



**US Army Corps  
of Engineers**  
Louisville District

---

# **Solicitation For**

## **Repair Aircraft Maintenance B1455 for MH-139, Maxwell AFB, AL**

**P2: 496395**

**Design-Bid-Build**

**Specifications - Vol 2 of 3  
Certified Final Design**

**29 December 2022  
W912QR23R0003**

**ARIMS: 200A  
Disposition: Maintain for 15yrs after construction**

496395 Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## PROJECT TABLE OF CONTENTS

### VOLUME 1 - SPECIFICATIONS

#### **DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS**

00 80 00.00 06 SPECIAL PROVISIONS

#### **DIVISION 01 - GENERAL REQUIREMENTS**

01 11 00 SUMMARY OF WORK  
01 32 01.00 06 PROJECT SCHEDULE  
01 33 00 SUBMITTAL PROCEDURES  
01 35 26.00 06 GOVERNMENT SAFETY REQUIREMENTS  
01 42 00 SOURCES FOR REFERENCE PUBLICATIONS  
01 45 00.15 10 RESIDENT MANAGEMENT SYSTEM CONTRACTOR MODE (RMS CM)  
01 45 04.10 06 CONTRACTOR QUALITY CONTROL  
01 45 35 SPECIAL INSPECTIONS  
01 46 00.00 06 TOTAL BUILDING COMMISSIONING  
01 50 00 TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS  
01 57 19.00 06 TEMPORARY ENVIRONMENTAL CONTROLS AND PERMITS  
01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL  
01 78 23 OPERATION AND MAINTENANCE DATA

### VOLUME 2 - SPECIFICATIONS

#### **DIVISION 02 - EXISTING CONDITIONS**

02 41 00 DEMOLITION  
02 82 00 ASBESTOS REMEDIATION  
02 83 00 LEAD REMEDIATION  
02 84 16 HANDLING OF LIGHTING BALLASTS AND LAMPS CONTAINING PCBs  
AND MERCURY  
02 84 33 REMOVAL AND DISPOSAL OF POLYCHLORINATED BIPHENYLS (PCBs)

#### **DIVISION 03 - CONCRETE**

03 30 00 CAST-IN-PLACE CONCRETE

#### **DIVISION 04 - MASONRY**

04 20 00 UNIT MASONRY

#### **DIVISION 05 - METALS**

05 05 23.16 STRUCTURAL WELDING  
05 12 00 STRUCTURAL STEEL  
05 30 00 STEEL DECKS  
05 40 00 COLD-FORMED METAL FRAMING  
05 50 13 MISCELLANEOUS METAL FABRICATIONS  
05 51 00 METAL STAIRS  
05 52 00 METAL RAILINGS

#### **DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES**

06 10 00 ROUGH CARPENTRY  
06 41 16.00 10 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS  
06 61 16 SOLID SURFACING FABRICATIONS

#### **DIVISION 07 - THERMAL AND MOISTURE PROTECTION**

07 05 23 PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS  
07 21 13 BOARD AND BLOCK INSULATION

496395 Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

07 21 16	MINERAL FIBER BLANKET INSULATION
07 22 00	ROOF AND DECK INSULATION
07 27 10.00 10	BUILDING AIR BARRIER SYSTEM
07 27 19.01	SELF-ADHERING AIR BARRIERS
07 27 36	SPRAY FOAM AIR BARRIERS
07 42 13.19	INSULATED CORE METAL WALL PANELS
07 54 23	THERMOPLASTIC POLYOLEFIN (TPO) ROOFING
07 60 00	FLASHING AND SHEET METAL
07 81 00	SPRAY-APPLIED FIREPROOFING
07 92 00	JOINT SEALANTS

#### **DIVISION 08 - OPENINGS**

08 11 13	STEEL DOORS AND FRAMES
08 14 00	WOOD DOORS
08 31 00	ACCESS DOORS AND PANELS
08 34 73	SOUND CONTROL DOOR ASSEMBLIES
08 41 13	ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS
08 71 00	DOOR HARDWARE
08 81 00	GLAZING
08 91 00	METAL WALL LOUVERS

#### **DIVISION 09 - FINISHES**

09 22 00	SUPPORTS FOR PLASTER AND GYPSUM BOARD
09 29 00	GYPSUM BOARD
09 30 10	CERAMIC, QUARRY, AND GLASS TILING
09 51 00	ACOUSTICAL CEILINGS
09 62 38	STATIC-CONTROL FLOORING
09 65 00	RESILIENT FLOORING
09 67 23.13	STANDARD RESINOUS FLOORING
09 68 00	CARPETING
09 69 13	RIGID GRID ACCESS FLOORING
09 84 20	ACOUSTICAL WALL PANELS
09 90 00	PAINTS AND COATINGS

#### **DIVISION 10 - SPECIALTIES**

10 14 00.20	INTERIOR SIGNAGE
10 21 13	TOILET COMPARTMENTS
10 22 39	FOLDING PANEL PARTITIONS
10 26 00	WALL AND DOOR PROTECTION
10 28 13	TOILET ACCESSORIES
10 44 16	FIRE EXTINGUISHERS
10 51 13	METAL LOCKERS

#### **DIVISION 12 - FURNISHINGS**

12 24 13	ROLLER WINDOW SHADES
----------	----------------------

#### **DIVISION 14 - CONVEYING EQUIPMENT**

14 24 23	HYDRAULIC PASSENGER ELEVATORS
----------	-------------------------------

#### **VOLUME 3 - SPECIFICATIONS**

#### **DIVISION 21 - FIRE SUPPRESSION**

21 13 13	WET PIPE SPRINKLER SYSTEMS, FIRE PROTECTION
----------	---

#### **DIVISION 22 - PLUMBING**

496395 Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

22 00 00 PLUMBING, GENERAL PURPOSE

**DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)**

23 05 48.19 SEISMIC BRACING FOR HVAC  
23 05 93.00 06 TESTING, ADJUSTING, AND BALANCING (TAB) OF HVAC  
23 07 00 THERMAL INSULATION FOR MECHANICAL SYSTEMS  
23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC  
23 09 13 INSTRUMENTATION AND CONTROL DEVICES FOR HVAC  
23 09 23.01 LONWORKS DIRECT DIGITAL CONTROL FOR HVAC AND OTHER  
BUILDING CONTROL SYSTEMS  
23 11 20 FACILITY GAS PIPING  
23 21 23 HYDRONIC PUMPS  
23 23 00 REFRIGERANT PIPING  
23 25 00 CHEMICAL TREATMENT OF WATER FOR MECHANICAL SYSTEMS  
23 30 00 HVAC AIR DISTRIBUTION  
23 52 00 HEATING BOILERS  
23 64 10 WATER CHILLERS, VAPOR COMPRESSION TYPE  
23 64 26 CHILLED, CHILLED-HOT, AND CONDENSER WATER PIPING SYSTEMS  
23 81 23 COMPUTER ROOM AIR CONDITIONING UNITS

**DIVISION 25 - INTEGRATED AUTOMATION**

25 05 11.21 CYBERSECURITY FOR FACILITY-RELATED CONTROL SYSTEMS, FIRE  
AND LIFE SAFETY SYSTEMS  
25 05 11.23 CYBERSECURITY FOR FACILITY-RELATED CONTROL SYSTEMS, ENERGY  
MANAGEMENT CONTROL SYSTEM  
25 05 11.26 CYBERSECURITY FOR FACILITY-RELATED CONTROL SYSTEMS,  
UTILITY CONTROL SYSTEM  
25 10 10 UTILITY MONITORING AND CONTROL SYSTEM (UMCS) FRONT END AND  
INTEGRATION

**DIVISION 26 - ELECTRICAL**

26 20 00 INTERIOR DISTRIBUTION SYSTEM  
26 28 01.00 10 COORDINATED POWER SYSTEM PROTECTION  
26 41 00 LIGHTNING PROTECTION SYSTEM  
26 51 00 INTERIOR LIGHTING

**DIVISION 27 - COMMUNICATIONS**

27 10 00 BUILDING TELECOMMUNICATIONS CABLING SYSTEM  
27 51 16 PUBLIC ADDRESS SYSTEMS

**DIVISION 28 - ELECTRONIC SAFETY AND SECURITY**

28 31 76 INTERIOR FIRE ALARM AND MASS NOTIFICATION SYSTEM,  
ADDRESSABLE

**DIVISION 31 - EARTHWORK**

31 00 00.00 06 EARTHWORK RADON  
31 21 13 MITIGATION

496395 Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

**DIVISION 32 - EXTERIOR IMPROVEMENTS**

32 05 33	LANDSCAPE ESTABLISHMENT
32 11 23	AGGREGATE BASE COURSES
32 11 23.23	BASE COURSE DRAINAGE LAYERS
32 12 13	BITUMINOUS TACK AND PRIME COATS
32 12 16.16	ROAD-MIX ASPHALT PAVING
32 16 19	SIDEWALKS
32 31 13	CHAIN LINK FENCES AND GATES
32 92 23	SODDING

**DIVISION 33 - UTILITIES**

33 30 00	SANITARY SEWERAGE
33 40 00	STORM DRAINAGE UTILITIES
33 82 00	TELECOMMUNICATIONS OUTSIDE PLANT (OSP)

**ATTACHMENT**

TECHNICAL SCOPE AMRS METER SPECIFICATION

-- End of Project Table of Contents --

THIS PAGE INTENTIONALLY LEFT BLANK

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 02 41 00

## DEMOLITION

05/10, CHG 2: 02/19

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AIR-CONDITIONING, HEATING AND REFRIGERATION INSTITUTE (AHRI)

AHRI Guideline K (2009) Guideline for Containers for Recovered Non-Flammable Fluorocarbon Refrigerants

## AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP A10.6 (2006) Safety & Health Program Requirements for Demolition Operations - American National Standard for Construction and Demolition Operations

## CARPET AND RUG INSTITUTE (CRI)

CRI 104 (2015) Carpet Installation Standard for Commercial Carpet

CRI 105 (2015) Carpet Installation Standard for Residential Carpet

## U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (2014) Safety -- Safety and Health Requirements Manual

## U.S. DEFENSE LOGISTICS AGENCY (DLA)

DLA 4145.25 (Jun 2000; Reaffirmed Oct 2010) Storage and Handling of Liquefied and Gaseous Compressed Gases and Their Full and Empty Cylinders  
<http://www.aviation.dla.mil/UserWeb/aviationengineerir>

## U.S. DEPARTMENT OF DEFENSE (DOD)

DOD 4000.25-1-M (2006) MILSTRIP - Military Standard Requisitioning and Issue Procedures

MIL-STD-129 (2014; Rev R; Change 1 2018; Change 2 2019) Military Marking for Shipment and Storage

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 61	National Emission Standards for Hazardous Air Pollutants
40 CFR 82	Protection of Stratospheric Ozone
49 CFR 173.301	Shipment of Compressed Gases in Cylinders and Spherical Pressure Vessels

## 1.2 PROJECT DESCRIPTION

### 1.2.1 Definitions

#### 1.2.1.1 Demolition

Demolition is the process of wrecking or taking out any load-supporting structural member of a facility together with any related handling and disposal operations.

#### 1.2.1.2 Deconstruction

Deconstruction is the process of taking apart a facility with the primary goal of preserving the value of all useful building materials.

#### 1.2.1.3 Demolition Plan

Demolition Plan is the planned steps and processes for managing demolition activities and identifying the required sequencing activities and disposal mechanisms.

### 1.2.2 Demolition Plan

Prepare a [Demolition Plan](#) and submit proposed salvage, demolition, deconstruction, and removal procedures for approval before work is started. Include in the plan procedures for careful removal and disposition of materials specified to be salvaged, coordination with other work in progress, a disconnection schedule of utility services, and airfield lighting, a detailed description of methods and equipment to be used for each operation and of the sequence of operations. [Identify components and materials to be salvaged for reuse or recycling with reference to paragraph Existing Facilities to be Removed. Append tracking forms for all removed materials indicating type, quantities, condition, destination, and end use.](#) Provide procedures for safe conduct of the work in accordance with [EM 385-1-1](#). Plan shall be approved by Structural PE [and](#) Contracting Officer prior to work beginning.

### 1.2.3 General Requirements

Do not begin demolition until authorization is received from the Contracting Officer. [The work of this section is to be performed in a manner that maximizes the value derived from the salvage and recycling of materials.](#) Remove rubbish and debris from the project site; do not allow accumulations inside or outside the building on airfield pavements. The work includes demolition, deconstruction, salvage of identified items and materials, and removal of resulting rubbish and debris. Remove rubbish and debris from Government property daily, unless otherwise directed. Store materials that cannot be removed daily in areas specified by the Contracting Officer. In the interest of occupational safety and health,



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

perform the work in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections.

### 1.3 ITEMS TO REMAIN IN PLACE

Take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Government. Repair or replace damaged items as approved by the Contracting Officer. Coordinate the work of this section with all other work indicated. Construct and maintain shoring, bracing, and supports as required. Ensure that structural elements are not overloaded. Increase structural supports or add new supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract. Do not overload structural elements or pavements to remain. Provide new supports and reinforcement for existing construction weakened by demolition, deconstruction, or removal work. Repairs, reinforcement, or structural replacement require approval by the Contracting Officer prior to performing such work.

#### 1.3.1 Existing Construction Limits and Protection

Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction. Provide temporary shoring and bracing for support of building components to prevent settlement or other movement. Provide protective measures to control accumulation and migration of dust and dirt in all work areas. Remove snow, dust, dirt, and debris from work areas daily.

#### 1.3.2 Weather Protection

For portions of the building to remain, protect building interior and materials and equipment from the weather at all times. Where removal of existing roofing is necessary to accomplish work, have materials and workmen ready to provide adequate and temporary covering of exposed areas.

#### 1.3.3 Utility Service

Maintain existing utilities indicated to stay in service and protect against damage during demolition and deconstruction operations. Prior to start of work, the Government will disconnect and seal utilities serving each area of alteration or removal upon written request from the Contractor.

#### 1.3.4 Facilities

Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities. Floors, roofs, walls, columns, pilasters, and other structural components that are designed and constructed to stand without lateral support or shoring, and are determined to be in stable condition, must remain standing without additional bracing, shoring, or lateral support until demolished or deconstructed, unless directed otherwise by the Contracting Officer. Ensure that no elements determined to be unstable are left unsupported and place and secure bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.4 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted

#### 1.5 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

##### SD-01 Preconstruction Submittals

Demolition Plan

Existing Conditions

##### SD-07 Certificates

Notification

##### SD-11 Closeout Submittals

Receipts

#### 1.6 QUALITY ASSURANCE

Submit timely notification of demolition, deconstruction, and renovation projects to Federal, State, regional, and local authorities in accordance with 40 CFR 61, Subpart M. Notify the State's environmental protection agency and the Contracting Officer in writing 10 working days prior to the commencement of work in accordance with 40 CFR 61, Subpart M. Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," conform to the safety requirements contained in ASSP A10.6. Comply with the Environmental Protection Agency requirements specified. Use of explosives will not be permitted.

##### 1.6.1 Dust and Debris Control

Prevent the spread of dust and debris to occupied portions of the building and onto airfield pavements and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution. Sweep pavements as often as necessary to control the spread of debris that may result in foreign object damage potential to aircraft.

#### 1.7 PROTECTION

##### 1.7.1 Traffic Control Signs

Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades with flashing lights. Anchor barricades in a manner to prevent displacement by wind, jet or prop blast. Notify the Contracting Officer prior to beginning such work.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.7.2 Protection of Personnel

Before, during and after the demolition and deconstruction work continuously evaluate the condition of the structure being deconstructed and take immediate action to protect all personnel working in and around the project site. No area, section, or component of floors, roofs, walls, columns, pilasters, or other structural element will be allowed to be left standing without sufficient bracing, shoring, or lateral support to prevent collapse or failure while workmen remove debris or perform other work in the immediate area.

#### 1.8 FOREIGN OBJECT DAMAGE (FOD)

Aircraft and aircraft engines are subject to FOD from debris and waste material lying on airfield pavements. Remove all such materials that may appear on operational aircraft pavements due to the Contractor's operations. If necessary, the Contracting Officer may require the Contractor to install a temporary barricade at the Contractor's expense to control the spread of FOD potential debris. The barricade shall include a fence covered with a fabric designed to stop the spread of debris. Anchor the fence and fabric to prevent displacement by winds or jet/prop blasts. Remove barricade when no longer required.

#### 1.9 RELOCATIONS

Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Repair or replace items to be relocated which are damaged by the Contractor with new undamaged items as approved by the Contracting Officer.

#### 1.10 EXISTING CONDITIONS

Before beginning any demolition or deconstruction work, survey the site and examine the drawings and specifications to determine the extent of the work. Record existing conditions in the presence of the Contracting Officer showing the condition of structures and other facilities adjacent to areas of alteration or removal. Photographs sized 4 inch will be acceptable as a record of existing conditions. Include in the record the elevation of the top of foundation walls, finish floor elevations, possible conflicting electrical conduits, plumbing lines, alarms systems, the location and extent of existing cracks and other damage and description of surface conditions that exist prior to before starting work. It is the Contractor's responsibility to verify and document all required outages which will be required during the course of work, and to note these outages on the record document. Submit survey results.

### PART 2 PRODUCTS

#### 2.1 FILL MATERIAL

Comply with excavating, backfilling, and compacting procedures for soils used as backfill material to fill basements, voids, depressions or excavations resulting from demolition or deconstruction of structures. Fill material shall be waste products from demolition or deconstruction until all waste appropriate for this purpose is consumed.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

Inspect and evaluate existing structures onsite for reuse. Existing construction scheduled to be removed for reuse shall be disassembled. Dismantled and removed materials are to be separated, set aside, and prepared as specified, and stored or delivered to a collection point for reuse, remanufacture, recycling, or other disposal, as specified. Materials shall be designated for reuse onsite whenever possible.

3.1.1 Structures

- a. Remove existing structures indicated to be removed to **top of foundation unless otherwise indicated**. Interior walls, other than retaining walls and partitions, shall be removed to top of concrete slab **unless otherwise indicated**. Remove sidewalks, curbs, gutters and street light bases as indicated.
- b. Deconstruct structures in a systematic manner from the top of the structure to the ground. Complete demolition work above each tier or floor before the supporting members on the lower level are disturbed. Deconstruct concrete and masonry walls in small sections. Remove structural framing members and lower to ground by means of derricks, platforms hoists, or other suitable methods as approved by the Contracting Officer.
- c. Locate demolition and deconstruction equipment throughout the structure and remove materials so as to not impose excessive loads to supporting walls, floors, or framing.

3.1.2 Utilities and Related Equipment

3.1.2.1 General Requirements

Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the Contracting Officer. Do not interrupt existing utilities serving facilities occupied and used by the Government except when approved in writing and then only after temporary utility services have been approved and provided. Do not begin demolition or deconstruction work until all utility disconnections have been made. Shut off and cap utilities for future use, as indicated.

3.1.2.2 Disconnecting Existing Utilities

Remove existing utilities, as indicated and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Contracting Officer. When utility lines are encountered but are not indicated on the drawings, notify the Contracting Officer prior to further work in that area.

3.1.3 Paving and Slabs

Remove sawcut concrete and asphaltic concrete paving and slabs including aggregate base to a depth of 12 **inches** below existing adjacent grade. Provide neat sawcuts at limits of pavement removal as indicated. Pavement and slabs not to be used in this project shall be removed from the Installation at Contractor's expense.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 3.1.4 Masonry

Sawcut and remove masonry so as to prevent damage to surfaces to remain, to removed materials being salvaged and to facilitate the installation of new work. Where new masonry adjoins existing, the new work shall abut or tie into the existing construction as indicated. Provide square, straight edges and corners where existing masonry adjoins new work and other locations.

#### 3.1.5 Concrete

Saw concrete along straight lines to a depth of a minimum 2 inch. Make each cut in walls perpendicular to the face and in alignment with the cut in the opposite face. Break out the remainder of the concrete provided that the broken area is concealed in the finished work, and the remaining concrete is sound. At locations where the broken face cannot be concealed, grind smooth or saw cut entirely through the concrete.

#### 3.1.6 Structural Steel

Dismantle structural steel at field connections and in a manner that will prevent bending or damage. Salvage for reuse or recycle structural steel, steel joists, girders, angles, plates, columns and shapes. Flame-cutting torches are only permitted when other methods of dismantling are not practical. Transport steel joists and girders as whole units and not dismantled. Transport structural steel shapes to a designated storage area, recycling facility, or area as directed by the Contracting Officer, stacked according to size, type of member and length, and stored off the ground, protected from the weather.

#### 3.1.7 Miscellaneous Metal

Salvage shop-fabricated items such as access doors and frames, steel gratings, metal ladders, wire mesh partitions, metal railings, metal windows and similar items as whole units. Salvage light-gage and cold-formed metal framing, such as steel studs, steel trusses, metal gutters, roofing and siding, metal toilet partitions, toilet accessories and similar items. Recycle scrap metal as part of demolition and deconstruction operations. Provide separate containers to collect scrap metal and transport to a scrap metal collection or recycling facility, in accordance with the Waste Management Plan.

#### 3.1.8 Carpentry

Chip or shred and recycle salvaged wood unfit for reuse, except stained, painted, or treated wood. Remove windows, doors, frames, and cabinets, and similar items as whole units, complete with trim and accessories. Brace the open end of door frames to prevent damage.

#### 3.1.9 Carpet

Remove existing carpet for reclamation in accordance with manufacturer recommendations and as follows. Remove used carpet in large pieces, roll tightly, and pack neatly in a container. Remove adhesive according to recommendations of the Carpet and Rug Institute (CRI). Adhesive removal solvents shall comply with CRI 104/CRI 105. Recycle removed carpet cushion.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.1.10 Acoustic Ceiling Tile

Remove, neatly stack, and recycle acoustic ceiling tiles. Recycling may be available with manufacturer. Otherwise, priority shall be given to a local recycling organization. Recycling is not required if the tiles contain or may have been exposed to asbestos material.

### 3.1.11 Patching

Where removals leave holes and damaged surfaces exposed in the finished work, patch and repair these holes and damaged surfaces to match adjacent finished surfaces, using on-site materials when available. Where new work is to be applied to existing surfaces, perform removals and patching in a manner to produce surfaces suitable for receiving new work. Finished surfaces of patched area shall be flush with the adjacent existing surface and shall match the existing adjacent surface as closely as possible as to texture and finish. Patching shall be as specified and indicated, and shall include:

- a. Concrete and Masonry: Completely fill holes and depressions, caused by previous physical damage or left as a result of removals in existing masonry walls to remain, with an approved masonry patching material, applied in accordance with the manufacturer's printed instructions.
- b. Where existing partitions have been removed leaving damaged or missing resilient tile flooring, patch to match the existing floor tile.
- c. Patch acoustic lay-in ceiling where partitions have been removed. The transition between the different ceiling heights shall be affected by continuing the higher ceiling level over to the first runner on the lower ceiling and closing the vertical opening with a painted sheet metal strip.

### 3.1.12 Air Conditioning Equipment

Recover all refrigerants prior to removing air conditioning, refrigeration, and other equipment containing refrigerants and dispose of in accordance with the paragraph entitled "Disposal of Ozone Depleting Substance (ODS)."

### 3.1.13 Cylinders and Canisters

Remove all fire suppression system cylinders and canisters and dispose of in accordance with the paragraph entitled "Disposal of Ozone Depleting Substance (ODS)."

### 3.1.14 Locksets on Swinging Doors

Remove all locksets from all swinging doors indicated to be removed and disposed of. Deliver the locksets and related items to a designated location for receipt by the Contracting Officer after removal.

### 3.1.15 Mechanical Equipment and Fixtures

Disconnect mechanical hardware at the nearest connection to existing services to remain, unless otherwise noted. Disconnect mechanical equipment and fixtures at fittings. Remove service valves attached to the unit. Salvage each item of equipment and fixtures as a whole unit; listed, indexed, tagged, and stored. Salvage each unit with its normal

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

operating auxiliary equipment. Transport salvaged equipment and fixtures, including motors and machines, to a designated storage area as directed by the Contracting Officer. Do not remove equipment until approved. Do not offer low-efficiency equipment for reuse.

#### 3.1.15.1 Preparation for Storage

Remove water, dirt, dust, and foreign matter from units; tanks, piping and fixtures shall be drained; interiors, if previously used to store flammable, explosive, or other dangerous liquids, shall be steam cleaned. Seal openings with caps, plates, or plugs. Secure motors attached by flexible connections to the unit. Change lubricating systems with the proper oil or grease.

#### 3.1.15.2 Piping and Radiant Heaters

Disconnect piping at unions, flanges and valves, and fittings as required to reduce the pipe into straight lengths for practical storage. Disconnect heaters and related appurtenances including gas piping, burner, vacuum pumps, and radiant pipe. Store salvaged piping according to size and type. If the piping that remains can become pressurized due to upstream valve failure, end caps, blind flanges, or other types of plugs or fittings with a pressure gage and bleed valve shall be attached to the open end of the pipe to ensure positive leak control. Carefully dismantle piping that previously contained gas, gasoline, oil, or other dangerous fluids, with precautions taken to prevent injury to persons and property. Store piping outdoors until all fumes and residues are removed. Box prefabricated supports, hangers, plates, valves, and specialty items according to size and type. Wrap sprinkler heads individually in plastic bags before boxing. Classify piping not designated for salvage, or not reusable, as scrap metal.

#### 3.1.15.3 Ducts

Classify removed duct work as scrap metal.

#### 3.1.15.4 Fixtures, Motors and Machines

Remove and salvage fixtures, motors and machines associated with plumbing, heating, air conditioning, refrigeration, and other mechanical system installations. Salvage, box and store auxiliary units and accessories with the main motor and machines. Tag salvaged items for identification, storage, and protection from damage. Classify broken, damaged, or otherwise unserviceable units and not caused to be broken, damaged, or otherwise unserviceable as debris to be disposed of by the Contractor.

#### 3.1.16 Electrical Equipment and Fixtures

Salvage motors, motor controllers, and operating and control equipment that are attached to the driven equipment. Salvage wiring systems and components. Box loose items and tag for identification. Disconnect primary, secondary, control, communication, and signal circuits at the point of attachment to their distribution system.

##### 3.1.16.1 Fixtures

Remove and salvage electrical fixtures. Salvage unprotected glassware from the fixture and salvage separately. Salvage incandescent, mercury-vapor, and fluorescent lamps and fluorescent ballasts manufactured

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

prior to 1978, boxed and tagged for identification, and protected from breakage.

#### 3.1.16.2 Electrical Devices

Remove and salvage switches, switchgear, transformers, conductors including wire and nonmetallic sheathed and flexible armored cable, regulators, meters, instruments, plates, circuit breakers, panelboards, outlet boxes, and similar items. Box and tag these items for identification according to type and size.

#### 3.1.16.3 Wiring Ducts or Troughs

Remove and salvage wiring ducts or troughs. Dismantle plug-in ducts and wiring troughs into unit lengths. Remove plug-in or disconnecting devices from the busway and store separately.

#### 3.1.16.4 Conduit and Miscellaneous Items

Salvage conduit except where embedded in concrete or masonry. Consider corroded, bent, or damaged conduit as scrap metal. Sort straight and undamaged lengths of conduit according to size and type. Classify supports, knobs, tubes, cleats, and straps as debris to be removed and disposed.

#### 3.1.17 Elevators and Hoists

Remove elevators, hoists, and similar conveying equipment and salvage as whole units, to the most practical extent. Remove and prepare items for salvage without damage to any of the various parts. Salvage and store rails for structural steel with the equipment as an integral part of the unit.

#### 3.1.18 Items With Unique/Regulated Disposal Requirements

Remove and dispose of items with unique or regulated disposal requirements in the manner dictated by law or in the most environmentally responsible manner.

### 3.2 CONCURRENT EARTH-MOVING OPERATIONS

Do not begin excavation, filling, and other earth-moving operations that are sequential to demolition or deconstruction work in areas occupied by structures to be demolished or deconstructed until all demolition and deconstruction in the area has been completed and debris removed. Fill holes, open basements and other hazardous openings.

### 3.3 DISPOSITION OF MATERIAL

#### 3.3.1 Title to Materials

Except for salvaged items specified in related Sections, and for materials or equipment scheduled for salvage, all materials and equipment removed and not reused or salvaged, shall become the property of the Contractor and shall be removed from Government property. Title to materials resulting from demolition and deconstruction, and materials and equipment to be removed, is vested in the Contractor upon approval by the Contracting Officer of the Contractor's demolition, deconstruction, and removal procedures, and authorization by the Contracting Officer to begin



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

demolition and deconstruction. The Government will not be responsible for the condition or loss of, or damage to, such property after contract award. Showing for sale or selling materials and equipment on site is prohibited.

### 3.3.2 Reuse of Materials and Equipment

Remove and store materials and equipment indicated to be reused or relocated to prevent damage and reinstall as the work progresses. Capture re-use of materials in the diversion calculations for the project.

### 3.3.3 Salvaged Materials and Equipment

Remove materials and equipment that are indicated and specified to be removed by the Contractor and that are to remain the property of the Government, and deliver to a storage site, as directed.

- a. Salvage items and material to the maximum extent possible.
- b. Store all materials salvaged for the Contractor as approved by the Contracting Officer and remove from Government property before completion of the contract. Capture salvaged materials in the diversion calculations for the project.
- c. Remove salvaged items to remain the property of the Government in a manner to prevent damage, and packed or crated to protect the items from damage while in storage or during shipment. Items damaged during removal or storage must be repaired or replaced to match existing items. Properly identify the contents of containers.
- d. Remove historical items in a manner to prevent damage. Deliver the following historical items to the Government for disposition: Corner stones, contents of corner stones, and document boxes wherever located on the site.
- e. The Government will remove and capture Class I ODS refrigerants. To view the web site for ODS, link to:  
<https://www.osd.mil/denix/Public/News/DLA/ODS/sect1.html>

### 3.3.4 Disposal of Ozone Depleting Substance (ODS)

Class I and Class II ODS are defined in Section, 602(a) and (b), of The Clean Air Act. Prevent discharge of Class I and Class II ODS to the atmosphere. Place recovered ODS in cylinders meeting [AHRI Guideline K](#) suitable for the type ODS (filled to no more than 80 percent capacity) and provide appropriate labeling. Recovered ODS shall be removed from Government property and disposed of in accordance with [40 CFR 82](#). Products, equipment and appliances containing ODS in a sealed, self-contained system (e.g. residential refrigerators and window air conditioners) shall be disposed of in accordance with [40 CFR 82](#). Submit [Receipts](#) or bills of lading, as specified. Submit a shipping receipt or bill of lading for all containers of ozone depleting substance (ODS) shipped to the Defense Depot, Richmond, Virginia.

#### 3.3.4.1 Special Instructions

No more than one type of ODS is permitted in each container. A warning/hazardous label shall be applied to the containers in accordance with Department of Transportation regulations. All cylinders including

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

but not limited to fire extinguishers, spheres, or canisters containing an ODS shall have a tag with the following information:

- a. Activity name and unit identification code
- b. Activity point of contact and phone number
- c. Type of ODS and pounds of ODS contained
- d. Date of shipment
- e. National stock number (for information, call (804) 279-4525).

#### 3.3.4.2 Fire Suppression Containers

Deactivate fire suppression system cylinders and canisters with electrical charges or initiators prior to shipment. Also, safety caps must be used to cover exposed actuation mechanisms and discharge ports on these special cylinders.

#### 3.3.5 Transportation Guidance

Ship all ODS containers in accordance with MIL-STD-129, DLA 4145.25 (also referenced one of the following: Army Regulation 700-68, Naval Supply Instruction 4440.128C, Marine Corps Order 10330.2C, and Air Force Regulation 67-12), 49 CFR 173.301, and DOD 4000.25-1-M.

#### 3.3.6 Unsalvageable and Non-Recyclable Material

Dispose of unsalvageable and non-recyclable combustible material off the site.

### 3.4 CLEANUP

Remove debris and rubbish from basement and similar excavations. Remove and transport the debris in a manner that prevents spillage on streets or adjacent areas. Apply local regulations regarding hauling and disposal.

### 3.5 DISPOSAL OF REMOVED MATERIALS

#### 3.5.1 Regulation of Removed Materials

Dispose of debris, rubbish, scrap, and other nonsalvageable materials resulting from removal operations with all applicable federal, state and local regulations as contractually specified off the site center.

#### 3.5.2 Burning on Government Property

Burning of materials removed from demolished and deconstructed structures will not be permitted on Government property.

#### 3.5.3 Removal to Spoil Areas on Government Property

Transport noncombustible materials removed from demolition and deconstruction structures to designated spoil areas on Government property.

#### 3.5.4 Removal from Government Property

Transport waste materials removed from demolished and deconstructed

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

structures, except waste soil, from Government property for legal disposal. Dispose of waste soil as directed.

### 3.6 REUSE OF SALVAGED ITEMS

Recondition salvaged materials and equipment designated for reuse before installation. Replace items damaged during removal and salvage operations or restore them as necessary to usable condition.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 02 82 00

## ASBESTOS REMEDIATION

**11/18, CHG 1: 11/19**

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

**ASSP Z9.2** (2018) Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems

## ASTM INTERNATIONAL (ASTM)

**ASTM C732** (2017; R 2022 Standard Test Method for Aging Effects of Artificial Weathering on Latex Sealants

**ASTM D4397** (2016) Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications

**ASTM E84** (2020) Standard Test Method for Surface Burning Characteristics of Building Materials

**ASTM E96/E96M** (2021) Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials

**ASTM E119** (2020) Standard Test Methods for Fire Tests of Building Construction and Materials

**ASTM E736/E736M** (2017) Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members

**ASTM E1368** (2014) Visual Inspection of Asbestos Abatement Projects

## COMPRESSED GAS ASSOCIATION (CGA)

**CGA G-7** (2014) Compressed Air for Human Respiration; 6th Edition

## INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION (ISEA)

**ANSI/ISEA Z87.1** (2020) Occupational and Educational Personal Eye and Face Protection Devices

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701 (2019) Standard Methods of Fire Tests for  
Flame Propagation of Textiles and Films

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH NMAM (2016; 5th Ed) NIOSH Manual of Analytical  
Methods

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (2014) Safety -- Safety and Health  
Requirements Manual

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 340/1-90/018 (1990) Asbestos/NESHAP Regulated Asbestos  
Containing Materials Guidance

EPA 560/5-85-024 (1985) Guidance for Controlling  
Asbestos-Containing Materials in Buildings  
(Purple Book)

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.147 The Control of Hazardous Energy (Lock  
Out/Tag Out)

29 CFR 1926.51 Sanitation

29 CFR 1926.59 Hazard Communication

29 CFR 1926.103 Respiratory Protection

29 CFR 1926.200 Accident Prevention Signs and Tags

29 CFR 1926.1101 Asbestos

40 CFR 61-SUBPART A General Provisions

40 CFR 61-SUBPART M National Emission Standard for Asbestos

40 CFR 763 Asbestos

42 CFR 84 Approval of Respiratory Protective Devices

49 CFR 107 Hazardous Materials Program Procedures

49 CFR 171 General Information, Regulations, and  
Definitions

49 CFR 172 Hazardous Materials Table, Special  
Provisions, Hazardous Materials  
Communications, Emergency Response  
Information, and Training Requirements

49 CFR 173 Shippers - General Requirements for

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## Shipments and Packagings

U.S. NAVAL FACILITIES ENGINEERING COMMAND (NAVFAC)

ND OPNAVINST 5100.23

(2005; Rev G) Navy Occupational Safety and Health (NAVOSH) Program Manual

UNDERWRITERS LABORATORIES (UL)

UL 586

(2009; Reprint Dec 2017) UL Standard for Safety High-Efficiency Particulate, Air Filter Units

### 1.2 DEFINITIONS

#### 1.2.1 ACM

Asbestos Containing Materials.

#### 1.2.2 Amended Water

Water containing a wetting agent or surfactant with a maximum surface tension of 0.00042 psi.

#### 1.2.3 Area Sampling

Sampling of asbestos fiber concentrations which approximates the concentrations of asbestos in the theoretical breathing zone but is not actually collected in the breathing zone of an employee.

#### 1.2.4 Asbestos

The term asbestos includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, and actinolite asbestos and any of these minerals that has been chemically treated or altered. Materials are considered to contain asbestos if the asbestos content of the material is determined to be at least one percent.

#### 1.2.5 Asbestos Control Area

That area where asbestos removal operations are performed which is isolated by physical boundaries which assist in the prevention of the uncontrolled release of asbestos dust, fibers, or debris.

#### 1.2.6 Asbestos Fibers

Those fibers having an aspect ratio of at least 3:1 and longer than 5 micrometers as determined by National Institute for Occupational Safety and Health (NIOSH) Method 7400.

#### 1.2.7 Asbestos Permissible Exposure Limit

0.1 fibers per cubic centimeter of air as an 8-hour time weighted average measured in the breathing zone as defined by 29 CFR 1926.1101 or other Federal legislation having legal jurisdiction for the protection of workers health.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.2.8 Authorized Person

Any person authorized by the Contractor and required by work duties to be present in the regulated areas.

#### 1.2.9 Background

The ambient airborne asbestos concentration in an uncontaminated area as measured prior to any asbestos hazard abatement efforts. Background concentrations for other (contaminated) areas are measured in similar but asbestos free locations.

#### 1.2.10 Competent Person (CP)

A person meeting the requirements for competent person as specified in 29 CFR 1926.1101 including a person capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, and is specifically trained in a training course which meet the criteria of EPA's Model Accreditation Plan (40 CFR 763) for project designer or supervisor, or its equivalent. The competent person must have a current State of Alabama asbestos contractors or supervisors license.

#### 1.2.11 Contractor

The Contractor is that individual, or entity under contract to perform the herein listed work.

#### 1.2.12 Disposal Bag

A 6 mil thick, leak-tight plastic bag, pre-labeled in accordance with 29 CFR 1926.1101, used for transporting asbestos waste from containment to disposal site.

#### 1.2.13 Disturbance

Activities that disrupt the matrix of ACM, crumble or pulverize ACM, or generate visible debris from ACM. Disturbance includes cutting away small amounts of ACM, no greater than the amount which can be contained in one standard sized glovebag or waste bag, not larger than 60 inches in length and width in order to access a building component.

#### 1.2.14 Encapsulation

The abatement of an asbestos hazard through the appropriate use of chemical encapsulants.

#### 1.2.15 Encapsulants

Specific materials in various forms used to chemically or physically entrap asbestos fibers in various configurations to prevent these fibers from becoming airborne. There are four types of encapsulants as follows which must comply with performance requirements as specified herein.

- a. Removal Encapsulant (can be used as a wetting agent)
- b. Bridging Encapsulant (used to provide a tough, durable surface coating to asbestos containing material)



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- c. Penetrating Encapsulant (used to penetrate the asbestos containing material encapsulating all asbestos fibers and preventing fiber release due to routine mechanical damage)
- d. Lock-Down Encapsulant (used to seal off or "lock-down" minute asbestos fibers left on surfaces from which asbestos containing material has been removed).

#### 1.2.16 Friable Asbestos Material

A term defined in 40 CFR 61-SUBPART M and EPA 340/1-90/018 meaning any material which contains more than 1 percent asbestos, as determined using the method specified in 40 CFR 763, Polarized Light Microscopy (PLM), that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

#### 1.2.17 Glovebag Technique

Those asbestos removal and control techniques put forth in 29 CFR 1926.1101.

#### 1.2.18 Government Consultant (GC)

That qualified person employed directly by the Government to monitor, sample, inspect the work or in some other way advise the Contracting Officer. The GC is normally a private consultant, but can be an employee of the Government.

#### 1.2.19 HEPA Filter Equipment

High efficiency particulate air (HEPA) filtered vacuum and exhaust ventilation equipment with a filter system capable of collecting and retaining asbestos fibers. Filters must retain 99.97 percent of particles 0.3 microns or larger as indicated in UL 586.

#### 1.2.20 Model Accreditation Plan (MAP)

USEPA training accreditation requirements for persons who work with asbestos as specified in 40 CFR 763.

#### 1.2.21 Negative Pressure Enclosure (NPE)

That engineering control technique described as a negative pressure enclosure in 29 CFR 1926.1101.

#### 1.2.22 NESHAP

National Emission Standards for Hazardous Air Pollutants. The USEPA NESHAP regulation for asbestos is at 40 CFR 61-SUBPART M.

#### 1.2.23 Nonfriable Asbestos Material

Material that contains asbestos in which the fibers have been immobilized by a bonding agent, coating, binder, or other material so that the asbestos is well bound and will not normally release asbestos fibers during any appropriate use, handling, storage or transportation. It is understood that asbestos fibers may be released under other conditions such as demolition, removal, or mishap.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.2.24 Permissible Exposure Limits (PELs)

##### 1.2.24.1 PEL-Time Weighted Average(TWA)

Concentration of asbestos not in excess of 0.1 fibers per cubic centimeter of air (f/cc) as an 8-hour time weighted average (TWA).

##### 1.2.24.2 PEL-Excursion Limit

An airborne concentration of asbestos not in excess of 1.0 f/cc of air as averaged over a sampling period of 30 minutes.

#### 1.2.25 Personal Sampling

Air sampling which is performed to determine asbestos fiber concentrations within the breathing zone of a specific employee, as performed in accordance with 29 CFR 1926.1101.

#### 1.2.26 Private Qualified Person (PQP)

That qualified person hired by the Contractor to perform the herein listed tasks.

#### 1.2.27 Qualified Person (QP)

A Registered Architect, Professional Engineer, Certified Industrial Hygienist, consultant or other qualified person who has successfully completed training and is therefore accredited under a legitimate State Model Accreditation Plan as described in 40 CFR 763 as a Building Inspector, Contractor/Supervisor Abatement Worker, and Asbestos Project Designer; and has successfully completed the National Institute of Occupational Safety and Health (NIOSH) 582 course "Sampling and Evaluating Airborne Asbestos Dust" or equivalent. The QP must be qualified to perform visual inspections as indicated in ASTM E1368. The QP must be appropriately licensed in the State of Alabama.

#### 1.2.28 TEM

Refers to Transmission Electron Microscopy.

#### 1.2.29 Time Weighted Average (TWA)

The TWA is an 8-hour time weighted average airborne concentration of asbestos fibers.

#### 1.2.30 Transite

A generic name for asbestos cement wallboard and pipe.

#### 1.2.31 Wetting Agent

A chemical added to water to reduce the water's surface tension thereby increasing the water's ability to soak into the material to which it is applied. An equivalent wetting agent must have a surface tension of at most 0.00042 psi.

#### 1.2.32 Worker

Individual (not designated as the Competent Person or a supervisor) who

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

performs asbestos work and has completed asbestos worker training required by 29 CFR 1926.1101, to include EPA Model Accreditation Plan (MAP) "Worker" training; accreditation, if required by the OSHA Class of work to be performed or by the state where the work is to be performed. The worker must be appropriately licensed in the State of Alabama.

### 1.3 REQUIREMENTS

#### 1.3.1 Description of Work

The work covered by this section includes the handling and control of asbestos containing materials and describes some of the resultant procedures and equipment required to protect workers, the environment and occupants of the building or area, or both, from contact with airborne asbestos fibers. The work also includes the disposal of any asbestos containing materials generated by the work. More specific operational procedures must be outlined in the Asbestos Hazard Abatement Plan called for elsewhere in this specification. If asbestos-containing materials are discovered during demolition, provide negative pressure enclosure techniques as outlined in this specification. The work area will be evacuated during the asbestos abatement work. A competent person must supervise asbestos removal work as specified herein.

#### 1.3.2 Unexpected Discovery of Asbestos

Notify the Contracting Officer if any previously untested building components suspected to contain asbestos are impacted by the work.

#### 1.3.3 Medical Requirements

Provide medical requirements including but not limited to medical surveillance and medical record keeping as listed in 29 CFR 1926.1101.

##### 1.3.3.1 Medical Examinations

Before exposure to airborne asbestos fibers, provide workers with a comprehensive medical examination as required by 29 CFR 1926.1101 or other pertinent State or local directives. This requirement must have been satisfied within the 12 months prior to the start of work on this contract. The same medical examination must be given on an annual basis to employees engaged in an occupation involving asbestos and within 30 calendar days before or after the termination of employment in such occupation. Specifically identify x-ray films of asbestos workers to the consulting radiologist and mark medical record jackets with the word "ASBESTOS."

##### 1.3.3.2 Medical Records

Maintain complete and accurate records of employees' medical examinations, medical records, and exposure data for a period of 50 years after termination of employment and make records of the required medical examinations and exposure data available for inspection and copying to: The Assistant Secretary of Labor for Occupational Safety and Health (OSHA), or authorized representatives of them, and an employee's physician upon the request of the employee or former employee.

#### 1.3.4 Employee Training

Submit certificates, prior to the start of work but after the main

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

abatement submittal, signed by each employee indicating that the employee has received training in the proper handling of materials and wastes that contain asbestos in accordance with 40 CFR 763; understands the health implications and risks involved, including the illnesses possible from exposure to airborne asbestos fibers; understands the use and limits of the respiratory equipment to be used; and understands the results of monitoring of airborne quantities of asbestos as related to health and respiratory equipment as indicated in 29 CFR 1926.1101 on an initial and annual basis. Organize certificates by individual worker, not grouped by type of certification. Post appropriate evidence of compliance with the training requirements of 40 CFR 763. Train personnel involved in the asbestos control work in accordance with United States Environmental Protection Agency (USEPA) Asbestos Hazard Emergency Response Act (AHERA) training criteria or State training criteria whichever is more stringent. Document the training by providing: dates of training, training entity, course outline, names of instructors, and qualifications of instructors upon request by the Contracting Officer. Furnish each employee with respirator training and fit testing administered by the PQP as required by 29 CFR 1926.1101 and 29 CFR 1926.103. Fully cover engineering and other hazard control techniques and procedures. Asbestos workers must have a current State of Alabama asbestos worker's license.

#### 1.3.5 Permits and Notifications

Prior to the start of work, obtain necessary permits in conjunction with asbestos removal, encapsulation, hauling, and disposition, and furnish notification of such actions required by Federal, State, regional, and local authorities. Notify the State's environmental protection agency and the Contracting Officer in writing 10 working days prior to commencement of work in accordance with 40 CFR 61-SUBPART M. Notify the Contracting Officer and other appropriate Government agencies in writing 20 working days prior to the start of asbestos work as indicated in applicable laws, ordinances, criteria, rules, and regulations. Submit copies of all Notifications to the Contracting Officer.

#### 1.3.6 Environment, Safety and Health Compliance

In addition to detailed requirements of this specification, comply with those applicable laws, ordinances, criteria, rules, and regulations of Federal, State, regional, and local authorities regarding handling, storing, transporting, and disposing of asbestos waste materials. Comply with the applicable requirements of the current issue of EM 385-1-1, 29 CFR 1926.1101, 40 CFR 61-SUBPART A, 40 CFR 61-SUBPART M, and 40 CFR 763 and ND OPNAVINST 5100.23. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting the work. Where the requirements of this specification, applicable laws, rules, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirement as defined by the Government apply.

#### 1.3.7 Respiratory Protection Program

Establish and implement a respirator program as required by 29 CFR 1926.1101, and 29 CFR 1926.103. Submit a written description of the program to the Contracting Officer. Submit a written program manual or operating procedure including methods of compliance with regulatory statutes.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.3.7.1 Respirator Program Records

Submit records of the respirator program as required by 29 CFR 1926.103, and 29 CFR 1926.1101.

#### 1.3.7.2 Respirator Fit Testing

The Contractor's PQP must conduct a qualitative or quantitative fit test conforming to 29 CFR 1926.103 for each worker required to wear a respirator, and any authorized visitors who enter a regulated area where respirators are required to be worn. A respirator fit test must be performed prior to initially wearing a respirator and every 12 months thereafter. If physical changes develop that will affect the fit, a new fit test must be performed. Functional fit checks must be performed each time a respirator is put on and in accordance with the manufacturer's recommendation.

#### 1.3.7.3 Respirator Selection and Use Requirements

Provide respirators, and ensure that they are used as required by 29 CFR 1926.1101 and in accordance with CGA G-7 and the manufacturer's recommendations. Respirators must be approved by the National Institute for Occupational Safety and Health NIOSH, under the provisions of 42 CFR 84, for use in environments containing airborne asbestos fibers. For air-purifying respirators, the particulate filter must be high-efficiency particulate air (HEPA)/(N-,R-,P-100). The initial respirator selection and the decisions regarding the upgrading or downgrading of respirator type must be made by the Contractor's Designated IH based on the measured or anticipated airborne asbestos fiber concentrations to be encountered.

#### 1.3.8 Asbestos Hazard Control Supervisor

The Contractor must be represented on site by a supervisor, trained using the model Contractor accreditation plan as indicated in the Federal statutes for all portions of the herein listed work.

#### 1.3.9 Hazard Communication

Adhere to all parts of 29 CFR 1926.59 and provide the Contracting Officer with a copy of the Safety Data Sheets (SDS) for all materials brought to the site.

#### 1.3.10 Asbestos Hazard Abatement Plan

Submit a detailed plan of the safety precautions such as lockout, tagout, tryout, fall protection, and confined space entry procedures and equipment and work procedures to be used in the removal and demolition of materials containing asbestos. The plan, not to be combined with other hazard abatement plans, must be prepared, signed, and sealed by the PQP. Provide a Table of Contents for each abatement submittal, which follows the sequence of requirements in the contract. The plan must include but not be limited to the precise personal protective equipment to be used including, but not limited to, respiratory protection, type of whole-body protection, the location of asbestos control areas including clean and dirty areas, buffer zones, showers, storage areas, change rooms, removal method, interface of trades involved in the construction, sequencing of asbestos related work, disposal plan, type of wetting agent and asbestos sealer to be used, locations of local exhaust equipment, planned air monitoring strategies, and a detailed description of the method to be

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

employed in order to control environmental pollution. The plan must also include (both fire and medical emergency) response plans and an Activity Hazard Analyses (AHAs) in accordance with EM 385-1-1. The Asbestos Hazard Abatement Plan must be approved in writing prior to starting any asbestos work. The Contractor, Asbestos Hazard Control Supervisor,, CP and PQP must meet with the Contracting Officer prior to beginning work, to discuss in detail the Asbestos Hazard Abatement Plan, including work procedures and safety precautions. Once approved by the Contracting Officer, the plan will be enforced as if an addition to the specification. Any changes required in the specification as a result of the plan must be identified specifically in the plan to allow for free discussion and approval by the Contracting Officer prior to starting work.

#### 1.3.11 Testing Laboratory

Submit the name, address, and telephone number of each testing laboratory selected for the sampling, analysis, and reporting of airborne concentrations of asbestos fibers along with evidence that each laboratory selected holds the appropriate State license and permits and certification that each laboratory is American Industrial Hygiene Association (AIHA) accredited and that persons counting the samples have been judged proficient by current inclusion on the AIHA Asbestos Analysis Registry (AAR) and successful participation of the laboratory in the Proficiency Analytical Testing (PAT) Program. Where analysis to determine asbestos content in bulk materials or transmission electron microscopy is required, submit evidence that the laboratory is accredited by the National Institute of Science and Technology (NIST) under National Voluntary Laboratory Accreditation Program (NVLAP) for asbestos analysis. The testing laboratory firm must be independent of the asbestos contractor and must have no employee or employer relationship which could constitute a conflict of interest.

#### 1.3.12 Landfill Approval

Submit written evidence that the landfill is approved for asbestos disposal by the U.S. Environmental Protection Agency, Region 4 and local regulatory agencies. Within three working days after delivery, submit detailed delivery tickets, prepared, signed, and dated by an agent of the landfill, certifying the amount of asbestos materials delivered to the landfill. Submit a copy of the waste shipment records within one day of the shipment leaving the project site.

#### 1.3.13 Transporter Certification

Submit written evidence that the transporter is approved to transport asbestos waste in accordance with the DOT requirements of 49 CFR 171, 49 CFR 172 and 49 CFR 173 as well as registration requirements of 49 CFR 107 and all other State and local regulatory agency requirements.

#### 1.3.14 Medical Certification

Provide a written certification for each worker and supervisor, signed by a licensed physician indicating that the worker and supervisor has met or exceeded all of the medical prerequisites listed herein and in 29 CFR 1926.1101 and 29 CFR 1926.103 as prescribed by law. Submit certificates prior to the start of work but after the main abatement submittal.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.4 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

##### SD-03 Product Data

Amended Water; G

Safety Data Sheets (SDS) for All Materials; G

Encapsulants; G

Respirators; G

Local Exhaust Equipment; G

Pressure Differential Automatic Recording Instrument; G

Vacuums; G

Glovebags; G

##### SD-06 Test Reports

Air Sampling Results; G

Pressure Differential Recordings for Local Exhaust System; G

Clearance Sampling; G

Asbestos Disposal Quantity Report; G

##### SD-07 Certificates

Employee Training; G

Notifications; G

Respiratory Protection Program; G

Asbestos Hazard Abatement Plan; G

Testing Laboratory; G

Landfill Approval; G

Delivery Tickets; G

Waste Shipment Records; G

Transporter Certification; G

Medical Certification; G

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Private Qualified Person Documentation; G

Designated Competent Person; G

Worker's License; G

Contractor's License; G

Federal, State or Local Citations on Previous Projects; G

Encapsulants; G

Equipment Used to Contain Airborne Asbestos Fibers; G

Water Filtration Equipment; G

Vacuums; G

Ventilation Systems; G

#### SD-11 Closeout Submittals

Permits; G

Notifications; G

Respirator Program Records; G

Rental Equipment; G

### 1.5 QUALITY ASSURANCE

#### 1.5.1 Private Qualified Person Documentation

Submit the name, address, and telephone number of the Private Qualified Person (PQP) selected to prepare the Asbestos Hazard Abatement Plan, direct monitoring and training, and documented evidence that the PQP has successfully completed training in and is accredited and where required is certified as, a Building Inspector, Contractor/Supervisor Abatement Worker, and Asbestos Project Designer as described by 40 CFR 763 and has successfully completed the National Institute of Occupational Safety and Health (NIOSH) 582 course "Sampling and Evaluating Airborne Asbestos Dust" or equivalent. The PQP and the asbestos contractor must not have an employee/employer relationship or financial relationship which could constitute a conflict of interest. The PQP must be a first tier subcontractor.

#### 1.5.2 Designated Competent Person Documentation

The Designated Competent Person must be experienced in the administration and supervision of asbestos abatement projects including exposure assessment and monitoring, work practices, abatement methods, protective measures for personnel, setting up and inspecting asbestos abatement work areas, evaluating the integrity of containment barriers, placement and operation of local exhaust systems, ACM generated waste containment and disposal procedures, decontamination units installation and maintenance requirements, site safety and health requirements, notification of other employees onsite. The Designated Competent Person must be on-site at all times when asbestos abatement activities are underway. Submit training certification and a current State of Alabama Asbestos Contractor's and



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Supervisor's License. Submit evidence that the Designated Competent Person has a minimum of 2 years of on-the-job asbestos abatement experience relevant to OSHA designated competent person requirements. The Designated Competent Person must be a first tier subcontractor.

#### 1.5.3 Worker's License

Submit documentation that workers meet the requirements of 29 CFR 1926.1101, 40 CFR 61-SUBPART M and have a current State of Alabama Asbestos Workers License.

#### 1.5.4 Contractor's License

Submit a copy of the asbestos contractor's license issued by the State of Alabama. Submit the following certification along with the license: "I certify that the personnel I am responsible for during the course of this project fully understand the contents of 29 CFR 1926.1101, 40 CFR 61-SUBPART MEM 385-1-1, and the Federal, State and local requirements for those asbestos abatement activities that they will be involved in." This certification statement must be signed by the Company's President or Chief Executive.

#### 1.5.5 Air Sampling Results

Complete fiber counting and provide results to the PQP for review within 16 hours of the "time off" of the sample pump. Notify the Contracting Officer immediately of any airborne levels of asbestos fibers in excess of the acceptable limits. Submit sampling results to the Contracting Officer and the affected Contractor employees where required by law within three working days, signed by the testing laboratory employee performing air sampling, the employee that analyzed the sample, and the PQP. Notify the Contractor and the Contracting Officer immediately of any variance in the pressure differential which could cause adjacent unsealed areas to have asbestos fiber concentrations in excess of 0.01 fibers per cubic centimeter or background whichever is higher. In no circumstance must levels exceed 0.1 fibers per cubic centimeter.

#### 1.5.6 Pressure Differential Recordings for Local Exhaust System

Provide a local exhaust system that creates a negative pressure of at least 0.02 inches of water relative to the pressure external to the enclosure and operate it continuously, 24-hours a day, until the temporary enclosure of the asbestos control area is removed. Submit pressure differential recordings for each work day to the PQP for review and to the Contracting Officer within 24-hours from the end of each work day.

#### 1.5.7 Federal, State or Local Citations on Previous Projects

Submit a statement, signed by an officer of the company, containing a record of any citations issued by Federal, State or local regulatory agencies relating to asbestos activities within the last 5 years (including projects, dates, and resolutions); a list of penalties incurred through non-compliance with asbestos project specifications, including liquidated damages, overruns in scheduled time limitations and resolutions; and situations in which an asbestos-related contract has been terminated (including projects, dates, and reasons for terminations). If there are none, a negative declaration signed by an officer of the company must be provided.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.5.8 Preconstruction Conference

Conduct a safety preconstruction conference to discuss the details of the Asbestos Hazard Abatement Plan, Accident Prevention Plan (APP) including the AHAs. The safety preconstruction conference must include the Contractor and their Designated Competent Person, Designated IH and Project Supervisor and the Contracting Officer. Deficiencies in the APP will be discussed. Onsite work must not begin until the APP has been accepted.

#### 1.6 SECURITY

A log book must be kept documenting entry into and out of the regulated area. Entry into regulated areas must only be by personnel authorized by the Contractor and the Contracting Officer. Personnel authorized to enter regulated areas must be trained, medically evaluated, and wear the required personal protective equipment.

#### 1.7 EQUIPMENT

##### 1.7.1 Rental Equipment

Provide a copy of the written notification to the rental company concerning the intended use of the equipment and the possibility of asbestos contamination of the equipment.

### PART 2 PRODUCTS

#### 2.1 ENCAPSULANTS

Encapsulants must conform to current USEPA requirements, contain no toxic or hazardous substances as defined in 29 CFR 1926.59, and conform to the following performance requirements.

##### 2.1.1 Lock-down Encapsulant

<u>Requirement</u>	<u>Test Standard</u>
Flame Spread - 25, Smoke Emission - 50	ASTM E84
Life Expectancy - 20 years	ASTM C732 Accelerated Aging Test
Permeability - Minimum 0.4 perms	ASTM E96/E96M
Fire Resistance - Negligible affect on fire resistance rating over 3-hour test (Tested with fireproofing over encapsulant applied directly to steel member)	ASTM E119
Bond Strength: 100 pounds of force/foot	ASTM E736/E736M

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Requirement	Test Standard
(Tests compatibility with cementitious and fibrous fireproofing)	

## 2.2 ENCASEMENT PRODUCTS

Encasement must consist of primary cellular polymer coat, polymer finish coat, and any other finish coat as approved by the Contracting Officer.

## 2.3 DUCT TAPE

Industrial grade duct tape of appropriate widths suitable for bonding sheet plastic and disposal container.

## 2.4 DISPOSAL CONTAINERS

Leak-tight (defined as solids, liquids, or dust that cannot escape or spill out) disposal containers must be provided for ACM wastes as required by 29 CFR 1926.1101. Disposal containers can be in the form of:

- a. Disposal Bags
- b. Fiberboard Drums
- c. Cardboard Boxes

## 2.5 SHEET PLASTIC

Sheet plastic must be polyethylene of 6 mil minimum thickness and must be provided in the largest sheet size necessary to minimize seams. Film must be clear and conform to ASTM D4397, except as specified below

### 2.5.1 Flame Resistant

Where a potential for fire exists, flame-resistant sheets must be provided. Film must be frosted or black and must conform to the requirements of NFPA 701.

### 2.5.2 Reinforced

Reinforced sheets must be provided where high skin strength is required, such as where it constitutes the only barrier between the regulated area and the outdoor environment. The sheet stock must consist of translucent, nylon-reinforced or woven-polyethylene thread laminated between 2 layers of polyethylene film. Film must meet flame resistant standards of NFPA 701.

## 2.6 MASTIC REMOVING SOLVENT

Mastic removing solvent must be nonflammable and must not contain methylene chloride, glycol ether, or halogenated hydrocarbons. Solvents used onsite must have a flash point greater than 140 degrees F.

## 2.7 LEAK-TIGHT WRAPPING

Two layers of 6 mil minimum thick polyethylene sheet stock must be used for the containment of removed asbestos-containing components or materials such as large tanks, boilers, insulated pipe segments and other

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

materials. Upon placement of the ACM component or material, each layer must be individually leak-tight sealed with duct tape.

## 2.8 VIEWING INSPECTION WINDOW

Where feasible, a minimum of one clear, 1/8 inch thick, acrylic sheet, 18 by 24 inches, must be installed as a viewing inspection window at eye level on a wall in each containment enclosure. The windows must be sealed leak-tight with industrial grade duct tape.

## 2.9 WETTING AGENTS

Removal encapsulant (a penetrating encapsulant) must be provided when conducting removal abatement activities that require a longer removal time or are subject to rapid evaporation of amended water. The removal encapsulant must be capable of wetting the ACM and retarding fiber release during disturbance of the ACM greater than or equal to that provided by amended water. Performance requirements for penetrating encapsulants are specified in paragraph ENCAPSULANTS above.

# PART 3 EXECUTION

## 3.1 EQUIPMENT

Provide the Contracting Officer or the Contracting Officer's Representative, with at least two complete sets of personal protective equipment as required for entry to and inspection of the asbestos control area. Provide equivalent training to the Contracting Officer or a designated representative as provided to Contractor employees in the use of the required personal protective equipment. Provide manufacturer's certificate of compliance for all equipment used to contain airborne asbestos fibers.

### 3.1.1 Air Monitoring Equipment

The Contractor's PQP must approve air monitoring equipment. The equipment must include, but must not be limited to:

- a. High-volume sampling pumps that can be calibrated and operated at a constant airflow up to 16 liters per minute.
- b. Low-volume, battery powered, body-attachable, portable personal pumps that can be calibrated to a constant airflow up to approximately 3.5 liters per minute, and a self-contained rechargeable power pack capable of sustaining the calibrated flow rate for a minimum of 10 hours. The pumps must also be equipped with an automatic flow control unit which must maintain a constant flow, even as filter resistance increases due to accumulation of fiber and debris on the filter surface.
- c. Single use standard 25 mm diameter cassette, open face, 0.8 micron pore size, mixed cellulose ester membrane filters and cassettes with 50 mm electrically conductive extension cowl, and shrink bands for personal air sampling.
- d. Single use standard 25 mm diameter cassette, open face, 0.45 micron pore size, mixed cellulose ester membrane filters and cassettes with 50 mm electrically conductive cowl, and shrink bands when conducting environmental area sampling using NIOSH NMAM Methods 7400 and 7402,

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

(and the transmission electric microscopy method specified at  
40 CFR 763 if required).

- e. A flow calibrator capable of calibration to within plus or minus 2 percent of reading over a temperature range of minus 4 to plus 140 degrees F and traceable to a NIST primary standard.

### 3.1.2 Respirators

Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services.

#### 3.1.2.1 Respirators for Handling Asbestos

Provide personnel engaged in pre-cleaning, cleanup, handling, removal or demolition of asbestos materials with respiratory protection as indicated in 29 CFR 1926.1101 and 29 CFR 1926.103. Breathing air must comply with CGA G-7.

### 3.1.3 Exterior Whole Body Protection

#### 3.1.3.1 Outer Protective Clothing

Provide personnel exposed to asbestos with disposable "non-breathable," whole body outer protective clothing, head coverings, gloves, and foot coverings. Provide disposable plastic or rubber gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber gloves for comfort, but must not be used alone. Make sleeves secure at the wrists, make foot coverings secure at the ankles, and make clothing secure at the neck by the use of tape.

#### 3.1.3.2 Work Clothing

Provide cloth work clothes for wear under the outer protective clothing and foot coverings and either dispose of or properly decontaminate them as recommended by the GC after each use.

#### 3.1.3.3 Personal Decontamination Unit

Provide a temporary, negative pressure unit with a separate decontamination locker room and clean locker room with a shower that complies with 29 CFR 1926.51(f)(4)(ii) through (V) in between for personnel required to wear whole body protective clothing. Provide two separate lockers for each asbestos worker, one in each locker room. Keep street clothing and street shoes in the clean locker. HEPA vacuum and remove asbestos contaminated disposable protective clothing while still wearing respirators at the boundary of the asbestos work area and seal in impermeable bags or containers for disposal. Do not wear work clothing between home and work. Locate showers between the decontamination locker room and the clean locker room and require that all employees shower before changing into street clothes. Collect used shower water and filter with approved water filtration equipment to remove asbestos contamination. Wastewater filters must be installed in series with the first stage pore size 20 microns and the second stage pore size of 5 microns. Dispose of filters and residue as asbestos waste. Discharge clean water to the sanitary system. Dispose of asbestos contaminated work clothing as asbestos contaminated waste. Keep the floor of the decontamination unit's clean room dry and clean at all times. Proper

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

housekeeping and hygiene requirements must be maintained. Provide soap and towels for showering, washing and drying. Cloth towels provided must be disposed of as ACM waste or must be laundered in accordance with 29 CFR 1926.1101. Physically attach the decontamination units to the asbestos control area. Construct both a personnel decontamination unit and an equipment decontamination unit onto and integral with each asbestos control area.

#### 3.1.3.4 Eye Protection

Provide eye protection that complies with ANSI/ISEA Z87.1 when operations present a potential eye injury hazard. Provide goggles to personnel engaged in asbestos abatement operations when the use of a full face respirator is not required.

#### 3.1.4 Regulated Areas

All Class I, II, and III asbestos work must be conducted within regulated areas. The regulated area must be demarcated to minimize the number of persons within the area and to protect persons outside the area from exposure to airborne asbestos. Control access to regulated areas, ensure that only authorized personnel enter, and verify that Contractor required medical surveillance, training and respiratory protection program requirements are met prior to allowing entrance.

#### 3.1.5 Load-out Unit

Provide a temporary load-out unit that is adjacent and connected to the regulated area. Attach the load-out unit in a leak-tight manner to each regulated area.

#### 3.1.6 Warning Signs and Labels

Provide bilingual warning signs printed in English and Spanish at all approaches to asbestos control areas. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Provide labels and affix to all asbestos materials, scrap, waste, debris, and other products contaminated with asbestos. Containers with preprinted warning labels conforming to the requirements are acceptable

##### 3.1.6.1 Warning Sign

Provide vertical format conforming to 29 CFR 1926.200, and 29 CFR 1926.1101 minimum 20 by 14 inches displaying the following legend in the lower panel:

<u>Legend</u>	<u>Notation</u>
DANGER	one inch Sans Serif Gothic or Block
ASBESTOS	one inch Sans Serif Gothic or Block

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

<u>Legend</u>	<u>Notation</u>
MAY CAUSE CANCER	one inch Sans Serif Gothic or Block
CAUSES DAMAGE TO LUNGS	1/4 inch Sans Serif Gothic or Block
AUTHORIZED PERSONNEL ONLY	1/4 inch Sans Serif Gothic or Block
WEAR RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING IN THIS AREA	1/4 inch Sans Serif Gothic or Block

Spacing between lines must be at least equal to the height of the upper of any two lines.

### 3.1.6.2 Warning Labels

Provide labels conforming to 29 CFR 1926.1101 of sufficient size to be clearly legible, displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST AVOID CREATING DUST

### 3.1.7 Local Exhaust System

Provide a local exhaust system in the asbestos control area in accordance with ASSP Z9.2 and 29 CFR 1926.1101 that will provide at least four air changes per hour inside of the negative pressure enclosure. Local exhaust equipment must be operated 24-hours per day, until the asbestos control area is removed and must be leak proof to the filter and equipped with HEPA filters. Maintain a minimum pressure differential in the control area of minus 0.02 inch of water column relative to adjacent, unsealed areas. Provide continuous 24-hour per day monitoring of the pressure differential with a pressure differential automatic recording instrument. The building ventilation system must not be used as the local exhaust system for the asbestos control area. Filters on exhaust equipment must conform to ASSP Z9.2 and UL 586. Terminate the local exhaust system out of doors and remote from any public access or ventilation system intakes.

### 3.1.8 Tools

Vacuums must be leak proof to the filter and equipped with HEPA filters. Filters on vacuums must conform to ASSP Z9.2 and UL 586. Do not use power tools to remove asbestos containing materials unless the tool is equipped with effective, integral HEPA filtered exhaust ventilation systems. Remove all residual asbestos from reusable tools prior to storage or

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

reuse. Reusable tools must be thoroughly decontaminated prior to being removed from the regulated areas.

### 3.1.9 Rental Equipment

If rental equipment is to be used, furnish written notification to the rental agency concerning the intended use of the equipment and the possibility of asbestos contamination of the equipment.

### 3.1.10 Glovebags

Submit written manufacturers proof that glovebags will not break down under expected temperatures and conditions.

### 3.1.11 Single Stage Decontamination Area

A decontamination area (equipment room/area) must be provided for Class I work involving less than 25 feet or 10 square feet of TSI or surfacing ACM, and for Class II and Class III asbestos work operations where exposures exceed the PELs or where there is no negative exposure assessment. The equipment room or area must be adjacent to the regulated area for the decontamination of employees, material, and their equipment which could be contaminated with asbestos. The area must be covered by an impermeable drop cloth on the floor or horizontal working surface. The area must be of sufficient size to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area.

### 3.1.12 Decontamination Area Exit Procedures

Ensure that the following procedures are followed:

- a. Before leaving the regulated area, remove all gross contamination and debris from work clothing using a HEPA vacuum.
- b. Employees must remove their protective clothing in the equipment room and deposit the clothing in labeled impermeable bags or containers for disposal or laundering.
- c. Employees must not remove their respirators until showering.
- d. Employees must shower prior to entering the clean room. If a shower has not been located between the equipment room and the clean room or the work is performed outdoors, ensure that employees engaged in Class I asbestos jobs: a) Remove asbestos contamination from their work suits in the equipment room or decontamination area using a HEPA vacuum before proceeding to a shower that is not adjacent to the work area; or b) Remove their contaminated work suits in the equipment room, without cleaning worksuits, and proceed to a shower that is not adjacent to the work area.

## 3.2 WORK PROCEDURE

Perform asbestos related work in accordance with 29 CFR 1926.1101, 40 CFR 61-SUBPART M, and as specified herein. Use wet removal procedures and negative pressure enclosure techniques. Wear and utilize protective clothing and equipment as specified herein. No eating, smoking, drinking, chewing gum, tobacco, or applying cosmetics is permitted in the asbestos work or control areas. Personnel of other trades not engaged in the



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

removal and demolition of asbestos containing material must not be exposed at any time to airborne concentrations of asbestos unless all the personnel protection and training provisions of this specification are complied with by the trade personnel. Seal all roof top penetrations, except plumbing vents, prior to asbestos roofing work. Shut down the building heating, ventilating, and air conditioning system, cap the openings to the system, and provide temporary heating, ventilation, and air conditioning prior to the commencement of asbestos work. Power to the regulated area must be locked-out and tagged in accordance with 29 CFR 1910.147. Disconnect electrical service when wet removal is performed and provide temporary electrical service with verifiable ground fault circuit interrupter (GFCI) protection prior to the use of any water.

All electrical work must be performed by a licensed electrician. Stop abatement work in the regulated area immediately when the airborne total fiber concentration: (1) equals or exceeds 0.01 f/cc, or the pre-abatement concentration, whichever is greater, outside the regulated area; or (2) equals or exceeds 1.0 f/cc inside the regulated area. Correct the condition to the satisfaction of the Contracting Officer, including visual inspection and air sampling. Work must resume only upon notification by the Contracting Officer. Corrective actions must be documented. If an asbestos fiber release or spill occurs outside of the asbestos control area, stop work immediately, correct the condition to the satisfaction of the Contracting Officer including clearance sampling, prior to resumption of work.

### 3.2.1 Building Ventilation System and Critical Barriers

Building ventilation system supply and return air ducts in a regulated area must be isolated by airtight seals to prevent the spread of contamination throughout the system. The airtight seals must consist of 2 layers of polyethylene. Edges to wall, ceiling and floor surfaces must be sealed with industrial grade duct tape.

- a. A Competent Person must supervise the work.
- b. For indoor work, critical barriers must be placed over all openings to the regulated area.
- c. Impermeable dropcloths must be placed on surfaces beneath all removal activity.

### 3.2.2 Protection of Existing Work to Remain

Perform work without damage or contamination of adjacent work. Where such work is damaged or contaminated as verified by the Contracting Officer using visual inspection or sample analysis, it must be restored to its original condition or decontaminated by the Contractor at no expense to the Government as deemed appropriate by the Contracting Officer. This includes inadvertent spill of dirt, dust, or debris in which it is reasonable to conclude that asbestos may exist. When these spills occur, stop work immediately. Then clean up the spill. When satisfactory visual inspection and air sampling results are obtained from the PQP work may proceed at the discretion of the Contracting Officer.

### 3.2.3 Furnishings

Furniture and equipment will be removed from the area of work by the Government before asbestos work begins.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 3.2.4 Precleaning

Wet wipe and HEPA vacuum all surfaces potentially contaminated with asbestos prior to establishment of an enclosure.

#### 3.2.5 Asbestos Control Area Requirements

##### 3.2.5.1 Negative Pressure Enclosure

Removal of asbestos contaminated acoustical ceiling tiles, spray applied fireproofing, thermal system insulation, gypsum wallboard/joint compound require the use of a negative pressure enclosure. Block and seal openings in areas where the release of airborne asbestos fibers can be expected. Establish an asbestos negative pressure enclosure with the use of curtains, portable partitions, or other enclosures in order to prevent the escape of asbestos fibers from the contaminated asbestos work area. Negative pressure enclosure development must include protective covering of uncontaminated walls, and ceilings with a continuous membrane of two layers of minimum 6-mil plastic sheet sealed with tape to prevent water or other damage. Provide two layers of 6-mil plastic sheet over floors and extend a minimum of 12 inches up walls. Seal all joints with tape. Provide local exhaust system in the asbestos control area. Openings will be allowed in enclosures of asbestos control areas for personnel and equipment entry and exit, the supply and exhaust of air for the local exhaust system and the removal of properly containerized asbestos containing materials. Replace local exhaust system filters as required to maintain the efficiency of the system.

##### 3.2.5.2 Glovebag

If the construction of a negative pressure enclosure is infeasible for the removal of asbestos containing materials. Use alternate techniques as indicated in 29 CFR 1926.1101. Establish designated limits for the asbestos regulated area with the use of rope or other continuous barriers, and maintain all other requirements for asbestos control areas. The PQP must conduct personal samples of each worker engaged in asbestos handling (removal, disposal, transport and other associated work) throughout the duration of the project. If the quantity of airborne asbestos fibers monitored at the breathing zone of the workers at any time exceeds background or 0.01 fibers per cubic centimeter whichever is greater, stop work, evacuate personnel in adjacent areas or provide personnel with approved protective equipment at the discretion of the Contracting Officer. This sampling may be duplicated by the Government at the discretion of the Contracting Officer. If the air sampling results obtained by the Government differ from those obtained by the Contractor, the Government will determine which results predominate. If adjacent areas are contaminated as determined by the Contracting Officer, clean the contaminated areas, monitor, and visually inspect the area as specified herein.

##### 3.2.5.3 Regulated Area for Class II Removal

Removal of asbestos containing floor tile/mastic, carpet/mastic, sealants, are Class II removal activities. Establish designated limits for the asbestos regulated work area with the use of red barrier tape; install critical barriers, splash guards and signs, and maintain all other requirements for asbestos control area except local exhaust. Place impermeable dropcloths on surfaces beneath removal activity extending out 3 feet in all directions. A detached decontamination system may be used.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Conduct area monitoring of airborne fibers during the work shift at the designated limits of the asbestos work area and conduct personal samples of each worker engaged in the work. If workers the airborne fiber concentration of the workers or designated limits at any time exceeds background or 0.01 fibers per cubic centimeter, whichever is greater, stop work immediately and correct the situation.

### 3.2.6 Removal Procedures

Wet asbestos material with a fine spray of amended water during removal, cutting, or other handling so as to reduce the emission of airborne fibers. Remove material and immediately place in 6 mil plastic disposal bags. Remove asbestos containing material in a gradual manner, with continuous application of the amended water or wetting agent in such a manner that no asbestos material is disturbed prior to being adequately wetted. Where unusual circumstances prohibit the use of 6 mil plastic bags, submit an alternate proposal for containment of asbestos fibers to the Contracting Officer for approval. For example, in the case where both piping and insulation are to be removed, the Contractor may elect to wet the insulation, wrap the pipes and insulation in plastic and remove the pipe by sections. Containerize asbestos containing material while wet. Do not allow asbestos material to accumulate or become dry. Lower and otherwise handle asbestos containing material as indicated in 40 CFR 61-SUBPART M.

#### 3.2.6.1 Sealing Contaminated Items Designated for Disposal

Remove contaminated architectural, mechanical, and electrical appurtenances such as venetian blinds, full-height partitions, carpeting, duct work, pipes and fittings, radiators, light fixtures, conduit, panels, and other contaminated items designated for removal by completely coating the items with an asbestos lock-down encapsulant at the demolition site before removing the items from the asbestos control area. These items need not be vacuumed. The asbestos lock-down encapsulant must be tinted a contrasting color and spray-applied by airless method. Thoroughness of sealing operation must be visually gauged by the extent of colored coating on exposed surfaces. Lock-down encapsulants must comply with the performance requirements specified herein.

#### 3.2.6.2 Exposed Pipe Insulation Edges

Contain edges of asbestos insulation to remain that are exposed by a removal operation. Wet and cut the rough ends true and square with sharp tools and then encapsulate the edges with a 1/4 inch thick layer of non-asbestos containing insulating cement troweled to a smooth hard finish. When cement is dry, lag the end with a layer of non-asbestos lagging cloth, overlapping the existing ends by at least 4 inches. When insulating cement and cloth is an impractical method of sealing a raw edge of asbestos, take appropriate steps to seal the raw edges as approved by the Contracting Officer.

### 3.2.7 Methods of Compliance

#### 3.2.7.1 Mandated Practices

The specific abatement techniques and items identified must be detailed in the Contractor's AHAP. Use the following engineering controls and work practices in all operations, regardless of the levels of exposure:

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- a. Vacuum cleaners equipped with HEPA filters.
- b. Wet methods or wetting agents except where it can be demonstrated that the use of wet methods is unfeasible due to the creation of electrical hazards, equipment malfunction, and in roofing.
- c. Prompt clean-up and disposal.
- d. Inspection and repair of polyethylene.
- e. Cleaning of equipment and surfaces of containers prior to removing them from the equipment room or area.

#### 3.2.7.2 Control Methods

Use the following control methods:

- a. Local exhaust ventilation equipped with HEPA filter;
- b. Enclosure or isolation of processes producing asbestos dust;
- c. Where the feasible engineering and work practice controls are not sufficient to reduce employee exposure to or below the PELs, use them to reduce employee exposure to the lowest levels attainable and must supplement them by the use of respiratory protection.

#### 3.2.7.3 Unacceptable Practices

The following work practices must not be used:

- a. High-speed abrasive disc saws that are not equipped with point of cut ventilator or enclosures with HEPA filtered exhaust air.
- b. Compressed air used to remove asbestos containing materials, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air.
- c. Dry sweeping, shoveling, or other dry clean up.
- d. Employee rotation as a means of reducing employee exposure to asbestos.

#### 3.2.8 Class I Work Procedures

In addition to requirements of paragraphs MANDATED PRACTICES and CONTROL METHODS, the following engineering controls and work practices must be used:

- a. A Competent Person must supervise the installation and operation of the control methods.
- b. For jobs involving the removal of more than 25 feet or 10 square feet of TSI or surfacing material, place critical barriers over all openings to the regulated area.
- c. HVAC systems must be isolated in the regulated area by sealing with a double layer of plastic or air-tight rigid covers.
- d. Impermeable dropcloths (6 mil or greater thickness) must be placed on

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

surfaces beneath all removal activity.

- e. Where a negative exposure assessment has not been provided or where exposure monitoring shows the PEL was exceeded, the regulated area must be ventilated with a HEPA unit and employees must use PPE.

### 3.2.9 Specific Control Methods for Class I Work

Use Class I work procedures, control methods and removal methods for the following ACM:

- a. Spray Applied Fireproofing
- b. Gypsum Wallboard and Joint Compound
- c. Thermal System Insulation and Mudded Pipe Fittings
- d. Plaster and Textured Ceilings and Walls
- e. Vermiculite

#### 3.2.9.1 Negative Pressure Enclosure (NPE) System

The system must provide at least four air changes per hour inside the containment. The local exhaust unit equipment must be operated 24-hours per day until the containment is removed. The NPE must be smoke tested for leaks at the beginning of each shift and be sufficient to maintain a minimum pressure differential of minus 0.02 inch of water column relative to adjacent, unsealed areas. Pressure differential must be monitored continuously, 24-hours per day, with an automatic manometric recording instrument and Records must be provided daily on the same day collected to the Contracting Officer. The Contracting Officer must be notified immediately if the pressure differential falls below the prescribed minimum. The building ventilation system must not be used as the local exhaust system for the regulated area. The NPE must terminate outdoors unless an alternate arrangement is allowed by the Contracting Officer. All filters used must be new at the beginning of the project and must be periodically changed as necessary and disposed of as ACM waste.

#### 3.2.9.2 Glovebag Systems

Glovebags must be used without modification, smoke-tested for leaks, and completely cover the circumference of pipe or other structures where the work is to be done. Glovebags must be used only once and must not be moved. Glovebags must not be used on surfaces that have temperatures exceeding 150 degrees F. Prior to disposal, glovebags must be collapsed using a HEPA vacuum. Before beginning the operation, loose and friable material adjacent to the glovebag operation must be wrapped and sealed in 2 layers of plastic or otherwise rendered intact. At least two persons must perform glovebag removal. Asbestos regulated work areas must be established for glovebag abatement. Designated boundary limits for the asbestos work must be established with rope or other continuous barriers and all other requirements for asbestos control areas must be maintained, including area signage and boundary warning tape.

- a. Attach HEPA vacuum systems to the bag to prevent collapse during removal of ACM.
- b. The negative pressure glove boxes must be fitted with gloved apertures

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

and a bagging outlet and constructed with rigid sides from metal or other material which can withstand the weight of the ACM and water used during removal. A negative pressure must be created in the system using a HEPA filtration system. The box must be smoke tested for leaks prior to each use.

#### 3.2.9.3 Mini-Enclosure

Single bulkhead containment, Double bulkhead containment, or Mini-containment (small walk-in enclosure) to accommodate no more than two persons, may be used if the disturbance or removal can be completely contained by the enclosure. The mini-enclosure must be inspected for leaks and smoke tested before each use. Air movement must be directed away from the employee's breathing zone within the mini-enclosure.

#### 3.2.9.4 Wrap and Cut Operation

Prior to cutting pipe, the asbestos-containing insulation must be wrapped with polyethylene and securely sealed with duct tape to prevent asbestos becoming airborne as a result of the cutting process. The following steps must be taken: install glovebag, strip back sections to be cut **6 inches** from point of cut, and cut pipe into manageable sections.

#### 3.2.9.5 Class I Removal Method

Class I ACM must be removed using a control method described above. Prepare work area as previously specified. Establish designated limits for the asbestos regulated work area with the use of red barrier tape, critical barriers, signs, and maintain all other requirements for asbestos control area. Spread one layer of **6-mil** seamless plastic sheeting on the floor below the work area. Remove asbestos containing spray applied fireproofing using a scraper and wet methods and immediately place into **6-mil** thickness disposal bag. After removal of the material use a wire brush to clean the exposed substrate to remove residual material. Continue wet cleaning until surfaces are free of visible debris. Cut manageable sections of gypsum wallboard and joint compound and immediately place into a **6-mil** minimum thickness disposal bag or other approved container. Make every effort to keep the material from falling to the floor of the work area. Use a wire brush and wet clean to remove residual material from studs. Continue wet cleaning until the surface is clean of visible material and encapsulate stud walls. Remove ACM thermal system insulation and mudded pipe fittings using mechanical means and wet methods and immediately place into **6-mil** thickness disposal bag. Continue wet cleaning until surfaces are free of visible debris. Remove ACM plaster ceilings or walls using mechanical means and adequately wet methods and immediately place into **6-mil** thickness disposal bag. Make every effort to keep the material from falling to the floor of the work area. Continue wet cleaning until surfaces are free of visible debris. Remove ACM textured ceiling finish using a scraper and wet methods and immediately place into **6-mil** thickness disposal bag. Floors are considered contaminated from fallen textured ceiling finish. Clean up debris on floor and dispose of carpet as asbestos contaminated material. After removal of the material use a wire brush to clean the exposed concrete ceiling to remove residual material. Continue wet cleaning until surfaces are free of visible debris. Remove ACM vermiculite using mechanical means and adequately wet methods and immediately place into **6-mil** thickness disposal bag. Make every effort to keep the material from falling to the floor of the work area. Continue wet cleaning until surfaces are free of visible debris. Bag all asbestos debris which has fallen to the floor as

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

asbestos-containing debris. Place all debris in plastic disposal bags of 6-mil minimum thickness. Once the material is in the disposal bag, apply additional water as needed to achieve "adequately wet" conditions for NESHAP compliance. Place bagged asbestos waste under negative pressure with the use of a HEPA vacuum, goose neck and duck tape to seal the bag, wash to remove any visible contamination and place into a second 6-mil minimum thickness disposal bag. Containerize asbestos containing waste while wet. Lower and otherwise handle asbestos containing materials as indicated in 40 CFR 61-SUBPART M. Conduct area monitoring of airborne fibers during the work shift at the designated limits of the asbestos work area and conduct personal samples of each worker engaged in the work. If the quantity of airborne asbestos fibers monitored at the breathing zone of the workers or the designated limits at any time exceeds background or 0.01 fibers per cubic centimeter, whichever is greater, stop work, and immediately correct the situation.

### 3.2.10 Class II Work Procedures

In addition to the requirements of paragraphs MANDATED PRACTICES and CONTROL METHODS, the following engineering controls and work practices must be used:

- a. A Competent Person must supervise the work.
- b. For indoor work, critical barriers must be placed over all openings to the regulated area.
- c. Impermeable dropcloths must be placed on surfaces beneath all removal activity.

### 3.2.11 Specific Control Methods for Class II Work

#### 3.2.11.1 Vinyl and Asphaltic Flooring Materials and Carpet and Mastic

Establish designated limits for the asbestos regulated work area with the use of red barrier tape, critical barriers, signs, and maintain all other requirements for asbestos control area except local exhaust. A detached decontamination system may be used. When removing vinyl floor tile and mastic, and carpet and mastic which contains ACM, use the following practices. Remove floor tile and mastic, and carpet and mastic using adequately wet methods. Remove floor tiles, and carpet and mastic intact (if possible). Do not sand flooring or its backing. Scrape residual adhesive and backing using wet methods. Mechanical chipping is prohibited unless performed in a negative pressure enclosure. Dry sweeping is prohibited. Use vacuums equipped with HEPA filter, disposable dust bag, and metal floor tool (no brush) to clean floors. Place debris into a 6-mil minimum thickness disposal bag or other approved container. Once the material is in the disposal bag, apply additional water as needed to achieve "adequately wet" conditions for NESHAP compliance. Place bagged asbestos waste under negative pressure with the use of a HEPA vacuum, goose neck and duck tape to seal the bag, wash to remove any visible contamination and place into a second 6-mil minimum thickness disposal bag. Containerize asbestos containing waste while wet. Lower and otherwise handle asbestos containing materials as indicated in 40 CFR 61-SUBPART M. Conduct area monitoring of airborne fibers during the work shift at the designated limits of the asbestos work area and conduct personal samples of each worker engaged in the work. If workers the airborne fiber concentration of the workers or designated limits at any time exceeds background or 0.01 fibers per cubic centimeter, whichever

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

is greater, stop work immediately and correct the situation.

#### 3.2.11.2 Sealants and Mastic

Establish designated limits for the asbestos regulated work area with the use of red barrier tape, critical barriers and signs, and maintain all other requirements for asbestos control area except local exhaust. Spread 6-mil plastic sheeting on the ground around the perimeter of the work area extending out in all directions. Using adequately wet methods, carefully remove the ACM sealants and mastics using a scraper or knife blade. As it is removed place the material into a disposal bag. Make every effort to keep the asbestos material from falling to the ground or work area floor below. Dry sweeping is prohibited. Use vacuums equipped with HEPA filter and disposable dust bag. Place debris into a 6-mil minimum thickness disposal bag or other approved container. Once the material is in the disposal bag, apply additional water as needed to achieve "adequately wet" conditions for NESHAP compliance. Place bagged asbestos waste under negative pressure with the use of a HEPA vacuum, goose neck and duck tape to seal the bag, wash to remove any visible contamination and place into a second 6-mil minimum thickness disposal bag. Containerize asbestos containing waste while wet. Lower and otherwise handle asbestos containing materials as indicated in 40 CFR 61-SUBPART M. Conduct area monitoring of airborne fibers during the work shift at the designated limits of the asbestos work area and conduct personal samples of each worker engaged in the work. If the airborne fiber concentration of the workers or at designated limits at any time exceeds background or 0.01 fibers per cubic centimeter, whichever is greater, stop work immediately and correct the situation.

#### 3.2.11.3 Suspect Fire Doors

Establish designated limits for the asbestos regulated work area with the use of red barrier tape, critical barriers, signs, and maintain all other requirements for asbestos control area except local exhaust. A detached decontamination system may be used. Spread 6-mil plastic sheeting on the ground beneath the work area and around the perimeter of the work area extending out in all directions. Remove door intact from hinges and wrap with 6-mil plastic sheeting. Inspect the interior areas of the door to determine if ACM is present. If ACM is not present the door may be disposed of as general construction debris. If ACM is present place whole door in enclosed container for disposal. Conduct area monitoring of airborne fibers during the work shift at the designated limits of the asbestos work area and conduct personal samples of each worker engaged in the work. If the airborne fiber concentration of the workers or designated limits at any time exceeds background or 0.01 fibers per cubic centimeter, whichever is greater, stop work immediately and correct the situation.

#### 3.2.11.4 Roofing Materials

Establish designated limits for the asbestos regulated work area with the use of red barrier tape, critical barriers, signs, and maintain all other requirements for asbestos control area except local exhaust. When removing roofing materials which contain ACM as described in 29 CFR 1926.1101(g)(8)(ii), use the following practices. Roofing material must be removed in an intact state. Wet methods must be used to remove roofing materials that are not intact, or that will be rendered not intact during removal, unless such wet methods are not feasible or will create safety hazards. When removing built-up roofs, with asbestos-containing



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

roofing felts and an aggregate surface, using a power roof cutter, all dust resulting from the cutting operations must be collected by a HEPA dust collector, or must be HEPA vacuumed by vacuuming along the cut line. Asbestos-containing roofing material must not be dropped or thrown to the ground, but must be lowered to the ground via covered, dust-tight chute, crane, hoist or other method approved by the Contracting Officer. Any ACM that is not intact must be lowered to the ground as soon as practicable, but not later than the end of the work shift. While the material remains on the roof it must be kept wet or placed in an impermeable waste bag or wrapped in plastic sheeting. Intact ACM must be lowered to the ground as soon as practicable, but not later than the end of the work shift. Unwrapped material must be transferred to a closed receptacle. Critical barriers must be placed over roof level heating and ventilation air intakes. Conduct area monitoring of airborne fibers during the work shift at the designated limits of the asbestos work area and conduct personal samples of each worker engaged in the work. If the airborne fiber concentration of the workers or designated limits at any time exceeds background or 0.01 fibers per cubic centimeter, whichever is greater, stop work immediately and correct the situation.

#### 3.2.11.5 Cementitious Siding and Shingles or Transite Panels

Establish designated limits for the asbestos regulated work area with the use of red barrier tape, critical barriers, signs, and maintain all other requirements for asbestos control area except local exhaust. When removing cementitious asbestos-containing siding, shingles or Transite panels use the following work practices. Intentionally cutting, abrading or breaking is prohibited. Each panel or shingle must be sprayed with amended water prior to removal. Nails must be cut with flat, sharp instruments. Unwrapped or unbagged panels or shingles must be immediately lowered to the ground via covered dust-tight chute, crane or hoist, or placed in an impervious waste bag or wrapped in plastic sheeting and lowered to the ground no later than the end of the work shift. Place debris into a 6-mil minimum thickness disposal bag or other approved container. Once the material is in the disposal bag, apply additional water as needed to achieve "adequately wet" conditions for NESHAP compliance. Place bagged asbestos waste under negative pressure with the use of a HEPA vacuum, goose neck and duck tape to seal the bag, wash to remove any visible contamination and place into a second 6-mil minimum thickness disposal bag. Containerize asbestos containing waste while wet. Conduct area monitoring of airborne fibers during the work shift at the designated limits of the asbestos work area and conduct personal samples of each worker engaged in the work. If the airborne fiber concentration of the workers or designated limits at any time exceeds background or 0.01 fibers per cubic centimeter, whichever is greater, stop work immediately and correct the situation.

#### 3.2.11.6 Gaskets

Establish designated limits for the asbestos regulated work area with the use of red barrier tape, critical barriers, signs, and maintain all other requirements for asbestos control area except local exhaust. Gaskets must be thoroughly wetted with amended water prior to removal and immediately placed in a disposal container. If a gasket is visibly deteriorated and unlikely to be removed intact, removal must be undertaken within a glovebag. Any scraping to remove residue must be performed wet. Place debris into a 6-mil minimum thickness disposal bag or other approved container. Once the material is in the disposal bag, apply additional water as needed to achieve "adequately wet" conditions for NESHAP

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

compliance. Place bagged asbestos waste under negative pressure with the use of a HEPA vacuum, goose neck and duck tape to seal the bag, wash to remove any visible contamination and place into a second 6-mil minimum thickness disposal bag. Containerize asbestos containing waste while wet. Conduct area monitoring of airborne fibers during the work shift at the designated limits of the asbestos work area and conduct personal samples of each worker engaged in the work. If the airborne fiber concentration of the workers or designated limits at any time exceeds background or 0.01 fibers per cubic centimeter, whichever is greater, stop work immediately and correct the situation.

### 3.2.12 Abatement of Asbestos Contaminated Soil

Establish designated limits for the asbestos regulated work area with the use of red barrier tape, critical barriers, signs, and maintain all other requirements for asbestos control area except local exhaust. Asbestos contaminated soil must be removed from areas to a minimum depth of 2 inches. Soil must be thoroughly dampened with amended water and then removed by manual shoveling into labeled containers. Place debris into a 6-mil minimum thickness disposal bag or other approved container. Once the material is in the disposal bag, apply additional water as needed to achieve "adequately wet" conditions for NESHAP compliance. Place bagged asbestos waste under negative pressure with the use of a HEPA vacuum, goose neck and duck tape to seal the bag, wash to remove any visible contamination and place into a second 6-mil minimum thickness disposal bag. Containerize asbestos containing waste while wet. Conduct area monitoring of airborne fibers during the work shift at the designated limits of the asbestos work area and conduct personal samples of each worker engaged in the work. If the airborne fiber concentration of the workers or designated limits at any time exceeds background or 0.01 fibers per cubic centimeter, whichever is greater, stop work immediately and correct the situation.

### 3.2.13 Air Sampling

Perform sampling of airborne concentrations of asbestos fibers in accordance with 29 CFR 1926.1101, the Contractor's air monitoring plan and as specified herein. Sampling performed in accordance with 29 CFR 1926.1101 must be performed by the PQP. Sampling performed for environmental and quality control reasons must be performed by the PQP. Unless otherwise specified, use NIOSH Method 7400 for sampling and analysis. Monitoring may be duplicated by the Government at the discretion of the Contracting Officer. If the air sampling results obtained by the Government differ from those results obtained by the Contractor, the Government will determine which results predominate. Results of breathing zone samples must be posted at the job site and made available to the Contracting Officer. Submit all documentation regarding initial exposure assessments, negative exposure assessments, and air-monitoring results.

#### 3.2.13.1 Sampling Prior to Asbestos Work

Provide area air sampling and establish the baseline one day prior to the masking and sealing operations for each demolition or removal site. Establish the background by performing area sampling in similar but uncontaminated sites in the building.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.2.13.2 Sampling During Asbestos Work

The PQP must provide personal and area sampling as indicated in [29 CFR 1926.1101](#) and governing environmental regulations. Breathing zone samples must be taken for at least 25 percent of the workers in each shift, or a minimum of two, whichever is greater. Air sample fiber counting must be completed and results provided within 24-hours (breathing zone samples), and [24](#) hours (environmental/clearance monitoring) after completion of a sampling period. In addition, provided the same type of work is being performed, provide area sampling at least once every work shift close to the work inside the enclosure, outside the clean room entrance to the enclosure, and at the exhaust opening of the local exhaust system. If sampling outside the enclosure shows airborne levels have exceeded background or 0.01 fibers per cubic centimeter, whichever is greater, stop all work, correct the condition(s) causing the increase, and notify the Contracting Officer immediately. Where alternate methods are used, perform personal and area air sampling at locations and frequencies that will accurately characterize the evolving airborne asbestos levels. The written results must be signed by testing laboratory analyst, testing laboratory principal and the Contractor's PQP. The air sampling results must be documented on a Contractor's daily air monitoring log.

### 3.2.13.3 Final Clearance Requirements, NIOSH PCM Method

For PCM sampling and analysis using [NIOSH NMAM](#) Method 7400, the fiber concentration inside the abated regulated area, for each airborne sample, must be less than 0.01 f/cc. The abatement inside the regulated area is considered complete when every PCM final clearance sample is below the clearance limit. If any sample result is greater than 0.01 total f/cc, the asbestos fiber concentration (asbestos f/cc) must be confirmed from that same filter using [NIOSH NMAM](#) Method 7402 (TEM) at Contractor's expense. If any confirmation sample result is greater than 0.01 asbestos f/cc, abatement is incomplete and cleaning must be repeated at the Contractor's expense. Upon completion of any required recleaning, resampling with results to meet the above clearance criteria must be done at the Contractor's expense.

### 3.2.13.4 Final Clearance Requirements, EPA TEM Method

For EPA TEM sampling and analysis, using the EPA Method specified in [40 CFR 763](#), abatement inside the regulated area is considered complete when the arithmetic mean asbestos concentration of the five inside samples is less than or equal to 70 structures per square millimeter (70 S/mm). When the arithmetic mean is greater than 70 S/mm, the three blank samples must be analyzed. If the three blank samples are greater than 70 S/mm, resampling must be done. If less than 70 S/mm, the five outside samples must be analyzed and a Z-test analysis performed. When the Z-test results are less than 1.65, the decontamination must be considered complete. If the Z-test results are more than 1.65, the abatement is incomplete and cleaning must be repeated. Upon completion of any required recleaning, resampling with results to meet the above clearance criteria must be done at the Contractor's expense.

### 3.2.13.5 Sampling After Final Clean-Up ([Clearance Sampling](#))

Provide area sampling of asbestos fibers using aggressive air sampling techniques as defined in the [EPA 560/5-85-024](#) and establish an airborne asbestos concentration of less than 0.01 fibers per cubic centimeter after final clean-up but before removal of the enclosure or the asbestos work

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

control area. After final cleanup and the asbestos control area is dry but prior to clearance sampling, the PQP must perform a visual inspection in accordance with [ASTM E1368](#) to ensure that the asbestos control and work area is free of any accumulations of dirt, dust, or debris. Prepare a written report signed and dated by the PQP documenting that the asbestos control area is free of dust, dirt, and debris and all waste has been removed. The asbestos fiber counts from these samples must be less than 0.01 fibers per cubic centimeter or be not greater than the background, whichever is greater. Should any of the final samples indicate a higher value take appropriate actions to re-clean the area and repeat the sampling and TEM analysis at the Contractor's expense.

#### 3.2.13.6 Air Clearance Failure

If clearance sampling results fail to meet the final clearance requirements, pay all costs associated with the required recleaning, resampling, and analysis, until final clearance requirements are met.

#### 3.2.14 Lock-Down

Prior to removal of plastic barriers and after pre-clearance clean up of gross contamination, the PQP must conduct a visual inspection of all areas affected by the removal in accordance with [ASTM E1368](#). Inspect for any visible fibers. Spray apply a post removal (lock-down) encapsulant to ceiling, walls, floors and other areas exposed in the removal area. The exposed area includes but is not limited to plastic barriers, furnishings and articles to be discarded as well as dirty change room, air locks for bag removal and decontamination chambers.

#### 3.2.15 Site Inspection

While performing asbestos engineering control work, the Contractor must be subject to on-site inspection by the Contracting Officer who may be assisted by or represented by safety or industrial hygiene personnel. If the work is found to be in violation of this specification, the Contracting Officer or his representative will issue a stop work order to be in effect immediately and until the violation is resolved. All related costs including standby time required to resolve the violation must be at the Contractor's expense.

### 3.3 CLEAN-UP AND DISPOSAL

#### 3.3.1 Housekeeping

Essential parts of asbestos dust control are housekeeping and clean-up procedures. Maintain surfaces of the asbestos control area free of accumulations of asbestos fibers. Give meticulous attention to restricting the spread of dust and debris; keep waste from being distributed over the general area. Use HEPA filtered vacuum cleaners. DO NOT BLOW DOWN THE SPACE WITH COMPRESSED AIR. When asbestos removal is complete, all asbestos waste is removed from the work-site, and final clean-up is completed, the Contracting Officer will attest that the area is safe before the signs can be removed. After final clean-up and acceptable airborne concentrations are attained but before the HEPA unit is turned off and the enclosure removed, remove all pre-filters on the building HVAC system and provide new pre-filters. Dispose of filters as asbestos contaminated materials. Reestablish HVAC mechanical, and electrical systems in proper working order. The Contracting Officer will visually inspect all surfaces within the enclosure for residual material

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

or accumulated dust or debris. The Contractor must re-clean all areas showing dust or residual materials. If re-cleaning is required, air sample and establish an acceptable asbestos airborne concentration after re-cleaning. The Contracting Officer must agree that the area is safe in writing before unrestricted entry will be permitted. The Government must have the option to perform monitoring to determine if the areas are safe before entry is permitted.

### 3.3.2 Title to Materials

All waste materials, except as specified otherwise, become the property of the Contractor and must be disposed of as specified in applicable local, State, and Federal regulations and herein.

### 3.3.3 Disposal of Asbestos

#### 3.3.3.1 Procedure for Disposal

Coordinate all waste disposal manifests with the Contracting Officer. Collect asbestos waste, contaminated waste water filters, asbestos contaminated water, scrap, debris, bags, containers, equipment, and asbestos contaminated clothing which may produce airborne concentrations of asbestos fibers and place in sealed fiber-proof, waterproof, non-returnable containers (e.g. double plastic bags 6 mils thick, cartons, drums or cans). Wastes within the containers must be adequately wet in accordance with 40 CFR 61-SUBPART M. Affix a warning and Department of Transportation (DOT) label to each container including the bags or use at least 6 mils thick bags with the approved warnings and DOT labeling preprinted on the bag. Clearly indicate on the outside of each container the name of the waste generator and the location at which the waste was generated. Prevent contamination of the transport vehicle (especially if the transport vehicle is a rented truck likely to be used in the future for non-asbestos purposes). These precautions include lining the vehicle cargo area with plastic sheeting (similar to work area enclosure) and thorough cleaning of the cargo area after transport and unloading of asbestos debris is complete. Dispose of waste asbestos material at an Environmental Protection Agency (EPA) or State-approved asbestos landfill off Government property. For temporary storage, store sealed impermeable bags in asbestos waste drums or skids. An area for interim storage of asbestos waste-containing drums or skids will be assigned by the Contracting Officer or his authorized representative. Comply with 40 CFR 61-SUBPART M, State, regional, and local standards for hauling and disposal. Sealed plastic bags may be dumped from drums into the burial site unless the bags have been broken or damaged. Damaged bags must remain in the drum and the entire contaminated drum must be buried. Uncontaminated drums may be recycled. Workers unloading the sealed drums must wear appropriate respirators and personal protective equipment when handling asbestos materials at the disposal site.

#### 3.3.3.2 Asbestos Disposal Quantity Report

Direct the PQP to record and report, to the Contracting Officer, the amount of asbestos containing material removed and released for disposal. Deliver the report for the previous day at the beginning of each day shift with amounts of material removed during the previous day reported in linear feet or square feet as described initially in this specification and in cubic feet for the amount of asbestos containing material released

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

for disposal.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 02 83 00

## LEAD REMEDIATION

11/18

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP Z9.2 (2018) Fundamentals Governing the Design  
and Operation of Local Exhaust Ventilation  
Systems

## NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701 (2019) Standard Methods of Fire Tests for  
Flame Propagation of Textiles and Films

## U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (2014) Safety -- Safety and Health  
Requirements Manual

## U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1926.21	Safety Training and Education
29 CFR 1926.33	Access to Employee Exposure and Medical Records
29 CFR 1926.55	Gases, Vapors, Fumes, Dusts, and Mists
29 CFR 1926.59	Hazard Communication
29 CFR 1926.62	Lead
29 CFR 1926.65	Hazardous Waste Operations and Emergency Response
29 CFR 1926.103	Respiratory Protection
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 745	Lead-Based Paint Poisoning Prevention in Certain Residential Structures
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 178	Specifications for Packagings

#### UNDERWRITERS LABORATORIES (UL)

UL 586	(2009; Reprint Dec 2017) UL Standard for Safety High-Efficiency Particulate, Air Filter Units
--------	---

## 1.2 DEFINITIONS

### 1.2.1 Action Level

Employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8-hour period.

### 1.2.2 Area Sampling

Sampling of lead concentrations within the lead control area and inside the physical boundaries which is representative of the airborne lead concentrations but is not collected in the breathing zone of personnel (approximately 5 to 6 feet above the floor).

### 1.2.3 Certified Industrial Hygienist (CIH)

As used in this section refers to a person retained by the Contractor who is certified as an industrial hygienist and who is trained in the recognition and control of lead hazards in accordance with current federal, State, and local regulations. CIH must be certified for comprehensive practice by the American Board of Industrial Hygiene. The Certified Industrial Hygienist must be independent of the Contractor and must have no employee or employer relationship which could constitute a conflict of interest.

### 1.2.4 Competent Person (CP)

As used in this section, refers to a person employed by the Contractor who is trained in the recognition and control of lead hazards in accordance with current federal, State, and local regulations and has the authority to take prompt corrective actions to control the lead hazard. The Contractor may provide more than one CP as required to supervise and



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

monitor the work. The CP must be a Certified Industrial Hygienist (CIH) certified by the American Board of Industrial Hygiene or a Certified Safety Professional (CSP) certified by the Board of Certified Safety Professionals or a licensed lead-based paint abatement Supervisor/Project Designer in the State of [Alabama](#).

#### 1.2.5 Contaminated Room

Refers to a room for removal of contaminated personal protective equipment (PPE).

#### 1.2.6 Decontamination Shower Facility

That facility that encompasses a clean clothing storage room, and a contaminated clothing storage and disposal rooms, with a shower facility in between.

#### 1.2.7 Eight-Hour Time Weighted Average (TWA)

Airborne concentration of lead to which an employee is exposed, averaged over an 8-hour workday as indicated in [29 CFR 1926.62](#).

#### 1.2.8 High Efficiency Particulate Air (HEPA) Filter Equipment

HEPA filtered vacuuming equipment with a [UL 586](#) filter system capable of collecting and retaining lead contaminated particulate. A high efficiency particulate filter demonstrates at least 99.97 percent efficiency against 0.3 micron or larger size particles.

#### 1.2.9 Lead

Metallic lead, inorganic lead compounds, and organic lead soaps. Excludes other forms of organic lead compounds. The use of the term Lead in this section also refers to paints which contain detectable concentrations of Cadmium and Chromium. For the purposes of the section lead-based paint (LBP) and paint with lead (PWL) also contains cadmium and chromium.

#### 1.2.10 Lead-Based Paint (LBP)

Paint or other surface coating that contains lead in excess of 1.0 milligrams per centimeter squared or 0.5 percent by weight.

#### 1.2.11 Lead Control Area

A system of control methods to prevent the spread of lead dust, paint chips or debris to adjacent areas that may include temporary containment, floor or ground cover protection, physical boundaries, and warning signs to prevent unauthorized entry of personnel. HEPA filtered local exhaust equipment may be used as engineering controls to further reduce personnel exposures or building/outdoor environmental contamination.

#### 1.2.12 Lead Permissible Exposure Limit (PEL)

Fifty micrograms per cubic meter of air as an 8-hour time weighted average as determined by [29 CFR 1926.62](#). If an employee is exposed for more than 8-hours in a work day, determine the PEL by the following formula:

$$\text{PEL (micrograms/cubic meter of air)} = 400/\text{No. hrs worked per day}$$

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.2.13 Material Containing Lead/Paint with Lead (MCL/PWL)

Any material, including paint, which contains lead as determined by the testing laboratory using a valid test method. The requirements of this section does not apply if no detectable levels of lead are found using a quantitative method for analyzing paint or MCL using laboratory instruments with specified limits of detection (usually 0.01 percent). An X-Ray Fluorescence (XRF) instrument is not considered a valid test method.

#### 1.2.14 Personal Sampling

Sampling of airborne lead concentrations within the breathing zone of an employee to determine the 8-hour time weighted average concentration in accordance with 29 CFR 1926.62. Samples must be representative of the employees' work tasks. Breathing zone must be considered an area within a hemisphere, forward of the shoulders, with a radius of 6 to 9 inches and centered at the nose or mouth of an employee.

#### 1.2.15 Physical Boundary

Area physically roped or partitioned off around lead control area to limit unauthorized entry of personnel.

### 1.3 DESCRIPTION

Construction activities impacting PWL or material containing lead which are covered by this specification include the demolition or removal of material containing lead. The work covered by this section includes work tasks and the precautions specified in this section for the protection of building occupants and the environment during and after the performance of the hazard abatement activities.

#### 1.3.1 Protection of Existing Areas To Remain

Project work including, but not limited to, lead hazard abatement work, storage, transportation, and disposal must be performed without damaging or contaminating adjacent work and areas. Where such work or areas are damaged or contaminated, restore work and areas to the original condition.

#### 1.3.2 Coordination with Other Work

Coordinate with work being performed in adjacent areas to ensure there are no exposure issues. Explain coordination procedures in the Lead Compliance Plan and describe how the Contractor will prevent lead exposure to other contractors and Government personnel performing work unrelated to lead.

### 1.4 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Competent Person Qualifications; G

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Training Certification; G

Occupational and Environmental Assessment Data Report; G

Medical Examinations; G

Lead Waste Management Plan; G

Lead Compliance Plan; G

Written Evidence of TSD Approval; G

#### SD-03 Product Data

Respirators; G

Vacuum Filters; G

Negative Air Pressure System; G

Materials and Equipment; G

Expendable Supplies; G

Local Exhaust Equipment; G

Pressure Differential Automatic Recording Instrument; G

Pressure Differential Log; G

#### SD-06 Test Reports

Occupational and Environmental Assessment Data Report; G

Sampling Results; G

Pressure Differential Recordings For Local Exhaust System; G

#### SD-07 Certificates

Testing Laboratory; G

#### SD-11 Closeout Submittals

Hazardous Waste Manifest; G

Turn-In Documents or Weight Tickets; G

### 1.5 QUALITY ASSURANCE

#### 1.5.1 Qualifications

##### 1.5.1.1 Competent Person (CP)

Submit name, address, and telephone number of the CP selected to perform responsibilities specified in paragraph COMPETENT PERSON (CP) RESPONSIBILITIES. Provide documented construction project-related experience with implementation of OSHA's Lead in Construction standard (

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

29 CFR 1926.62) which shows ability to assess occupational and environmental exposure to lead; experience with the use of respirators, personal protective equipment and other exposure reduction methods to protect employee health. Demonstrate a minimum of 3 years experience implementing OSHA's Lead in Construction standard (29 CFR 1926.62). Submit proper documentation that the CP is trained and certified in accordance with federal, state, and local laws.

#### 1.5.1.2 Training Certification

Submit a certificate for each worker and supervisor, signed and dated by the accredited training provider, stating that the employee has received the required lead training specified in 29 CFR 1926.62 and is certified to perform or supervise lead removal or demolition activities in the State of Alabama.

#### 1.5.1.3 Testing Laboratory

Submit the name, address, and telephone number of the testing laboratory selected to perform the air analysis, testing, and reporting of airborne concentrations of lead. Use a laboratory participating in the EPA National Lead Laboratory Accreditation Program (NLLAP) by being accredited by either the American Association for Laboratory Accreditation (A2LA) or the American Industrial Hygiene Association (AIHA) and that is successfully participating in the Environmental Lead Proficiency Analytical Testing (ELPAT) program to perform sample analysis. Laboratories selected to perform blood lead analysis must be OSHA approved.

### 1.5.2 Requirements

#### 1.5.2.1 Competent Person (CP) Responsibilities

- a. Verify training meets all federal, State, and local requirements.
- b. Review and approve Leadm Compliance Plan for conformance to the applicable referenced standards.
- c. Continuously inspect LBP/PWL or MCL work for conformance with the approved plan.
- d. Perform (or oversee performance of) air sampling. Recommend upgrades or downgrades (whichever is appropriate based on exposure) on the use of PPE (respirators included) and engineering controls.
- e. Ensure work is performed in strict accordance with specifications at all times.
- f. Control work to prevent hazardous exposure to human beings and to the environment at all times.
- g. Supervise final cleaning of the lead control area, take clearance wipe samples if necessary; review clearance sample results and make recommendations for further cleaning.
- h. Certify the conditions of the work as called for elsewhere in this specification.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.5.2.2 Lead Compliance Plan

Submit a detailed job-specific plan of the work procedures to be used in the disturbance of lead LBP/PWL or MCL. Include in the plan a sketch showing the location, size, and details of lead control areas, critical barriers, physical boundaries, location and details of decontamination facilities, viewing ports, and mechanical ventilation system. Include a description of equipment and materials, work practices, controls and job responsibilities for each activity from which lead is emitted. Include in the plan, eating, drinking, smoking, hygiene facilities and sanitary procedures, interface of trades, sequencing of lead related work, collected waste water and dust containing lead and debris, air sampling, respirators, personal protective equipment, and a detailed description of the method of containment of the operation to ensure that lead is not released outside of the lead control area. Include site preparation, cleanup and clearance procedures. Include occupational and environmental sampling, training and strategy, sampling and analysis strategy and methodology, frequency of sampling, duration of sampling, and qualifications of sampling personnel in the air sampling portion of the plan. Include a description of arrangements made among contractors on multicontractor worksites to inform affected employees and to clarify responsibilities to control exposures.

#### 1.5.2.3 Occupational and Environmental Assessment Data Report

If initial monitoring is necessary, submit occupational and environmental [sampling results](#) to the Contracting Officer within three working days of collection, signed by the testing laboratory employee performing the analysis, the employee that performed the sampling, and the CP.

In order to reduce the full implementation of [29 CFR 1926.62](#), the Contractor must provide documentation. Submit a report that supports the determination to reduce full implementation of the requirements of [29 CFR 1926.62](#) and supporting the Lead Compliance Plan.

- a. The initial monitoring must represent each job classification, or if working conditions are similar to previous jobs by the same employer, provide previously collected exposure data that can be used to estimate worker exposures per [29 CFR 1926.62](#). The data must represent the worker's regular daily exposure to lead for stated work.
- b. Submit worker exposure data gathered during the task based trigger operations of [29 CFR 1926.62](#) with a complete process description. This includes manual demolition, manual scraping, manual sanding, heat gun, power tool cleaning, rivet busting, cleanup of dry expendable abrasives, abrasive blast enclosure removal, abrasive blasting, welding, cutting and torch burning where lead containing coatings are present.
- c. The initial assessment must determine the requirement for further monitoring and the need to fully implement the control and protective requirements including the lead compliance plan per [29 CFR 1926.62](#).

#### 1.5.2.4 Medical Examinations

Submit pre-work blood lead levels and post-work blood lead levels for all workers performing lead activities during the execution of the work. Initial medical surveillance as required by [29 CFR 1926.62](#) must be made available to all employees exposed to lead at any time (one day) above the

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

action level. Full medical surveillance must be made available to all employees on an annual basis who are or may be exposed to lead in excess of the action level for more than 30 days a year or as required by 29 CFR 1926.62. Adequate records must show that employees meet the medical surveillance requirements of 29 CFR 1926.33, 29 CFR 1926.62 and 29 CFR 1926.103. Provide medical surveillance to all personnel exposed to lead as indicated in 29 CFR 1926.62. Maintain complete and accurate medical records of employees for the duration of employment plus 30 years.

#### 1.5.2.5 Training

Train each employee performing work that disturbs lead who performs LBP/MCL/PWL disposal, and air sampling operations prior to the time of initial job assignment and annually thereafter, in accordance with 29 CFR 1926.21, 29 CFR 1926.62, 40 CFR 745 and state and local regulations where appropriate.

#### 1.5.2.6 Respiratory Protection Program

- a. Provide each employee required to wear a respirator a respirator fit test at the time of initial fitting and at least annually thereafter as required by 29 CFR 1926.62.
- b. Establish and implement a respiratory protection program as required by 29 CFR 1926.103, 29 CFR 1926.62, and 29 CFR 1926.55.

#### 1.5.2.7 Hazard Communication Program

Establish and implement a Hazard Communication Program as required by 29 CFR 1926.59.

#### 1.5.2.8 Lead Waste Management

The Lead Waste Management Plan must comply with applicable requirements of federal, State, and local hazardous waste regulations and address:

- a. Identification and classification of wastes associated with the work.
- b. Estimated quantities of wastes to be generated and disposed of.
- c. Names and qualifications of each contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location and a 24-hour point of contact. Furnish two copies of hazardous waste permits.
- d. Names and qualifications (experience and training) of personnel who will be working on-site with hazardous wastes.
- e. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.
- f. Spill prevention, containment, and cleanup contingency measures including a health and safety plan to be implemented in accordance with 29 CFR 1926.65.
- g. Work plan and schedule for waste containment, removal and disposal. Proper containment of the waste includes using acceptable waste containers (e.g., 55-gallon drums) as well as proper marking/labeling of the containers. Clean up and containerize wastes daily.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- h. Include any process that may alter or treat waste rendering a hazardous waste non hazardous.
- i. Unit cost for hazardous waste disposal according to this plan.

#### 1.5.2.9 Environmental, Safety and Health Compliance

In addition to the detailed requirements of this specification, comply with laws, ordinances, rules, and regulations of federal, State, and local authorities regarding lead. Comply with the applicable requirements of the current issue of 29 CFR 1926.62 and EM 385-1-1. Submit matters regarding interpretation of standards to the Contracting Officer for resolution before starting work. Where specification requirements and the referenced documents vary, the most stringent requirements apply.

Licensing and certification in the State of Alabama is required.

#### 1.5.3 Pressure Differential Recordings for Local Exhaust System

Provide a local exhaust system that creates a negative pressure of at least 0.02 inches of water relative to the pressure external to the enclosure and operate it continuously, 24-hours a day, until the temporary enclosure of the lead control area is removed. Submit pressure differential recordings for each work day to the PQP for review and to the Contracting Officer within 24-hours from the end of each work day.

#### 1.5.4 Pre-Construction Conference

Along with the CP, meet with the Contracting Officer to discuss in detail the Lead Waste Management Plan and the Lead Compliance Plan, including procedures and precautions for the work.

### 1.6 EQUIPMENT

#### 1.6.1 Respirators

Furnish appropriate respirators approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services, for use in atmospheres containing lead dust, fume and mist. Respirators must comply with the requirements of 29 CFR 1926.62.

#### 1.6.2 Special Protective Clothing

Personnel exposed to lead contaminated dust must wear proper disposable protective whole body clothing, head covering, gloves, eye, and foot coverings as required by 29 CFR 1926.62. Furnish proper disposable plastic or rubber gloves to protect hands. Reduce the level of protection only after obtaining approval from the CP.

#### 1.6.3 Rental Equipment Notification

If rental equipment is to be used during PWL or MCL handling and disposal, notify the rental agency in writing concerning the intended use of the equipment.

#### 1.6.4 Vacuum Filters

UL 586 labeled HEPA filters.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.6.5 Equipment for Government Personnel

Furnish the Contracting Officer with two complete sets of personal protective equipment (PPE) daily, as required herein, for entry into and inspection of the lead removal work within the lead controlled area. Personal protective equipment must include disposable whole body covering, including appropriate foot, head, eye, and hand protection. PPE remains the property of the Contractor. The Government will provide respiratory protection for the Contracting Officer.

#### 1.6.6 Abrasive Removal Equipment

The use of powered machine for vibrating, sanding, grinding, or abrasive blasting is prohibited unless equipped with local exhaust ventilation systems equipped with high efficiency particulate air (HEPA) filters.

#### 1.6.7 Negative Air Pressure System

##### 1.6.7.1 Minimum Requirements

Do not proceed with work in the area until containment is set up and HEPA filtration systems are in place. The negative air pressure system must meet the requirements of ASSP Z9.2 including approved HEPA filters in accordance with UL 586. Negative air pressure equipment must be equipped with new HEPA filters and be sufficient to maintain a minimum pressure differential of minus 0.02 inch of water column relative to adjacent, unsealed areas. Negative air pressure system minimum requirements are listed as follows:

- a. The unit must be capable of delivering its rated volume of air with a clean first stage filter, an intermediate filter and a primary HEPA filter in place.
- b. The HEPA filter must be certified as being capable of trapping and retaining mono-disperse particles as small as 0.3 micrometers at a minimum efficiency of 99.97 percent.
- c. The unit must be capable of continuing to deliver no less than 70 percent of rated capacity when the HEPA filter is 70 percent full or measures 2.5 inches of water static pressure differential on a magnehelic gauge.
- d. Equip the unit with a manometer-type negative pressure differential monitor with minor scale division of 0.02 inch of water and accuracy within plus or minus 1.0 percent. The manometer must be calibrated daily as recommended by the manufacturer.
- e. Equip the unit with a means for the operator to easily interpret the readings in terms of the volumetric flow rate of air per minute moving through the machine at any given moment.
- f. Equip the unit with an electronic mechanism that automatically shuts the machine off in the event of a filter breach or absence of a filter.
- g. Equip the unit with an audible horn that sounds an alarm when the machine has shut itself off.
- h. Equip the unit with an automatic safety mechanism that prevents a



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

worker from improperly inserting the main HEPA filter.

#### 1.6.7.2 Auxiliary Generator

Provide an auxiliary generator with capacity to power a minimum of 50 percent of the negative air machines at any time during the work. When power fails, the generator controls must automatically start the generator and switch the negative air pressure system machines to generator power. The generator must not present a carbon monoxide hazard to workers.

#### 1.6.8 Vacuum Systems

Vacuum systems must be suitably sized for the project, and filters must be capable of trapping and retaining all mono-disperse particles as small as 0.3 micrometers (mean aerodynamic diameter) at a minimum efficiency of 99.97 percent. Properly dispose of used filters that are being replaced.

#### 1.6.9 Heat Blower Guns

Heat blower guns must be flameless, electrical, paint-softener type with controls to limit temperature to 1,100 degrees F. Heat blower must be (grounded) 120 volts ac, and must be equipped with cone, fan, glass protector and spoon reflector nozzles.

### 1.7 PROJECT/SITE CONDITIONS

#### 1.7.1 Protection of Existing Work to Remain

Perform work without damage or contamination of adjacent areas. Where existing work is damaged or contaminated, restore work to its original condition or better as determined by the Contracting Officer.

## PART 2 PRODUCTS

### 2.1 MATERIALS AND EQUIPMENT

Keep materials and equipment needed to complete the project available and on the site. Submit a description of the materials and equipment required; including Safety Data Sheets (SDSs) for material brought onsite to perform the work.

#### 2.1.1 Expendable Supplies

Submit a description of the expendable supplies required.

##### 2.1.1.1 Polyethylene Bags

Disposable bags must be polyethylene plastic and be a minimum of 6 mils thick (4 mils thick if double bags are used) or any other thick plastic material shown to demonstrate at least equivalent performance; and capable of being made leak-tight. Leak-tight means that solids, liquids or dust cannot escape or spill out.

##### 2.1.1.2 Polyethylene Leak-tight Wrapping

Wrapping used to wrap lead contaminated debris must be polyethylene plastic that is a minimum of 6 mils thick or any other thick plastic material shown to demonstrate at least equivalent performance.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.1.1.3 Polyethylene Sheeting

Sheeting must be polyethylene plastic with a minimum thickness of 6 mil, or any other thick plastic material shown to demonstrate at least equivalent performance; and be provided in the largest sheet size reasonably accommodated by the project to minimize the number of seams. Where the project location constitutes an out of the ordinary potential for fire, or where unusual fire hazards cannot be eliminated, provide flame-resistant polyethylene sheets which conform to the requirements of NFPA 701.

#### 2.1.1.4 Tape and Adhesive Spray

Tape and adhesive must be capable of sealing joints between polyethylene sheets and for attachment of polyethylene sheets to adjacent surfaces. After dry application, tape or adhesive must retain adhesion when exposed to wet conditions, including amended water. Tape must be minimum 2 inches wide, industrial strength.

#### 2.1.1.5 Containers

When used, containers must be leak-tight and be labeled in accordance with EPA, DOT and OSHA standards.

#### 2.1.1.6 Chemical Paint Strippers

Chemical paint strippers must not contain methylene chloride and be formulated to prevent stain, discoloration, or raising of the substrate materials.

#### 2.1.1.7 Chemical Paint Stripper Neutralizer

Neutralizers for paint strippers must be compatible with the substrate and suitable for use with the chemical stripper that has been applied to the surface.

### PART 3 EXECUTION

#### 3.1 PREPARATION

##### 3.1.1 Protection

###### 3.1.1.1 Notification

- a. Notify the Contracting Officer 20 days prior to the start of any lead work.

###### 3.1.1.2 Lead Control Area

- a. Physical Boundary - Provide physical boundaries around the lead control area by roping off the area designated in the work plan or providing curtains, portable partitions or other enclosures to ensure that lead will not escape outside of the lead control area. Prohibit the general public from accessing the lead control areas.
- b. Warning Signs - Provide warning signs at approaches to lead control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs must comply with the requirements of 29 CFR 1926.62.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 3.1.1.3 Furnishings

The Government will remove furniture and equipment from the building before lead work begins.

#### 3.1.1.4 Heating, Ventilating and Air Conditioning (HVAC) Systems

Shut down, lock out, and isolate HVAC systems that supply, exhaust, or pass through the lead control areas. Seal intake and exhaust vents in the lead control area with 6 mil plastic sheet and tape. Seal seams in HVAC components that pass through the lead control area. Provide temporary HVAC system for areas in which HVAC has been shut down outside the lead control area.

#### 3.1.1.5 Local Exhaust System

Provide a local exhaust system in the lead control area in accordance with ASSP Z9.2 and 29 CFR 1926.62 that will provide at least 4 air changes per hour inside of the negative pressure enclosure. Local exhaust equipment must be operated 24-hours per day, until the lead control area is removed and must be leak proof to the filter and equipped with HEPA filters. Maintain a minimum pressure differential in the lead control area of minus 0.02 inch of water column relative to adjacent, unsealed areas. Provide continuous 24-hour per day monitoring of the pressure differential with a pressure differential automatic recording instrument. The building ventilation system must not be used as the local exhaust system for the lead control area. Filters on exhaust equipment must conform to ASSP Z9.2 and UL 586. Terminate the local exhaust system out of doors and remote from any public access or ventilation system intakes.

#### 3.1.1.6 Negative Air Pressure System Containment

- a. Operate the negative air pressure systems to provide at least 4 air changes per hour inside the containment. Operate the local exhaust unit equipment continuously until the containment is removed. Smoke test the negative air pressure system for leaks at the beginning of each shift. The certified supervisor is responsible to continuously monitor and keep a pressure differential log with an automatic manometric recording instrument. Notify the Contracting Officer immediately if the pressure differential falls below the prescribed minimum. Submit the continuously monitored pressure differential log, as specified. Do not use the building ventilation system as the local exhaust system. Terminate the local exhaust system out of doors unless the Contracting Officer allows an alternate arrangement. All filters must be new at the beginning of the project and be periodically changed as necessary to maintain specified pressure differential and disposed of as lead contaminated waste.
- b. Discontinuing Negative Air Pressure System. Operate the negative air pressure system continuously during abatement activities unless otherwise authorized by the Contracting Officer. At the completion of the project, units must be run until full cleanup has been completed and final clearance testing requirements have been met. Dismantling of the negative air pressure systems must be approved by the Contracting Officer be as presented in the Lead Compliance Plan. Seal the HEPA filter machine intakes with polyethylene to prevent environmental contamination.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 3.1.1.7 Decontamination Shower Facility

Provide clean and contaminated change rooms and shower facilities in accordance with this specification and 29 CFR 1926.62.

#### 3.1.1.8 Eye Wash Station

Provide suitable facilities within the work area for quick drenching or flushing of the eyes where eyes may be exposed to injurious corrosive materials.

#### 3.1.1.9 Mechanical Ventilation System

- a. Use adequate ventilation to control personnel exposure to lead in accordance with 29 CFR 1926.62. To the extent feasible, use local exhaust ventilation or other collection systems, approved by the CP. Evaluate and maintain local exhaust ventilation systems in accordance with 29 CFR 1926.62.
- b. Vent local exhaust outside the building and away from building ventilation intakes or ensure system is connected to HEPA filters.
- c. Use locally exhausted, power actuated tools or manual hand tools.

#### 3.1.1.10 Personnel Protection

Personnel must wear and use protective clothing and equipment as specified herein. Eating, smoking, or drinking or application of cosmetics is not permitted in the lead control area. No one will be permitted in the lead control area unless they have been appropriately trained and provided with protective equipment.

### 3.2 ERECTION

#### 3.2.1 Lead Control Area Requirements

Establish a lead control area by completely establishing barriers and physical boundaries around the area or structure where PWL or MCL removal operations will be performed.

Full containment - Contain removal operations by the use of a negative pressure enclosure system with decontamination facilities and with HEPA filtered exhaust if required by the CP. For containment areas larger than 1,000 square feet install a minimum of two 18 inch square viewing ports. Locate ports to provide a view of the required work from the exterior of the enclosed contaminated area. Glaze ports with laminated safety glass.

### 3.3 APPLICATION

#### 3.3.1 Lead Work

Perform lead work in accordance with approved Lead Compliance Plan. Use procedures and equipment required to limit occupational exposure and environmental contamination with lead when the work is performed in accordance with 29 CFR 1926.62, and as specified herein. Dispose of all PWL or MCL and associated waste in compliance with federal, State, and local requirements.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.3.2 Paint with Lead or Material Containing Lead Removal

Provide methodology for removing lead in the Lead Compliance Plan. Select lead removal processes to minimize contamination of work areas outside the control area with lead contaminated dust or other lead contaminated debris or waste and to ensure that unprotected personnel are not exposed to hazardous concentrations of lead. Describe this removal process in the Lead Compliance Plan.

Provide methodology for lead, LBP/PWL removal and processes to minimize contamination of work areas outside the control area with lead contaminated dust or other lead contaminated debris/waste and to ensure that unprotected personnel are not exposed to hazardous concentrations of lead. Describe this lead LBP/PWL removal/control process in the Lead Compliance Plan.

#### 3.3.2.1 Paint with Lead or Material Containing Lead Indoor Removal

Perform manual **or** mechanical removal in the lead control areas using enclosures, barriers or containments and powered locally exhausted tools equipped with HEPA filters. Collect residue and debris for disposal in accordance with federal, State, and local requirements.

#### 3.3.2.2 Paint with Lead or Material Containing Lead - Outdoor Removal

Perform outdoor removal as indicated in federal, State, and local regulations and in the Lead Compliance Plan. The worksite preparation (barriers or containments) must be job dependent and presented in the Lead Compliance Plan.

### 3.3.3 Personnel Exiting Procedures

Whenever personnel exit the lead controlled area, they must perform the following procedures and must not leave the work place wearing any clothing or equipment worn in the control area:

- a. Vacuum all clothing before entering the contaminated change room.
- b. Remove protective clothing in the contaminated change room and place them in an approved impermeable disposal bag.
- c. Shower.
- c. Wash hands and face at the site, don appropriate disposable or uncontaminated reusable clothing, move to an appropriate shower facility, shower.
- d. Change to clean clothes prior to leaving the clean clothes storage area.

### 3.4 FIELD QUALITY CONTROL

#### 3.4.1 Tests

##### 3.4.1.1 Air and Wipe Sampling

Conduct sampling for lead in accordance with **29 CFR 1926.62** and as specified herein. Air and wipe sampling must be directed or performed by the CP.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- a. The CP must be on the job site directing the air and wipe sampling and inspecting the PWL or MCL removal work to ensure that the requirements of the contract have been satisfied during the entire PWL or MCL operation.
- b. Collect personal air samples on employees who are anticipated to have the greatest risk of exposure as determined by the CP. In addition, collect air samples on at least twenty-five percent of the work crew or a minimum of two employees, whichever is greater, during each work shift.
- c. Submit results of air samples, signed by the CP, within 72-hours after the air samples are taken.
- d. Conduct area air sampling daily, on each shift in which lead and PWL operations are performed, in areas immediately adjacent to the lead control area. Conduct sufficient area monitoring to ensure unprotected personnel are not exposed at or above 30 micrograms of lead per cubic meter of air. If 30 micrograms of lead per cubic meter of air is reached or exceeded, stop work, correct the conditions(s) causing the increased levels. Notify the Contracting Officer immediately. Determine if condition(s) require any further change in work methods. Resume removal work only after the CP and the Contracting Officer give approval.

### 3.5 CLEANING AND DISPOSAL

#### 3.5.1 Cleanup

Maintain surfaces of the lead control area free of accumulations of dust and debris. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use pressurized air to clean up the area. At the end of each shift and when the lead operation has been completed, clean the controlled area of all visible contamination by vacuuming with a HEPA filtered vacuum cleaner, wet mopping the area and wet wiping the area as indicated by the Lead Compliance Plan. Reclean areas showing dust or debris. After visible dust and debris is removed, wet wipe and HEPA vacuum all surfaces in the controlled area. If adjacent areas become contaminated at any time during the work, clean, visually inspect all contaminated areas. The CP must then certify in writing that the area has been cleaned of lead contamination before clearance testing.

##### 3.5.1.1 Clearance Certification

Clear the lead control area in industrial facilities of all visible dust and debris.

#### 3.5.2 Disposal

- a. Dispose of material, whether hazardous or non-hazardous in accordance with all laws and provisions and all federal, State or local regulations. Ensure all waste is properly characterized. The result of each waste characterization (TCLP for RCRA materials) will dictate disposal requirements.
- b. Contractor is responsible for segregation of waste. Collect lead contaminated waste, scrap, debris, bags, containers, equipment, and lead contaminated clothing that may produce airborne concentrations of

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

lead particles. Label the containers in accordance with 29 CFR 1926.62 and 40 CFR 261, 40 CFR 262 and corresponding state regulations.

- c. Dispose of lead contaminated material classified as hazardous waste at an EPA or State approved hazardous waste treatment, storage, or disposal facility off Government property.
- d. Accumulate waste materials in U.S. Department of Transportation (49 CFR 178) approved 55 gallon drums or appropriately sized container for smaller volumes. Properly label each drum to identify the type of hazardous material (49 CFR 172). For hazardous waste, the collection container requires marking/labeling in accordance with 40 CFR 262 and corresponding state regulations during the accumulation/collection timeframe. The Contracting Officer or an authorized representative will assign an area for accumulation of waste containers. Coordinate authorized accumulation volumes and time limits with the host installation environmental function.
- e. Handle, store, transport, and dispose lead or lead contaminated waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, and 40 CFR 265. Comply with land disposal restriction notification requirements as required by 40 CFR 268.
- f. All lead waste generation, management, and disposal will be coordinated with the host installation environmental function.

#### 3.5.2.1 Disposal Documentation

Coordinate all disposal or off-site shipments of lead waste with the host installation environmental function. Submit written evidence of TSD approval to demonstrate the hazardous waste treatment, storage, or disposal facility (TSD) is approved for lead disposal by the EPA, State or local regulatory agencies. Submit one copy of the completed hazardous waste manifest, signed and dated by the initial transporter in accordance with 40 CFR 262. Provide a certificate that the waste was accepted by the disposal facility. Provide turn-in documents or weight tickets for non-hazardous waste disposal.

#### 3.5.2.2 Payment for Hazardous Waste

Payment for disposal of hazardous and non-hazardous waste will not be made until a signed copy of the manifest from the treatment or disposal facility is received and approved by the Contracting Officer. The manifest must detail and certify the amount of lead containing materials or non-hazardous waste delivered to the treatment or disposal facility.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 02 84 16

### HANDLING OF LIGHTING BALLASTS AND LAMPS CONTAINING PCBs AND MERCURY 05/20

#### PART 1 GENERAL

##### 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

#### U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.1000	Air Contaminants
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 270	EPA Administered Permit Programs: The Hazardous Waste Permit Program
40 CFR 273	Standards for Universal Waste Management
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
49 CFR 178	Specifications for Packagings

##### 1.2 REQUIREMENTS

Removal and disposal of PCB containing lighting ballasts and associated mercury-containing lamps. Contractor may encounter leaking PCB ballasts.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 1.3 DEFINITIONS

#### 1.3.1 Certified Industrial Hygienist (CIH)

A industrial hygienist hired by the contractor shall be certified by the American Board of Industrial Hygiene.

#### 1.3.2 Leak

Leak or leaking means any instance in which a PCB article, PCB container, or PCB equipment has any PCBs on any portion of its external surface.

#### 1.3.3 Lamps

Lamp is defined as the bulb or tube portion of an electric lighting device. A lamp is specifically designed to produce radiant energy, most often in the ultraviolet, visible, and infra-red regions of the electromagnetic spectrum. Examples of common electric lamps include, but are not limited to, fluorescent, high intensity discharge, neon, mercury vapor, high pressure sodium, and metal halide lamps.

#### 1.3.4 Polychlorinated Biphenyls (PCBs)

PCBs as used in this specification shall mean the same as PCBs, and all related items, as defined in 40 CFR 761, Section 3, Definitions.

#### 1.3.5 Spill

Spill means both intentional and unintentional spills, leaks, and other uncontrolled discharges when the release results in any quantity of PCBs running off or about to run off the external surface of the equipment or other PCB source, as well as the contamination resulting from those releases.

#### 1.3.6 Universal Waste

Universal Waste means any of the following hazardous wastes that are managed under the universal waste requirements 40 CFR 273:

- (1) Batteries as described in Sec. 273.2 of this chapter;
- (2) Pesticides as described in Sec. 273.3 of this chapter;
- (3) Mercury containing equipment as described in Sec. 273.4 of this chapter; and
- (4) Lamps as described in Sec. 273.5 of this chapter.

### 1.4 QUALITY ASSURANCE

#### 1.4.1 Regulatory Requirements

Perform PCB related work in accordance with 40 CFR 761. Perform mercury-containing lamps storage and transport in accordance with 40 CFR 261, 40 CFR 264, 40 CFR 265, 40 CFR 273.

#### 1.4.2 Training

Certified industrial hygienist (CIH) shall instruct and certify the

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

training of all persons involved in the removal of PCB containing lighting ballasts and mercury-containing lamps. The instruction shall include: The dangers of PCB and mercury exposure, decontamination, safe work practices, and applicable OSHA and EPA regulations. The CIH shall review and approve the PCB and Mercury-Containing Lamp Removal Work Plans.

#### 1.4.3 Regulation Documents

Maintain at all times one copy each at the office and one copy each in view at the job site of 29 CFR 1910.1000, 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 265, 40 CFR 268, 40 CFR 270, 40 CFR 273 and of the Contractor removal work plan and disposal plan for PCB and for associated mercury-containing lamps.

#### 1.5 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

##### SD-07 Certificates

Qualifications of CIH; G

Training Certification; G

PCB and Lamp Removal Work Plan; G

PCB and Lamp Disposal Plan; G

##### SD-11 Closeout Submittals

Transporter Certification of notification to EPA of their PCB waste activities and EPA ID numbers; G

Certification of Decontamination

Certificate of Disposal and/or recycling. Submit to the Government before application for payment within 30 days of the date that the disposal of the PCB and mercury-containing lamp waste identified on the manifest was completed.

#### 1.6 ENVIRONMENTAL REQUIREMENTS

Use special clothing:

- a. Disposable gloves (polyethylene)
- b. Eye protection
- c. PPE as required by CIH

#### 1.7 SCHEDULING

Notify the Contracting Officer 20 days prior to the start of PCB and mercury-containing lamp removal work.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 1.8 QUALITY ASSURANCE

### 1.8.1 Qualifications of CIH

Submit the name, address, and telephone number of the Industrial Hygienist selected to perform the duties in paragraph CERTIFIED INDUSTRIAL HYGIENIST. Submit [training certification](#) that the Industrial Hygienist is certified, including certification number and date of certification or re certification.

### 1.8.2 PCB and Lamp Removal Work Plan

Submit a job-specific plan within 20 calendar days after award of contract of the work procedures to be used in the removal, packaging, and storage of PCB-containing lighting ballasts and associated mercury-containing lamps. Include in the plan: Requirements for Personal Protective Equipment (PPE), spill cleanup procedures and equipment, eating, smoking and restroom procedures. The plan shall be approved and signed by the Certified Industrial Hygienist. Obtain approval of the plan by the Contracting Officer prior to the start of PCB and/or lamp removal work.

### 1.8.3 PCB and Lamp Disposal Plan

Submit a PCB and lamp Disposal Plan with 45 calendar days after award of contract. The PCB and Lamp Disposal Plan shall comply with applicable requirements of federal, state, and local PCB and Universal waste regulations and address:

- a. Estimated quantities of wastes to be generated, disposed of, and recycled.
- b. Names and qualifications of each Contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location. Furnish two copies of EPA and state PCB and mercury-containing lamp waste permit applications and EPA identification numbers, as required.
- c. Names and qualifications (experience and training) of personnel who will be working on-site with PCB and mercury-containing lamp wastes.
- d. Spill prevention, containment, and cleanup contingency measures to be implemented.
- e. Work plan and schedule for PCB and mercury-containing lamp waste removal, containment, storage, transportation, disposal and or recycling. Wastes shall be cleaned up and containerize daily.

## PART 2 PRODUCTS

Not used.

## PART 3 EXECUTION

### 3.1 WORK PROCEDURE

Furnish labor, materials, services, and equipment necessary for the removal of PCB containing lighting ballasts, associated mercury-containing fluorescent lamps, and high intensity discharge (HID) lamps in accordance

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

with local, state, or federal regulations. Do not expose PCBs to open flames or other high temperature sources since toxic decomposition by-products may be produced. Do not break mercury containing fluorescent lamps or high intensity discharge lamps.

### 3.1.1 Work Operations

Ensure that work operations or processes involving PCB or PCB-contaminated materials are conducted in accordance with 40 CFR 761, 40 CFR 262 40 CFR 263, and the applicable requirements of this section, including but not limited to:

- a. Obtaining suitable PCB and mercury-containing lamp storage sites.
- b. Notifying Contracting Officer prior to commencing the operation.
- c. Reporting leaks and spills to the Contracting Officer.
- d. Cleaning up spills.
- e. Inspecting PCB and PCB-contaminated items and waste containers for leaks and forwarding copies of inspection reports to the Contracting Officer.
- f. Maintaining inspection, inventory and spill records.

## 3.2 PCB SPILL CLEANUP REQUIREMENTS

### 3.2.1 PCB Spills

Immediately report to the Contracting Officer any PCB spills.

### 3.2.2 PCB Spill Control Area

Rope off an area around the edges of a PCB leak or spill and post a "PCB Spill Authorized Personnel Only" caution sign. Immediately transfer leaking items to a drip pan or other container.

### 3.2.3 PCB Spill Cleanup

40 CFR 761, subpart G. Initiate cleanup of spills as soon as possible, but no later than 24 hours of its discovery. Mop up the liquid with rags or other conventional absorbent. The spent absorbent shall be properly contained and disposed of as solid PCB waste.

### 3.2.4 Records and Certification

Document the cleanup with records of decontamination in accordance with 40 CFR 761, Section 125, Requirements for PCB Spill Cleanup. Provide test results of cleanup and [certification of decontamination](#).

## 3.3 REMOVAL

### 3.3.1 Ballasts

As ballast are removed from the lighting fixture, inspect label on ballast. Ballasts without a "No PCB" label shall be assumed to contain PCBs and containerized and disposed of as required under paragraphs STORAGE FOR DISPOSAL and DISPOSAL. If there are less than 1600 "No PCB"

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

labeled lighting ballasts, dispose of them as normal demolition debris.

### 3.3.2 Lighting Lamps

Remove lighting tubes/lamps from the lighting fixture and carefully place (unbroken) into appropriate containers (original transport boxes or equivalent). In the event of a lighting tube/lamp breaking, sweep and place waste in double plastic taped bags and dispose of as universal waste as specified herein.

### 3.4 STORAGE FOR DISPOSAL

#### 3.4.1 Storage Containers for PCBs

49 CFR 178. Store PCB in containers approved by DOT for PCB.

#### 3.4.2 Storage Containers for lamps

Store mercury containing lamps in appropriate DOT containers. The boxes shall be stored and labeled for transport in accordance with 40 CFR 273.

#### 3.4.3 Labeling of Waste Containers

Label with the following:

- a. Date the item was placed in storage and the name of the cognizant activity/building.
- b. "Caution Contains PCB," conforming to 40 CFR 761, CFR Subpart C. Affix labels to PCB waste containers.
- c. Label mercury-containing lamp waste in accordance with 40 CFR 273. Affix labels to all lighting waste containers.

### 3.5 DISPOSAL

Dispose of off Government property in accordance with EPA, DOT, and local regulations at a permitted site.

#### 3.5.1 Identification Number

Federal regulations 40 CFR 761, and 40 CFR 263 require that generators, transporters, commercial storers, and disposers of PCB waste possess U.S. EPA identification numbers. The contractor shall verify that the activity has a U.S. EPA generator identification number for use on the Uniform Hazardous Waste manifest. If not, the contractor shall advise the activity that it must file and obtain an I.D. number with EPA prior to commencement of removal work. For mercury containing lamp removal, Federal regulations 40 CFR 273 require that large quantity handlers of Universal waste (LQHUW) must provide notification of universal waste management to the appropriate EPA Region (or state director in authorized states), obtain an EPA identification number, and retain for three years records of off-site shipments of universal waste. The contractor shall verify that the activity has a U.S. EPA generator identification number for use on the Universal Waste manifest. If not, the contractor shall advise the activity that it must file and obtain an I.D. number with EPA prior to commencement of removal work.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.5.2 Transporter Certification

Comply with disposal and transportation requirements outlined in 40 CFR 761 and 40 CFR 263. Before transporting the PCB waste, sign and date the manifest acknowledging acceptance of the PCB waste from the Government. Return a signed copy to the Government before leaving the job site. Ensure that the manifest accompanies the PCB waste at all times. Submit transporter certification of notification to EPA of their PCB waste activities (EPA Form 7710-53).

#### 3.5.2.1 Certificate of Disposal and/or Recycling

40 CFR 761. Certificate for the PCBs and PCB items disposed shall include:

- a. The identity of the disposal and or recycling facility, by name, address, and EPA identification number.
- b. The identity of the PCB waste affected by the Certificate of Disposal including reference to the manifest number for the shipment.
- c. A statement certifying the fact of disposal and or recycling of the identified PCB waste, including the date(s) of disposal, and identifying the disposal process used.
- d. A certification as defined in 40 CFR 761.

#### 3.5.3 Disposal by the Government

Containerize all PCB and mercury containing waste materials and contact Maxwell AFB Environmental to arrange for drop off.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 02 84 33

### REMOVAL AND DISPOSAL OF POLYCHLORINATED BIPHENYLS (PCBs)

05/20

#### PART 1 GENERAL

##### 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

##### U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.145	Specifications for Accident Prevention Signs and Tags
29 CFR 1910.1000	Air Contaminants
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
49 CFR 171	General Information, Regulations, and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings
49 CFR 174	Carriage by Rail
49 CFR 175	Carriage by Aircraft
49 CFR 176	Carriage by Vessel
49 CFR 177	Carriage by Public Highway
49 CFR 178	Specifications for Packagings
49 CFR 179	Specifications for Tank Cars

##### 1.2 REQUIREMENTS

Perform work in accordance with 40 CFR 761 and the requirements specified herein.

##### 1.3 DEFINITIONS

###### 1.3.1 Leak

Leak or leaking means any instance in which a PCB Article, PCB Container, or PCB Equipment has any PCBs on any portion of its external surface.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 1.3.2 PCBs

PCBs as used in this specification shall mean the same as PCBs, PCB Article, PCB Article Container, PCB Container, PCB Equipment, PCB Item, PCB Transformer, PCB-Contaminated Electrical Equipment, as defined in 40 CFR 761, Section 3, Definitions.

### 1.3.3 Spill

Spill means both intentional and unintentional spills, leaks, and other uncontrolled discharges when the release results in any quantity of PCBs running off or about to run off the external surface of the equipment or other PCB source, as well as the contamination resulting from those releases.

## 1.4 QUALITY ASSURANCE

### 1.4.1 Training

Instruct employees on the dangers of PCB exposure, on respirator use, decontamination, and applicable OSHA and EPA regulations.

### 1.4.2 Certified Industrial Hygienist (CIH)

Obtain the services of an industrial hygienist certified by the American Board of Industrial Hygiene to certify training, review and approve the PCB removal plan, including determination of the need for personnel protective equipment (PPE) in performing PCB removal work.

### 1.4.3 Regulation Documents

Maintain at all times one copy each at the office and one copy each in view at the job site 29 CFR 1910.1000, 40 CFR 761, and Contractor work practices for removal, storage and disposal of PCBs.

### 1.4.4 Surveillance Personnel

Surveillance personnel may enter PCB control areas for brief periods of time provided they wear disposable polyethylene gloves and disposal polyethylene foot covers, as a minimum. Additional protective equipment may be required if respiratory hazard is involved or if skin contact with PCB is involved.

## 1.5 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-07 Certificates

Training certification

Qualifications of CIH

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

PCB Removal Work Plan

PCB Disposal Plan

Notification

Transporter Certification of notification to EPA of their PCB waste activities and EPA ID numbers

Certification of Decontamination for PCB Spill

Post Cleanup Sampling Data

Certificate of Disposal

## 1.6 EQUIPMENT

### 1.6.1 Special Clothing

Work clothes shall consist of PPE as required by OSHA regulations, including, but not limited to the following:

- a. Disposable coveralls
- b. Gloves (Disposable rubber gloves may be worn under these)
- c. Disposable foot covers (polyethylene)
- d. Chemical safety goggles
- e. Half mask cartridge respirator.

### 1.6.2 Special Clothing for Government Personnel

Provide PPE specified in paragraph SPECIAL CLOTHING to the Contracting Officer as required for inspection of the work.

### 1.6.3 PCB Spill Kit

Assemble a spill kit to include the following items:

ITEM	MINIMUM QUANTITY
1. Disposable gloves (polyethylene)	6 prs
2. Gloves with a high degree of impermeability to PCB	6 prs
3. Disposable coveralls with permeation resistance to PCB	4 ea
4. Chemical safety goggles	2 ea
5. Disposable foot covers (polyethylene)	6 prs

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

6. PCB Caution Sign: "PCB Spill--Authorized Personnel Only"	2 ea
7. Banner guard or equivalent banner material	100 feet
8. Absorbent material	
9. Blue polyethylene waste bags	5 bags
10. Cloth backed tape	5 ea
11. Area access logs, blank	1 roll
12. Brattice cloth, 6' x 6'	10 ea
13. Rags	1 piece
14. Ball point pens	20 ea
15. Herculite, 4' x 4' and 8' x 8'	2 ea and 1 ea
16. Blank metal signs and grease pencils	
17. Waste containers 55 gallon drum, may be used as container for kit	2 ea

## 1.7 QUALITY ASSURANCE

### 1.7.1 Training Certification

Submit certificates, prior to the start of work but after the main abatement submittals, signed and dated by the CIH and by each employee stating that the employee has received training. Certificates shall be organized by individual worker, not grouped by type of certificates.

### 1.7.2 Qualifications of CIH

Submit the name, address, and telephone number of the Industrial Hygienist selected to perform the duties in paragraph CERTIFIED INDUSTRIAL HYGIENIST. Submit proper documentation that the Industrial Hygienist is certified, including certification number and date of certification/recertification.

### 1.7.3 PCB Removal Work Plan

Submit a detailed job-specific plan of the work procedures to be used in the removal of PCB-containing materials, not to be combined with other hazardous abatement plans. Provide a Table of Contents for each abatement submittal which shall follow the sequence of requirements in the contract. The plan shall include a sketch showing the location, size, and details of PCB control areas, location and details of decontamination rooms, change rooms, shower facilities, and mechanical ventilation system. Include in the plan, eating, drinking, smoking and restroom procedures, interface of trades, sequencing of PCB related work, PCB disposal plan, respirators, protective equipment, and a detailed description of the

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

method of containment of the operation to ensure that PCB contamination is not spread or carried outside of the control area. Include provisions to ensure that airborne PCB concentrations of 3.10 E-08 pound per cubic feet of air are not exceeded outside of the PCB control area. Include air sampling, training and strategy, sampling methodology, frequency, duration of sampling, and qualifications of air monitoring personnel in the air sampling portion of the plan. Obtain approval of the plan prior to the start of PCB removal work.

#### 1.7.4 PCB Disposal Plan

Submit a PCB Disposal Plan within 45 calendar days after award of contract for Contracting Officer's approval. The PCB Disposal Plan shall comply with applicable requirements of Federal, State, and local PCB waste regulations and address:

- a. Identification of PCB wastes associated with the work.
- b. Estimated quantities of wastes to be generated and disposed of.
- c. Names and qualifications of each contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location and a 24-hour point of contact. Furnish two copies of permits and EPA Identification numbers.
- d. Names and qualifications (experience and training) of personnel who will be working on-site with PCB wastes.
- e. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.
- f. Spill prevention, containment, and cleanup contingency measures to be implemented.
- g. Work plan and schedule for PCB waste containment, removal and disposal. Wastes shall be cleaned up and containerized daily.

#### 1.7.5 Notification

Notify the Contracting Officer 20 days prior to the start of PCB removal work.

### PART 2 PRODUCTS

Not used.

### PART 3 EXECUTION

#### 3.1 PROTECTION

##### 3.1.1 Decontamination Room, Clean Room and Shower Facilities

- a. Provide material and labor for construction of a decontamination room, a clean room, and shower facilities. Provide rooms with doors and attach to the exit ways of PCB work areas. Rooms shall be of sufficient size to accommodate the Contractor's operation within. Existing facilities with water closets, urinals, wash basins and showers may be used if available to the Contractor. Provide portable toilet and shower facilities. Locate shower facilities between the

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

clean room and decontamination room. Provide separate clothing lockers or containers in each room to prevent contamination of street and work clothes.

- b. Remove PCB-contaminated PPE in the decontamination room. Workers shall then proceed to showers. Workers shall shower before lunch and at the end of each day's work. Hot water, towels, soap, and hygienic conditions are the responsibility of the Contractor.

### 3.1.2 PCB Control Area

Isolate PCB control area by physical boundaries to prevent unauthorized entry of personnel. Food, drink and smoking materials shall not be permitted in areas where PCBs are handled or PCB items are stored.

### 3.1.3 Personnel Protection

Workers shall wear and use PPE, as recommended by the Industrial Hygienist, upon entering a PCB control area. If PPE is not required per the CIH, specify in the PCB removal work plan.

### 3.1.4 Footwear

Work footwear shall remain inside work area until completion of the job.

### 3.1.5 Permissible Exposure Limits (PEL)

PEL for PCBs is **3.1 E-08 lb/cubic foot** on an 8-hour time weighted average basis.

### 3.1.6 Special Hazards

- a. PCBs shall not be exposed to open flames or other high temperature sources since toxic decomposition by-products may be produced.
- b. PCBs shall not be heated to temperatures of **135 degrees F** or higher without Contracting Officer's concurrence.

### 3.1.7 PCB Caution Label

**40 CFR 761**, Subpart C. Affix labels to PCB waste containers and other PCB-contaminated items. Provide label with sufficient print size to be clearly legible, with bold print on a contrasting background, displaying the following: CAUTION: Contains PCBs (Polychlorinated Biphenyls).

### 3.1.8 PCB Caution Sign

**29 CFR 1910.145**. Provide signs at approaches to PCB control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area.

## 3.2 WORK PROCEDURE

Furnish labor, materials, services, and equipment necessary for the complete removal of PCBs located at the site as indicated or specified in accordance with local, State, or Federal regulations. Package and mark PCB as required by EPA and DOT regulations and dispose of off Government property in accordance with EPA, DOT, and local regulations at a permitted site.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.2.1 No Smoking

Smoking is not permitted within 50 feet of the PCB control area. Provide "No Smoking" signs as directed by the Contracting Officer.

### 3.2.2 Work Operations

Ensure that work operations or processes involving PCB or PCB-contaminated materials are conducted in accordance with 40 CFR 761 and the applicable requirements of this section, including but not limited to:

- a. Obtaining advance approval of PCB storage sites.
- b. Notifying Contracting Officer prior to commencing the operation.
- c. Reporting leaks and spills to the Contracting Officer.
- d. Cleaning up spills.
- e. Maintaining an access log of employees working in a PCB control area and providing a copy to the Contracting Officer upon completion of the operation.
- f. Inspecting PCB and PCB-contaminated items and waste containers for leaks and forwarding copies of inspection reports to the Contracting Officer.
- g. Maintaining a spill kit as specified in paragraph PCB SPILL KIT.
- h. Maintaining inspection, inventory and spill records.

## 3.3 PCB TRANSFORMERS

### 3.3.1 Draining of Transformer Liquid

Perform work in accordance with 49 CFR 171, 49 CFR 172, 49 CFR 173, 49 CFR 174, 49 CFR 175, 49 CFR 176, 49 CFR 177, 49 CFR 178, and 49 CFR 179, Subchapter C and as specified herein. Drain the transformer, switches, and regulators of free flowing liquid prior to transportation. Place the drained liquids in DOT Spec 17E drums. The drums shall not contain more than 50 gallons of oil. If the equipment cannot be drained, then place it in DOT Spec 17C drums.

### 3.3.2 Markings

Provide drums and drained PCB-contaminated electrical equipment with caution label markings as specified in paragraph PCB CAUTION LABEL.

### 3.3.3 Laboratory Analysis

All transformers shall have a laboratory analysis for turn-in. DLA DS prefers a gas chromatograph test. The only two exceptions to this rule are:

- a. The transformer is hermetically sealed (solder sealed or fusion sealed. No access ports or openings).
- b. The name plate states that the transformer contains Pyranol,

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Interteen, etc.

Attach a copy of the lab analysis to both the DD 1348-1 and the transformer itself.

### 3.3.4 Markings

#### 3.3.4.1 Transformers, Less Than 50 ppm

Add absorbent material to absorb residue oil remaining after draining. Write the date drained on the transformer. Turn in transformers to DLA DS.

#### 3.3.4.2 Transformers, 50-499 ppm

Same procedure as transformers in the less than 50 ppm range.

#### 3.3.4.3 Transformers, Greater Than 500 ppm

Stencil date drained on the transformer. Turn in transformer to DLA DS.

#### 3.3.4.4 Drums

Stencil on DOT-approved 55 gallon drums containing PCB liquid the following:

- a. ppm
- b. Date drum filled
- c. Serial number of transformer liquid came from
- d. National Stock Number

(1) "9999-00-OIL" for <50 ppm

(2) "9999-00-CONPCB" for 50-499 ppm

(3) "9999-00-PCBOIL" for >500 ppm

Do not mix different ppms in the same drum. Drums must have a 2 inch ullage space from the top of the drum.

### 3.4 PCB REMOVAL

Select PCB removal procedure to minimize contamination of work areas with PCB or other PCB-contaminated debris/waste. Handle PCBs such that no skin contact occurs. PCB removal process should be described in the work plan.

#### 3.4.1 Confined Spaces

As feasible, do not carry out PCB handling operations in confined spaces. A confined space shall mean a space having limited means of egress and inadequate cross ventilation.

#### 3.4.2 Control Area

Establish a PCB control area around the PCB item as specified in paragraph PCB CONTROL AREA. Only personnel briefed on the elements in the paragraph TRAINING and on the handling precautions shall be allowed into the area.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 3.4.3 Exhaust Ventilation

If used, exhaust ventilation for PCB operations shall discharge to the outside and away from personnel.

#### 3.4.4 Temperatures

As feasible, handle PCBs at ambient temperatures and not at elevated temperatures.

#### 3.4.5 Solvent Cleaning

Clean contaminated tools, containers, etc., after use by rinsing three times with an appropriate solvent or by wiping down three times with a solvent wetted rag. Suggested solvents are Stoddard solvent or hexane.

#### 3.4.6 Drip Pans

Drip pans are required under portable PCB transformers and rectifiers in use or stored for use. The pans shall have a containment volume of at least one and one-half times the internal volume of PCBs in the item.

#### 3.4.7 Evacuation Procedures

Procedures shall be written for evacuation of injured workers. Aid for a seriously injured worker shall not be delayed for reasons of decontamination.

### 3.5 PCB SPILL CLEANUP REQUIREMENTS

#### 3.5.1 PCB Spills

Immediately report to the Contracting Officer any PCB spills on the ground or in the water, PCB spills in drip pans, or PCB leaks.

#### 3.5.2 PCB Spill Control Area

Rope off an area around the edges of a PCB leak or spill and post a "PCB Spill Authorized Personnel Only" caution sign. Immediately transfer leaking items to a drip pan or other container.

#### 3.5.3 PCB Spill Cleanup

[40 CFR 761](#), Subpart G. Initiate cleanup of spills as soon as possible, but no later than 48 hours of its discovery. To clean up spills, personnel shall wear the PPE prescribed in paragraph SPECIAL CLOTHING of this section. If misting, elevated temperatures or open flames are present, or if the spill is situated in a confined space, notify the Contracting Officer. Mop up the liquid with rags or other conventional absorbent. The spent absorbent shall be properly contained and disposed of as solid PCB waste.

#### 3.5.4 Records and Certification

Document the cleanup with records of decontamination in accordance with [40 CFR 761](#), Section 125, Requirements for PCB Spill Cleanup. Provide [certification of decontamination](#).

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.5.5 Sampling Requirements

Perform **post cleanup sampling** as required by **40 CFR 761**, Section 130, Sampling Requirements. Do not remove boundaries of the PCB control area until site is determined satisfactorily clean by the Contracting Officer.

### 3.6 STORAGE FOR DISPOSAL

#### 3.6.1 Storage Containers for PCBs

**49 CFR 178**. Store liquid PCBs in Department of Transportation (DOT) Specification 17E containers. Store nonliquid PCB mixtures, articles, or equipment in DOT Specification 5, 5B, or 17C containers with removable heads.

#### 3.6.2 Waste Containers

Label with the following:

- a. "Solid (or Liquid) Waste Polychlorinated Biphenyls"
- b. The PCB Caution Label, paragraph PCB CAUTION LABEL
- c. The date the item was placed in storage and the name of the cognizant activity/building.

#### 3.6.3 PCB Articles and PCB-Contaminated Items

Label with items b. through c. above.

#### 3.6.4 Approval of Storage Site

Obtain in advance Contracting Officer approval using the following criteria without exception.

- a. Adequate roof and walls to prevent rainwater from reaching the stored PCBs.
- b. An adequate floor which has continuous curbing with a minimum **6 inch** high curb. Such floor and curbing shall provide a containment volume equal to at least two times the internal volume of the largest PCB article or PCB container stored therein or 25 percent of the total internal volume of all PCB equipment or containers stored therein, whichever is greater.
- c. No drain valves, floor drains, expansion joints, sewer lines, or other openings that would permit liquids to flow from the curbed area.
- d. Floors and curbing constructed of continuous smooth and impervious materials such as portland cement, concrete or steel to prevent or minimize penetrations of PCBs.
- e. Not located at a site which is below the 100-year flood water elevation.
- f. Each storage site shall be posted with the PCB Caution Sign, paragraph PCB CAUTION SIGN.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.7 CLEANUP

Maintain surfaces of the PCB control area free of accumulations of PCBs. Restrict the spread of dust and debris; keep waste from being distributed over work area.

Do not remove the PCB control area and warning signs prior to the Contracting Officer's approval. Reclean areas showing residual PCBs.

### 3.8 DISPOSAL

Comply with disposal requirements and procedures outlined in 40 CFR 761. Do not accept PCB waste unless it is accompanied by a manifest signed by the Government. Before transporting the PCB waste, sign and date the manifest acknowledging acceptance of the PCB waste from the Government. Return a signed copy to the Government before leaving the job site. Ensure that the manifest accompanies the PCB waste at all times. Submit transporter certification of notification to EPA of their PCB waste activities.

#### 3.8.1 Certificate of Disposal

40 CFR 761. Submit to the Government within 30 days of the date that the disposal of the PCB waste identified on the manifest was completed. Certificate for the PCBs and PCB items disposed shall include:

- a. The identity of the disposal facility, by name, address, and EPA identification number.
- b. The identity of the PCB waste affected by the Certificate of Disposal including reference to the manifest number for the shipment.
- c. A statement certifying the fact of disposal of the identified PCB waste, including the date(s) of disposal, and identifying the disposal process used.
- d. A certification as defined in 40 CFR 761, Section 3.

##### 3.8.1.1 Payment Upon Furnishing Certificate of Disposal of PCBs

Payment will not be made until the certificate of disposal has been furnished to the Contracting Officer.

#### 3.8.2 Disposal by the Government

Containerize all PCB containing waste materials and contact Maxwell AFB Environmental to arrange for drop off.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 03 30 00

## CAST-IN-PLACE CONCRETE

02/19, CHG 2: 05/21

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN CONCRETE INSTITUTE (ACI)

ACI 117	(2010; Errata 2011) Specifications for Tolerances for Concrete Construction and Materials and Commentary
ACI 121R	(2008) Guide for Concrete Construction Quality Systems in Conformance with ISO 9001
ACI 301	(2016) Specifications for Structural Concrete
ACI 302.1R	(2015) Guide for Concrete Floor and Slab Construction
ACI 304.2R	(2017) Guide to Placing Concrete by Pumping Methods
ACI 304R	(2000; R 2009) Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 305.1	(2014) Specification for Hot Weather Concreting
ACI 305R	(2020) Guide to Hot Weather Concreting
ACI 306.1	(1990; R 2002) Standard Specification for Cold Weather Concreting
ACI 306R	(2016) Guide to Cold Weather Concreting
ACI 308.1	(2011) Specification for Curing Concrete
ACI SP-2	(2007; Abstract: 10th Edition) ACI Manual of Concrete Inspection
ACI SP-15	(2011) Field Reference Manual: Standard Specifications for Structural Concrete ACI 301-05 with Selected ACI References

## AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA A135.4	(1995; R 2004) Basic Hardboard
------------	--------------------------------

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4/D1.4M (2011) Structural Welding Code -  
Reinforcing Steel

ASTM INTERNATIONAL (ASTM)

ASTM A53/A53M (2020) Standard Specification for Pipe,  
Steel, Black and Hot-Dipped, Zinc-Coated,  
Welded and Seamless

ASTM A184/A184M (2019) Standard Specification for Welded  
Deformed Steel Bar Mats for Concrete  
Reinforcement

ASTM A615/A615M (2020) Standard Specification for Deformed  
and Plain Carbon-Steel Bars for Concrete  
Reinforcement

ASTM A706/A706M (2016) Standard Specification for  
Low-Alloy Steel Deformed and Plain Bars  
for Concrete Reinforcement

ASTM A934/A934M (2016) Standard Specification for  
Epoxy-Coated Prefabricated Steel  
Reinforcing Bars

ASTM A970/A970M (2018) Standard Specification for Headed  
Steel Bars for Concrete Reinforcement

ASTM A1044/A1044M (2016a) Standard Specification for Steel  
Stud Assemblies for Shear Reinforcement of  
Concrete

ASTM A1064/A1064M (2017) Standard Specification for  
Carbon-Steel Wire and Welded Wire  
Reinforcement, Plain and Deformed, for  
Concrete

ASTM C31/C31M (2021a) Standard Practice for Making and  
Curing Concrete Test Specimens in the Field

ASTM C33/C33M (2018) Standard Specification for Concrete  
Aggregates

ASTM C39/C39M (2021) Standard Test Method for  
Compressive Strength of Cylindrical  
Concrete Specimens

ASTM C42/C42M (2020) Standard Test Method for Obtaining  
and Testing Drilled Cores and Sawed Beams  
of Concrete

ASTM C78/C78M (2021) Standard Test Method for Flexural  
Strength of Concrete (Using Simple Beam  
with Third-Point Loading)

ASTM C94/C94M (2021b) Standard Specification for  
Ready-Mixed Concrete

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

ASTM C136/C136M	(2019) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C138/C138M	(2017a) Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
ASTM C143/C143M	(2020) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150/C150M	(2021) Standard Specification for Portland Cement
ASTM C172/C172M	(2017) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C173/C173M	(2016) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C231/C231M	(2017a) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260/C260M	(2010a; R 2016) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C311/C311M	(2018) Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete
ASTM C494/C494M	(2019) Standard Specification for Chemical Admixtures for Concrete
ASTM C595/C595M	(2021) Standard Specification for Blended Hydraulic Cements
ASTM C618	(2019) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C803/C803M	(2018) Standard Test Method for Penetration Resistance of Hardened Concrete
ASTM C845/C845M	(2018) Standard Specification for Expansive Hydraulic Cement
ASTM C873/C873M	(2015) Standard Test Method for Compressive Strength of Concrete Cylinders Cast in Place in Cylindrical Molds
ASTM C900	(2015) Standard Test Method for Pullout Strength of Hardened Concrete
ASTM C920	(2018) Standard Specification for Elastomeric Joint Sealants
ASTM C989/C989M	(2018a) Standard Specification for Slag

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### Cement for Use in Concrete and Mortars

ASTM C1012/C1012M	(2018b) Standard Test Method for Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate Solution
ASTM C1017/C1017M	(2013; E 2015) Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1074	(2019) Standard Practice for Estimating Concrete Strength by the Maturity Method
ASTM C1077	(2017) Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1107/C1107M	(2020) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C1157/C1157M	(2020a) Standard Performance Specification for Hydraulic Cement
ASTM C1218/C1218M	(2020c) Standard Test Method for Water-Soluble Chloride in Mortar and Concrete
ASTM C1260	(2021) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C1293	(2008; R 2015) Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction
ASTM C1567	(2021) Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
ASTM C1602/C1602M	(2018) Standard Specification for Mixing Water Used in Production of Hydraulic Cement Concrete
ASTM C1778	(2016) Standard Guide for Reducing the Risk of Deleterious Alkali-Aggregate Reaction in Concrete
ASTM D412	(2016) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D471	(2016a) Standard Test Method for Rubber Property - Effect of Liquids
ASTM D1751	(2004; E 2013; R 2013) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Structural Construction (Nonextruding and  
Resilient Bituminous Types)

ASTM D1752	(2018) Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D2628	(1991; R 2016) Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements
ASTM D2835	(1989; R 2017) Standard Specification for Lubricant for Installation of Preformed Compression Seals in Concrete Pavements
ASTM D5759	(2012; R 2020) Characterization of Coal Fly Ash and Clean Coal Combustion Fly Ash for Potential Uses
ASTM D6690	(2015) Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
ASTM E96/E96M	(2021) Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials
ASTM E329	(2020) Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection
ASTM E1155	(2020) Standard Test Method for Determining Floor Flatness and Floor Levelness Numbers
ASTM E1643	(2018a) Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
ASTM E1745	(2017) Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs

#### CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI 10MSP	(2018) Manual of Standard Practice
CRSI RB4.1	(2016) Supports for Reinforcement Used in Concrete

#### NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST PS 1	(2009) DOC Voluntary Product Standard PS 1-07, Structural Plywood
-----------	--

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 104	(1980) Method of Calculation of the Fineness Modulus of Aggregate
COE CRD-C 513	(1974) Corps of Engineers Specifications for Rubber Waterstops
COE CRD-C 572	(1974) Corps of Engineers Specifications for Polyvinylchloride Waterstops

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED NC	(2009) Leadership in Energy and Environmental Design(tm) New Construction Rating System
---------	---

1.2 DEFINITIONS

- a. "Cementitious material" as used herein must include all portland cement, pozzolan, fly ash, and slag cement.
- b. "Exposed to public view" means situated so that it can be seen from eye level from a public location after completion of the building. A public location is accessible to persons not responsible for operation or maintenance of the building.
- c. "Chemical admixtures" are materials in the form of powder or fluids that are added to the concrete to give it certain characteristics not obtainable with plain concrete mixes.
- d. "Supplementary cementing materials" (SCM) include coal fly ash, slag cement, natural or calcined pozzolans, and ultra-fine coal ash when used in such proportions to replace the portland cement that result in improvement to sustainability and durability and reduced cost.
- e. "Design strength" (f'c) is the specified compressive strength of concrete at time(s) specified in this section to meet structural design criteria.
- f. "Mass Concrete" is any concrete system that approaches a maximum temperature of 158 degrees F within the first 72 hours of placement. In addition, it includes all concrete elements with a section thickness of 3 feet or more regardless of temperature.
- g. "Mixture proportioning" is the process of designing concrete mixture proportions to enable it to meet the strength, service life and constructability requirements of the project while minimizing the initial and life-cycle cost.
- h. "Mixture proportions" are the masses or volumes of individual ingredients used to make a unit measure (cubic meter or cubic yard) of concrete.
- i. "Pozzolan" is a siliceous or siliceous and aluminous material, which in itself possesses little or no cementitious value but will, in finely divided form and in the presence of moisture, chemically react with calcium hydroxide at ordinary temperatures to form compounds possessing cementitious properties.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- j. "Workability (or consistence)" is the ability of a fresh (plastic) concrete mix to fill the form/mould properly with the desired work (vibration) and without reducing the concrete's quality. Workability depends on water content, chemical admixtures, aggregate (shape and size distribution), cementitious content and age (level of hydration).

### 1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-01 Preconstruction Submittals

Concrete Curing Plan  
Quality Control Plan; G  
Quality Control Personnel Certifications; G  
Quality Control Organizational Chart  
Laboratory Accreditation; G  
Form Removal Schedule; G  
Maturity Method Data

#### SD-02 Shop Drawings

Formwork  
Reinforcing Steel; G

#### SD-03 Product Data

Joint Sealants; (LEED NC)  
Joint Filler; (LEED NC)  
Formwork Materials  
Recycled Aggregate Materials; (LEED NC)  
Cementitious Materials; (LEED NC)  
Vapor Retarder  
Concrete Curing Materials  
Reinforcement; (LEED NC)  
Admixtures  
Mechanical Reinforcing Bar Connectors

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Waterstops

Biodegradable Form Release Agent

Pumping Concrete

Finishing Plan

Nonshrink Grout

SD-05 Design Data

Concrete Mix Design; G

SD-06 Test Reports

Concrete Mix Design; G

Fly Ash

Pozzolan

Slag Cement

Aggregates

Tolerance Report

Compressive Strength Tests; G

Unit Weight of Structural Concrete

Chloride Ion Concentration

Air Content

Slump Tests

Water

SD-07 Certificates

Reinforcing Bars

Welder Qualifications

VOC Content for Form Release Agents, Curing Compounds, and  
Concrete Penetrating Sealers

Safety Data Sheets

Field Testing Technician and Testing Agency

SD-08 Manufacturer's Instructions

Joint Sealants; (LEED NC)

Curing Compound

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.4 MODIFICATION OF REFERENCES

Accomplish work in accordance with ACI publications except as modified herein. Consider the advisory or recommended provisions to be mandatory. Interpret reference to the "Building Official," the "Structural Engineer," and the "Architect/Engineer" to mean the Contracting Officer.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

Follow ACI 301, ACI 304R and ASTM A934/A934M requirements and recommendations. Do not deliver concrete until vapor retarder, forms, reinforcement, embedded items, and chamfer strips are in place and ready for concrete placement. Do not store concrete curing compounds or sealers with materials that have a high capacity to adsorb volatile organic compound (VOC) emissions. Do not store concrete curing compounds or sealers in occupied spaces.

##### 1.5.1 Reinforcement

Store reinforcement of different sizes and shapes in separate piles or racks raised above the ground to avoid excessive rusting. Protect from contaminants such as grease, oil, and dirt. Ensure bar sizes can be accurately identified after bundles are broken and tags removed.

#### 1.6 QUALITY ASSURANCE

##### 1.6.1 Design Data

##### 1.6.1.1 Concrete Mix Design

Sixty days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Submit a complete list of materials including type; brand; source and amount of cement, supplementary cementitious materials, and admixtures; and applicable reference specifications. Submit mill test and all other test for cement, supplementary cementitious materials, aggregates, and admixtures. Provide documentation of maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained verses sieve size. Provide mix proportion data using at least three different water-cementitious material ratios for each type of mixture, which produce a range of strength encompassing those required for each type of concrete required. If source material changes, resubmit mix proportion data using revised source material. Provide only materials that have been proven by trial mix studies to meet the requirements of this specification, unless otherwise approved in writing by the Contracting Officer. Indicate clearly in the submittal where each mix design is used when more than one mix design is submitted. Resubmit data on concrete components if the qualities or source of components changes. For previously approved concrete mix designs used within the past twelve months, the previous mix design may be re-submitted without further trial batch testing if accompanied by material test data conducted within the last six months. Obtain mix design approval from the contracting officer prior to concrete placement.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 1.6.2 Shop Drawings

### 1.6.2.1 Formwork

Drawings showing details of formwork including, but not limited to; joints, supports, studding and shoring, and sequence of form and shoring removal. Indicate placement schedule, construction, location and method of forming control joints. Include locations of inserts, conduit, sleeves and other embedded items. Reproductions of contract drawings are unacceptable. Submit **form removal schedule** indicating element and minimum length of time for form removal.

Design, fabricate, erect, support, brace, and maintain formwork so that it is able to support, without failure, all vertical and lateral loads that may reasonably be anticipated to be applied to the formwork.

### 1.6.2.2 Reinforcing Steel

Indicate bending diagrams, assembly diagrams, splicing and laps of bars, shapes, dimensions, and details of bar reinforcing, accessories, and concrete cover. Do not scale dimensions from structural drawings to determine lengths of reinforcing bars. Reproductions of contract drawings are unacceptable.

## 1.6.3 Control Submittals

### 1.6.3.1 Concrete Curing Plan

Submit proposed materials, methods and duration for curing concrete elements in accordance with **ACI 308.1**. **Provide wet curing for areas to receive epoxy coating.**

### 1.6.3.2 Pumping Concrete

Submit proposed materials and methods for pumping concrete. Submittal must include mix designs, pumping equipment including type of pump and size and material for pipe, and maximum length and height concrete is to be pumped.

### 1.6.3.3 Finishing Plan

Submit proposed material and procedures to be used in obtaining the finish for the floors. Include qualification of person to be used for obtaining floor tolerance measurement, description of measuring equipment to be used, and a sketch showing lines and locations the measuring equipment will follow.

### 1.6.3.4 VOC Content for form release agents, curing compounds, and concrete penetrating sealers

Submit certification for the form release agent, curing compounds, and concrete penetrating sealers that indicate the VOC content of each product.

### 1.6.3.5 Safety Data Sheets

Submit Safety Data Sheets (SDS) for all materials that are regulated for hazardous health effects. SDS must be readily accessible during each work shift to employees when they are at the construction site.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.6.4 Test Reports

##### 1.6.4.1 Fly Ash and Pozzolan

Submit test results in accordance with [ASTM C618](#) for fly ash and pozzolan. Submit test results performed within 6 months of submittal date.

##### 1.6.4.2 Slag Cement

Submit test results in accordance with [ASTM C989/C989M](#) for slag cement. Submit test results performed within 6 months of submittal date.

##### 1.6.4.3 Aggregates

Submit test results in accordance with [ASTM C33/C33M](#) and [ASTM C1293](#) or [ASTM C1567](#) as required in the paragraph titled ALKALI-AGGREGATE REACTION.

#### 1.6.5 Quality Control Plan

Develop and submit for approval a concrete quality control program in accordance with the guidelines of [ACI 121R](#) and as specified herein. The plan must include approved laboratories. Provide direct oversight for the concrete qualification program inclusive of associated sampling and testing. All quality control reports must be provided to the Contracting Officer, Quality Manager and Concrete Supplier. Maintain a copy of [ACI SP-15](#) and [CRSI 10MSP](#) at project site.

#### 1.6.6 Quality Control Personnel Certifications

The Contractor must submit for approval the responsibilities of the various quality control personnel, including the names and qualifications of the individuals in those positions and a [quality control organizational chart](#) defining the quality control hierarchy and the responsibility of the various positions. Quality control personnel must be employed by the Contractor.

Submit American Concrete Institute certification for the following:

- a. CQC personnel responsible for inspection of concrete operations.
- b. Lead Foreman or Journeyman of the Concrete Placing, Finishing, and Curing Crews.
- c. Field Testing Technicians: ACI Concrete Field Testing Technician, Grade I.

##### 1.6.6.1 Quality Manager Qualifications

The quality manager must hold a current license as a professional engineer in a U.S. state or territory with experience on at least five similar projects. Evidence of extraordinary proven experience may be considered by the Contracting Officer as sufficient to act as the Quality Manager.

##### 1.6.6.2 Field Testing Technician and Testing Agency

Submit data on qualifications of proposed testing agency and technicians for approval by the Contracting Officer prior to performing testing on concrete.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- a. Work on concrete under this contract must be performed by an ACI Concrete Field Testing Technician Grade 1 qualified in accordance with [ACI SP-2](#) or equivalent. Equivalent certification programs must include requirements for written and performance examinations as stipulated in [ACI SP-2](#).
- b. Testing agencies that perform testing services on reinforcing steel must meet the requirements of [ASTM E329](#).
- c. Testing agencies that perform testing services on concrete materials must meet the requirements of [ASTM C1077](#).

#### 1.6.7 Laboratory Qualifications for Concrete Qualification Testing

The concrete testing laboratory must have the necessary equipment and experience to accomplish required testing. The laboratory must meet the requirements of [ASTM C1077](#) and be Cement and Concrete Reference Laboratory (CCRL) inspected.

#### 1.6.8 Laboratory Accreditation

Laboratory and testing facilities must be provided by and at the expense of the Contractor. The laboratories performing the tests must be accredited in accordance with [ASTM C1077](#), including [ASTM C78/C78M](#) and [ASTM C1260](#). The accreditation must be current and must include the required test methods, as specified. Furthermore, the testing must comply with the following requirements:

- a. Aggregate Testing and Mix Proportioning: Aggregate testing and mixture proportioning studies must be performed by an accredited laboratory and under the direction of a registered professional engineer in a U.S. state or territory competent in concrete materials.
- b. Acceptance Testing: Furnish all materials, labor, and facilities required for molding, curing, testing, and protecting test specimens at the site and in the laboratory. Furnish and maintain boxes or other facilities suitable for storing and curing the specimens at the site while in the mold within the temperature range stipulated by [ASTM C31/C31M](#).
- c. Contractor Quality Control: All sampling and testing must be performed by an approved, onsite, independent, accredited laboratory.

#### 1.7 ENVIRONMENTAL REQUIREMENTS

Provide space ventilation according to material manufacturer recommendations, at a minimum, during and following installation of concrete curing compound and sealer. Maintain one of the following ventilation conditions during the curing period or for 72 hours after installation:

- a. Supply 100 percent outside air 24 hours a day.
- b. Supply airflow at a rate of 6 air changes per hour, when outside temperatures are between [55 degrees F](#) and [84 degrees F](#) and humidity is between 30 percent and 60 percent.
- c. Supply airflow at a rate of 1.5 air changes per hour, when outside air conditions are not within the range stipulated above.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.7.1 Submittals for Environmental Performance

- a. Provide data indication the percentage of post-industrial pozzolan (fly ash, slag cement) cement substitution as a percentage of the full product composite by weight.
- b. Provide data indicating the percentage of post-industrial and post-consumer recycled content aggregate.
- c. Provide product data indicating the percentage of post-consumer recycled steel content in each type of steel reinforcement as a percentage of the full product composite by weight.
- d. Provide product data stating the location where all products were manufactured
- e. For projects using FSC certified formwork, provide chain-of-custody documentation for all certified wood products.
- f. For projects using reusable formwork, provide data showing how formwork is reused.
- g. Provide SDS product information data showing that form release agents meet any environmental performance goals such as using vegetable and soy based products.
- h. Provide SDS product information data showing that concrete adhesives meet any environmental performance goals including low emitting, low volatile organic compound products.

#### 1.8 SUSTAINABLE DESIGN REQUIREMENTS

Not Used.

#### 1.9 QUALIFICATIONS FOR WELDING WORK

Welding procedures must be in accordance with AWS D1.4/D1.4M.

Verify that Welder qualifications are in accordance with AWS D1.4/D1.4M for welding of reinforcement or under an equivalent qualification test approved in advance. Welders are permitted to do only the type of welding for which each is specifically qualified.

### PART 2 PRODUCTS

#### 2.1 FORMWORK MATERIALS

- a. Form-facing material in contact with concrete must be lumber, plywood, tempered concrete-form-grade hardboard, metal, plastic, or treated paper that creates specified appearance and texture of concrete surface. Submit product information on proposed form-facing materials if different from that specified herein.
- b. Design formwork, shores, reshores, and backshores to support loads transmitted to them and to comply with applicable building code requirements.
- c. Design formwork and shoring for load redistribution resulting from

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

stressing of post-tensioned reinforcement. Ensure that formwork allows movement resulting from application of prestressing force.

- d. Design formwork to withstand pressure resulting from placement and vibration of concrete and to maintain specified tolerances.
- e. Design formwork to accommodate waterstop materials in joints at locations indicated in Contract Documents.
- f. Provide temporary openings in formwork if needed to facilitate cleaning and inspection.
- g. Design formwork joints to inhibit leakage of mortar.
- h. Limit deflection of facing materials for concrete surfaces exposed to view to 1/240 of center-to-center spacing of facing supports.
- i. Do not use earth cuts as forms for vertical or sloping surfaces.
- j. Submit product information on proposed form-facing materials if different from that specified herein.
- k. Submit manufacturer's product data on form liner proposed for use with each formed surface.

#### 2.1.1.1 Wood Forms

Use lumber as specified in Section 06 10 00 ROUGH CARPENTRY and as follows. Provide lumber that is square edged or tongue-and-groove boards, free of raised grain, knotholes, or other surface defects. Provide plywood that complies with NIST PS 1, B-B concrete form panels or better or AHA A135.4, hardboard for smooth form lining. Submit data verifying that composite wood products contain no urea formaldehyde resins. Virgin wood used must be FSC-certified.

##### 2.1.1.1.1 Concrete Form Plywood (Standard Rough)

Provide plywood that conforms to NIST PS 1, B-B, concrete form, not less than 5/8-inch thick.

##### 2.1.1.1.2 Overlaid Concrete Form Plywood (Standard Smooth)

Provide plywood that conforms to NIST PS 1, B-B, high density form overlay, not less than 5/8-inch thick.

#### 2.1.2 Plastic Forms

Plastic lumber as specified in Section 06 10 00 ROUGH CARPENTRY. Provide plastic forms that contain a minimum of 50 percent post-consumer recycled content, or a minimum of 50 percent post-industrial recycled content.

#### 2.1.3 Steel Forms

Provide steel form surfaces that do not contain irregularities, dents, or sags.

### 2.2 FORMWORK ACCESSORIES

- a. Use commercially manufactured formwork accessories, including ties and

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

hangers.

- b. Form ties and accessories must not reduce the effective cover of the reinforcement.

#### 2.2.1 Form Ties

- a. Use form ties with ends or end fasteners that can be removed without damage to concrete.
- b. Where indicated in Contract Documents, use form ties with integral water barrier plates or other acceptable positive water barriers in walls.
- c. The breakback distance for ferrous ties must be at least 2 in. for Surface Finish-2.0 or Surface Finish-3.0, as defined in ACI 301.
- d. If the breakback distance is less than 3/4 in., use coated or corrosion-resistant ties.
- e. Submit manufacturer's data sheet on form ties.

#### 2.2.2 Waterstops

Submit manufacturer's data sheet on waterstop materials and splices.

##### 2.2.2.1 PVC Waterstop

Polyvinylchloride waterstops must conform to COE CRD-C 572.

##### 2.2.2.2 Rubber Waterstop

Rubber waterstops must conform to COE CRD-C 513.

##### 2.2.2.3 Thermoplastic Elastomeric Rubber Waterstop

Thermoplastic elastomeric rubber waterstops must conform to ASTM D471.

##### 2.2.2.4 Hydrophilic Waterstop

Swellable strip type compound of polymer modified chloroprene rubber that swells upon contact with water must conform to the following requirements when tested in accordance to ASTM D412: Tensile strength 420 psi minimum; ultimate elongation 600 percent minimum. Hardness must be 50 minimum on the type A durometer and the volumetric expansion ratio in distilled water at 70 degrees F must be 3 to 1 minimum.

#### 2.2.3 Biodegradable Form Release Agent

- a. Provide form release agent that is colorless, biodegradable, and water-based, with a low (maximum of 55 grams/liter (g/l)) VOC content.
- b. Provide product that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
- c. Provide form release agent that reduces formwork moisture absorption, and does not contain diesel fuel, petroleum-based lubricating oils, waxes, or kerosene. Submit documentation indicating type of biobased

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

material in product and biobased content. Indicate relative dollar value of biobased content products to total dollar value of products included in project.

- d. Submit manufacturer's product data on formwork release agent for use on each form-facing material.

#### 2.2.4 Chamfer Materials

Use lumber materials with dimensions of 3/4 x 3/4 in.

#### 2.2.5 Construction and movement joints

- a. Submit details and locations of construction joints in accordance with the requirements herein.
- b. Locate construction joints within middle one-third of spans of slabs, beams, and girders. If a beam intersects a girder within the middle one-third of girder span, the distance between the construction joint in the girder and the edge of the beam must be at least twice the width of the larger member.
- c. For members with post-tensioning tendons, locate construction joints where tendons pass through centroid of concrete section.
- d. Locate construction joints in walls and columns at underside of slabs, beams, or girders and at tops of footings or slabs.
- e. Make construction joints perpendicular to main reinforcement.
- f. Provide movement joints where indicated in Contract Documents or in accepted alternate locations.
- g. Submit location and detail of movement joints if different from those indicated in Contract Documents.
- h. Submit manufacturer's data sheet on expansion joint materials.
- i. Provide keyways where indicated in Contract Documents. Longitudinal keyways indicated in Contract Documents must be at least 1-1/2 in. deep, measured perpendicular to the plane of the joint.

#### 2.2.6 Other Embedded items

Use sleeves, inserts, anchors, and other embedded items of material and design indicated in Contract Documents.

### 2.3 CONCRETE MATERIALS

#### 2.3.1 Cementitious Materials

##### 2.3.1.1 Portland Cement

- a. Unless otherwise specified, provide cement that conforms to ASTM C150/C150M Type I or II.
- b. Use one brand and type of cement for formed concrete having exposed-to-view finished surfaces.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- c. For portland cement manufactured in a kiln fueled by hazardous waste, maintain a record of source for each batch. Supplier must certify that no hazardous waste is used in the fuel mix or raw materials, **or** must certify that the hazardous waste is neutralized by the manufacturing process and that no additional pollutants are discharged.
- d. Submit information along with evidence demonstrating compliance with referenced standards. Submittals must include types of cementitious materials, manufacturing locations, shipping locations, and certificates showing compliance.
- e. Cementitious materials must be stored and kept dry and free from contaminants.

#### 2.3.1.2 Fly Ash

- a. **ASTM C618**, Class F, except that the maximum allowable loss on ignition must not exceed 6 percent.
- b. If fly ash is used it shall range from 15 to 30 percent by weight of cementitious material, provided the fly ash does not reduce the amount of cement in the concrete mix below the minimum requirements of local building codes. Where the use of fly ash cannot meet the minimum level, it shall not be used. Report the chemical analysis of the fly ash in accordance with **ASTM C311/C311M**. Evaluate and classify fly ash in accordance with **ASTM D5759**.

#### 2.3.1.3 Slag Cement

**ASTM C989/C989M**, Grade 100.

#### 2.3.1.4 Other Supplementary Cementitious Materials

Natural pozzolan must be raw or calcined and conform to **ASTM C618**, Class N, including the optional requirements for uniformity and effectiveness in controlling ASR and must have an ignition loss not exceeding 3 percent. Class N pozzolan for use in mitigating ASR must have a Calcium Oxide (CaO) content of less than 13 percent and total equivalent alkali content less than 3 percent.

#### 2.3.2 Water

- a. Water or ice must comply with the requirements of **ASTM C1602/C1602M**.
- b. Minimize the amount of water in the mix. Improve workability by adjusting the grading of the aggregate and using admixture rather than by adding water.
- c. Water must be potable; free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete.
- d. Protect mixing water and ice from contamination during storage and delivery.
- e. Submit test report showing water complies with **ASTM C1602/C1602M**.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 2.3.3 Aggregate

#### 2.3.3.1 Normal-Weight Aggregate

- a. Aggregates must conform to [ASTM C33/C33M](#).
- b. Aggregates used in concrete must be obtained from the same sources and have the same size range as aggregates used in concrete represented by submitted field test records or used in trial mixtures.
- c. Provide sand that is at least 50 percent natural sand.
- d. Store and handle aggregate in a manner that will avoid segregation and prevents contamination by other materials or other sizes of aggregates. Store aggregates in locations that will permit them to drain freely. Do not use aggregates that contain frozen lumps.
- e. Submit types, pit or quarry locations, producers' names, aggregate supplier statement of compliance with [ASTM C33/C33M](#), and [ASTM C1293](#) expansion data not more than 18 months old.

#### 2.3.3.2 Recycled Aggregate Materials

Use a minimum of 25 percent recycled aggregate, depending on local availability and conforming to requirements of the mix design. Recycled aggregate to include: recovered stone that meets the aggregate requirements specified. Submit recycled material request with the aggregate certification submittals and do not use until approved by the Contracting Officer.

#### 2.3.4 Admixtures

- a. Chemical admixtures must conform to [ASTM C494/C494M](#).
- b. Air-entraining admixtures must conform to [ASTM C260/C260M](#).
- c. Chemical admixtures for use in producing flowing concrete must conform to [ASTM C1017/C1017M](#).
- d. Do not use calcium chloride admixtures.
- e. Use a corrosion-inhibiting admixture for concrete classified under exposure category C1 [or](#) C2. Use an ASR-inhibiting admixture for concrete containing aggregate susceptible to ASR.
- f. Admixtures used in concrete must be the same as those used in the concrete represented by submitted field test records or used in trial mixtures.
- g. Protect stored admixtures against contamination, evaporation, or damage.
- h. To ensure uniform distribution of constituents, provide agitating equipment for admixtures used in the form of suspensions or unstable solutions. Protect liquid admixtures from freezing and from temperature changes that would adversely affect their characteristics.
- i. Submit types, brand names, producers' names, manufacturer's technical data sheets, and certificates showing compliance with standards

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

required herein.

## 2.4 MISCELLANEOUS MATERIALS

### 2.4.1 Concrete Curing Materials

Provide concrete curing material in accordance with [ACI 301](#) Section 5 and [ACI 308.1](#) Section 2. Submit product data for concrete curing compounds. Submit manufactures instructions for placement of curing compound.

### 2.4.2 Nonshrink Grout

Nonshrink grout in accordance with [ASTM C1107/C1107M](#).

### 2.4.3 Expansion/Contraction Joint Filler

[ASTM D1751](#) or [ASTM D1752](#) Type I or Type II. Material must be 1/2 inch thick, unless otherwise indicated.

### 2.4.4 Joint Sealants

Submit manufacturer's product data, indicating VOC content.

#### 2.4.4.1 Horizontal Surfaces, 3 Percent Slope, Maximum

[ASTM D6690](#) or [ASTM C920](#), Type M, Class 25, Use T.

#### 2.4.4.2 Vertical Surfaces Greater Than 3 Percent Slope

[ASTM C920](#), Type M, Grade NS, Class 25, Use T.

#### 2.4.4.3 Preformed Polychloroprene Elastomeric Type

[ASTM D2628](#).

#### 2.4.4.4 Lubricant for Preformed Compression Seals

[ASTM D2835](#).

### 2.4.5 Vapor Retarder

[ASTM E1745](#) Class C polyethylene sheeting, minimum 10 mil thickness or other equivalent material with a maximum permeance rating of 0.04 perms per [ASTM E96/E96M](#).

Consider plastic vapor retarders and adhesives with a high recycled content, low toxicity low VOC (Volatile Organic Compounds) levels.

### 2.4.6 Dovetail Anchor Slot

Preformed metal slot approximately 1 inch by 1 inch of not less than 22 gage galvanized steel cast in concrete. Coordinate actual size and throat opening with dovetail anchors and provide with removable filler material.

## 2.5 CONCRETE MIX DESIGN

### 2.5.1 Properties and Requirements

- a. Use materials and material combinations listed in this section and the

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

contract documents.

- b. Cementitious material content must be adequate for concrete to satisfy the specified requirements for strength, w/cm, durability, and finishability described in this section and the contract documents.

The minimum cementitious material content for concrete used in floors must meet the following requirements:

Nominal maximum size of aggregate, in.	Minimum cementitious material content, pounds per cubic yard
1-1/2	470
1	520
3/4	540
3/8	610

- c. Selected target slump must meet the requirements this section, the contract documents, and must not exceed 9 in. Concrete must not show visible signs of segregation.
- d. The target slump must be enforced for the duration of the project. Determine the slump by ASTM C143/C143M. Slump tolerances must meet the requirements of ACI 117.
- e. The nominal maximum size of coarse aggregate for a mixture must not exceed three-fourths of the minimum clear spacing between reinforcement, one-fifth of the narrowest dimension between sides of forms, or one-third of the thickness of slabs or toppings.
- f. Concrete must be air entrained for members assigned to Exposure Class F1, F2, or F3. The total air content must be in accordance with the requirements of the paragraph titled DURABILITY.
- g. Measure air content at the point of delivery in accordance with ASTM C173/C173M or ASTM C231/C231M.
- h. Concrete for slabs to receive a hard-troweled finish must not contain an air-entraining admixture or have a total air content greater than 3 percent.
- i. Concrete properties and requirements for each portion of the structure are specified in the table below. Refer to the paragraph titled DURABILITY for more details on exposure categories and their requirements.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

	Minimum $f'c$ psi	Exposure Categories^	Miscellaneous Requirements
Footings, grade beams, all concrete not specifically listed	4500 at 28 days	S1, C1, W1, F2	Max. slump: 6 in.  Nominal maximum aggregate size must be 1 in.
Elevated slabs	4000 at 28 days	F0, S0, W0, C0	Nominal maximum aggregate 3/4 in.
Beams and interior concrete slabs on ground and walls	4000 at 28 days	S0, C0, W0, F0	Nominal maximum aggregate size 1 in.

## 2.5.2 Durability

### 2.5.2.1 Alkali-Aggregate Reaction

Do not use any aggregate susceptible to alkali-carbonate reaction (ACR). Use one of the three options below for qualifying concrete mixtures to reduce the potential of alkali-silica reaction (ASR):

- a. For each aggregate used in concrete, the expansion result determined in accordance with ASTM C1293 must not exceed 0.04 percent at one year.
- b. For each aggregate used in concrete, the expansion result of the aggregate and cementitious materials combination determined in accordance with ASTM C1567 must not exceed 0.10 percent at an age of 16 days.
- c. Alkali content in concrete (LBA) must not exceed 4 pounds per cubic yard for moderately reactive aggregate or 3 pounds per cubic yard for highly reactive aggregate. Reactivity must be determined by testing in accordance with ASTM C1293 and categorized in accordance with ASTM C1778. Alkali content is calculated as follows:  

$$LBA = (\text{cement content, pounds per cubic yard}) \times (\text{equivalent alkali content of portland cement in percent}/100 \text{ percent})$$

### 2.5.2.2 Freezing and Thawing Resistance

- a. Provide concrete meeting the following requirements based on exposure class assigned to members for freezing-and-thawing exposure in Contract Documents:

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Exposure class	Maximum w/cm*	Minimum $f'c$ , psi	Air content	Additional Requirements
F0	N/A	2500	N/A	
F1	0.55	3500	Depends on aggregate size	N/A
F2	0.45	4500	Depends on aggregate size	See limits on maximum cementitious material by mass
F3	0.40	5000	Depends on aggregate size	See limits on maximum cementitious material by mass
F3 plain concrete	0.45	4500	Depends on aggregate size	See limits on maximum cementitious material by mass

- b. Concrete must be air entrained for members assigned to Exposure Class F1, F2, or F3. The total air content must meet the requirements of the following table:

Nominal maximum aggregate size, in.	Total air content, percent**	
	Exposure Class F2 and F3	Exposure Class F1
3/8	7.5	6.0
1/2	7.0	5.5
3/4	6.0	5.0
1	6.0	4.5
1-1/2	5.5	4.5
2	5.0	4.0

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Nominal maximum aggregate size, in.	Total air content, percent*^	
	Exposure Class F2 and F3	Exposure Class F1
3	5.5	3.5

\*Tolerance on air content as delivered must be plus/minus 1.5 percent.

^For f'c greater than 5000 psi, reducing air content by 1.0 percentage point is acceptable.

- c. Submit documentation verifying compliance with specified requirements.
- d. For sections of the structure that are assigned Exposure Class F3, submit certification on cement composition verifying that concrete mixture meets the requirements of the following table:

Cementitious material	Maximum percent of total cementitious material by mass*
Fly ash or other pozzolans conforming to ASTM C618	25
Slag cement conforming to ASTM C989/C989M	50
Total of fly ash or other pozzolans and slag cement	50^

\*Total cementitious material also includes ASTM C150/C150M, ASTM C595/C595M, ASTM C845/C845M, and ASTM C1157/C1157M cement. The maximum percentages above must include:

- i. Fly ash or other pozzolans present in ASTM C1157/C1157M or ASTM C595/C595M Type IP blended cement.
- ii. Slag cement present in ASTM C1157/C1157M or ASTM C595/C595M Type IS blended cement.

^Fly ash or other pozzolans must constitute no more than 25 percent of the total mass of the cementitious materials.

#### 2.5.2.3 Corrosion and Chloride Content

- a. Provide concrete meeting the requirements of the following table based on the exposure class assigned to members requiring protection against reinforcement corrosion in Contract Documents.
- b. Submit documentation verifying compliance with specified requirements.
- c. Water-soluble chloride ion content contributed from constituents including water, aggregates, cementitious materials, and admixtures must be determined for the concrete mixture by ASTM C1218/C1218M at age between 28 and 42 days.
- d. The maximum water-soluble chloride ion (Cl-) content in concrete, percent by mass of cement is as follows:

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Exposure class	Maximum w/cm*	Minimum f'c, psi	Maximum water-soluble chloride ion (CL-) content in concrete, percent by mass of cement
Reinforced concrete			
C0	N/A	2500	1.00
C1	N/A	2500	0.30
C2	0.4	5000	0.15
Prestressed concrete			
C0	N/A	2500	0.06
C1	N/A	2500	0.06
C2	0.4	5000	0.06

#### 2.5.2.4 Sulfate Resistance

- a. Provide concrete meeting the requirements of the following table based on the exposure class assigned to members for sulfate exposure.

Exposure class	Maximum w/cm	Minimum f'c, psi	Required cementitious materials-types			Calcium chloride admixture
			ASTM C150/C150M	ASTM C595/C595M	ASTM C1157/C1157M	
S0	N/A	2500	N/A	N/A	N/A	No restrictions
S1	0.50	4000	II <sup>^</sup>	IP(MS); IS(<70)(MS); IT(MS)	MS	No restrictions
S2	0.45	4500	IV <sup>^</sup>	IP(HS); IS(<70)(HS); IT(HS)	HS	Not permitted
S3	0.45	4500	V + pozzolan or slag cement**	IP(HS)+ pozzolan or slag cement <sup>^</sup> ; IS (<70)(HS) + pozzolan or slag cement <sup>^</sup> ; IT (HS) + pozzolan or slag cement**	HS + pozzolan or slag cement**	Not permitted

\* For seawater exposure, other types of portland cements with tricalcium aluminate (C3A) contents up to 10 percent are acceptable if the w/cm does not exceed 0.40.

\*\* The amount of the specific source of the pozzolan or slag cement to be used shall be at least the amount determined by test or service

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

record to improve sulfate resistance when used in concrete containing Type V cement. Alternatively, the amount of the specific source of the pozzolan or slag used shall not be less than the amount tested in accordance with **ASTM C1012/C1012M** and meeting the requirements maximum expansion requirements listed herein.

^ Other available types of cement, such as Type III or Type I, are acceptable in exposure classes S1 or S2 if the C3A contents are less than 8 or 5 percent, respectively.

- b. Alternative combinations of cementitious materials of those listed in this paragraph are acceptable if they meet the maximum expansion requirements listed in the following table:

Exposure class	Maximum expansion when tested using <b>ASTM C1012/C1012M</b>		
	At 6 months	At 12 months	At 18 months
S1	0.10 percent	N/A	N/A
S2	0.05 percent	0.10 percent^	N/A
S3	N/A	N/A	0.10 percent

^The 12-month expansion limit applies only when the measured expansion exceeds the 6-month maximum expansion limit.

#### 2.5.2.5 Concrete Temperature

The temperature of concrete as delivered must not exceed **95°F**.

#### 2.5.2.6 Concrete permeability

- a. Provide concrete meeting the requirements of the following table based on exposure class assigned to members requiring low permeability in the Contract Documents.

Exposure class	Maximum w/cm*	Minimum f'c, <b>psi</b>	Additional minimum requirements
W0	N/A	<b>2500</b>	None
W1	0.5	<b>4000</b>	None

- b. Submit documentation verifying compliance with specified requirements.

#### 2.5.3 Trial Mixtures

Trial mixtures must be in accordance to **ACI 301**.

#### 2.5.4 Ready-Mix Concrete

Provide concrete that meets the requirements of **ASTM C94/C94M**.

Ready-mixed concrete manufacturer must provide duplicate delivery tickets

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

with each load of concrete delivered. Provide delivery tickets with the following information in addition to that required by [ASTM C94/C94M](#):

- a. Type and brand cement
- b. Cement and supplementary cementitious materials content in [94-pound](#) bags per cubic [yard](#) of concrete
- c. Maximum size of aggregate
- d. Amount and brand name of admixtures
- e. Total water content expressed by water cementitious material ratio

## 2.6 [REINFORCEMENT](#)

- a. Bend reinforcement cold. Fabricate reinforcement in accordance with fabricating tolerances of [ACI 117](#).
- b. When handling and storing coated reinforcement, use equipment and methods that do not damage the coating. If stored outdoors for more than 2 months, cover coated reinforcement with opaque protective material.
- c. Submit manufacturer's certified test report for reinforcement.
- d. Submit placing drawings showing fabrication dimensions and placement locations of reinforcement and reinforcement supports. Placing drawings must indicate locations of splices, lengths of lap splices, and details of mechanical and welded splices.
- e. Submit request with locations and details of splices not indicated in Contract Documents.
- f. Submit request to place column dowels without using templates.
- g. Submit request for field cutting, including location and type of bar to be cut and reason field cutting is required.

### 2.6.1 [Reinforcing Bars](#)

- a. Reinforcing bars must be deformed, except spirals, load-transfer dowels, and welded wire reinforcement, which may be plain.
- b. [ASTM A615/A615M](#) with the bars marked S, Grade [60](#). Cold drawn wire used for spiral reinforcement must conform to [ASTM A1064/A1064M](#).
- c. Reinforcing bars may contain post-consumer or post-industrial recycled content. Submit documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content products to total dollar value of products included in project.
- d. Submit mill certificates for reinforcing bars.

#### 2.6.1.1 [Headed Reinforcing Bars](#)

Headed reinforcing bars must conform to [ASTM A970/A970M](#) including Annex A1, and other specified requirements.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.6.1.2 Bar Mats

- a. Bar mats must conform to **ASTM A184/A184M**.
- b. If coated bar mats are required, repair damaged coating as required in the paragraph titled GALVANIZED REINFORCING BARS EPOXY-COATED REINFORCING BARS and DUAL-COATED REINFORCING BARS.

#### 2.6.1.3 Headed Shear Stud Reinforcement

Headed studs and headed stud assemblies must conform to **ASTM A1044/A1044M**.

#### 2.6.2 Mechanical Reinforcing Bar Connectors

- a. Provide 125 percent minimum yield strength of the reinforcement bar.
- b. Mechanical splices for galvanized reinforcing bars must be galvanized or coated with dielectric material.
- c. Mechanical splices used with epoxy-coated or dual-coated reinforcing bars must be coated with dielectric material.
- d. Submit data on mechanical splices demonstrating compliance with this paragraph.

#### 2.6.3 Wire

- a. Wire reinforcement may contain post-consumer or post-industrial recycled content. Provide flat sheets of welded wire reinforcement for slabs and toppings **where indicated on drawings**.
- b. Plain or deformed steel wire must conform to **ASTM A1064/A1064M**.

#### 2.6.4 Welded wire reinforcement

- a. Use welded wire reinforcement specified in Contract Documents and conforming to one or more of the specifications given herein.
- b. Plain welded wire reinforcement must conform to **ASTM A1064/A1064M**, with welded intersections spaced no greater than **12 in.** apart in direction of principal reinforcement.
- c. Deformed welded wire reinforcement must conform to **ASTM A1064/A1064M**, with welded intersections spaced no greater than **16 in.** apart in direction of principal reinforcement.

#### 2.6.5 Reinforcing Bar Supports

- a. Provide reinforcement support types within structure as required by Contract Documents. Reinforcement supports must conform to **CRSI RB4.1**. Submit description of reinforcement supports and materials for fastening coated reinforcement if not in conformance with **CRSI RB4.1**.
- b. Legs of supports in contact with formwork must be hot-dip galvanized, or plastic coated after fabrication, or stainless-steel bar supports.
- c. Plastic and steel may contain post-consumer or post-industrial recycled content.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.6.6 Dowels for Load Transfer in Floors

Provide greased dowels for load transfer in floors of the type, design, weight, and dimensions indicated. Provide dowel bars that are plain-billet steel conforming to ASTM A615/A615M, Grade 40. Provide dowel pipe that is steel conforming to ASTM A53/A53M.

#### 2.6.7 Welding

- a. Provide weldable reinforcing bars that conform to ASTM A706/A706M and ASTM A615/A615M and Supplement S1, Grade 60, except that the maximum carbon content must be 0.55 percent.
- b. Comply with AWS D1.4/D1.4M unless otherwise specified. Do not tack weld reinforcing bars.
- c. Welded assemblies of steel reinforcement produced under factory conditions, such as welded wire reinforcement, bar mats, and deformed bar anchors, are allowed.
- d. After completing welds on zinc-coated (galvanized), epoxy-coated, or zinc and epoxy dual-coated reinforcement, coat welds and repair coating damage as previously specified.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- a. Do not begin installation until substrates have been properly constructed; verify that substrates are level.
- b. If substrate preparation is the responsibility of another installer, notify Contracting Officer of unsatisfactory preparation before processing.
- c. Check field dimensions before beginning installation. If dimensions vary too much from design dimensions for proper installation, notify Contracting Officer and wait for instructions before beginning installation.

#### 3.2 PREPARATION

Determine quantity of concrete needed and minimize the production of excess concrete. Designate locations or uses for potential excess concrete before the concrete is poured.

##### 3.2.1 General

- a. Surfaces against which concrete is to be placed must be free of debris, loose material, standing water, snow, ice, and other deleterious substances before start of concrete placing.
- b. Remove standing water without washing over freshly deposited concrete. Divert flow of water through side drains provided for such purpose.

##### 3.2.2 Subgrade Under Foundations and Footings

- a. When subgrade material is semi-porous and dry, sprinkle subgrade



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

surface with water as required to eliminate suction at the time concrete is deposited, or seal subgrade surface by covering surface with specified vapor retarder.

- b. When subgrade material is porous, seal subgrade surface by covering surface with specified vapor retarder.

### 3.2.3 Subgrade Under Slabs on Ground

- a. Before construction of slabs on ground, have underground work on pipes and conduits completed and approved.
- b. Previously constructed subgrade or fill must be cleaned of foreign materials
- c. Finish surface of capillary water barrier under interior slabs on ground must not show deviation in excess of  $1/4$  inch when tested with a 10-foot straightedge parallel with and at right angles to building lines.
- d. Finished surface of subgrade or fill under exterior slabs on ground must not be more than 0.02-foot above or 0.10-foot below elevation indicated.

### 3.2.4 Edge Forms and Screed Strips for Slabs

- a. Set edge forms or bulkheads and intermediate screed strips for slabs to obtain indicated elevations and contours in finished slab surface and must be strong enough to support vibrating bridge screeds or roller pipe screeds if nature of specified slab finish requires use of such equipment.
- b. Align concrete surface to elevation of screed strips by use of strike-off templates or approved compacting-type screeds.

### 3.2.5 Reinforcement and Other Embedded Items

- a. Secure reinforcement, joint materials, and other embedded materials in position, inspected, and approved before start of concrete placing.
- b. When concrete is placed, reinforcement must be free of materials deleterious to bond. Reinforcement with rust, mill scale, or a combination of both will be considered satisfactory, provided minimum nominal dimensions, nominal weight, and minimum average height of deformations of a hand-wire-brushed test specimen are not less than applicable ASTM specification requirements.

## 3.3 FORMS

- a. Provide forms, shoring, and scaffolding for concrete placement. Set forms mortar-tight and true to line and grade.
- b. Chamfer above grade exposed joints, edges, and external corners of concrete 0.75 inch. Place chamfer strips in corners of formwork to produce beveled edges on permanently exposed surfaces.
- c. Provide formwork with clean-out openings to permit inspection and removal of debris.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- d. Inspect formwork and remove foreign material before concrete is placed.
- e. At construction joints, lap form-facing materials over the concrete of previous placement. Ensure formwork is placed against hardened concrete so offsets at construction joints conform to specified tolerances.
- f. Provide positive means of adjustment (such as wedges or jacks) of shores and struts. Do not make adjustments in formwork after concrete has reached initial setting. Brace formwork to resist lateral deflection and lateral instability.
- g. Fasten form wedges in place after final adjustment of forms and before concrete placement.
- h. Provide anchoring and bracing to control upward and lateral movement of formwork system.
- i. Construct formwork for openings to facilitate removal and to produce opening dimensions as specified and within tolerances.
- j. Provide runways for moving equipment. Support runways directly on formwork or structural members. Do not support runways on reinforcement. Loading applied by runways must not exceed capacity of formwork or structural members.
- k. Position and support expansion joint materials, waterstops, and other embedded items to prevent displacement. Fill voids in sleeves, inserts, and anchor slots temporarily with removable material to prevent concrete entry into voids.
- l. Clean surfaces of formwork and embedded materials of mortar, grout, and foreign materials before concrete placement.

#### 3.3.1 Coating

- a. Cover formwork surfaces with an acceptable material that inhibits bond with concrete.
- b. If formwork release agent is used, apply to formwork surfaces in accordance with manufacturer's recommendations before placing reinforcement. Remove excess release agent on formwork prior to concrete placement.
- c. Do not allow formwork release agent to contact reinforcement or hardened concrete against which fresh concrete is to be placed.

#### 3.3.2 Reuse

- a. Reuse forms providing the structural integrity of concrete and the aesthetics of exposed concrete are not compromised.
- b. Wood forms must not be clogged with paste and must be capable of absorbing high water-cementitious material ratio paste.
- c. Remove leaked mortar from formwork joints before reuse.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.3.3 Forms for Standard Rough Form Finish

Provide formwork in accordance with **ACI 301** Section 5 with a surface finish, SF-1.0, for formed surfaces that are to be concealed by other construction.

### 3.3.4 Forms for Standard Smooth Form Finish

Provide formwork in accordance with **ACI 301** Section 5 with a surface finish, SF-3.0, for formed surfaces that are exposed to view.

### 3.3.5 Form Ties

- a. For post-tensioned structures, do not remove formwork supports until stressing records have been accepted by the Contracting Officer.
- b. After ends or end fasteners of form ties have been removed, repair tie holes in accordance with **ACI 301** Section 5 requirements.

### 3.3.6 Tolerances for Form Construction

- a. Construct formwork so concrete surfaces conform to tolerances in **ACI 117**.
- b. Position and secure sleeves, inserts, anchors, and other embedded items such that embedded items are positioned within **ACI 117** tolerances.
- c. To maintain specified elevation and thickness within tolerances, install formwork to compensate for deflection and anticipated settlement in formwork during concrete placement. Set formwork and intermediate screed strips for slabs to produce designated elevation, camber, and contour of finished surface before formwork removal. If specified finish requires use of vibrating screeds or roller pipe screeds, ensure that edge forms and screed strips are strong enough to support such equipment.

### 3.3.7 Removal of Forms and Supports

- a. If vertical formed surfaces require finishing, remove forms as soon as removal operations will not damage concrete.
- b. Remove top forms on sloping surfaces of concrete as soon as removal will not allow concrete to sag. Perform repairs and finishing operations required. If forms are removed before end of specified curing period, provide curing and protection.
- c. Do not damage concrete during removal of vertical formwork for columns, walls, and sides of beams. Perform needed repair and finishing operations required on vertical surfaces. If forms are removed before end of specified curing period, provide curing and protection.
- d. Leave formwork and shoring in place to support construction loads and weight of concrete in beams, slabs, and other structural members until in-place required strength of concrete is reached.
- e. Form-facing material and horizontal facing support members may be removed before in-place concrete reaches specified compressive

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

strength if shores and other supports are designed to allow facing removal without deflection of supported slab or member.

### 3.3.8 Strength of Concrete Required for Removal of Formwork

If removal of formwork, reshoring, or backshoring is based on concrete reaching a specified in-place strength, mold and field-cure cylinders in accordance with [ASTM C31/C31M](#). Test cylinders in accordance with [ASTM C39/C39M](#). Alternatively, use one or more of the methods listed herein to evaluate in-place concrete strength for formwork removal.

- a. Tests of cast-in-place cylinders in accordance with [ASTM C873/C873M](#). This option is limited to slabs with concrete depths from 5 to 12 in.
- b. Penetration resistance in accordance with [ASTM C803/C803M](#).
- c. Pullout strength in accordance with [ASTM C900](#).
- d. Maturity method in accordance with [ASTM C1074](#). Submit [maturity method data](#) using project materials and concrete mix proportions used on the project to demonstrate the correlation between maturity and compressive strength of laboratory cured test specimens to the Contracting Officer.

### 3.4 WATERSTOP INSTALLATION AND SPLICES

- a. Provide waterstops in construction joints as indicated.
- b. Install formwork to accommodate waterstop materials. Locate waterstops in joints where indicated in Contract Documents. Minimize number of splices in waterstop. Splice waterstops in accordance with manufacturer's written instructions. Install factory-manufactured premolded mitered corners.
- c. Install waterstops to form a continuous diaphragm in each joint. Make adequate provisions to support and protect waterstops during progress of work. Protect waterstops protruding from joints from damage.

#### 3.4.1 PVC Waterstop

Make splices by heat sealing the adjacent waterstop edges together using a thermoplastic splicing iron utilizing a non-stick surface specifically designed for waterstop welding. Reform waterstops at splices with a remolding iron with ribs or corrugations to match the pattern of the waterstop. The spliced area, when cooled, must show no signs of separation, holes, or other imperfections when bent by hand in as sharp an angle as possible.

#### 3.4.2 Rubber Waterstop

Rubber waterstops must be spliced using cold bond adhesive as recommended by the manufacturer.

#### 3.4.3 Thermoplastic Elastomeric Rubber Waterstop

Fittings must be shop made using a machine specifically designed to mechanically weld the waterstop. A portable power saw must be used to miter or straight cut the ends to be joined to ensure good alignment and contact between joined surfaces. Maintain continuity of the

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

characteristic features of the cross section of the waterstop (for example ribs, tabular center axis, and protrusions) across the splice.

#### 3.4.4 Hydrophilic Waterstop

Miter cut ends to be joined with sharp knife or shears. The ends must be adhered with adhesive.

### 3.5 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS

- a. Unless otherwise specified, placing reinforcement and miscellaneous materials must be in accordance to **ACI 301**. Provide bars, welded wire reinforcement, wire ties, supports, and other devices necessary to install and secure reinforcement.
- b. Reinforcement must not have rust, scale, oil, grease, clay, or foreign substances that would reduce the bond. Rusting of reinforcement is a basis of rejection if the effective cross-sectional area or the nominal weight per unit length has been reduced. Remove loose rust prior to placing steel. Tack welding is prohibited.
- c. Nonprestressed cast-in-place concrete members must have concrete cover for reinforcement given in the following table:

Concrete Exposure	Member	Reinforcement	Specified cover, in.
Cast against and permanently in contact with ground	All	All	3
Exposed to weather or in contact with ground	All	No. 6 through No. 18 bars	2
		No. 5 bar, W31 or D31 wire, and smaller	1-1/2

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Concrete Exposure	Member	Reinforcement	Specified cover, in.
Not exposed to weather or in contact with ground	Slabs, joists, and walls	No. 14 and No. 18 bars	1-1/2
		No. 11 bar and smaller	3/4
	Beams, columns, pedestals, and tension ties	Primary reinforcement, stirrups, ties, spirals, and hoops	1-1/2

- d. Cast-in-place prestressed concrete members must have concrete cover for reinforcement, ducts, and end fittings given in the following table:

Concrete	Member	Reinforcement	Specified
Cast against and permanently in contact with ground	All	All	3
Exposed to weather or in contact with ground	Slabs, joists, and walls	All	1
	All other	All	1-1/2
Not exposed to weather or in contact with ground	Slabs, joists, and walls	All	3/4
	Beams, columns, and tension ties	Primary reinforcement	1-1/2
		Stirrups, ties, spirals, and hoops	1

- e. Precast nonprestressed or prestressed concrete members manufactured under plant conditions must have concrete cover for reinforcement, ducts, and end fittings given in the following table:

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Concrete Exposure	Member	Reinforcement	Specified cover, in.
Exposed to weather or in contact with ground	Walls	No. 14 and No. 18 bars; tendons larger than 1-1/2 in. diameter	1-1/2
		No. 11 bars and smaller; W31 and D31 wire, and smaller; tendons and strands 1-1/2 in.	3/4
	All other	No. 14 and No. 18 bars; tendons larger than 1-1/2 in.	2
		No. 6 through No. 11 bars; tendons and strands larger than 5/8 in. diameter through 1-1/2 in.	1-1/2
		No. 5 bar, W31 or D31 wire, and smaller; tendons and strands 5/8 in. diameter and smaller	1-1/4

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Concrete Exposure	Member	Reinforcement	Specified cover, in.
Not exposed to weather or in contact with ground	Slabs, joists, and walls	No. 14 and No. 18 bars; tendons larger than 1-1/2 in. diameter	1-1/4
		Tendons and strands 1-1/2 in. diameter and smaller	3/4
		No. 11 bar, W31 or D31	5/8
	Beams, columns, pedestals, and tension ties	Primary reinforcement	Greater of bar diameter and 5/8 and need not exceed 1-1/2
		Stirrups, ties, spirals, and hoops	3/8

### 3.5.1 General

Provide details of reinforcement that are in accordance with the Contract Documents.

### 3.5.2 Vapor Retarder

- a. Install in accordance with **ASTM E1643**. Provide beneath the on-grade concrete floor slab. Use the greatest widths and lengths practicable to eliminate joints wherever possible. Lap joints a minimum of 12



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

inches and tape.

- b. Remove torn, punctured, or damaged vapor retarder and provide with new vapor retarder prior to placing concrete. Concrete placement must not damage vapor retarder. Place vapor barrier directly on underlying subgrade, base course, or capillary water barrier, unless it consists of crushed material or large granular material which could puncture the vapor barrier. In this case, a thin layer of approximately 1/2 inch of fine graded material should be rolled or compacted over the fill before installation of the vapor barrier to reduce the possibility of puncture. Control concrete placement so as to prevent damage to the vapor barrier.

### 3.5.3 Perimeter Insulation

Install perimeter insulation at locations indicated. Adhesive must be used where insulation is applied to the interior surface of foundation walls and may be used for exterior application.

### 3.5.4 Reinforcement Supports

Provide reinforcement support in accordance with CRSI RB4.1 and ACI 301 Section 3 requirements. Supports for coated or galvanized bars must also be coated with electrically compatible material for a distance of at least 2 inches beyond the point of contact with the bars.

### 3.5.5 Splicing

As indicated in the Contract Documents. For splices not indicated follow ACI 301. Do not splice at points of maximum stress. Overlap welded wire reinforcement the spacing of the cross wires, plus 2 inches. AWS D1.4/D1.4M. Approve welded splices prior to use.

### 3.5.6 Future Bonding

Plug exposed, threaded, mechanical reinforcement bar connectors with a greased bolt. Provide bolt threads that match the connector. Countersink the connector in the concrete. Caulk the depression after the bolt is installed.

### 3.5.7 Setting Miscellaneous Material

Place and secure anchors and bolts, pipe sleeves, conduits, and other such items in position before concrete placement and support against displacement. Plumb anchor bolts and check location and elevation. Temporarily fill voids in sleeves with readily removable material to prevent the entry of concrete.

### 3.5.8 Fabrication

Shop fabricate reinforcing bars to conform to shapes and dimensions indicated for reinforcement, and as follows:

- a. Provide fabrication tolerances that are in accordance with ACI 117.
- b. Provide hooks and bends that are in accordance with the Contract Documents.

Reinforcement must be bent cold to shapes as indicated. Bending must be

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

done in the shop. Rebending of a reinforcing bar that has been bent incorrectly is not be permitted. Bending must be in accordance with standard approved practice and by approved machine methods.

Deliver reinforcing bars bundled, tagged, and marked. Tags must be metal with bar size, length, mark, and other information pressed in by machine. Marks must correspond with those used on the placing drawings.

Do not use reinforcement that has any of the following defects:

- a. Bar lengths, depths, and bends beyond specified fabrication tolerances
- b. Bends or kinks not indicated on drawings or approved shop drawings
- c. Bars with reduced cross-section due to rusting or other cause

Replace defective reinforcement with new reinforcement having required shape, form, and cross-section area.

### 3.5.9 Placing Reinforcement

Place reinforcement in accordance with [ACI 301](#).

For slabs on grade (over earth or over capillary water barrier) and for footing reinforcement, support bars or welded wire reinforcement on precast concrete blocks, spaced at intervals required by size of reinforcement, to keep reinforcement the minimum height specified above the underside of slab or footing.

For slabs other than on grade, supports for which any portion is less than [1 inch](#) from concrete surfaces that are exposed to view or to be painted must be of precast concrete units, plastic-coated steel, or stainless steel protected bar supports. Precast concrete units must be wedge shaped, not larger than [3-1/2 by 3-1/2 inches](#), and of thickness equal to that indicated for concrete protection of reinforcement. Provide precast units that have cast-in galvanized tie wire hooked for anchorage and blend with concrete surfaces after finishing is completed.

Provide reinforcement that is supported and secured together to prevent displacement by construction loads or by placing of wet concrete, and as follows:

- a. Provide supports for reinforcing bars that are sufficient in number and have sufficient strength to carry the reinforcement they support, and in accordance with [ACI 301](#) and [CRSI 10MSP](#). Do not use supports to support runways for concrete conveying equipment and similar construction loads.
- b. Equip supports on ground and similar surfaces with sand-plates.
- c. Support welded wire reinforcement as required for reinforcing bars.
- d. Secure reinforcements to supports by means of tie wire. Wire must be black, soft iron wire, not less than [16 gage](#).
- e. Reinforcement must be accurately placed, securely tied at intersections, and held in position during placing of concrete by spacers, chairs, or other approved supports. Point wire-tie ends away from the form. Unless otherwise indicated, numbers, type, and spacing

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

of supports must conform to the Contract Documents.

- f. Bending of reinforcing bars partially embedded in concrete is permitted only as specified in the Contract Documents.

#### 3.5.10 Spacing of Reinforcing Bars

- a. Spacing must be as indicated in the Contract Documents.
- b. Reinforcing bars may be relocated to avoid interference with other reinforcement, or with conduit, pipe, or other embedded items. If any reinforcing bar is moved a distance exceeding one bar diameter or specified placing tolerance, resulting rearrangement of reinforcement is subject to preapproval by the Contracting Officer.

#### 3.5.11 Concrete Protection for Reinforcement

Additional concrete protection must be in accordance with the Contract Documents.

#### 3.5.12 Welding

Welding must be in accordance with AWS D1.4/D1.4M.

### 3.6 BATCHING, MEASURING, MIXING, AND TRANSPORTING CONCRETE

In accordance with ASTM C94/C94M, ACI 301, ACI 302.1R and ACI 304R, except as modified herein. Batching equipment must be such that the concrete ingredients are consistently measured within the following tolerances: 1 percent for cement and water, 2 percent for aggregate, and 3 percent for admixtures. Furnish mandatory batch ticket information for each load of ready mix concrete.

#### 3.6.1 Measuring

Make measurements at intervals as specified in paragraphs SAMPLING and TESTING.

#### 3.6.2 Mixing

- a. Mix concrete in accordance with ASTM C94/C94M, ACI 301 and ACI 304R.
- b. Machine mix concrete. Begin mixing within 30 minutes after the cement has been added to the aggregates. Place concrete within 90 minutes of either addition of mixing water to cement and aggregates or addition of cement to aggregates if the concrete temperature is less than 84 degrees F.
- c. Reduce mixing time and place concrete within 60 minutes if the concrete temperature is greater than 84 degrees F except as follows: if set retarding admixture is used and slump requirements can be met, limit for placing concrete may remain at 90 minutes. Additional water may be added, provided that both the specified maximum slump and submitted water-cementitious material ratio are not exceeded and the required concrete strength is still met. When additional water is added, an additional 30 revolutions of the mixer at mixing speed is required.
- d. If the entrained air content falls below the specified limit, add a

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

sufficient quantity of admixture, within the manufacturer's recommended dosage, to bring the entrained air content within the specified limits. Dissolve admixtures in the mixing water and mix in the drum to uniformly distribute the admixture throughout the batch. Do not reconstitute concrete that has begun to solidify.

### 3.6.3 Transporting

Transport concrete from the mixer to the forms as rapidly as practicable. Prevent segregation or loss of ingredients. Clean transporting equipment thoroughly before each batch. Do not use aluminum pipe or chutes. Remove concrete which has segregated in transporting and dispose of as directed.

## 3.7 PLACING CONCRETE

Place concrete in accordance with [ACI 301](#) Section 5. Concrete shall be placed within 15 minutes of discharge into non-agitating equipment.

### 3.7.1 Footing Placement

Concrete for footings may be placed in excavations without forms upon inspection and approval by the Contracting Officer. Excavation width must be a minimum of [4 inches](#) greater than indicated.

### 3.7.2 Pumping

[ACI 304R](#) and [ACI 304.2R](#). Pumping must not result in separation or loss of materials nor cause interruptions sufficient to permit loss of plasticity between successive increments. Loss of slump in pumping equipment must not exceed [2 inches](#) at discharge/placement. Do not convey concrete through pipe made of aluminum or aluminum alloy. Avoid rapid changes in pipe sizes. Limit maximum size of coarse aggregate to 33 percent of the diameter of the pipe. Limit maximum size of well-rounded aggregate to 40 percent of the pipe diameter. Take samples for testing at both the point of delivery to the pump and at the discharge end.

### 3.7.3 Cold Weather

Cold weather concrete must meet the requirements of [ACI 306.1](#) unless otherwise specified. Do not allow concrete temperature to decrease below [50 degrees F](#). Obtain approval prior to placing concrete when the ambient temperature is below [40 degrees F](#) or when concrete is likely to be subjected to freezing temperatures within 24 hours. Cover concrete and provide sufficient heat to maintain [50 degrees F](#) minimum adjacent to both the formwork and the structure while curing. Limit the rate of cooling to [37 degrees F](#) in any 1 hour and [50 degrees F](#) per 24 hours after heat application.

### 3.7.4 Hot Weather

Hot weather concrete must meet the requirements of [ACI 305.1](#) unless otherwise specified. Maintain required concrete temperature using Figure 4.2 in [ACI 305R](#) to prevent the evaporation rate from exceeding [0.2 pound of water per square foot](#) of exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. Shade the fresh concrete as soon as possible after placing. Start curing when the surface of the fresh concrete is sufficiently hard to permit curing without damage. Provide water hoses, pipes, spraying equipment, and water hauling

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

equipment, where job site is remote to water source, to maintain a moist concrete surface throughout the curing period. Provide burlap cover or other suitable, permeable material with fog spray or continuous wetting of the concrete when weather conditions prevent the use of either liquid membrane curing compound or impervious sheets. For vertical surfaces, protect forms from direct sunlight and add water to top of structure once concrete is set.

### 3.7.5 Bonding

Surfaces of set concrete at joints, must be roughened and cleaned of laitance, coatings, loose particles, and foreign matter. Roughen surfaces in a manner that exposes the aggregate uniformly and does not leave laitance, loosened particles of aggregate, nor damaged concrete at the surface.

Obtain bonding of fresh concrete that has set as follows:

- a. At joints between footings and walls or columns, between walls or columns and the beams or slabs they support, and elsewhere unless otherwise specified; roughened and cleaned surface of set concrete must be dampened, but not saturated, immediately prior to placing of fresh concrete.
- b. At joints in exposed-to-view work; at vertical joints in walls; at joints near midpoint of span in girders, beams, supported slabs, other structural members; in work designed to contain liquids; the roughened and cleaned surface of set concrete must be dampened but not saturated and covered with a cement grout coating.
- c. Provide cement grout that consists of equal parts of portland cement and fine aggregate by weight with not more than 6 gallons of water per sack of cement. Apply cement grout with a stiff broom or brush to a minimum thickness of 1/16 inch. Deposit fresh concrete before cement grout has attained its initial set.

### 3.8 WASTE MANAGEMENT

Provide as specified in the Waste Management Plan and as follows.

#### 3.8.1 Mixing Equipment

Before concrete pours, designate Contractor-owned site meeting environmental standards or on-site area to be paved later in project for cleaning out concrete mixing trucks. Minimize water used to wash equipment.

#### 3.8.2 Hardened, Cured Waste Concrete

Crush and reuse hardened, cured waste concrete as fill or as a base course for pavement.

#### 3.8.3 Reinforcing Steel

Collect reinforcing steel and place in designated area for recycling.

#### 3.8.4 Other Waste

Identify concrete manufacturer's or supplier's policy for collection or return of construction waste, unused material, deconstruction waste,

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

and/or packaging material. Return excess cement to supplier. Institute deconstruction and construction waste separation and recycling for use in manufacturer's programs. When such a program is not available, seek local recyclers to reclaim the materials.

### 3.9 SURFACE FINISHES EXCEPT FLOOR, SLAB, AND PAVEMENT FINISHES

#### 3.9.1 Defects

Repair surface defects in accordance with **ACI 301** Section 5.

#### 3.9.2 Not Against Forms (Top of Walls)

Surfaces not otherwise specified must be finished with wood floats to even surfaces. Finish must match adjacent finishes.

#### 3.9.3 Formed Surfaces

##### 3.9.3.1 Tolerances

Tolerances in accordance with **ACI 117** and as indicated.

##### 3.9.3.2 As-Cast Rough Form

Provide for surfaces not exposed to public view a surface finish SF-1.0. Patch holes and defects in accordance with **ACI 301**.

##### 3.9.3.3 Standard Smooth Finish

Provide for surfaces exposed to public view a surface finish SF-3.0. Patch holes and defects in accordance with **ACI 301**.

### 3.10 FLOOR, SLAB, AND PAVEMENT FINISHES AND MISCELLANEOUS CONSTRUCTION

In accordance with **ACI 301** and **ACI 302.1R**, unless otherwise specified. Slope floors uniformly to drains where drains are provided. Depress the concrete base slab where quarry tile, ceramic tile, or **other recesses** are indicated. Steel trowel and fine-broom finish concrete slabs that are to receive quarry tile, ceramic tile, or paver tile. Where straightedge measurements are specified, Contractor must provide straightedge.

#### 3.10.1 Finish

Place, consolidate, and immediately strike off concrete to obtain proper contour, grade, and elevation before bleedwater appears. Permit concrete to attain a set sufficient for floating and supporting the weight of the finisher and equipment. If bleedwater is present prior to floating the surface, drag the excess water off or remove by absorption with porous materials. Do not use dry cement to absorb bleedwater. Grate tampers ("jitterbugs") shall not be used.

##### 3.10.1.1 Scratched

Use for surfaces intended to receive bonded applied cementitious applications. Finish concrete in accordance with **ACI 301** Section 5 for a scratched finish.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 3.10.1.2 Floated

Use for surfaces to receive roofing, waterproofing membranes, sand bed terrazzo, and exterior slabs where not otherwise specified. Finish concrete in accordance with ACI 301 Section 5 for a floated finish.

#### 3.10.1.3 Steel Troweled

Use for floors intended as walking surfaces and for reception of floor coverings. Finish concrete in accordance with ACI 301 Section 5 for a steel troweled finish.

#### 3.10.1.4 Nonslip Finish

Use on surfaces of exterior platforms, steps, and landings; and on exterior and interior pedestrian ramps. Finish concrete in accordance with ACI 301 Section 5 for a dry-shake finish. After the selected material has been embedded by the two floatings, complete the operation with a floated finish.

#### 3.10.1.5 Broomed

Use on surfaces of exterior walks, platforms, patios, and ramps, unless otherwise indicated. Finish concrete in accordance with ACI 301 Section 5 for a broomed finish.

#### 3.10.1.6 Pavement

Screed the concrete with a template advanced with a combined longitudinal and crosswise motion. Maintain a slight surplus of concrete ahead of the template. After screeding, float the concrete longitudinally. Use a straightedge to check slope and flatness; correct and refloat as necessary. Obtain final finish by a burlap drag. Drag a strip of clean, wet burlap from 3 to 10 feet wide and 2 feet longer than the pavement width across the slab. Produce a fine, granular, sandy textured surface without disfiguring marks. Round edges and joints with an edger having a radius of 1/8 inch.

#### 3.10.2 Flat Floor Finishes

ACI 302.1R. Construct in accordance with one of the methods recommended in Table 10.15.3a, "Slab-on-ground flatness/levelness construction guide" or Table 10.15.3b, "Suspended slab flatness/levelness construction guide" appropriate for the type of construction. ACI 117 for tolerance tested by ASTM E1155.

##### a. Specified Conventional Value:

Floor Flatness (Ff) 25 overall, 17 minimum  
Floor Levelness (FL) 20 overall, 15 minimum

#### 3.10.2.1 Measurement of Floor Tolerances

Test slab within 24 hours of the final troweling. Provide tests to Contracting Officer within 12 hours after collecting the data. Floor flatness inspector is required to provide a tolerance report which must include:

##### a. Key plan showing location of data collected.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

b. Results required by ASTM E1155.

#### 3.10.2.2 Remedies for Out of Tolerance Work

Contractor is required to repair and retest any floors not meeting specified tolerances. Prior to repair, Contractor must submit and receive approval for the proposed repair, including product data from any materials proposed. Repairs must not result in damage to structural integrity of the floor. For floors exposed to public view, repairs must prevent any uneven or unusual coloring of the surface.

#### 3.10.3 Concrete Walks

Provide 4 inches thick minimum. Provide contraction joints spaced every 5 linear feet unless otherwise indicated. Cut contraction joints 1 inch deep, or one fourth the slab thickness whichever is deeper, with a jointing tool after the surface has been finished. Provide 0.5 inch thick transverse expansion joints at changes in direction where sidewalk abuts curb, steps, rigid pavement, or other similar structures; space expansion joints every 50 feet maximum. Give walks a broomed finish. Unless indicated otherwise, provide a transverse slope of 1/48. Limit variation in cross section to 1/4 inch in 5 feet.

#### 3.10.4 Pits and Trenches

Place bottoms and walls monolithically or provide waterstops and keys.

#### 3.10.5 Curbs and Gutters

Provide contraction joints spaced every 10 feet maximum unless otherwise indicated. Cut contraction joints 3/4 inch deep with a jointing tool after the surface has been finished. Provide expansion joints 1/2 inch thick and spaced every 100 feet maximum unless otherwise indicated. Perform pavement finish.

#### 3.10.6 Splash Blocks

Provide at outlets of downspouts emptying at grade. Splash blocks may be precast concrete, and must be 24 inches long, 12 inches wide and 4 inches thick, unless otherwise indicated, with smooth-finished countersunk dishes sloped to drain away from the building.

### 3.11 JOINTS

#### 3.11.1 Construction Joints

Make and locate joints not indicated so as not to impair strength and appearance of the structure, as approved. Joints must be perpendicular to main reinforcement. Reinforcement must be continued and developed across construction joints. Locate construction joints as follows:

##### 3.11.1.1 Maximum Allowable Construction Joint Spacing

- a. In walls at not more than 60 feet in any horizontal direction.
- b. In slabs on ground, so as to divide slab into areas not in excess of 1,200 square feet.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 3.11.1.2 Construction Joints for Constructability Purposes

- a. In walls, at top of footing; at top of slabs on ground; at top and bottom of door and window openings or where required to conform to architectural details; and at underside of deepest beam or girder framing into wall.
- b. In columns or piers, at top of footing; at top of slabs on ground; and at underside of deepest beam or girder framing into column or pier.
- c. Near midpoint of spans for supported slabs, beams, and girders unless a beam intersects a girder at the center, in which case construction joints in girder must offset a distance equal to twice the width of the beam. Make transfer of shear through construction joint by use of inclined reinforcement.

Provide keyways at least 1-1/2-inches deep in construction joints in walls and slabs and between walls and footings; approved bulkheads may be used for slabs.

#### 3.11.2 Isolation Joints in Slabs on Ground

- a. Provide joints at points of contact between slabs on ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated.
- b. Fill joints with premolded joint filler strips 1/2 inch thick, extending full slab depth. Install filler strips at proper level below finish floor elevation with a slightly tapered, dress-and-oiled wood strip temporarily secured to top of filler strip to form a groove not less than 3/4 inch in depth where joint is sealed with sealing compound and not less than 1/4 inch in depth where joint sealing is not required. Remove wood strip after concrete has set. Contractor must clean groove of foreign matter and loose particles after surface has dried.

#### 3.11.3 Contraction Joints in Slabs on Ground

- a. Provide joints to form panels as indicated.
- b. Under and on exact line of each control joint, cut 50 percent of welded wire reinforcement before placing concrete.
- c. Sawcut contraction joints into slab on ground in accordance with ACI 301 Section 5.
- d. Joints must be 1/8-inch wide by 1/5 to 1/4 of slab depth and formed by inserting hand-pressed fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. After concrete has cured for at least 7 days, the Contractor must remove inserts and clean groove of foreign matter and loose particles.
- e. Sawcutting will be limited to within 12 hours after set and at 1/4 slab depth.

#### 3.11.4 Sealing Joints in Slabs on Ground

- a. Contraction and control joints which are to receive finish flooring material must be sealed with joint sealing compound after concrete

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

curing period. Slightly underfill groove with joint sealing compound to prevent extrusion of compound. Remove excess material as soon after sealing as possible.

- b. Sealed groove must be left ready to receive filling material that is provided as part of finish floor covering work.

### 3.12 CONCRETE FLOOR TOPPING

#### 3.12.1 Standard Floor Topping

Provide topping for treads and platforms of metal steel stairs and elsewhere as indicated.

##### 3.12.1.1 Preparations Prior to Placing

- a. When topping is placed on a green concrete base slab, screed surface of base slab to a level not more than  $1\frac{1}{2}$  inches nor less than 1 inch below required finish surface. Remove water and laitance from surface of base slab before placing topping mixture. As soon as water ceases to rise to surface of base slab, place topping.
- b. When topping is placed on a hardened concrete base slab, remove dirt, loose material, oil, grease, asphalt, paint, and other contaminants from base slab surface, leaving a clean surface. Prior to placing topping mixture,  $2\frac{1}{2}$ -inches minimum, slab surface must be dampened and left free of standing water. Immediately before topping mixture is placed, broom a coat of neat cement grout onto surface of slab. Do not allow cement grout to set or dry before topping is placed.
- c. When topping is placed on a metal surface, such as metal pans for steel stairs, remove dirt, loose material, oil, grease, asphalt, paint, and other contaminants from metal surface.

##### 3.12.1.2 Placing

Spread standard topping mixture evenly on previously prepared base slab or metal surface, brought to correct level with a straightedge, and struck off. Topping must be consolidated, floated, checked for trueness of surface, and refloated as specified for float finish.

##### 3.12.1.3 Finishing

Give trowel finish standard floor topping surfaces.

Give other finishes standard floor topping surfaces as indicated.

#### 3.12.2 Heavy-Duty Floor Topping

Provide topping where indicated.

##### 3.12.2.1 Heavy-duty Topping Mixture

Provide mixture that consists of 1 part portland cement and  $2\frac{1}{2}$  parts emery aggregate or 1 part fine aggregate and  $1\frac{1}{2}$  parts traprock coarse aggregate, by volume. Exact proportions of mixture must conform to recommendations of aggregate manufacturer. Mixing water must not exceed  $3\frac{1}{4}$  gallons per 94-pound sack of cement including unabsorbed moisture in

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

aggregate. Maximum slump must be 1 inch.

#### 3.12.2.2 Base Slab

- a. Screed surface of slab to a level no more than 1-1/2 inches nor less than 1 inch below grade of finished floor.
- b. Give slab a scratch finish as specified.
- c. Preparations prior to placing.

Remove dirt, loose material, oil, grease, asphalt, paint and other contaminants from base slab surface. Prior to placing topping mixture, dampen slab surface and leave free of standing water. Immediately before topping mixture is placed, broom a coat of neat cement grout onto surface of slab. Allow cement grout to set or dry before topping mixture is placed.

#### 3.12.2.3 Placing

Spread heavy-duty topping mixture evenly on previously prepared base slab, and bring to correct level with a straightedge, and strike off. Provide topping that is consolidated, floated, and checked for trueness of surface as specified for float finish, except that power-driven floats is the impact type.

#### 3.12.2.4 Finishing

Give trowel finish heavy-duty floor topping surfaces. Provide trowel finish as specified, except that additional troweling after first power troweling must be not less than three hand-troweling operations.

### 3.13 CURING AND PROTECTION

Curing and protection in accordance with ACI 301 Section 5, unless otherwise specified. Begin curing immediately following form removal. Avoid damage to concrete from vibration created by blasting, pile driving, movement of equipment in the vicinity, disturbance of formwork or protruding reinforcement, and any other activity resulting in ground vibrations. Protect concrete from injurious action by sun, rain, flowing water, frost, mechanical injury, tire marks, and oil stains. Do not allow concrete to dry out from time of placement until the expiration of the specified curing period. Do not use membrane-forming compound on surfaces where appearance would be objectionable, on any surface to be painted, where coverings are to be bonded to the concrete, or on concrete to which other concrete is to be bonded. If forms are removed prior to the expiration of the curing period, provide another curing procedure specified herein for the remaining portion of the curing period. Provide moist curing for those areas receiving liquid chemical sealer, hardener, or epoxy coating. Allow curing compound/sealer installations to cure prior to the installation of materials that adsorb VOCs.

#### 3.13.1 Requirements for Type III, High-Early-Strength Portland Cement

The curing periods are required to be not less than one-fourth of those specified for portland cement, but in no case less than 72 hours.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.13.2 Curing Periods

**ACI 301** Section 5, except 10 days for retaining walls, pavement or chimneys. Begin curing immediately after placement. Protect concrete from premature drying, excessively hot temperatures, and mechanical injury; and maintain minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing are subject to approval by the Contracting Officer.

### 3.13.3 Curing Formed Surfaces

Accomplish curing of formed surfaces, including undersurfaces of girders, beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed before end of curing period, accomplish final curing of formed surfaces by any of the curing methods specified above, as applicable.

### 3.13.4 Curing Unformed Surfaces

- a. Accomplish initial curing of unformed surfaces, such as monolithic slabs, floor topping, and other flat surfaces, by membrane curing.
- b. Accomplish final curing of unformed surfaces by any of curing methods specified, as applicable.
- c. Accomplish final curing of concrete surfaces to receive liquid floor hardener of finish flooring by moisture-retaining cover curing.

### 3.13.5 Temperature of Concrete During Curing

When temperature of atmosphere is **41 degrees F** and below, maintain temperature of concrete at not less than **55 degrees F** throughout concrete curing period or **45 degrees F** when the curing period is measured by maturity. When necessary, make arrangements before start of concrete placing for heating, covering, insulation, or housing as required to maintain specified temperature and moisture conditions for concrete during curing period.

When the temperature of atmosphere is **80 degrees F** and above or during other climatic conditions which cause too rapid drying of concrete, make arrangements before start of concrete placing for installation of wind breaks, of shading, and for fog spraying, wet sprinkling, or moisture-retaining covering of light color as required to protect concrete during curing period.

Changes in temperature of concrete must be uniform and not exceed **37 degrees F** in any 1 hour nor **80 degrees F** in any 24-hour period.

### 3.13.6 Protection from Mechanical Injury

During curing period, protect concrete from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration and from damage caused by rain or running water.

### 3.13.7 Protection After Curing

Protect finished concrete surfaces from damage by construction operations.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.14 FIELD QUALITY CONTROL

#### 3.14.1 Aggregate Testing

##### 3.14.1.1 Fine Aggregate

At least once during each shift when the concrete plant is operating, there shall be one sieve analysis and fineness modulus determination in accordance with [ASTM C136/C136M](#) and [COE CRD-C 104](#) for the fine aggregate or for each fine aggregate if it is batched in more than one size or classification. The location at which samples are taken may be selected by the Contractor as the most advantageous for control. However, the Contractor is responsible for delivering fine aggregate to the mixer within specification limits. When the amount passing on any sieve is outside the specification limits, the fine aggregate shall be immediately resampled and retested. If there is another failure on any sieve, the fact shall be immediately reported to the Contracting Officer, concreting shall be stopped, and immediate steps taken to correct the grading.

##### 3.14.1.2 Coarse Aggregate

At least once during each shift in which the concrete plant is operating, there shall be a sieve analysis in accordance with [ASTM C136/C136M](#) for each size of coarse aggregate. The location at which samples are taken may be selected by the Contractor as the most advantageous for production control. However, the Contractor shall be responsible for delivering the aggregate to the mixer within specification limits. A test record of samples of aggregate taken at the same locations shall show the results of the current test as well as the average results of the five most recent tests including the current test. The Contractor may adopt limits for control coarser than the specification limits for samples taken other than as delivered to the mixer to allow for degradation during handling. When the amount passing any sieve is outside the specification limits, the coarse aggregate shall be immediately resampled and retested. If the second sample fails on any sieve, that fact shall be reported to the Contracting Officer. Where two consecutive averages of 5 tests are outside specification limits, the operation shall be considered out of control and reported to the Contracting Officer. Concreting shall be stopped and immediate steps shall be taken to correct the grading.

#### 3.14.2 Concrete Sampling

[ASTM C172/C172M](#). Collect samples of fresh concrete to perform tests specified. [ASTM C31/C31M](#) for making test specimens.

#### 3.14.3 Concrete Testing

##### 3.14.3.1 Slump Tests

[ASTM C143/C143M](#). Take concrete samples during concrete placement/discharge. The maximum slump may be increased as specified with the addition of an approved admixture provided that the water-cementitious material ratio is not exceeded. Perform tests at commencement of concrete placement, when test cylinders are made, and for each batch (minimum) or every [20 cubic yards](#) (maximum) of concrete.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 3.14.3.2 Temperature Tests

Test the concrete delivered and the concrete in the forms. Perform tests in hot or cold weather conditions (below 50 degrees F and above 80 degrees F) for each batch (minimum) or every 20 cubic yards (maximum) of concrete, until the specified temperature is obtained, and whenever test cylinders and slump tests are made.

#### 3.14.3.3 Compressive Strength Tests

ASTM C39/C39M. Make six 6 inch by 12 inch test cylinders for each set of tests in accordance with ASTM C31/C31M, ASTM C172/C172M and applicable requirements of ACI 305R and ACI 306R. Take precautions to prevent evaporation and loss of water from the specimen. Test two cylinders at 7 days, two cylinders at 28 days, and hold two cylinder in reserve. Take samples for strength tests of each mix design of concrete placed each day not less than once a day, nor less than once for each 100 cubic yards of concrete for the first 500 cubic yards, then every 500 cubic yards thereafter, nor less than once for each 5400 square feet of surface area for slabs or walls. For the entire project, take no less than five sets of samples and perform strength tests for each mix design of concrete placed. Each strength test result must be the average of two cylinders from the same concrete sample tested at 28 days. Concrete compressive tests must meet the requirements of this section, the Contract Document, and ACI 301. Retest locations represented by erratic core strengths. Where retest does not meet concrete compressive strength requirements submit a mitigation or remediation plan for review and approval by the contracting officer. Repair core holes with nonshrink grout. Match color and finish of adjacent concrete.

#### 3.14.3.4 Air Content

ASTM C173/C173M or ASTM C231/C231M for normal weight concrete. Test air-entrained concrete for air content at the same frequency as specified for slump tests.

#### 3.14.3.5 Unit Weight of Structural Concrete

ASTM C138/C138M. Determine unit weight of normal weight concrete. Perform test for every 20 cubic yards maximum.

#### 3.14.3.6 Chloride Ion Concentration

Chloride ion concentration must meet the requirements of the paragraph titled CORROSION AND CHLORIDE CONTENT. Determine water soluble ion concentration in accordance with ASTM C1218/C1218M. Perform test once for each mix design.

#### 3.14.3.7 Strength of Concrete Structure

The strength of the concrete structure will be considered to be deficient if any of the following conditions are identified:

- a. Failure to meet compressive strength tests as evaluated.
- b. Reinforcement not conforming to requirements specified.
- c. Concrete which differs from required dimensions or location in such a manner as to reduce strength.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- d. Concrete curing and protection of concrete against extremes of temperature during curing, not conforming to requirements specified.
- e. Concrete subjected to damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration.
- f. Poor workmanship likely to result in deficient strength.

Where the strength of the concrete structure is considered deficient submit a mitigation or remediation plan for review and approval by the contracting officer.

#### 3.14.3.8 Non-Conforming Materials

Factors that indicate that there are non-conforming materials include (but not limited to) excessive compressive strength, inadequate compressive strength, excessive slump, excessive voids and honeycombing, concrete delivery records that indicate excessive time between mixing and placement, or excessive water was added to the mixture during delivery and placement. Any of these indicators alone are sufficient reason for the Contracting Officer to request additional sampling and testing.

Investigations into non-conforming materials must be conducted at the Contractor's expense. The Contractor must be responsible for the investigation and must make written recommendations to adequately mitigate or remediate the non-conforming material. The Contracting Officer may accept, accept with reduced payment, require mitigation, or require removal and replacement of non-conforming material at no additional cost to the Government.

#### 3.14.3.9 Testing Concrete Structure for Strength

When there is evidence that strength of concrete structure in place does not meet specification requirements or there are non-conforming materials, make cores drilled from hardened concrete for compressive strength determination in accordance with [ASTM C42/C42M](#), and as follows:

- a. Take at least three representative cores from each member or area of concrete-in-place that is considered potentially deficient. Location of cores will be determined by the Contracting Officer.
- b. Test cores after moisture conditioning in accordance with [ASTM C42/C42M](#) if concrete they represent is more than superficially wet under service.
- c. Air dry cores, (60 to 80 degrees F with relative humidity less than 60 percent) for 7 days before test and test dry if concrete they represent is dry under service conditions.
- d. Strength of cores from each member or area are considered satisfactory if their average is equal to or greater than 85 percent of the 28-day design compressive strength of the class of concrete.
- e. Core specimens will be taken and tested by the Government. If the results of core-boring tests indicate that the concrete as placed does not conform to the drawings and specification, the cost of such tests and restoration required must be borne by the Contractor.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Fill core holes solid with patching mortar and finished to match adjacent concrete surfaces.

Correct concrete work that is found inadequate by core tests in a manner approved by the Contracting Officer.

### 3.15 REPAIR, REHABILITATION AND REMOVAL

Before the Contracting Officer accepts the structure the Contractor must inspect the structure for cracks, damage and substandard concrete placements that may adversely affect the service life of the structure. A report documenting these defects must be prepared which includes recommendations for repair, removal or remediation must be submitted to the Contracting Officer for approval before any corrective work is accomplished.

#### 3.15.1 Crack Repair

Prior to final acceptance, all cracks in excess of 0.02 inches wide must be documented and repaired. The proposed method and materials to repair the cracks must be submitted to the Contracting Officer for approval. The proposal must address the amount of movement expected in the crack due to temperature changes and loading.

#### 3.15.2 Repair of Weak Surfaces

Weak surfaces are defined as mortar-rich, rain-damaged, uncured, or containing exposed voids or deleterious materials. Concrete surfaces with weak surfaces less than 1/4 inch thick must be diamond ground to remove the weak surface. Surfaces containing weak surfaces greater than 1/4 inch thick must be removed and replaced or mitigated in a manner acceptable to the Contracting Officer.

#### 3.15.3 Failure of Quality Assurance Test Results

Proposed mitigation efforts by the Contractor must be approved by the Contracting Officer prior to proceeding.

-- End of Section --



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 04 20 00

### UNIT MASONRY

11/15, CHG 2: 05/19

#### PART 1 GENERAL

##### 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

#### AMERICAN CONCRETE INSTITUTE (ACI)

ACI 216.1 (2014) Code Requirements for Determining  
Fire Resistance of Concrete and Masonry  
Construction Assemblies

ACI SP-66 (2004) ACI Detailing Manual

#### ASTM INTERNATIONAL (ASTM)

ASTM A153/A153M (2016a) Standard Specification for Zinc  
Coating (Hot-Dip) on Iron and Steel  
Hardware

ASTM A185/A185M (2007) Standard Specification for Steel  
Welded Wire Reinforcement, Plain, for  
Concrete

ASTM A615/A615M (2020) Standard Specification for Deformed  
and Plain Carbon-Steel Bars for Concrete  
Reinforcement

ASTM A641/A641M (2019) Standard Specification for  
Zinc-Coated (Galvanized) Carbon Steel Wire

ASTM A653/A653M (2020) Standard Specification for Steel  
Sheet, Zinc-Coated (Galvanized) or  
Zinc-Iron Alloy-Coated (Galvannealed) by  
the Hot-Dip Process

ASTM A706 Grade Reinforcing Bar

ASTM A951/A951M (2011) Standard Specification for Steel  
Wire for Masonry Joint Reinforcement

ASTM A1008/A1008M (2020) Standard Specification for Steel,  
Sheet, Cold-Rolled, Carbon, Structural,  
High-Strength Low-Alloy, High-Strength  
Low-Alloy with Improved Formability,  
Solution Hardened, and Bake Hardenable

ASTM A1064/A1064M (2017) Standard Specification for  
Carbon-Steel Wire and Welded Wire  
Reinforcement, Plain and Deformed, for

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## Concrete

ASTM C62	(2017) Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale)
ASTM C67/C67M	(2020) Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile
ASTM C90	(2016) Standard Specification for Loadbearing Concrete Masonry Units
ASTM C129	(2017) Standard Specification for Nonloadbearing Concrete Masonry Units
ASTM C207	(2018) Standard Specification for Hydrated Lime for Masonry Purposes
ASTM C216	(2019) Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)
ASTM C270	(2019) Standard Specification for Mortar for Unit Masonry
ASTM C315	(2007; R 2021) Standard Specification for Clay Flue Linings and Chimney Pots
ASTM C476	(2020) Standard Specification for Grout for Masonry
ASTM C494/C494M	(2019) Standard Specification for Chemical Admixtures for Concrete
ASTM C641	(2017) Standard Test Method for Iron Staining Materials in Lightweight Concrete Aggregates
ASTM C780	(2020) Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
ASTM C979/C979M	(2016) Standard Specification for Pigments for Integrally Colored Concrete
ASTM C1019	(2019) Standard Test Method for Sampling and Testing Grout
ASTM C1314	(2014) Standard Test Method for Compressive Strength of Masonry Prisms
ASTM C1384	(2012a) Standard Specification for Admixtures for Masonry Mortars
ASTM C1611/C1611M	(2014) Standard Test Method for Slump Flow of Self-Consolidating Concrete
ASTM D2000	(2018) Standard Classification System for

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### Rubber Products in Automotive Applications

ASTM D2287

(2019) Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds

ASTM E514/E514M

(2020) Standard Test Method for Water Penetration and Leakage Through Masonry

#### THE MASONRY SOCIETY (TMS)

TMS MSJC

(2016) Masonry Standard Joint Committee's (MSJC) Book - Building Code Requirements and Specification for Masonry Structures, Containing TMS 402/ACI 530/ASCE 5, TMS 602/ACI 530.1/ASCE 6, and Companion Commentaries

### 1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for Contractor Quality Control approval. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-02 Shop Drawings

Cut CMU Drawings; G

Reinforcement Detail Drawings; G

#### SD-03 Product Data

Hot Weather Procedures; G

Cold Weather Procedures; G

Clay or Shale Brick; G

Cement; G

Cementitious Materials; G

#### SD-04 Samples

Clay or Shale Brick; G

Concrete Masonry Units (CMU); G

Admixtures for Masonry Mortar; G

Anchors, Ties, and Bar Positioners; G

Joint Reinforcement; G

Clay Masonry Expansion-Joint Materials; G

#### SD-05 Design Data

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Masonry Compressive Strength; G

Fire-Rated Concrete Masonry Units

SD-06 Test Reports

Efflorescence Test

Fire-Rated Concrete Masonry Units

Field Testing of Mortar

Field Testing of Grout

Prism Tests

Single-Wythe Masonry Wall Water Penetration Test

SD-07 Certificates

Clay or Shale Brick

Concrete Masonry Units (CMU)

Cementitious Materials

Admixtures for Masonry Mortar

Admixtures for Grout

Anchors, Ties, and Bar Positioners

Joint Reinforcement

SD-08 Manufacturer's Instructions

Admixtures for Masonry Mortar

Admixtures for Grout

SD-10 Operation and Maintenance Data

Take-Back Program

1.3 QUALITY ASSURANCE

Not Used.

1.4 DELIVERY, STORAGE, AND HANDLING

Not Used.

1.5 PROJECT/SITE CONDITIONS

Conform to TMS MSJC for hot and cold weather masonry erection.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.5.1 Hot Weather Procedures

When ambient air temperature exceeds 100 degrees F, or exceeds 90 degrees F and the wind velocity is greater than 8 mph, comply with TMS MSJC Article 1.8 D for: preparation prior to conducting masonry work; construction while masonry work is in progress; and protection for newly completed masonry.

#### 1.5.2 Cold Weather Procedures

When ambient temperature is below 40 degrees F, comply with TMS MSJC Article 1.8 C for: preparation prior to conducting masonry work; construction while masonry work is in progress; and protection for newly completed masonry.

### PART 2 PRODUCTS

#### 2.1 SYSTEM DESCRIPTION

##### 2.1.1 Design - Specified Compressive Strength of Masonry

The specified compressive strength of masonry,  $f'_m$ , is as indicated for each type of masonry.

##### 2.1.2 Performance - Verify Masonry Compressive Strength

Verify specified compressive strength of masonry using the "Unit Strength Method" of TMS MSJC. Submit calculations and certifications of unit and mortar strength.

Verify specified compressive strength of masonry using the "Prism Test Method" of TMS MSJC when the "Unit Strength Method" cannot be used. Submit test results.

#### 2.2 MANUFACTURED UNITS

##### 2.2.1 General Requirements

Do not change the source of materials, which will affect the appearance of the finished work, after the work has started except with Contracting Officer's approval. Submit test reports from an approved independent laboratory. Certify test reports on a previously tested material as the same materials as that proposed for use in this project. Submit certificates of compliance stating that the materials meet the specified requirements.

##### 2.2.2 Clay or Shale Brick

###### 2.2.2.1 General

###### 2.2.2.1.1 Sample Submittal

Submit brick samples as specified, showing the color range and texture of clay or shale brick. Limit units used on the project to those that conform to the approved sample. Submit sample of colored mortar with applicable masonry unit and color samples of three stretcher units and one unit for each type of special shape.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.2.2.1.2 Uniformity

Manufacture bricks at one time and from the same run. Deliver clay or shale brick units factory-blended to provide a uniform appearance and color range in the completed wall.

#### 2.2.2.1.3 Efflorescence Test

Test clay brick that will be exposed to weathering for efflorescence in accordance with ASTM C67/C67M. Schedule tests far enough in advance of starting masonry work to permit retesting if necessary. Units meeting the definition of "effloresced" are subject to rejection.

#### 2.2.2.2 Solid Clay or Shale Brick

Provide solid clay or shale brick that conforms to ASTM C216, Type FBS and ASTM C62. Where brick cores, recesses, or deformation would be exposed to view, provide 100 percent solid units. Provide brick with texture and color range to match the brick on the existing facility.

#### 2.2.2.3 Flue Linings and Thimbles

Provide units that comply with ASTM C315 and are free from fractures. Provide sizes and shapes as indicated.

### 2.2.3 Concrete Units

#### 2.2.3.1 Aggregates

Test lightweight aggregates, and blends of lightweight and heavier aggregates in proportions used in producing the units, for stain-producing iron compounds in accordance with ASTM C641, visual classification method. Do not incorporate aggregates for which the iron stain deposited on the filter paper exceeds the "light stain" classification.

Use industrial waste by-products (air-cooled slag, cinders, or bottom ash), ground waste glass and concrete, granulated slag, and expanded slag in aggregates.

#### 2.2.3.2 Concrete Masonry Units (CMU)

##### 2.2.3.2.1 Cement

Use only cement that has a low alkali content and is of one brand.

##### 2.2.3.2.2 Recycled Content

Provide units with a minimum of 10 percent post-consumer recycled content, or a minimum of 20 percent post-industrial recycled content, based on mass, cost, or volume.

##### 2.2.3.2.3 Size

Provide units with specified dimension of 7-5/8 inches wide, 7-5/8 inches high, and 15-5/8 inches long.

##### 2.2.3.2.4 Surfaces

For units that are to be plastered, provide surfaces that are sufficiently

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

rough to provide bond. Elsewhere, provide units with exposed surfaces that are smooth and of uniform texture.

#### 2.2.3.2.5 Weather Exposure

Provide concrete masonry units with water-repellant admixture added during manufacture where units will be exposed to weather.

#### 2.2.3.2.6 Unit Types

- a. Hollow Load-Bearing Units: **ASTM C90**, medium weight or normal weight. Provide load-bearing units for exterior walls, foundation walls, load-bearing walls, and shear walls.
- b. Hollow Non-Load-Bearing Units: **ASTM C129**, medium weight or normal weight. Load-bearing units may be provided in lieu of non-load-bearing units.
- c. Solid Load-Bearing Units: **ASTM C90**, medium weight or normal weight units. Provide solid units as indicated.

#### 2.2.3.2.7 Jamb Units

Provide jamb units of the shapes and sizes to conform with wall units. Solid units may be incorporated in the masonry work where necessary to fill out at corners, gable slopes, and elsewhere as approved.

Provide sash jamb units with a 3/4 by 3/4 inch groove near the center at end of each unit.

#### 2.2.3.3 Fire-Rated Concrete Masonry Units

For indicated fire-rated construction, provide concrete masonry units of minimum equivalent thickness for the fire rating indicated and the corresponding type of aggregates indicated in TABLE I. Units containing more than one of the aggregates listed in TABLE I will be rated by linear interpolation based on the percent by dry-rodded volume of each aggregate used in manufacturing the units.

TABLE I FIRE-RATED CONCRETE MASONRY UNITS							
Aggregate Type	Minimum Equivalent Thickness for Fire-Resistance Rating, inch						
	1/2 hour	3/4 hour	1 hour	1-1/2 hour	2 hours	3 hours	4 hours
Calcareous or siliceous gravel (other than limestone)	2.0	2.4	2.8	3.6	4.2	5.3	6.2
Limestone, cinders, or air-cooled slag	1.9	2.3	2.7	3.4	4.0	5.0	5.9
Expanded clay, expanded shale, or expanded slate	1.8	2.2	2.6	3.3	3.6	4.4	5.1

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

TABLE I FIRE-RATED CONCRETE MASONRY UNITS							
Aggregate Type	Minimum Equivalent Thickness for Fire-Resistance Rating, inch						
Expanded slag or pumice	1.5	1.9	2.1	2.7	3.2	4.0	4.7

Determine equivalent thickness in accordance with [ACI 216.1](#). Where walls are to receive plaster or be faced with brick, or otherwise form an assembly; include the thickness of plaster or brick or other material in the assembly in determining the equivalent thickness. Submit calculation results.

## 2.3 EQUIPMENT

### 2.3.1 Vibrators

Maintain at least one spare vibrator on site at all times.

### 2.3.2 Grout Pumps

Pumping through aluminum tubes is not permitted.

## 2.4 MATERIALS

### 2.4.1 Mortar Materials

#### 2.4.1.1 Cementitious Materials

Provide cementitious materials that conform to those permitted by [ASTM C270](#).

#### 2.4.1.2 Hydrated Lime and Alternates

Provide lime that conforms to one of the materials permitted by [ASTM C207](#) for use in combination with portland cement, hydraulic cement, and blended hydraulic cement. Do not use lime in combination with masonry cement or mortar cement.

#### 2.4.1.3 Colored Mortar

Use mortar pigment that conforms to [ASTM C979/C979M](#). Add pigment to mortar to produce a uniform color matching [the mortar color on the existing facility](#). Furnish pigments in accurately pre-measured and packaged units that can be added to a measured amount of cementitious materials or supply pigments via preblended cementitious materials or dry mortar mix.

#### 2.4.1.4 Admixtures for Masonry Mortar

In cold weather, use a non-chloride based accelerating admixture that conforms to [ASTM C1384](#), unless Type III portland cement is used in the mortar.

In showers and kitchens, use mortar that contains a water-repellent admixture that conforms to [ASTM C1384](#). Provide a water-repellent admixture, conforming to [ASTM C1384](#) and of the same brand and manufacturer as the block's integral water-repellent, in the mortar used to place



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

concrete masonry units that have an integral water-repellent admixture.

#### 2.4.1.5 Aggregate and Water

Provide aggregate (sand) and water that conform to materials permitted by [ASTM C270](#).

#### 2.4.2 Grout and Ready-Mix Grout Materials

##### 2.4.2.1 Cementitious Materials for Grout

Provide cementitious materials that conform to those permitted by [ASTM C476](#).

##### 2.4.2.2 Admixtures for Grout

Water-reducing admixtures that conform to [ASTM C494/C494M](#) Type F or G and viscosity-modifying admixtures that conform to [ASTM C494/C494M](#) Type S are permitted for use in grout. Other admixtures require approval by the Contracting Officer.

In cold weather, a non-chloride based accelerating admixture may be used subject to approval by the Contracting Officer; use accelerating admixture that is non-corrosive and conforms to [ASTM C494/C494M](#), Type C.

##### 2.4.2.3 Aggregate and Water

Provide fine and coarse aggregates and water that conform to materials permitted by [ASTM C476](#).

#### 2.5 MORTAR AND GROUT MIXES

##### 2.5.1 Mortar Mix

- a. Provide mortar Type S unless specified otherwise herein.
- b. Provide Type N or S mortar for non-load-bearing, non-shear-wall interior masonry.
- c. For field-batched mortar, measure component materials by volume. Use measuring boxes for materials that do not come in packages, such as sand, for consistent batching. Mix cementitious materials and aggregates between 3 and 5 minutes in a mechanical batch mixer with a sufficient amount of water to produce a workable consistency. Do not hand mix mortar unless approved by the Contracting Officer. Maintain workability of mortar by remixing or retempering. Discard mortar that has begun to stiffen or is not used within 2-1/2 hours after initial mixing.
- d. For preblended mortar, follow manufacturer's mixing instructions.

##### 2.5.2 Grout and Ready Mix Grout Mix

Use grout that conforms to [ASTM C476](#), coarse. Use conventional grout with a slump between 8 and 11 inches. Use self-consolidating grout with slump flow of 24 to 30 inches and a visual stability index (VSI) not greater than 1. Provide minimum grout strength of 2500 psi in 28 days, as tested in accordance with [ASTM C1019](#). Do not change proportions and do not use materials with different physical or chemical characteristics in grout for the work unless additional evidence is furnished that grout

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

meets the specified requirements. Use ready-mixed grout that conforms to [ASTM C476](#).

## 2.6 ACCESSORIES

### 2.6.1 Grout Barriers

Grout barriers for vertical cores that consist of fine mesh wire, fiberglass, or expanded metal.

### 2.6.2 [Anchors, Ties, and Bar Positioners](#)

#### 2.6.2.1 General

- a. Fabricate anchors and ties without drips or crimps. Size anchors and ties to provide a minimum of [5/8 inch](#) mortar cover from each face of masonry.
- b. Fabricate steel wire anchors and ties shall from wire conforming to [ASTM A1064/A1064M](#) and hot-dip galvanize in accordance with [ASTM A153/A153M](#).
- c. Fabricate joint reinforcement in conformance with [ASTM A951/A951M](#). Hot dip galvanize joint reinforcement in exterior walls and in interior walls exposed to moist environment in conformance with [ASTM A153/A153M](#). Galvanize joint reinforcement in other interior walls in conformance with [ASTM A641/A641M](#); coordinate with paragraph JOINT REINFORCEMENT below.
- d. Fabricate sheet metal anchors and ties in conformance with [ASTM A1008/A1008M](#). Hot dip galvanize sheet metal anchors and ties in exterior walls and in interior walls exposed to moist environment in compliance with [ASTM A153/A153M](#) Class B. Galvanize sheet metal anchors and ties in other interior walls in compliance with [ASTM A653/A653M](#), Coating Designation G60.
- e. Submit two anchors, ties and bar positioners of each type used, as samples.

#### 2.6.2.2 Wire Mesh Anchors

Provide wire mesh anchors of [1/4 inch](#) mesh galvanized hardware cloth, conforming to [ASTM A185/A185M](#), with length not less than [12 inches](#), at intersections of interior non-bearing masonry walls.

#### 2.6.2.3 Wall Ties for Multi-Wythe Masonry Construction

Provide rectangular-shaped wall ties, fabricated of hot-dipped galvanized [W2.8](#) diameter steel wire. Provide rectangular wall ties no less than [4 inches](#) wide.

Provide adjustable type wall ties, if approved for use, that consist of two essentially U-shaped elements fabricated of minimum [W2.8](#) diameter steel wire or pintle type ties that are inserted to eyes of horizontal joint reinforcement, hot-dip galvanized. Provide adjustable ties with double pintle legs and allows a maximum offset of [1-1/4 inch](#) between each element of the tie and maximum distance between connecting parts no more than [1/16 inch](#). Form the pintle and eye elements shall be formed so that both can be in the same plane. Wall ties may also be of a continuous type

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

conforming to paragraph JOINT REINFORCEMENT.

#### 2.6.2.4 Dovetail Anchors

Provide dovetail anchors of  $3/16$  inch diameter steel wire, triangular shaped, and attached to a 12 gauge or heavier steel dovetail section. Use these anchors to connect the exterior masonry wythe as it passes over the face of concrete columns, beams, or walls. Fill cells immediately above and below these anchors unless solid units are used. Furnish dovetail slots, which are specified to be installed by others, in accordance with Section 03 30 00 CAST-IN-PLACE CONCRETE.

#### 2.6.2.5 Adjustable Anchors

##### 2.6.2.5.1 Anchorage to Structural Steel

Provide hot-dip galvanized adjustable anchors for connecting masonry walls to the structural steel frame as detailed on the drawings. Provide zinc-rich paint for touching up paint after welding galvanized anchors to structural steel.

##### 2.6.2.5.2 Anchorage of Veneer to Light Gauge Steel or Concrete Backing

Use one of the following types of adjustable anchors to connect veneer to light gauge steel or concrete backing:

- a. sheet metal at least  $7/8$  inch wide, 0.06 inch thick, and with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch or bent, notched or punched to provide equivalent performance;
- b. wire anchors of minimum size W1.7 with ends bent to form a minimum 2 inches extension and without drips;
- c. or wire pintle anchors used in conjunction with joint reinforcement.

Do not exceed  $1/16$  inch clearance between connecting parts of the tie. Assemble adjustable anchors to prevent disengagement. Provide pintle anchors with one or more pintle legs of wire size W2.8 and an offset not exceeding  $1-1/4$  inch.

#### 2.6.2.6 Veneer Anchor Screws

Provide screws for attachment of veneer anchors to cold-formed steel framing members of size as required by design to provide the needed pullout load capacity but not less than No. 12. Provide length of screws such that the screws penetrate the holding member by not less than  $5/8$  inch.

#### 2.6.2.7 Bar Positioners

Factory-fabricate bar positioners, used to prevent displacement of reinforcing bars during the course of construction, from 9 gauge steel wire or equivalent, and hot-dip galvanized. Bar positioners must be suitable for intended use and be corrosion resistant steel. Bar positioners not fully contained within the wythe must be hot-dip galvanized.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 2.6.3 Joint Reinforcement

Factory fabricate joint reinforcement in conformance with ASTM A951/A951M, welded construction. Provide ladder type joint reinforcement, having one longitudinal wire in the mortar bed of each face shell for hollow units and one wire for solid units and with all wires a minimum of 9 gauge. Size joint reinforcement to provide a minimum of 5/8 inch cover from each face. Space crosswires not more than 16 inches. Provide joint reinforcement for straight runs in flat sections not less than 10 feet long. Provide joint reinforcement with factory formed corners and intersections. If approved for use, joint reinforcement may be furnished with adjustable wall tie features. Submit one piece of each type used, including corner and wall intersection pieces, showing at least two cross wires.

### 2.6.4 Reinforcing Steel Bars

Reinforcing steel bars and rods shall conform to ASTM A615/A615M or ASTM A706 (where weldable reinforcing is indicated), Grade 60.

### 2.6.5 Concrete Masonry Control Joint Keys

Provide control joint keys of a factory fabricated solid section of natural or synthetic rubber (or combination thereof) conforming to ASTM D2000 M2AA-805 with a minimum durometer hardness of 80 or polyvinyl chloride conforming to ASTM D2287 Type PVC 654-4 with a minimum durometer hardness of 85. Form the control joint key with a solid shear section not less than 5/8 inch thick and 3/8 inch thick flanges, with a tolerance of plus or minus 1/16 inch, to fit neatly, but without forcing, in masonry unit jamb sash grooves.

### 2.6.6 Clay Masonry Expansion-Joint Materials

Provide backer rod and sealant, adequate to accommodate joint compression and extension equal to 50 percent of the width of the joint. Provide the backer rod of compressible rod stock of closed cell polyethylene foam, polyurethane foam, butyl rubber foam, or other flexible, nonabsorptive material as recommended by the sealant manufacturer. Provide sealant in conformance with Section 07 92 00 JOINT SEALANTS.

Submit one piece of each type of material used.

### 2.6.7 Through Wall Flashing and Weeps

#### 2.6.7.1 General

Provide stainless steel sheet, self-adhesive rubberized sheet, or reinforced membrane sheet flashing except that flashing indicated to terminate in reglets shall be metal or coated-metal flashing and except that the material shall be one which is not adversely affected by dampproofing material.

#### 2.6.7.2 Weep Ventilators

Provide weep ventilators that are prefabricated from stainless steel or plastic. Provide inserts with grill or louver-type openings designed to allow the passage of moisture from cavities and to prevent the entrance of insects, and with a rectangular closure strip to prevent mortar droppings from clogging the opening. Provide ventilators with compressible flanges

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

to fit in a standard 3/8 inch wide mortar joint and with height equal to the nominal height of the unit.

#### 2.6.7.3 Single-Wythe Exterior Wall CMU Flashing System

In single-wythe exterior CMU walls, provide a system of CMU cell flashing pans and interlocking CMU web covers made from UV-resistant, high-density polyethylene. For exterior CMU walls, provide a flashing/weep system in open cores that do not receive grout. Cell flashing pans are to have integral weep spouts built into mortar bed joints that extend into the cell to prevent clogging with mortar.

#### 2.6.7.4 Metal Drip Edge

Provide stainless steel drip edge, 15-mil thick, hemmed edges, with down-turned drip at the outside edge and upturned dam at the inside edge for use with membrane flashings.

#### 2.6.8 RIGID BOARD-TYPE INSULATION

Provide rigid board-type insulation as specified in Section 07 21 13 BOARD AND BLOCK INSULATION.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

Prior to start of work, verify the applicable conditions as set forth in TMS MSJC, inspection.

#### 3.2 PREPARATION

##### 3.2.1 Stains

Protect exposed surfaces from mortar and other stains. When mortar joints are tooled, remove mortar from exposed surfaces with fiber brushes and wooden paddles. Protect base of walls from splash stains by covering adjacent ground with sand, sawdust, or polyethylene.

##### 3.2.2 Loads

Do not apply uniform loads for at least 12 hours or concentrated loads for at least 72 hours after masonry is constructed. Provide temporary bracing as required.

##### 3.2.3 Concrete Surfaces

Where masonry is to be placed, clean concrete of laitance, dust, dirt, oil, organic matter, or other foreign materials and slightly roughen to provide a surface texture with a depth of at least 1/8 inch. Sandblast, if necessary, to remove laitance from pores and to expose the aggregate.

##### 3.2.4 Shelf Angles

Adjust shelf angles as required to keep the masonry level and at the proper elevation.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.2.5 Bracing

Provide bracing and scaffolding necessary for masonry work. Design bracing to resist wind pressure as required by OSHA and local codes and submit bracing calculations, sealed by a registered professional engineer. Do not remove bracing in less than 10 days.

## 3.3 ERECTION

### 3.3.1 General

- a. Coordinate masonry work with the work of other trades to accommodate built-in items and to avoid cutting and patching. Lay masonry units in running bond pattern. Lay facing courses level with back-up courses, unless the use of adjustable ties has been approved in which case the tolerances is plus or minus  $1/2$  inch. Adjust each unit to its final position while mortar is still soft and has plastic consistency.
- b. Remove and clean units that have been disturbed after the mortar has stiffened, and relay with fresh mortar. Keep air spaces, cavities, chases, expansion joints, and spaces to be grouted free from mortar and other debris. Select units to be used in exposed masonry surfaces from those having the least amount of chipped edges or other imperfections detracting from the appearance of the finished work.
- c. When necessary to temporarily discontinue the work, step (rack) back the masonry for joining when work resumes. Toothing may be used only when specifically approved by the Contracting Officer. Before resuming work, remove loose mortar and thoroughly clean the exposed joint. Cover the top of walls subjected to rain or snow with nonstaining waterproof covering or membrane when work is not in process. Extend the covering a minimum of 610 mm 2 feet down on each side of the wall and hold securely in place.
- d. Ensure that units being laid and surfaces to receive units are free of water film and frost. Lay solid units in a nonfurrowed full bed of mortar. Shove units into place so that the vertical joints are tight. Completely fill vertical joints between solid units with mortar, except where indicated at control, expansion, and isolation joints. Place hollow units so that mortar extends to the depth of the face shell at heads and beds, unless otherwise indicated. Mortar will be permitted to protrude up to  $1/2$  inch into the space or cells to be grouted. Provide means to prevent mortar from dropping into the space below or clean grout spaces prior to grouting.
- e. In multi-wythe construction with collar joints no more than  $3/4$  inch wide, bring up the inner wythe not more than 16 inches ahead of the outer wythe. Fill collar joints with mortar during the laying of the facing wythe, and filling shall not lag the laying of the facing wythe by back-buttering each unit as it is laid.

#### 3.3.1.1 Jointing

Tool mortar joints when the mortar is thumbprint hard. Tool horizontal joints after tooling vertical joints. Brush mortar joints to remove loose and excess mortar.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 3.3.1.1.1 Tooled Joints

Tool mortar joints in exposed exterior and interior masonry surfaces concave, using a jointer that is slightly larger than the joint width so that complete contact is made along the edges of the unit. Perform tooling so that the mortar is compressed and the joint surface is sealed. Use a jointer of sufficient length to obtain a straight and true mortar joint. No exterior joints are to be left un-tooled.

#### 3.3.1.1.2 Flush Joints

Flush cut mortar joints in concealed masonry surfaces and joints at electrical outlet boxes in wet areas. Finish flush cut joints by cutting off the mortar flush with the face of the wall. Point joints in unparged masonry walls below grade tight. For architectural units, such as fluted units, completely fill both the head and bed joints and flush cut.

#### 3.3.1.1.3 Door and Window Frame Joints

On the exposed interior side of exterior frames, joints between frames and abutting masonry walls shall be raked to a depth of  $\frac{3}{8}$  inch. On the exterior side of exterior frames, joints between frames and abutting masonry walls shall be raked to a depth of  $\frac{3}{8}$  inch.

#### 3.3.1.1.4 Joint Widths

- a. Construct brick masonry with mortar joint widths equal to the difference between the specified and nominal dimensions of the unit, within tolerances permitted by TMS MSJC.
- b. Provide  $\frac{3}{8}$  inch wide mortar joints in concrete masonry, except for prefaced concrete masonry units.
- c. Provide  $\frac{3}{8}$  inch wide mortar joints on unfaced side of prefaced concrete masonry units and not less than  $\frac{3}{16}$  inch nor more than  $\frac{1}{4}$  inch wide on prefaced side.
- d. Maintain mortar joint widths within tolerances permitted by TMS MSJC

#### 3.3.1.2 Cutting and Fitting

Use full units of the proper size wherever possible, in lieu of cut units. Locate cut units where they would have the least impact on the architectural aesthetic goals of the facility. Perform cutting and fitting, including that required to accommodate the work of others, by masonry mechanics using power masonry saws. Concrete masonry units may be wet or dry cut. Before being placed in the work, dry wet-cut units to the same surface-dry appearance as uncut units being laid in the wall. Provide cut edges that are clean, true and sharp.

- a. Carefully make openings in the masonry so that wall plates, cover plates or escutcheons required by the installation will completely conceal the openings and will have bottoms parallel with the masonry bed joints. Provide reinforced masonry lintels above openings over 12 inches wide for pipes, ducts, cable trays, and other wall penetrations, unless steel sleeves are used.
- b. Do not reduce masonry units in size by more than one-third in height and one-half in length. Do not locate cut products at ends of walls,

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

corners, and other openings.

#### 3.3.1.3 Unfinished Work

Rack back unfinished work for joining with new work. Tooothing may be resorted to only when specifically approved by the Contracting Officer. Remove loose mortar and thoroughly clean the exposed joints before laying new work.

#### 3.3.1.4 Clay Masonry Expansion Joints

Provide clay masonry expansion joints as indicated. Construct by filling with a compressible foam pad. Ensure that no mortar or other noncompressible materials are within the joint. Install backer rod and sealant in accordance with Section 07 92 00 JOINT SEALANTS.

#### 3.3.1.5 Control Joints

Provide control joints in concrete masonry as indicated. Construct by using special control-joint units in accordance with the details shown on the Drawings. Form a continuous vertical joint at control joint locations, including through bond beams, by utilizing half blocks in alternating courses on each side of the joint. Interrupt the control joint key in courses containing continuous bond beam reinforcement. Interrupt the horizontal reinforcement and grout in bond beams at the control joint except in bond beams at the floor and roof diaphragms.

Where mortar was placed in the joint, rake both faces of the control joints to a depth of  $\frac{3}{4}$  inch. Install backer rod and sealant on both faces in accordance with Section 07 92 00 JOINT SEALANTS.

#### 3.3.1.6 Decorative Architectural Units

Place decorative masonry units with the patterned face shell properly aligned in the completed wall.

### 3.3.2 Clay or Shale Brick Masonry

#### 3.3.2.1 Brick Placement

Blend all brick at the jobsite from several cubes to produce a uniform appearance when installed. An observable "banding" or "layering" of colors or textures caused by improperly mixed brick is unacceptable. Lay brick facing with the better face exposed. Lay brick in running bond with each course bonded at corners, unless otherwise indicated. Lay molded brick with the frog side down. Do not lay brick that is cored, recessed, or has other deformations in a manner that allows those deformations to be exposed to view; lay 100 percent solid units in these areas. Completely fill head and bed joints of solid units with mortar. Lay hollow units with mortar joints as specified for concrete masonry units.

Place exterior face of salvaged bricks towards the exterior.

#### 3.3.2.2 Wetting of Units

Wetting of clay, shale brick, or hollow brick units having an initial rate of absorption of more than 1 gram per minute per square inch of bed surface shall be in conformance with ASTM C67/C67M. Ensure that each unit is nearly saturated when wetted but surface dry when laid.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Test clay or shale brick daily on the job, prior to laying, as follows: Using a wax pencil, draw a circle the size of a quarter on five randomly selected bricks. Apply 20 drops of water with a medicine dropper to the surface within the circle on each brick. If the average time that the water is completely absorbed in the five bricks is less than 1-1/2 minutes, wet bricks represented by the five bricks tested.

### 3.3.2.3 Brick Sills

Lay brick on edge, slope not less than 3/4 inch downward to the outside, and project not less than 1/2 inch beyond the face of the wall to form a wash and drip. Fill all joints solidly with mortar and tool.

### 3.3.2.4 Partitions

- a. Construct partitions continuous from floor to underside of floor or roof deck where shown. Fill openings in firewalls around joists and other structural members as indicated or approved. Where suspended ceilings on both sides of partitions are indicated, the partitions other than those shown to be continuous may be stopped approximately 4 inches above the ceiling level. Construct an isolation joint in the intersection between partitions and structural or exterior walls.
- b. Tie interior partitions having 4 inch nominal thickness units to intersecting partitions of 4 inch units, 5 inches into partitions of 6 inch units, and 7 inches into partitions of 8 inch or thicker units. Cells within vertical plane of ties shall be filled solid with grout for full height of partition or solid masonry units may be used. Tie interior partitions over 4 inches thick together with joint reinforcement. Provide joint reinforcement with prefabricated pieces at corners and intersections of partitions.
- c. Double-Faced Bases or Partitions: Construct double-faced clay unit bases and partitions of two-unit construction. Bond units by overlapping from opposite faces of the wall, 2 inches for 6 inch thick partitions and 4 inches for 8 inch thick or greater. A single wythe prefaced concrete masonry base or partition may be made with double faced units.

### 3.3.3 Composite Walls

Tie masonry wythes together with joint reinforcement or with unit wall ties. Embed wall ties at least 1-1/2 inch into mortar of solid units and at least 1/2 inch into the mortar of the outer face shell of hollow units. Provide at least one tie every 2.67 square feet for wire size W1.7 and at least one tie every 4.50 square feet for wire size W2.8. Space ties at a maximum of 36 inches horizontally and 24 inches vertically. Do not cross expansion joints or control joints with ties. Fill collar joints between masonry facing and masonry backup solidly with grout.

### 3.3.4 Reinforced, Single Wythe Concrete Masonry Units Walls

#### 3.3.4.1 Concrete Masonry Unit Placement

- a. Fully bed units used to form piers, pilasters, columns, starting courses on footings, solid foundation walls, lintels, and beams, and where cells are to be filled with grout in mortar under both face shells and webs. Provide mortar beds under both face shells for other

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

units. Mortar head joints for a distance in from the face of the unit not less than the thickness of the face shell.

- b. Solidly grout foundation walls below grade.
- c. Stiffen double walls at wall-mounted plumbing fixtures by use of strap anchors, two above each fixture and two below each fixture, located to avoid pipe runs, and extending from center to center of each wall within the double wall. Adequately reinforce walls and partitions for support of wall-hung plumbing fixtures when chair carriers are not specified.
- d. Submit drawings showing elevations of walls exposed to view and indicating the location of all cut CMU products.

#### 3.3.4.2 Preparation for Reinforcement

Lay units in such a manner as to preserve the unobstructed vertical continuity of cores to be grouted. Remove mortar protrusions extending 1/2 inch or more into cells before placing grout. Position reinforcing bars accurately as indicated before placing grout. Where vertical reinforcement occurs, fill cores solid with grout in accordance with paragraph PLACING GROUT in this Section.

#### 3.3.5 Anchorage

##### 3.3.5.1 Anchorage to Concrete

Anchorage of masonry to the face of concrete columns, beams, or walls shall be with dovetail anchors spaced not over 16 inches on centers vertically and 24 inches on center horizontally.

##### 3.3.5.2 Anchorage to Structural Steel

Masonry shall be anchored to vertical structural steel framing with adjustable steel wire anchors spaced not over 16 inches on centers vertically, and if applicable, not over 24 inches on centers horizontally.

##### 3.3.5.3 Anchorage at Intersecting Walls

Provide wire mesh anchors at maximum 16 inches spacing at intersections of interior non-bearing masonry walls.

Anchor structural masonry walls as indicated on drawings.

#### 3.3.6 Lintels

##### 3.3.6.1 Masonry Lintels

Construct masonry lintels with lintel units filled solid with grout in all courses and reinforced with a minimum of two No. 4 bars in the bottom course unless otherwise indicated. Extend lintel reinforcement beyond each side of masonry opening 40 bar diameters or 24 inches, whichever is greater. Support reinforcing bars in place prior to grouting and locate 1/2 inch above the bottom inside surface of the lintel unit.

##### 3.3.6.2 Precast Concrete and Steel Lintels

Provide precast concrete and steel lintels as shown on the Drawings. Set

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

lintels in a full bed of mortar with faces plumb and true. Provide steel and precast lintels with a minimum bearing length of 8 inches unless otherwise indicated. In partially grouted masonry, provide fully grouted units under the full lintel bearing length, unless otherwise indicated.

### 3.3.7 Sills and Copings

Set sills and copings in a full bed of mortar with faces plumb and true. Slope sills and copings to drain water. Mechanically anchor copings and sills longer than 4 feet as indicated.

## 3.4 INSTALLATION

### 3.4.1 Bar Reinforcement Installation

#### 3.4.1.1 Preparation

Submit detail drawings showing bar splice locations. Identify bent bars on a bending diagram and reference and locate such bars on the drawings. Show wall dimensions, bar clearances, and wall openings. Utilize bending details that conform to the requirements of ACI SP-66. No approval will be given to the shop drawings until the Contractor certifies that all openings, including those for mechanical and electrical service, are shown. If, during construction, additional masonry openings are required, resubmit the approved shop drawings with the additional openings shown along with the proposed changes. Clearly highlight location of these additional openings. Provide wall elevation drawings with minimum scale of 1/4 inch per foot. Submit drawings including plans, elevations, and details of wall reinforcement; details of reinforcing bars at corners and wall intersections; offsets; tops, bottoms, and ends of walls; control and expansion joints; lintels; and wall openings.

Clean reinforcement of loose, flaky rust, scale, grease, mortar, grout, and other coatings that might destroy or reduce its bond prior to placing grout. Do not use bars with kinks or bends not shown on the approved shop drawings. Place reinforcement prior to grouting. Unless otherwise indicated, extend vertical wall reinforcement to within 2 inches of tops of walls.

#### 3.4.1.2 Positioning Bars

- a. Accurately place vertical bars within the cells at the positions indicated on the drawings. A minimum clearance of 1/2 inch shall be maintained between the bars and masonry units. Provide minimum clearance between parallel bars of 1/2 inch between the bars and masonry units for coarse grout and a minimum clearance of 1/4 inch between the bars and masonry units for fine grout. Provide minimum clearance between parallel bars of 1 inch or one diameter of the reinforcement, whichever is greater. Vertical reinforcement may be held in place using bar positioners located near the ends of each bar and at intermediate intervals of not more than 192 diameters of the reinforcement or by other means to prevent displacement beyond permitted tolerances. As masonry work progresses, secure vertical reinforcement to prevent displacement beyond allowable tolerances.
- b. Wire column and pilaster lateral ties in position around the vertical reinforcing bars. Place lateral ties in contact with the vertical reinforcement and do not place in horizontal mortar bed joints.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- c. Position horizontal reinforcing bars as indicated. Stagger splices in adjacent horizontal bars, unless otherwise indicated.
- d. Form splices by lapping bars as indicated. Do not cut, bend or eliminate reinforcing bars. Foundation dowel bars may be field-bent when permitted by TMS MSJC.

#### 3.4.1.3 Splices of Bar Reinforcement

Lap splice reinforcing bars as indicated. When used, provide welded or mechanical connections that develop at least 125 percent of the specified yield strength of the reinforcement.

#### 3.4.2 Placing Grout

##### 3.4.2.1 General

Fill cells containing reinforcing bars with grout. Solidly grout hollow masonry units in walls or partitions supporting plumbing, heating, or other mechanical fixtures, voids at door and window jambs, and other indicated spaces. Solidly grout cells under lintel bearings on each side of openings for full height of openings. Solidly grout walls below grade, lintels, and bond beams. Units other than open end units may require grouting each course to preclude voids in the units.

Discard site-mixed grout that is not placed within 1-1/2 hours after water is first added to the batch or when the specified slump is not met without adding water after initial mixing. Discard ready-mixed grout that does not meet the specified slump without adding water other than water that was added at the time of initial discharge. Allow sufficient time between grout lifts to preclude displacement or cracking of face shells of masonry units. Provide a grout shear key between lifts when grouting is delayed and the lower lift loses plasticity. If blowouts, flowouts, misalignment, or cracking of face shells should occur during construction, tear down the wall and rebuild.

##### 3.4.2.2 Vertical Grout Barriers for Multi-Wythe Composite Walls

In multi-wythe composite walls, provide grout barriers in the collar joint not more than 30 feet apart, or as required, to limit the horizontal flow of grout for each pour.

##### 3.4.2.3 Horizontal Grout Barriers

Embed horizontal grout barriers in mortar below cells of hollow units receiving grout.

##### 3.4.2.4 Grout Holes and Cleanouts

###### 3.4.2.4.1 Grout Holes

Provide grouting holes in slabs, spandrel beams, and other in-place overhead construction. Locate holes over vertical reinforcing bars or as required to facilitate grout fill in bond beams. Provide additional openings spaced not more than 16 inches on centers where grouting of hollow unit masonry is indicated. Form such openings not less than 4 inches in diameter or 3 by 4 inches in horizontal dimensions. Upon completion of grouting operations, plug and finish grouting holes to match surrounding surfaces.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 3.4.2.4.2 Cleanouts for Hollow Unit Masonry Construction

For hollow masonry units, provide cleanout holes at the bottom of every grout pour in cores containing vertical reinforcement when the height of the grout pour exceeds 5 feet 4 inches. Where all cells are to be grouted, construct cleanout courses using bond beam units in an inverted position to permit cleaning of all cells. Provide cleanout holes at a maximum spacing of 32 inches where all cells are to be filled with grout.

Establish a new series of cleanouts if grouting operations are stopped for more than 4 hours. Provide cleanouts not less than 3 by 3 inch by cutting openings in one face shell. Manufacturer's standard cutout units may be used at the Contractor's option. Do not cleanout holes until masonry work, reinforcement, and final cleaning of the grout spaces have been completed and inspected. For walls which will be exposed to view, close cleanout holes in an approved manner to match surrounding masonry.

#### 3.4.2.5 Grout Placement

A grout pour is the total height of masonry to be grouted prior to erection of additional masonry. A grout lift is an increment of grout placement within a grout pour. A grout pour is filled by one or more lifts of grout.

- a. Lay masonry to the top of a pour permitted by TMS MSJC Table 7, based on the size of the grout space and the type of grout. Prior to grouting, remove masonry protrusions that extend 1/2 inch or more into cells or spaces to be grouted. Provide grout holes and cleanouts in accordance with paragraph GROUT HOLES AND CLEANOUTS above when the grout pour height exceeds 5 feet 4 inches. Hold reinforcement, bolts, and embedded connections rigidly in position before grouting is started. Do not prewet concrete masonry units.
- b. Place grout using a hand bucket, concrete hopper, or grout pump to fill the grout space without segregation of aggregate. Operate grout pumps to produce a continuous stream of grout without air pockets, segregation, or contamination.
- c. If the masonry has cured at least 4 hours, grout slump is maintained between 10 to 11 inches, and no intermediate reinforced bond beams are placed between the top and bottom of the pour height, place conventional grout in lifts not exceeding 12 feet 8 inches. For the same curing and slump conditions but with intermediate bond beams, limit conventional grout lift to the bottom of the lowest bond beam that is more than 5 feet 4 inches above the bottom of the lift, but do not exceed 12 feet 8 inches. If masonry has not cured at least 4 hours or grout slump is not maintained between 10 to 11 inches, place conventional grout in lifts not exceeding 5 feet 4 inches.
- d. Consolidate conventional grout lift and reconsolidate after initial settlement before placing next lift. For grout pours that are 12 inches or less in height, consolidate and reconsolidate grout by mechanical vibration or puddling. For grout pours that are greater than 12 inches in height, consolidate and reconsolidate grout by mechanical vibration. Apply vibrators at uniformly spaced points not further apart than the visible effectiveness of the machine. Limit duration of vibration to time necessary to produce satisfactory consolidation without causing segregation. If previous lift is not

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

permitted to set, dip vibrator into previous lift. Do not insert vibrators into lower lifts that are in a semi-solidified state. If lower lift sets prior to placement of subsequent lift, form a grout key by terminating grout a minimum of **1-1/2 inch** below a mortar joint. Vibrate each vertical cell containing reinforcement in partially grouted masonry. Do not form grout keys within beams.

- e. If the masonry has cured 4 hours, place self-consolidating grout (SCG) in lifts not exceeding the pour height. If masonry has not cured for at least 4 hours, place SCG in lifts not exceeding **5 feet 4 inches**. Do not mechanically consolidate self-consolidating grout. Place self-consolidating grout in accordance with manufacturer's recommendations.
- f. Upon completion of each day's grouting, remove waste materials and debris from the equipment, and dispose of outside the masonry.

#### 3.4.3 Joint Reinforcement Installation

Install joint reinforcement at **16 inches** on center unless otherwise indicated. Lap joint reinforcement not less than **6 inches**. Install prefabricated sections at corners and wall intersections. Place the longitudinal wires of joint reinforcement in mortar beds to provide not less than **5/8 inch** cover to either face of the unit.

#### 3.4.4 Bond Beams

Reinforce and grout bond beams as indicated and as described in paragraphs above. Install grout barriers under bond beam units to retain the grout as required, unless wall is fully grouted or solid bottom units are used. For high lift grouting in partially grouted masonry, provide grout retaining material on the top of bond beams to prevent upward flow of grout. Ensure that reinforcement is continuous, including around corners, except through control joints or expansion joints, unless otherwise indicated.

#### 3.4.5 Flashing and Weeps

- a. Install through-wall flashing at obstructions in the cavity and where indicated on Drawings. Ensure continuity of the flashing at laps and inside and outside corners by splicing in a manner approved by the flashing manufacturer. Ensure that the top edge of the flashing is sealed by attaching a termination bar and applying compatible sealant at the top edge of the termination bar **or** lapping a minimum of **6 inches** under the weather resistive barrier **or** securing the sheet metal flashing into a reglet. Terminate the horizontal leg of the flashing by extending the sheet metal **1/2 inch** beyond the outside face of masonry and turning downward with a hemmed drip. Provide sealant below the drip edge of through-wall flashing.
- b. Wherever through-wall flashing occurs, provide weep holes to drain flashing to exterior at acceptable locations as indicated. Provide weeps of weep ventilators. Locate weeps not more than **24 inches** on centers in mortar joints of the exterior wythe directly on the horizontal leg of through-wall flashing over foundations, bond beams, and any other horizontal interruptions of the cavity. Place weep holes perfectly horizontal or slightly canted downward to encourage water drainage outward and not inward. Other methods may be used for providing weeps when spacing is reduced to **16 inches** on center and

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

approved by the Contracting Officer. Maintain weeps free of mortar and other obstructions.

- c. Install single-wythe CMU flashing system in bed joints of CMU walls where CMU cells are open. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall on the exterior side. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

### 3.5 APPLICATION

#### 3.5.1 Interface with Other Products

##### 3.5.1.1 Built-In Items

Fill spaces around built-in items with mortar. Point openings around flush-mount electrical outlet boxes in wet locations with mortar. Embed anchors, ties, wall plugs, accessories, flashing, pipe sleeves and other items required to be built-in as the masonry work progresses. Fully embed anchors, ties and joint reinforcement in the mortar. Fill cells receiving anchor bolts and cells of the first course below bearing plates with grout, unless otherwise indicated.

##### 3.5.1.2 Door and Window Frame Joints

On the exposed interior and exterior sides of exterior frames, rake joints between frames and abutting masonry walls to a depth of  $\frac{3}{8}$  inch.

##### 3.5.1.3 Bearing Plates

Set bearing plates for beams, joists, joist girders and similar structural members to the proper line and elevation with damp-pack bedding mortar, except where non-shrink grout is indicated. Provide bedding mortar and non-shrink grout as specified in Section 03 30 00 CAST-IN-PLACE CONCRETE.

#### 3.5.2 Tolerances

Lay masonry plumb, true to line, with courses level within the tolerances of TMS MSJC, Article 3.3 F.

### 3.6 FIELD QUALITY CONTROL

#### 3.6.1 Tests

##### 3.6.1.1 Field Testing of Mortar

Perform mortar testing at the following frequency: two times per day. For each required mortar test, provide a minimum of three mortar samples. Perform initial mortar testing prior to construction for comparison purposes during construction.

Prepare and test mortar samples for mortar aggregate ratio in accordance with ASTM C780 Appendix A4. Prepare and test mortar compressive strength specimens in accordance with ASTM C780 Appendix A6.

##### 3.6.1.2 Field Testing of Grout

- a. Perform grout testing at the following frequency: two times per day.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

For each required grout property to be evaluated, provide a minimum of three specimens.

- b. Sample and test conventional and self-consolidating grout for compressive strength and temperature in accordance with [ASTM C1019](#).
- c. Evaluate slump in conventional grout in accordance with [ASTM C1019](#).
- d. Evaluate slump flow and visual stability index of self-consolidating grout in accordance with [ASTM C1611/C1611M](#).

#### 3.6.1.3 Clay Brick Efflorescence Test

Test clay brick that will be exposed to weathering for efflorescence in accordance with [ASTM C67/C67M](#). Schedule tests far enough in advance of starting masonry work to permit retesting if necessary. Units meeting the definition of "effloresced" are subject to rejection.

#### 3.6.1.4 Prism Tests

Perform at least one prism test sample for each 5,000 square feet of wall but not less than three such tests for any building. Evaluate three prisms in each test. Fabricate, store, handle, and test prisms in accordance with [ASTM C1314](#).

Seven-day tests may be used provided the relationship between the 7- and 28-day strengths of the masonry is established by the tests of the materials used. If the compressive strength of any prism falls below the specified value by more than 500 psi, take steps to assure that the load-carrying capacity of the structure is not jeopardized. If the likelihood of low-strength masonry is confirmed and computations indicate that the load-carrying capacity may have been significantly reduced, tests of cores drilled, or prisms sawed, from the area in question may be required. In such case, take three specimens for each prism test more than 500 psi below the specified value. Masonry in the area in question will be considered structurally adequate if the average compressive strength of three specimens is equal to or exceeds the specified value. Additional testing of specimens extracted from locations represented by erratic core or prism strength test results will be permitted.

#### 3.6.1.5 Single-Wythe Masonry Wall Water Penetration Test

Prior to start of field construction of the single-wythe concrete masonry wall, perform masonry wall water penetration test on mock-up wall assemblies consisting of the identical design, materials, mix, and construction methods as the actual wall construction and in accordance with [ASTM E514/E514M](#). Prepare a minimum of three specimens and cure for minimum 28 days prior to testing. Construct panels by the same methods, processes, and applications to be used on the project's construction site. Spray test for 6 hours on each specimen. If water is visible on back of test panels during the test and areas of dampness on the backside of the test panels do not exceed 25 percent of the wall area, the panels will be considered to have passed. Dampness is defined as any area of surface darkening or discoloration due to moisture penetration or accumulation below the observed surface.

Construct additional test panels for each failed test performed until three test panels pass the test. Factors that can affect test performance include materials, mixing, and quality of application and workmanship.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Materials, mixing, and methods adjustments may be necessary in order to provide construction that passes the water penetration test. Document and record the test specimen construction materials and application and provide written test report in accordance with [ASTM E514/E514M](#), supplemented by a detailed discussion of the specifics of test panel construction, application methods and processes used, quality of construction, and any variances or deviations that may have occurred between test panels during test panel construction. For failed test panels, identify in the supplemental report the variances, deficiencies or flaws that contributed to test panel failure and itemize the precautions to be taken in field construction of the masonry wall to prevent similar deficiencies and assure the wall construction replicates test panel conditions that pass the water penetration test. Submit the complete, certified test report, including supplemental report, to the Contracting Officer prior to start of single-wythe concrete masonry wall construction. Significant changes to materials, proportions, or construction techniques from those used in the passing water penetration test are grounds for performing new tests, at the discretion of the Contracting Officer.

### 3.6.2 Special Inspection

Perform special inspections and testing in accordance with Section [01 45 35](#) SPECIAL INSPECTIONS.

### 3.7 POINTING AND CLEANING

After mortar joints have attained their initial set, but prior to hardening, completely remove mortar and grout daubs and splashings from masonry-unit surfaces that will be exposed or painted. Before completion of the work, rake out defects in joints of masonry to be exposed or painted, fill with mortar, and tool to match existing joints. Immediately after grout work is completed, remove scum and stains that have percolated through the masonry work using a low pressure stream of water and a stiff bristled brush. Do not clean masonry surfaces, other than removing excess surface mortar, until mortar in joints has hardened. Leave masonry surfaces clean, free of mortar daubs, dirt, stain, and discoloration, including scum from cleaning operations, and with tight mortar joints throughout. Do not use metal tools and metal brushes for cleaning.

#### 3.7.1 Dry-Brushing Concrete Masonry

Dry brush exposed concrete masonry surfaces at the end of each day's work and after any required pointing, using stiff-fiber bristled brushes.

#### 3.7.2 Clay Brick Surfaces

Clean exposed clay brick masonry surfaces to obtain surfaces free of stain, dirt, mortar and grout daubs, efflorescence, and discoloration or scum from cleaning operations. Perform cleaning in accordance with the approved cleaning procedure demonstrated on the mockup.

After cleaning, examine the sample panel of similar material for discoloration or stain as a result of cleaning. If the sample panel is discolored or stained, change the method of cleaning to ensure that the masonry surfaces in the structure will not be adversely affected. Water-soak exposed masonry surfaces and then clean with a proprietary masonry cleaning agent specifically recommended for the color and texture by the clay brick manufacturer and manufacturer of the cleaning product. Apply the solution with stiff fiber brushes, followed immediately by

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

thorough rinsing with clean water. Use proprietary cleaning agents in conformance with the cleaning product manufacturer's printed recommendations. Remove efflorescence in conformance with the brick manufacturer's recommendations.

### 3.8 CLOSE-OUT TAKE-BACK PROGRAM

Collect information from manufacturer for take-back program options. Set aside masonry units, full and partial scrap, and packaging to be returned to manufacturer for recycling into new product. When such a service is not available, seek local recyclers to reclaim the materials. Submit documentation that includes contact information, summary of procedures, and the limitations and conditions applicable to the project. Indicate manufacturer's commitment to reclaim materials for recycling and/or reuse.

### 3.9 PROTECTION

Protect facing materials against staining. Cover top of walls with nonstaining waterproof covering or membrane to protect from moisture intrusion when work is not in progress. Continue covering the top of the unfinished walls until the wall is waterproofed with a complete roof or parapet system. Extend covering a minimum of 2 feet down on each side of the wall and hold securely in place. Before starting or resuming work, clean top surface of masonry in place of loose mortar and foreign material.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 05 05 23.16

STRUCTURAL WELDING  
08/18

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 360 (2016) Specification for Structural Steel Buildings

## AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)

ANSI/ASNT CP-189 (2020) ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel

## AMERICAN WELDING SOCIETY (AWS)

AWS A2.4 (2012) Standard Symbols for Welding, Brazing and Nondestructive Examination

AWS D1.1/D1.1M (2020) Structural Welding Code - Steel

AWS D1.3/D1.3M (2018) Structural Welding Code - Sheet Steel

AWS D1.4/D1.4M (2011) Structural Welding Code - Reinforcing Steel

AWS D14.4/D14.4M (2012) Specification for Welded Joints for Machinery and Equipment

AWS QC1 (2016) Specification for AWS Certification of Welding Inspectors

AWS Z49.1 (2012) Safety in Welding and Cutting and Allied Processes

## ASTM INTERNATIONAL (ASTM)

ASTM E165/E165M (2018) Standard Practice for Liquid Penetrant Examination for General Industry

ASTM E709 (2015) Standard Guide for Magnetic Particle Examination

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S"

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-01 Preconstruction Submittals

Welding Quality Assurance Plan; G

#### SD-03 Product Data

Welding Procedure Qualifications; G

Welder, Welding Operator, and Tacker Qualification

Previous Qualifications

Pre-Qualified Procedures; G

Welding Electrodes and Rods

#### SD-06 Test Reports

Nondestructive Testing

Weld Inspection Log

#### SD-07 Certificates

Certified Welding Procedure Specifications (WPS)

Certified Brazing Procedure Specifications (BPS)

Certified Procedure Qualification Records (PQR)

Certified Welder Performance Qualifications (WPQ)

Certified Brazer Performance Qualifications (BPQ)

Certified Welding Inspector

Nondestructive Testing Personnel

### 1.3 QUALITY ASSURANCE

Except for pre-qualified (in accordance with AWS D1.1/D1.1M) and previously qualified procedures, each Contractor performing welding must record in detail and qualify the welding procedure specification for any welding procedure followed in the fabrication of weldments. Conform welding procedure qualifications to AWS D1.1/D1.1M and to the specifications in this section. Submit for approval copies of the welding procedure specification and the procedure qualification records for each type of welding being performed. Submission of the welder, welding operator, or tacker qualification test records is also required. Approval of any procedure, however, does not relieve the Contractor of the sole responsibility for producing a finished structure meeting all the specified requirements. Submit this information on the forms in Annex M of AWS D1.1/D1.1M. Individually identify and clearly reference on the detail drawings and erection drawings all welding procedure specifications, or suitably key them to the contract drawings. In case of

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

conflict between this specification and AWS D1.1/D1.1M, this specification governs.

#### 1.3.1 General Requirements

Fabricate work in an AISC Certified Fabrication Plant, Category BU. Erect work by an AISC Certified Erector, Category CSE.

a. For Structural Projects, provide documentation of the following:

- (1) Component Thickness 1/8 inch and greater: Qualification documents (WPS, PQR, and WPQ) in accordance with AWS D1.1/D1.1M.
- (2) Component Thickness Less than 1/8 inch: Qualification documents (WPS, PQR, and WPQ) in accordance with AWS D1.3/D1.3M.
- (3) Reinforcing Steel: Qualification documents (WPS, PQR, and WPQ) in accordance with AWS D1.4/D1.4M.

b. For other applications, provide documentation of the following:

- (1) Submit one copy of the Certified Welding Procedure Specifications (WPS), Certified Brazing Procedure Specifications (BPS) and Certified Procedure Qualification Records (PQR) to the Contracting Officer for review.
- (2) Submit one copy of the Certified Welder Performance Qualifications (WPQ) and Certified Brazer Performance Qualifications (BPQ) to the Contracting Officer for review within fifteen calendar days prior to any employee welding on the project material.
- (3) Machinery: Qualification documents (WPS, PQR, and WPQ) in accordance with AWS D14.4/D14.4M.

#### 1.3.2 Previous Qualifications

Welding procedures previously qualified by test in accordance with AWS D1.1/D1.1M, may be accepted for this contract without re-qualification, upon receipt of the test results, if the following conditions are met:

- a. Testing was performed by an approved testing laboratory, technical consultant, or the Contractor's approved quality control organization.
- b. The qualified welding procedure conforms to the requirements of this specification and is applicable to welding conditions encountered under this contract.
- c. The welder, welding operator, and tacker qualification tests conform to the requirements of this specification and are applicable to welding conditions encountered under this contract.

#### 1.3.3 Pre-qualified Procedures

Welding procedures which are considered pre-qualified as specified in AWS D1.1/D1.1M will be accepted without further qualification. Submit for approval a listing or an annotated drawing to indicate the joints not pre-qualified. Procedure qualification is mandatory for these joints.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.3.4 Welder, Welding Operator, and Tacker Qualification

Each welder, welding operator, and tacker assigned to work on this contract must be qualified in accordance with the applicable requirements of AWS D1.1/D1.1M and as specified in this section. Welders, welding operators, and tackers who make acceptable procedure qualification test welds will be considered qualified for the welding procedure used within the applicable essential variables for welder qualification.

##### 1.3.4.1 Previous Personnel Qualifications

At the discretion of the Contracting Officer, welders, welding operators, and tackers qualified by test within the previous 6 months may be accepted for this contract without re-qualification if all the following conditions are met:

- a. Copies of the welding procedure specifications, the procedure qualification test records, and the welder, welding operator, and tacker qualification test records are submitted and approved in accordance with the specified requirements for detail drawings.
- b. Testing was performed by an approved testing laboratory, technical consultant, or the Contractor's approved quality control organization.
- c. The welder, welding operator, and tacker qualification tests conform to the requirements of this specification and are applicable to welding conditions encountered under this contract.

##### 1.3.4.2 Certificates

Before assigning any welder, welding operator, or tacker to work under this contract, submit the names and certification that each individual is qualified as specified. State in the certification the type of welding and positions for which the welder, welding operator, or tacker is qualified, the code and procedure under which the individual is qualified, the date qualified, and the name of the firm and person certifying the qualification tests. Keep the certification current, on file, and furnish 3 copies.

##### 1.3.4.3 Renewal of Qualification

Re-qualification of a welder or welding operator is required under any of the following conditions:

- a. It has been more than 6 months since the welder or welding operator has used the specific welding process for which he is qualified.
- b. There is specific reason to question the welder or welding operator's ability to make welds that meet the requirements of these specifications.
- c. The welder or welding operator was qualified by an employer other than those firms performing work under this contract, and a qualification test has not been taken within the past 12 months. Submit as evidence of conformance all records showing periods of employment, name of employer where welder, or welding operator, was last employed, and the process for which qualified.
- d. A tacker who passes the qualification test is considered eligible to

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

perform tack welding indefinitely in the positions and with the processes for which he/she is qualified, unless there is some specific reason to question the tacker's ability or there has been a gap greater than 6 months since he/she last used the process. In such a case, the tacker is required to pass the prescribed tack welding test.

#### 1.3.5 Inspector Qualification

Submit certificates indicating that [certified welding inspectors](#) meet the requirements of [AWS QC1](#). Submit qualifications for [nondestructive testing personnel](#) in accordance with the requirements of [ANSI/ASNT CP-189](#) for Levels I or II in the applicable nondestructive testing method. Level I inspectors must have direct supervision of a Level II inspector.

#### 1.3.6 Symbols and Safety

Use symbols in accordance with [AWS A2.4](#), unless otherwise indicated. Follow safe welding practices and safety precautions during welding in conformance with [AWS Z49.1](#).

### PART 2 PRODUCTS

#### 2.1 SYSTEM DESCRIPTION

Conform the design of welded connections to [AISC 360](#), unless otherwise indicated or specified. Material with welds will not be accepted unless the welding is specified or indicated on the drawings or otherwise approved. Perform welding as specified in this section, except where additional requirements are shown on the drawings or are specified in other sections. Do not commence welding until welding procedures, inspectors, nondestructive testing personnel, welders, welding operators, and tackers have been qualified and the submittals approved by the Contracting Officer. Perform all testing at or near the work site. Maintain records of the test results obtained in welding procedure, welder, welding operator, and tacker performance qualifications.

##### 2.1.1 Pre-erection Conference

Hold a pre-erection conference prior to the start of the field welding, to bring all affected parties together and to gain a naturally clear understanding of the project and the Welding Procedure Specifications (WPS) (submitted for all welding, including welding done using pre-qualified procedures). Mandatory attendance is required by all Contractor's welding production and inspection personnel and appropriate Government personnel. Include as items for discussion: responsibilities of various parties; welding procedures and processes to be followed; welding sequence (both within a joint and joint sequence within the building); inspection requirements and procedures, both visual and nondestructive testing; welding schedule; and other items deemed necessary by the attendees.

#### 2.2 WELDING EQUIPMENT AND MATERIALS

Provide all welding equipment, welding electrodes and rods, welding wire, and fluxes capable of producing satisfactory welds when used by a qualified welder or welding operator. Provide welding equipment and materials that comply with the applicable requirements of [AWS D1.1/D1.1M](#). Submit product data on [welding electrodes and rods](#).

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## PART 3 EXECUTION

### 3.1 WELDING OPERATIONS

#### 3.1.1 Requirements

Conform workmanship and techniques for welded construction to the requirements of [AWS D1.1/D1.1M](#) and [AISC 360](#). When [AWS D1.1/D1.1M](#) and the [AISC 360](#) specification conflict, the requirements of [AWS D1.1/D1.1M](#) govern.

#### 3.1.2 Identification

Identify all welds in one of the following ways:

- a. Submit written records to indicate the location of welds made by each welder, welding operator, or tacker.
- b. Identify all work performed by each welder, welding operator, or tacker with an assigned number, letter, or symbol to identify welds made by that individual. The Contracting Officer may require welders, welding operators, and tackers to apply their symbol next to the weld by means of rubber stamp, felt-tipped marker with waterproof ink, or other methods that do not cause an indentation in the metal. Place the identification mark for seam welds adjacent to the weld at [3 foot](#) intervals. Identification with die stamps or electric etchers is not allowed.

### 3.2 QUALITY CONTROL

Perform testing using an approved inspection or testing laboratory or technical consultant; or if approved, the Contractor's inspection and testing personnel may be used instead of the commercial inspection or testing laboratory or technical consultant. A Certified Welding Inspector must perform visual inspection on 100 percent of all welds. Document this inspection in the Visual [Weld Inspection Log](#). Test 50% of CJP welds using ultrasonic testing per Table 6.2 or 6.3 of [AWS D1.1/D1.1M](#). Randomly test [25%](#) of all PJP and fillet welds or as indicated by magnetic particle or dye penetrant testing. Verify the welds conform to paragraph STANDARDS OF ACCEPTANCE. Conform procedures and techniques for inspection with applicable requirements of [AWS D1.1/D1.1M](#), [ASTM E165/E165M](#), and [ASTM E709](#). Submit a [Welding Quality Assurance Plan](#) and records of tests and inspections.

### 3.3 STANDARDS OF ACCEPTANCE

Conform dimensional tolerances for welded construction, details of welds, and quality of welds with the applicable requirements of [AWS D1.1/D1.1M](#) and the contract drawings. Submit all records of [nondestructive testing](#).

#### 3.3.1 Nondestructive Testing

The welding is subject to inspection and tests in the mill, shop, and field. Inspection and tests in the mill or shop do not relieve the Contractor of the responsibility to furnish weldments of satisfactory quality. When materials or workmanship do not conform to the specification requirements, the Government reserves the right to reject material or workmanship or both at any time before final acceptance of the structure containing the weldment. Any indication of a defect is regarded as a defect, unless re-evaluation by nondestructive methods or by surface



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

conditioning shows that no unacceptable defect is present. Submit all records of nondestructive testing in accordance with paragraph STANDARDS OF ACCEPTANCE.

### 3.3.2 Destructive Tests

Make all repairs when metallographic specimens are removed from any part of a structure. Employ only qualified welders or welding operators, and use the proper joints and welding procedures, including peening or heat treatment if required, to develop the full strength of the members and joints cut and to relieve residual stress.

### 3.4 GOVERNMENT INSPECTION AND TESTING

In addition to the inspection and tests performed by the Contractor for quality control, the Government will perform inspection and testing for acceptance to the extent determined by the Contracting Officer. The work may be performed by the Government's own forces or under a separate contract for inspection and testing. The Government reserves the right to perform supplemental nondestructive and destructive tests to determine compliance with paragraph STANDARDS OF ACCEPTANCE.

### 3.5 CORRECTIONS AND REPAIRS

If inspection or testing indicates defects in the weld joints, repair defective welds using a qualified welder or welding operator as applicable. Conduct corrections in accordance with the requirements of AWS D1.1/D1.1M and the specifications. Repair all defects in accordance with the approved procedures. Repair defects discovered between passes before additional weld material is deposited. Wherever a defect is removed and repair by welding is not required, blend the affected area into the surrounding surface to eliminate sharp notches, crevices, or corners. After a defect is thought to have been removed, and before re-welding, examine the area by suitable methods to ensure that the defect has been eliminated. Repaired welds must meet the inspection requirements for the original welds.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 05 12 00

## STRUCTURAL STEEL

08/18, CHG 2: 05/21

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 207	(2016; R 2017) Certification Standard for Steel Fabrication and Erection, and Manufacturing of Metal Components
AISC 303	(2016) Code of Standard Practice for Steel Buildings and Bridges
AISC 325	(2017) Steel Construction Manual
AISC 326	(2009) Detailing for Steel Construction
AISC 360	(2016) Specification for Structural Steel Buildings
AISC DESIGN GUIDE 10	(1997) Erection Bracing of Low-Rise Structural Steel Buildings

## AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)

ANSI/ASNT CP-189	(2020) ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel
------------------	--

## AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B46.1	(2020) Surface Texture, Surface Roughness, Waviness and Lay
------------	---

## AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	(2012) Standard Symbols for Welding, Brazing and Nondestructive Examination
AWS D1.1/D1.1M	(2020) Structural Welding Code - Steel
AWS QC1	(2016) Specification for AWS Certification of Welding Inspectors

## ASTM INTERNATIONAL (ASTM)

ASTM A6/A6M	(2017a) Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
-------------	--

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

ASTM A29/A29M	(2020) Standard Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought
ASTM A36/A36M	(2019) Standard Specification for Carbon Structural Steel
ASTM A53/A53M	(2020) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A143/A143M	(2007; R 2020) Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
ASTM A307	(2021) Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A500/A500M	(2021) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A563	(2015) Standard Specification for Carbon and Alloy Steel Nuts
ASTM A780/A780M	(2020) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A992/A992M	(2020) Standard Specification for Structural Steel Shapes
ASTM B695	(2004; R 2016) Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
ASTM C827/C827M	(2016) Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures
ASTM C1107/C1107M	(2020) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM F436/F436M	(2019) Standard Specification for Hardened Steel Washers Inch and Metric Dimensions
ASTM F844	(2019) Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

ASTM F1136/F1136M	(2011) Standard Specification for Zinc/Aluminum Corrosion Protective Coatings for Fasteners
ASTM F1554	(2020) Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
ASTM F2329/F2329M	(2015) Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners
ASTM F2833	(2011; R 2017) Standard Specification for Corrosion Protective Fastener Coatings with Zinc Rich Base Coat and Aluminum Organic/Inorganic Type
ASTM F3125/F3125M	(2019) Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength

#### SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC SP 1	(2015) Solvent Cleaning
SSPC SP 2	(2018) Hand Tool Cleaning
SSPC SP 3	(2018) Power Tool Cleaning

#### U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-301-01	(2019) Structural Engineering
--------------	-------------------------------

#### U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR Part 1926, Subpart R	Steel Erection
-----------------------------	----------------

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

### SD-01 Preconstruction Submittals

Erection and Erection Bracing Drawings; G

### SD-02 Shop Drawings

Fabrication Drawings Including Details of Connections; G

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

SD-03 Product Data

Shop Primer

Welding Electrodes and Rods

Non-Shrink Grout

Tension Control Bolts

Recycled Content for Structural Steel; S

Recycled Content for Structural Steel Tubing; S

Recycled Content for Steel Pipe; S

SD-05 Design Data

Design Calculations for Steel Connections; G

Shoring and Temporary Bracing; G

SD-06 Test Reports

Class B Coating

Bolts, Nuts, and Washers

Weld Inspection Reports

Bolt Testing Reports

Embrittlement Test Reports

SD-07 Certificates

Steel

Bolts, Nuts, and Washers

Galvanizing

AISC Structural Steel Fabricator Quality Certification

AISC Structural Steel Erector Quality Certification

Welding Procedures and Qualifications

Welding Electrodes and Rods

Certified Welding Inspector

NDT Technician

Welding Procedure Specifications (WPS)

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 1.3 AISC QUALITY CERTIFICATION

Work must be fabricated by an AISC Certified Structural Steel Fabricator, in accordance with [AISC 207](#), Category BU. Submit [AISC Structural Steel Fabricator quality certification](#).

Work must be erected by an AISC Structural Steel Certified Erector, in accordance with [AISC 207](#), Category CSE. Submit [AISC Structural Steel erector quality certification](#).

### 1.4 QUALITY ASSURANCE

#### 1.4.1 Preconstruction Submittals

##### 1.4.1.1 Erection and Erection Bracing Drawings

Submit for record purposes. Indicate the sequence of erection, temporary shoring and bracing. The erection drawings must conform to [AISC 303](#). Erection drawings must be reviewed, stamped and sealed by a registered professional engineer.

#### 1.4.2 Fabrication Drawing Requirements

Submit [fabrication drawings](#) for approval prior to fabrication. Prepare in accordance with [AISC 303](#), [AISC 326](#) and [AISC 325](#). Fabrication drawings must not be reproductions of contract drawings. Include complete information for the fabrication and erection of the structure's components, including the location, type, and size of bolts, welds, member sizes and lengths, connection details, blocks, copes, and cuts. Use [AWS A2.4](#) standard welding symbols. [Shoring and temporary bracing](#) must be designed and sealed by a registered professional engineer and submitted for record purposes, with calculations, as part of the drawings. Clearly highlight any deviations from the details shown on the contract drawings highlighted on the fabrication drawings. Explain the reasons for any deviations from the contract drawings.

#### 1.4.3 Delegated Connection Design

Design structural steel connection indicated in the contract documents per [AISC 303](#), Option 3, using the connection loads indicated. Submit [design calculations for steel connections](#) signed and sealed by a registered professional engineer.

#### 1.4.4 Certifications

##### 1.4.4.1 Welding Procedures and Qualifications

Prior to welding, submit certification for each welder stating the type of welding and positions qualified for, the code and procedure qualified under, date qualified, and the firm and individual certifying the qualification tests. If the qualification date of the welder or welding operator is more than 6 months old, the welding operator's qualification certificate must be accompanied by a current certificate by the welder attesting to the fact that he has been engaged in welding since the date of certification, with no break in welding service greater than 6 months.

Conform to all requirements specified in [AWS D1.1/D1.1M](#).

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## PART 2 PRODUCTS

### 2.1 SYSTEM DESCRIPTION

Provide the structural steel system, including shop primer, galvanizing (where indicated), complete and ready for use. Provide structural steel systems including design, materials, installation, workmanship, fabrication, assembly, erection, inspection, quality control, and testing in accordance with AISC 303, AISC 360, and UFC 3-301-01 except as modified in this contract.

### 2.2 STEEL

#### 2.2.1 Structural Steel

Wide flange and WT shapes, ASTM A992/A992M. Angles, Channels and Plates, ASTM A36/A36M. Provide structural steel containing a minimum of 80 percent recycled content. Submit data identifying percentage of recycled content for structural steel.

#### 2.2.2 Structural Steel Tubing

ASTM A500/A500M, Grade B. Provide structural steel tubing containing a minimum of 50 percent recycled content. Submit data identifying percentage of recycled content for structural steel tubing.

#### 2.2.3 Steel Pipe

ASTM A53/A53M, Type E or S, Grade B, weight class as indicated. Provide steel pipe containing a minimum of 50 percent recycled content. Submit data identifying percentage of recycled content for steel pipe.

### 2.3 BOLTS, NUTS, AND WASHERS

Submit the certified manufacturer's mill reports which clearly show the applicable ASTM mechanical and chemical requirements together with the actual test results for the supplied fasteners.

#### 2.3.1 Common Grade Bolts

##### 2.3.1.1 Bolts

ASTM A307, Grade A, plain finish or hot dipped zinc coating (where indicated). The bolt heads and the nuts of the supplied fasteners must be marked with the manufacturer's identification mark, the strength grade and type specified by ASTM specifications.

##### 2.3.1.2 Nuts

ASTM A563, Grade A, heavy hex style.

##### 2.3.1.3 Washers

ASTM F844.

#### 2.3.2 High-Strength Bolts

High strength bolts and nuts must be shipped together in the same shipping container. Fasteners indicated to be galvanized shall be tested by the



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

supplier to show that the galvanized nut with the supplied lubricant provided may be rotated from the snug tight condition well in excess of the rotation required for pretensioned installation without stripping. The supplier shall supply nuts that have been lubricated and tested with the supplied bolts.

#### 2.3.2.1 Bolts

ASTM F3125/F3125M, Grade A325, Type 1 Heavy Hex Head Style, plain finish hot dipped zinc coating or mechanically deposited zinc coating where galvanizing is indicated.

#### 2.3.2.2 Nuts

ASTM A563, Grade and Style as specified in the applicable ASTM bolt standard.

#### 2.3.2.3 Washers

ASTM F436/F436M, plain carbon steel.

#### 2.3.3 Tension Control Bolts

ASTM F3125/F3125M, Grade F1852, Type 1, twistoff style assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon steel nuts, and hardened carbon steel washers. Assembly finish must be plain or mechanically deposited zinc coating where galvanizing is indicated. Submit product data for tension control bolts.

#### 2.3.4 Foundation Anchorage

##### 2.3.4.1 Anchor Rods

ASTM F1554 Gr 55, weldable, Class 2A.

##### 2.3.4.2 Anchor Nuts

ASTM A563, Grade A, hex style.

##### 2.3.4.3 Anchor Washers

ASTM F844.

##### 2.3.4.4 Anchor Plate Washers

ASTM A36/A36M.

#### 2.4 STRUCTURAL STEEL ACCESSORIES

##### 2.4.1 Welding Electrodes and Rods

AWS D1.1/D1.1M. Submit product data for welding electrodes and rods.

##### 2.4.2 Non-Shrink Grout

ASTM C1107/C1107M, with no ASTM C827/C827M shrinkage. Grout must be nonmetallic. Submit product data for non-shrink grout.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.4.3 Welded Shear Stud Connectors

ASTM A29/A29M, Grades 1010 through 1020. AWS D1.1/D1.1M, Table 7.1, Type B.

#### 2.5 GALVANIZING

ASTM F2329/F2329M, ASTM F1136/F1136M, ASTM F2833 or ASTM B695 for threaded parts or ASTM A123/A123M for structural steel members, as applicable, unless specified otherwise galvanize after fabrication where practicable.

#### 2.6 FABRICATION

Fabrication must be in accordance with the applicable provisions of AISC 325. Fabrication and assembly must be done in the shop to the greatest extent possible. Punch, subpunch and ream, or drill bolt holes perpendicular to the surface of the member.

Compression joints depending on contact bearing must have a surface roughness not in excess of 500 micro inch as determined by ASME B46.1, and ends must be square within the tolerances for milled ends specified in ASTM A6/A6M.

Shop splices of members between field splices will be permitted only where indicated on the Contract Drawings. Splices not indicated require the approval of the Contracting Officer.

##### 2.6.1 Markings

Prior to erection, identify members by a painted erection mark. Connecting parts assembled in the shop for reaming holes in field connections must be match marked with scratch and notch marks. Do not locate erection markings on areas to be welded. Do not locate match markings in areas that will decrease member strength or cause stress concentrations. Affix embossed tags to hot-dipped galvanized members.

##### 2.6.2 Shop Primer

Fabricator's standard shop primer. Shop prime structural steel. Do not prime steel surfaces embedded in concrete, galvanized surfaces, surfaces to receive sprayed-on fireproofing, or surfaces within 0.5 inch of the toe of the welds prior to welding (except surfaces on which metal decking and shear studs are to be welded). If flash rusting occurs, re-clean the surface prior to application of primer. Apply primer to a minimum dry film thickness of 2.0 mil. Submit shop primer product data.

Prime slip critical surfaces with a Class B coating in accordance with AISC 325. Submit test report for Class B coating.

Prior to assembly, prime surfaces which will be concealed or inaccessible after assembly. Do not apply primer in foggy or rainy weather; when the ambient temperature is below 45 degrees F or over 95 degrees F; or when the primer may be exposed to temperatures below 40 degrees F within 48 hours after application, unless approved otherwise by the Contracting Officer. Repair damaged primed surfaces with an additional coat of primer.

##### 2.6.2.1 Cleaning

SSPC SP 1, SSPC SP 2, or SSPC SP 3. Maintain steel surfaces free from

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

rust, dirt, oil, grease, and other contaminants through final assembly.

## 2.7 DRAINAGE HOLES

Drill adequate drainage holes to eliminate water traps. Hole diameter must be  $\frac{1}{2}$  inch and location indicated on the detail drawings. Hole size and locations must not affect the structural integrity.

## PART 3 EXECUTION

### 3.1 ERECTION

- a. Erection of structural steel, except as indicated in item b. below, must be in accordance with the applicable provisions of AISC 325, AISC 303 and 29 CFR Part 1926, Subpart R.
- b. For low-rise structural steel buildings (60 feet tall or less and a maximum of 2 stories), erect the structure in accordance with AISC DESIGN GUIDE 10.

After final positioning of steel members, provide full bearing under base plates and bearing plates using nonshrink grout. Place nonshrink grout in accordance with the manufacturer's instructions.

#### 3.1.1 STORAGE

Store the material out of contact with the ground in such manner and location as to minimize deterioration.

### 3.2 CONNECTIONS

Except as modified in this section, design connections indicated in accordance with AISC 360. Build connections into existing work. Do not tighten anchor bolts set in concrete with impact torque wrenches. Holes must not be cut or enlarged by burning. Bolts, nuts, and washers must be clean of dirt and rust, and lubricated immediately prior to installation.

#### 3.2.1 Common Grade Bolts

Tighten ASTM A307 bolts to a "snug tight" fit. "Snug tight" is the tightness that exists when plies in a joint are in firm contact. If firm contact of joint plies cannot be obtained with a few impacts of an impact wrench, or the full effort of a man using a spud wrench, contact the Contracting Officer for further instructions.

#### 3.2.2 High-Strength Bolts

Bolts must be installed in connection holes and initially brought to a snug tight fit. After the initial tightening procedure, fully tension bolts, progressing from the most rigid part of a connection to the free edges.

Fastener components shall be protected from dirt and moisture in closed containers at the site of the installation. Fastener components that are not incorporated into the work shall be returned to protected storage at the end of the work shift.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.2.3 Tension Control Bolts

Bolts must be installed in connection holes and initially brought to a snug tight fit. After the initial tightening procedure, fully tension bolts, progressing from the most rigid part of a connection to the free edges.

### 3.3 GAS CUTTING

Use of gas-cutting torch in the field for correcting fabrication errors is not permitted on any major member in the structural framing. Use of a gas cutting torch will be permitted on minor members not under stress only after approval has been obtained from the Contracting Officer.

### 3.4 WELDING

Welding must be in accordance with [AWS D1.1/D1.1M](#). Provide [AWS D1.1/D1.1M](#) qualified welders, welding operators, and tackers.

Develop and submit the [Welding Procedure Specifications \(WPS\)](#) for all welding, including welding done using prequalified procedures. Submit for approval all WPS, whether prequalified or qualified by testing.

#### 3.4.1 Removal of Temporary Welds, Run-Off Plates, and Backing Strips

Remove only from finished areas.

### 3.5 SHOP PRIMER REPAIR

Repair shop primer in accordance with the paint manufacturer's recommendation for surfaces damaged by handling, transporting, cutting, welding, or bolting.

#### 3.5.1 Field Priming

Field prime steel exposed to the weather or located in building areas without HVAC for control of relative humidity. After erection, the field bolt heads and nuts, field welds, and any abrasions in the shop coat must be cleaned and primed with paint of the same quality as that used for the shop coat.

### 3.6 GALVANIZING REPAIR

Repair damage to galvanized coatings using [ASTM A780/A780M](#) zinc rich paint for galvanizing damaged by handling, transporting, cutting, welding, or bolting. Do not heat surfaces to which repair paint has been applied.

### 3.7 FIELD QUALITY CONTROL

Perform field tests, and provide labor, equipment, and incidentals required for testing, except that electric power for field tests will be furnished as set forth in Division 1. Notify the Contracting Officer in writing of defective welds, bolts, nuts, and washers within 7 working days of the date of the inspection.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.7.1 Welds

#### 3.7.1.1 Visual Inspection

**AWS D1.1/D1.1M.** Furnish the services of AWS-certified welding inspectors for fabrication and erection inspection and testing and verification inspections. A **Certified Welding Inspector** must perform visual inspection on 100 percent of all welds. Document this inspection in the Visual Weld Inspection Log. Submit certificates indicating that certified welding inspectors meet the requirements of **AWS QC1**.

Inspect proper preparation, size, gaging location, and acceptability of all welds; identification marking; operation and current characteristics of welding sets in use.

#### 3.7.1.2 Nondestructive Testing

Nondestructive testing must be in accordance with **AWS D1.1/D1.1M**. Ultrasonic testing must be performed in accordance with Table 6.2 or 6.3 of **AWS D1.1/D1.1M**. Test locations must be selected by the Contracting Officer. All personnel performing NDT must be certified in accordance with **ANSI/ASNT CP-189** in the method of testing being performed. Submit certificates showing compliance with **ANSI/ASNT CP-189** for all **NDT technicians**. If more than 20 percent of welds made by a welder contain defects identified by testing, then all groove welds made by that welder must be tested by ultrasonic testing, and all fillet welds made by that welder must be inspected by magnetic particle testing (MT) or dye penetrant testing (PT) as approved by the Contracting Officer. When groove welds made by an individual welder are required to be tested, magnetic particle or dye penetrant testing may be used only in areas inaccessible to ultrasonic testing. Retest all repaired areas. Submit **weld inspection reports**.

Testing frequency: Provide the following types and number of tests:

<u>Test Type</u>	<u>Number of Tests</u>
Ultrasonic	50 percent of CJP Welds
Magnetic Particle	30 percent of PJP and Fillet Welds
Dye Penetrant	30 percent of PJP and Fillet Welds

### 3.7.2 High-Strength Bolts

#### 3.7.2.1 Testing Bolt, Nut, and Washer Assemblies

Test a minimum of 3 bolt, nut, and washer assemblies from each mill certificate batch in a tension measuring device at the job site prior to the beginning of bolting start-up. Demonstrate that the bolts and nuts, when used together, can develop tension not less than the provisions specified in **AISC 360**, depending on bolt size and grade. The bolt tension must be developed by tightening the nut. A representative of the manufacturer or supplier must be present to ensure that the fasteners are properly used, and to demonstrate that the fastener assemblies supplied satisfy the specified requirements. Submit **bolt testing reports**.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 3.7.2.2 Inspection

Inspection procedures must be in accordance with [AISC 360](#). Confirm and report to the Contracting Officer that the materials meet the project specification and that they are properly stored. Confirm that the faying surfaces have been properly prepared before the connections are assembled. Observe the specified job site testing and calibration and confirm that the procedure to be used provides the required tension. Monitor the work to ensure the testing procedures are routinely followed on joints that are specified to be fully tensioned.

Inspect calibration of torque wrenches for high-strength bolts.

#### 3.7.2.3 Testing

The Government has the option to perform nondestructive tests on 5 percent of the installed bolts to verify compliance with pre-load bolt tension requirements. Provide the required access for the Government to perform the tests. The nondestructive testing will be done in-place using an ultrasonic measuring device or any other device capable of determining in-place pre-load bolt tension. The test locations must be selected by the Contracting Officer. If more than 10 percent of the bolts tested contain defects identified by testing, then all bolts used from the batch from which the tested bolts were taken, must be tested at the Contractor's expense. Retest new bolts after installation at the Contractor's expense.

#### 3.7.3 Testing for Embrittlement

[ASTM A143/A143M](#) for steel products hot-dip galvanized after fabrication. Submit [embrittlement test reports](#).

#### 3.7.4 Inspection and Testing of Steel Stud Welding

Perform verification inspection and testing of steel stud welding conforming to the requirements of [AWS D1.1/D1.1M](#), Stud Welding Clause. The Contracting Officer will serve as the verification inspector. Bend test studs that do not show a full 360 degree weld flash or have been repaired by welding as required by [AWS D1.1/D1.1M](#), Stud Welding Clause. Studs that crack under testing in the weld, base metal or shank will be rejected and replaced by the Contractor at no additional cost.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 05 30 00

## STEEL DECKS

05/15, CHG 2: 08/18

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI D100 (2017) Cold-Formed Steel Design Manual

## AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M (2020) Structural Welding Code - Steel

AWS D1.3/D1.3M (2018) Structural Welding Code - Sheet Steel

## ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M (2019) Standard Specification for Carbon Structural Steel

ASTM A123/A123M (2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A653/A653M (2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

ASTM A780/A780M (2020) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

ASTM A792/A792M (2021a) Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process

ASTM A1008/A1008M (2020) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable

ASTM D746 (2014) Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact

ASTM D1056 (2014) Standard Specification for Flexible Cellular Materials - Sponge or Expanded

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### Rubber

ASTM D1149 (2007; R 2012) Standard Test Method for Rubber Deterioration - Surface Ozone Cracking in a Chamber

ASTM E84 (2020) Standard Test Method for Surface Burning Characteristics of Building Materials

#### FM GLOBAL (FM)

FM APP GUIDE (updated on-line) Approval Guide  
<http://www.approvalguide.com/>

FM DS 1-28R (1998) Data Sheet: Roof Systems

#### SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 20 (2019) Zinc-Rich Primers (Type I, Inorganic, and Type II, Organic)

#### STEEL DECK INSTITUTE (SDI)

ANSI/SDI C (2017) Standard for Composite Steel Floor Deck - Slabs

ANSI/SDI NC (2017) Standard for Non-Composite Steel Floor Deck

ANSI/SDI QA/QC (2017) Standard for Quality Control and Quality Assurance for Installation of Steel Deck

ANSI/SDI RD (2017) Standard for Steel Roof Deck

SDI DDM04 (2015; Errata 1-3 2016; Add 1 2015; Add 2 20162006) Diaphragm Design Manual; 4th Edition

SDI DDP (1987; R 2000) Deck Damage and Penetrations

SDI MOC3 (2016) Manual of Construction with Steel Deck (3rd Edition)

#### U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-301-01 (2019) Structural Engineering

#### U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1926 Safety and Health Regulations for Construction

#### UNDERWRITERS LABORATORIES (UL)

UL 580 (2006; Reprint Mar 2019) UL Standard for Safety Tests for Uplift Resistance of Roof Assemblies



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

UL Fire Resistance

(2014) Fire Resistance Directory

1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Fabrication Drawings; G

SD-03 Product Data

Accessories

Deck Units

Galvanizing Repair Paint

Mechanical Fasteners

Touch-Up Paint

Welding Equipment

Welding Rods and Accessories

Recycled Content of Steel Products; S

SD-04 Samples

Metal Roof Deck Units

Flexible Closure Strips

SD-05 Design Data

Deck Units; G

SD-07 Certificates

Powder-Actuated Tool Operator

Welder Qualifications

Welding Procedures

Fire Safety

Wind Storm Resistance

Manufacturer's Certificate

Stud Manufacture's Certification

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## Stud Manufacture's Test Reports

### 1.3 QUALITY ASSURANCE

#### 1.3.1 Deck Units

Furnish deck units and accessory products from a manufacturer regularly engaged in manufacture of steel decking. Provide [manufacturer's certificates](#) attesting that the decking material meets the specified requirements.

#### 1.3.2 Certification of [Powder-Actuated Tool Operator](#)

Provide manufacturer's certificate attesting that the operators are authorized to use the low velocity powder-actuated tool.

#### 1.3.3 Qualifications for Welding Work

Follow [Welding Procedures](#) of [AWS D1.3/D1.3M](#) for sheet steel and [AWS D1.1/D1.1M](#) for stud welding.

Submit qualified [Welder Qualifications](#) in accordance with [AWS D1.3/D1.3M](#) for sheet steel and [AWS D1.1/D1.1M](#) for stud welding, or under an equivalent approved qualification test. Perform tests on test pieces in positions and with clearances equivalent to those actually encountered. Test specimens shall be made in the presence of Contracting Officer and shall be tested by an approved testing laboratory at the Contractor's expense. If a test weld fails to meet requirements, perform an immediate retest of two test welds until each test weld passes. Failure in the immediate retest will require the welder be retested after further practice or training, performing a complete set of test welds.

Submit manufacturer's catalog data for [Welding Equipment](#) and [Welding Rods and Accessories](#).

#### 1.3.4 Regulatory Requirements

##### 1.3.4.1 [Fire Safety](#)

Test roof deck as a part of a roof deck construction assembly of the type used for this project, listing as fire classified in the [UL Fire Resistance](#), or listing as Class I construction in the [FM APP GUIDE](#), and so labeled.

##### 1.3.4.2 [Wind Storm Resistance](#)

Provide roof construction assembly capable of withstanding a nominal uplift pressure [as indicated on the drawings](#) when tested in accordance with the uplift pressure test described in the [FM DS 1-28R](#) or as described in [UL 580](#) and in general compliance with [UFC 3-301-01](#).

##### 1.3.5 [Fabrication Drawings](#)

Show type and location of units, location and sequence of connections, bearing on supports, methods of anchoring, attachment of accessories, adjusting plate details, cant strips, ridge and valley plates, metal closure strips, size and location of holes to be cut and reinforcement to be provided, the manufacturer's erection instructions and other pertinent details.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.4 DELIVERY, STORAGE, AND HANDLING

Deliver deck units to the site in a dry and undamaged condition. Store and handle steel deck in a manner to protect it from corrosion, deformation, and other types of damage. Do not use decking for storage or as working platform until units have been fastened into position. Exercise care not to damage material or overload decking during construction. The maximum uniform distributed storage load must not exceed the design live load. Stack decking on platforms or pallets and cover with weathertight ventilated covering. Elevate one end during storage to provide drainage. Maintain deck finish at all times to prevent formation of rust. Repair deck finish using touch-up paint. Replace damaged material.

#### 1.5 DESIGN REQUIREMENTS FOR ROOF DECKS

##### 1.5.1 Properties of Sections

Properties of metal roof deck sections must comply with engineering design width as limited by the provisions of [AISI D100](#).

##### 1.5.2 Allowable Loads

Indicate total uniform dead and live load for detailing purposes.

### PART 2 PRODUCTS

#### 2.1 DECK UNITS

Submit manufacturer's design calculations, or applicable published literature for the structural properties of the proposed deck units.

Provide products with an average [recycled content of steel products](#) so postconsumer recycled content plus one half of preconsumer recycled content not less than 25 percent.

##### 2.1.1 Roof Deck

Conform to [ASTM A792/A792M](#) or [ASTM A1008/A1008M](#) for deck used in conjunction with insulation and built-up roofing. Fabricate roof deck units of the steel design thickness required by the design drawings and galvanized. Furnish sample of [Metal Roof Deck Units](#) used to illustrate actual cross section dimensions and configurations.

##### 2.1.2 Composite Deck

Conform to [ASTM A653/A653M](#) or [ASTM A1008/A1008M](#) for composite deck assembly. Fabricate deck used as the tension reinforcing in composite deck of [the](#) steel design thickness required by the design drawings. Zinc-coat in conformance with [ASTM A653/A653M](#), G60 coating class.

##### 2.1.3 Form Deck

Conform to [ASTM A653/A653M](#) or [ASTM A1008/A1008M](#) for deck used as formwork for concrete. Fabricate form deck of the steel design thickness required by the design drawings. Zinc-coat in conformance with [ASTM A653/A653M](#), G60 coating class.

Use panels of maximum possible lengths to minimize end laps. Fabricate

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

deck units in lengths to span 3 or more supports with flush, telescoped, or nested 2 inch laps at ends, and interlocking, or nested side laps, unless otherwise indicated.

#### 2.1.4 Length of Deck Units

Provide deck units of sufficient length to span three or more spacings where possible.

#### 2.1.5 Touch-Up Paint

Provide a high zinc-dust content paint for regalvanizing welds in galvanized steel conforming to ASTM A780/A780M.

Provide touch-up paint for zinc-coated units of an approved galvanizing repair paint with a high-zinc dust content. Touch-up welds with paint conforming to SSPC Paint 20 in accordance with ASTM A780/A780M. Maintain finish of deck units and accessories by using touch-up paint whenever necessary to prevent the formation of rust.

### 2.2 ACCESSORIES

Provide accessories of same material as deck, unless specified otherwise. Provide manufacturer's standard type accessories, as specified.

#### 2.2.1 Adjusting Plates

Provide adjusting plates, or segments of deck units, of same thickness and configuration as deck units in locations too narrow to accommodate full size units. Provide factory cut plates of predetermined size where possible.

#### 2.2.2 End Closures

Fabricated of sheet metal by the deck manufacturer. Provide end closures minimum 0.0295 inch thick to close open ends at exposed edges of floors, parapets, end walls, eaves, and openings through deck.

#### 2.2.3 Partition Closures

Provide closures for closing voids above interior walls and partitions that are perpendicular to the direction of the configurations. Provide rubber, plastic, or sheet steel closures above typical partitions. Provide sheet steel closures above fire-resistant interior walls and partitions located on both sides of wall or partition. Provide glass fiber blanket insulation in the space between pairs of closures at acoustical partitions.

#### 2.2.4 Flexible Closure Strips for Roof Decks

Provide strips made of vulcanized, closed-cell, synthetic rubber material specified and premolded to the configuration required to provide tight-fitting closures at open ends and sides of steel roof decking.

Conforming to ASTM D1056, Grade 2A1, with the following additional properties:

Brittleness temperature of minus 40 degrees F when tested in accordance with ASTM D746.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Flammability resistance with a flame spread rating of less than 25 when tested in accordance with ASTM E84.

Resistance to ozone must be "no cracks" after exposure of a sample kept under a surface tensile strain of 25 percent to an ozone concentration of 100 parts per million of air by volume in air for 100 hours at 104 degrees F and tested in accordance with ASTM D1149.

Provide an elastomeric type adhesive as recommended by the manufacturer of the flexible closure strips.

#### 2.2.5 Closure Plates for Composite Deck

Support and retain concrete at each floor level. Provide edge closures at all edges of the slab of sufficient strength and stiffness to support the wet concrete. Provide metal closures for all openings in composite steel deck 1/4 inch and over.

#### 2.2.6 Sheet Metal Collar

Where deck is cut for passage of pipes, ducts, columns, etc., and deck is to remain exposed, provide a neatly cut sheet metal collar to cover edges of deck. Do not cut deck until after installation of supplemental supports.

#### 2.2.7 Cover Plates

Sheet metal to close panel edge and end conditions, and where panels change direction or butt. Polyethylene-coated, self-adhesive, 2 inch wide joint tape may be provided in lieu of cover plates on flat-surfaced decking butt joints.

Fabricate cover plates for abutting floor deck units from the specified structural-quality steel sheets not less than nominal 18 gage thick before galvanizing. Provide 6 inch wide cover plates and form to match the contour of the floor deck units.

#### 2.2.8 Roof Sump Pans

Sump pans must be provided for roof drains and must be minimum 0.075 inch thick steel, recessed type. Shape sump pans to meet roof slope by the supplier or by a sheet metal specialist. Provide bearing flanges of sump pans to overlap steel deck a minimum of 3 inch. Shape, size, and reinforce the opening in bottom of the sump pan to receive roof drain.

#### 2.2.9 Column Closures

Sheet metal, minimum 0.0358 inch thick or metal rib lath.

#### 2.2.10 Access Hole Covers

Sheet metal, minimum 0.0474 inch thick.

#### 2.2.11 Hanger

Provide clips or loops for utility systems and suspended ceilings of one or more of the following types:

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- a. Lip tabs or integral tabs where noncellular is 0.0474 inch thick or more, and a structural concrete fill is used over deck.
- b. Slots or holes punched in decking for installation of pigtails.
- c. Tabs driven from top side of decking and arranged so as not to pierce electrical cells.
- d. Decking manufacturer's standard as approved by the Contracting Officer.

#### 2.2.12 Shear Connectors

Provide shear connectors in accordance with AWS D1.1/D1.1M headed stud Type B. Submit stud manufacture's certification that the studs delivered conform to the material requirements. Submit stud manufacture's test reports for the last completed in-plant quality control mechanical tests.

#### 2.2.13 Cant Strips for Roof Decks

Fabricate cant strips from the specified commercial-quality steel sheets not less than nominal 0.0358 inch thick before galvanizing. Bend strips to form a 45-degree cant not less than 5 inch wide, with top and bottom flanges a minimum 3 inch wide. Length of strips 10 feet.

#### 2.2.14 Ridge and Valley Plates for Roof Decks

Fabricate plates from the specified structural-quality steel sheets, not less than nominal 0.0358 inch thick before galvanizing. Provide plates of minimum 4-1/2 inch wide and bent to provide tight fitting closures at ridges and valleys. Provide a minimum length of ridge and valley plates of 10 feet.

#### 2.2.15 Metal Closure Strips for Roof Decks

Fabricate strips from the specified commercial-quality steel sheets not less than nominal 0.0358 inch thick before galvanizing. Provide strips from the configuration required to provide tight-fitting closures at open ends and sides of steel roof decking.

#### 2.2.16 Galvanized Steel Angles for Roof Decks

Provide hot-rolled carbon steel angles conforming to ASTM A36/A36M, and hot-dip galvanized in accordance with ASTM A123/A123M.

#### 2.2.17 Mechanical Fasteners

Provide mechanical fasteners, such as powder actuated fasteners, pneumatically driven fasteners or self-drilling screws, for anchoring the deck to structural supports and adjoining units as indicated.

#### 2.2.18 Miscellaneous Accessories

Furnish the manufacturer's standard accessories to complete the deck installation. Furnish metal accessories of the same material as the deck and with the minimum design thickness as follows: saddles, 0.0474 inch welding washers, 0.0598 inch other metal accessories, 0.0358 inch unless otherwise indicated.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## PART 3 EXECUTION

### 3.1 EXAMINATION

Prior to installation of decking units and accessories, examine worksite to verify that as-built structure will permit installation of decking system without modification.

### 3.2 INSTALLATION

Install steel deck units in accordance with 29 CFR 1926, Subpart R - Steel Erection, ANSI/SDI QA/QC, ANSI/SDI C, ANSI/SDI NC, ANSI/SDI RD, SDI DDM04 and approved shop drawings. Place units on structural supports, properly adjusted, leveled, and aligned at right angles to supports before permanently securing in place. Damaged deck and accessories including material which is permanently stained or contaminated, deformed, or with burned holes shall not be installed. Extend deck units over three or more supports unless absolutely impractical. Report inaccuracies in alignment or leveling to the Contracting Officer and make necessary corrections before permanently anchoring deck units. Locate deck ends over supports only. Lap 2 inch roof deck ends, butted floor deck ends. Do not use unanchored deck units as a work or storage platform. Do not fill unanchored deck with concrete. Permanently anchor units placed by the end of each working day. Do not support suspended ceilings, light fixtures, ducts, utilities, or other loads by steel deck unless indicated. Distribute loads by appropriate means to prevent damage.

#### 3.2.1 Attachment

Immediately after placement and alignment, and after correcting inaccuracies, permanently fasten steel deck units to structural supports and to adjacent deck units as indicated on the design drawings and in accordance with manufacturer's recommended procedure and ANSI/SDI C, ANSI/SDI NC or ANSI/SDI RD. Clamp or weight deck units to provide firm contact between deck units and structural supports while performing welding or fastening. Attachment of adjacent deck units by button-punching is prohibited.

##### 3.2.1.1 Welding

Perform welding in accordance with AWS D1.3/D1.3M using methods and electrodes recommended by the manufacturers of the base metal alloys being used. Ensure only operators previously qualified by tests prescribed in AWS D1.3/D1.3M make welds. Immediately recertify, or replace qualified welders, that are producing unsatisfactory welding. Indicate location, size, and spacing of fastening. Do not use welding washers at the connections of the deck to supports. Do not use welding washers at sidelaps. Holes and similar defects will not be acceptable. Attach all partial or segments of deck units to structural supports in accordance with Section 2.5 of SDI DDM04. Attach shear connectors as shown and welded as per AWS D1.1/D1.1M through the steel deck to the steel member. Immediately clean welds by chipping and wire brushing. Heavily coat welds, cut edges and damaged portions of coated finish with zinc-dust paint conforming to ASTM A780/A780M.

##### 3.2.1.2 Mechanical Fastening

Anchor deck to structural supports and adjoining units with mechanical fasteners. Drive the powder-actuated fasteners with a low-velocity piston

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

tool by an operator authorized by the manufacturer of the powder-actuated tool. Drive pneumatic fasteners with a low-velocity fastening tool and comply with the manufacturer's recommendations. Drive screws to properly clamp deck to supporting steel.

#### 3.2.1.3 Sidelap Fastening

Lock sidelaps between adjacent floor deck units together by welding or screws as indicated.

#### 3.2.2 Openings

Cut or drill all holes and openings required and be coordinated with the drawings, specifications, and other trades. Frame and reinforce openings through the deck in conformance with **SDI DDP**. Reinforce holes and openings **6 to 12 inch** across by **0.0474 inch** thick steel sheet at least **12 inch** wider and longer than the opening and be fastened to the steel deck at each corner of the sheet and at a maximum of **6 inch** on center. Reinforce holes and openings larger than **12 inch** by steel channels or angles installed perpendicular to the steel joists and supported by the adjacent steel joists. Install steel channels or angles perpendicular to the deck ribs and fasten to the channels or angles perpendicular to the steel joists. Deck manufacturer shall approve holes or openings larger than **6 inch** in diameter prior to drilling or cutting.

#### 3.2.3 Deck Damage

**SDI MOC3**, for repair of deck damage.

#### 3.2.4 Touch-Up Paint

##### 3.2.4.1 Roof Deck

After roof decking installation, wire brush, clean, and touchup paint the scarred areas on top and bottom surfaces of metal roof decking. The scarred areas include welds, weld scars, bruises, and rust spots. Touchup galvanized surfaces with galvanizing repair paint. Touchup painted surfaces with repair paint of painted surfaces.

##### 3.2.4.2 Floor Deck

For floor decking installation, wire brush, clean, and touchup paint the scarred areas on the top and bottom surfaces of the metal floor decking and on the surface of supporting steel members. Include welds, weld scars, bruises, and rust spots for scarred areas. Touched up the galvanized surfaces with galvanizing repair paint. Touch up the painted surfaces with paint for the repair of painted surfaces.

#### 3.2.5 Accessory Installation

##### 3.2.5.1 Adjusting Plates

Provide in locations too narrow to accommodate full-size deck units and install as shown on shop drawings.

##### 3.2.5.2 End Closures

Provide end closure to close open ends of cells at columns, walls, and openings in deck.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 3.2.5.3 Closures Above Partitions

Provide for closing voids between cells over partitions that are perpendicular to direction of cells. Provide a one-piece closure strip for partitions 4 inch nominal or less in thickness and two-piece closure strips for wider partitions. Provide sheet metal closures above fire-rated partitions at both sides of partition with space between filled with fiberglass insulation. Provide flexible rubber closures above acoustic-rated partitions at both sides of partition with space between filled with blanket insulation.

#### 3.2.5.4 Cover Plates

Where concrete leakage would be a problem, provide metal cover plates, or joint tape, at joints between decking sheets, to be covered with concrete fill.

#### 3.2.5.5 Column Closures

Provide for spaces between floor decking and columns which penetrate the deck. Field cut closure plate to fit column in the field and tack weld to decking and columns.

#### 3.2.5.6 Access Hole Covers

Provide access whole covers to seal holes cut in decking to facilitate welding of the deck to structural supports.

#### 3.2.5.7 Hangers

Provide as indicated to support utility system and suspended ceilings. Space devices as indicated.

#### 3.2.6 Concrete Work

Prior to placement of concrete, inspect installed decking to ensure that there has been no permanent deflection or other damage to decking. Replace decking which has been damaged or permanently deflected as approved by the Contracting Officer. Place concrete on metal deck in accordance with Construction Practice of ANSI/SDI C or ANSI/SDI NC.

#### 3.2.7 Preparation of Fire-Proofed Surfaces

Provide deck surfaces, both composite and noncomposite, which are to receive sprayed-on fireproofing, galvanized and free of all grease, mill oil, paraffin, dirt, salt, and other contaminants which impair adhesion of the fireproofing. Complete any required cleaning prior to steel deck installation using a cleaning method that is compatible with the sprayed-on fireproofing.

#### 3.3 ROOF SUMP PANS

Place sump pans over openings in roof decking and fusion welded to top surface of roof decking. Do not exceed spacing of welds of 12 inch with not less than one weld at each corner. Field cut opening in the bottom of each roof sump pan to receive the roof drain as part of the work of this section.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.4 CANT STRIPS FOR ROOF DECKS

Provide strips to be fusion welded to surface of roof decking, secured to wood nailers by galvanized screws or to steel framing by galvanized self-tapping screws or welds. Do not exceed spacing of welds and fasteners of 12 inch. Lap end joints a minimum 3 inch and secure with galvanized sheet metal screws spaced a maximum 4 inch on center.

### 3.5 RIDGE AND VALLEY PLATES FOR ROOF DECKS

Provide plates to be fusion welded to top surface of roof decking. Lap end joints a minimum 3 inch. For valley plates, provide endlaps to be in the direction of water flow.

### 3.6 CLOSURE STRIPS FOR ROOF DECKS

Provide closure strips at open, uncovered ends and edges of the roof decking and in voids between roof decking and top of walls and partitions where indicated. Install closure strips in position in a manner to provide a weathertight installation.

### 3.7 ROOF INSULATION SUPPORT FOR ROOF DECKS

Provide metal closure strips for support of roof insulation where rib openings in top surface of metal roof decking occur adjacent to edges and openings. Weld metal closure strips in position.

### 3.8 CLEANING AND PROTECTION FOR ROOF DECKS

Upon completion of the deck, sweep surfaces clean and prepare for installation of the roofing.

### 3.9 FIELD QUALITY CONTROL

#### 3.9.1 Headed Stud Inspection

In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

- a. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
- b. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

#### 3.9.2 Deck Weld Inspection

Visual inspect welds in accordance with AWS D1.3/D1.3M.

#### 3.9.3 Decks Not Receiving Concrete

Inspect the decking top surface for distortion after installation. For roof decks not receiving concrete, verify distortion by placing a straight edge across three adjacent top flanges. The maximum allowable gap between the straight edge and the top flanges should not exceed manufacturing and construction tolerances of supporting members. When gap is more than the

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

allowable, provide corrective measures or replacement. Reinspect decking  
after performing corrective measures or replacement.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 05 40 00

## COLD-FORMED METAL FRAMING

05/15, CHG 1: 08/18

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN CONCRETE INSTITUTE (ACI)

ACI 318 (2014; Errata 1-2 2014; Errata 3-5 2015; Errata 6 2016; Errata 7-9 2017) Building Code Requirements for Structural Concrete (ACI 318-14) and Commentary (ACI 318R-14)

## AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI S100 (2016) North American Specification for the Design of Cold-Formed Steel Structural Members

AISI S110 (2007; Suppl 1; Reaffirmed 2012) Standard for Seismic Design of Cold-Formed Steel Structural Systems - Special Bolted Moment Frames

AISI S200 (2007) North American Standard for Cold-Formed Steel Framing - General Provision

AISI S201 (2007) North American Standard for Cold-Formed Steel Framing - Product Data

AISI S202 (2011) Code of Standard Practice for Cold-formed Steel Structural Framing

AISI S211 (2007) North American Standard for Cold-Formed Steel Framing - Wall Stud Design

AISI S212 (2007) North American Standard for Cold-Formed Steel Framing - Header Design

AISI S213 (2007; Suppl 1 2009) North American Standard for Cold-Formed Steel Framing - Lateral Design

AISI S214 (2012) North American Standard for Cold-Formed Steel Framing - Truss Design

## AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M (2020) Structural Welding Code - Steel

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

AWS D1.3/D1.3M (2018) Structural Welding Code - Sheet Steel

ASTM INTERNATIONAL (ASTM)

ASTM A123/A123M (2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A153/A153M (2016a) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A307 (2021) Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength

ASTM A370 (2020) Standard Test Methods and Definitions for Mechanical Testing of Steel Products

ASTM A653/A653M (2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

ASTM A1003/A1003M (2015) Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members

ASTM C955 (2017) Standard Specification for Cold-Formed Steel Structural Framing Members

ASTM C1007 (2020) Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories

ASTM C1513 (2018) Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections

ASTM E119 (2020) Standard Test Methods for Fire Tests of Building Construction and Materials

ASTM E329 (2020) Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

ASTM E488/E488M (2015) Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements

ASTM F1554 (2020) Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

ASTM F1941 (2010) Standard Specification for  
Electrodeposited Coatings on Threaded  
Fasteners (Unified Inch Screw Threads  
(UN/UNR))

ASTM F2329/F2329M (2015) Standard Specification for Zinc  
Coating, Hot-Dip, Requirements for  
Application to Carbon and Alloy Steel  
Bolts, Screws, Washers, Nuts, and Special  
Threaded Fasteners

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC (2018) International Building Code

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-301-01 (2019) Structural Engineering

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

### SD-02 Shop Drawings

Framing Components; G

### SD-03 Product Data

Steel Studs, Joists, Tracks, Bracing, Bridging and Accessories

Recycled Content of Steel Products; S

### SD-05 Design Data

Metal Framing Calculations; G

### SD-07 Certificates

Load-Bearing Cold-Formed Metal Framing

Welds

## 1.3 DELIVERY, STORAGE, AND HANDLING

Steel framing and related accessories shall be stored and handled in accordance with the AISI S202, "Code of Standard Practice for Cold-Formed Steel Structural Framing".

## 1.4 LOAD-BEARING COLD-FORMED METAL FRAMING

Include top and bottom tracks, bracing, fastenings, and other accessories necessary for complete installation. Framing members shall have the structural properties indicated. Where physical structural properties are not indicated, they shall be as necessary to withstand all imposed loads.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Design framing in accordance with [AISI S100](#). Non-load-bearing metal framing, furring, and ceiling suspension systems are specified in Section [09 22 00](#) SUPPORTS FOR PLASTER AND GYPSUM BOARD. Metal suspension systems for acoustical ceilings are specified in Section [09 51 00](#) ACOUSTICAL CEILINGS.

Submit mill certificates or test reports from independent testing agency, qualified in accordance with [ASTM E329](#), showing that the steel sheet used in the manufacture of each cold-formed component complies with the minimum yield strengths and uncoated steel thickness specified. Test reports shall be based on the results of three coupon tests in accordance with [ASTM A370](#).

#### 1.5 MAXIMUM DEFLECTION

Deflections of structural members shall not exceed the more restrictive of the limitations of [ICC IBC](#) and [UFC 3-301-01](#).

#### 1.6 QUALITY ASSURANCE

- a. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a registered professional engineer.
- b. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to [ASTM E329](#) for testing indicated.
- c. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- d. Welding Qualifications: Qualify procedures and personnel according to the following:
  - (1) [AWS D1.1/D1.1M](#), "Structural Welding Code - Steel".
  - (2) [AWS D1.3/D1.3M](#), "Structural Welding Code - Sheet Steel".
- e. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per [ASTM E119](#) by, and displaying a classification label from, a testing and inspecting agency acceptable to authorities having jurisdiction.
- f. AISI Specifications and Standards: Comply with:
  - (1) [AISI S100](#), "North American Specification for the Design of Cold-Formed Steel Structural Members".
  - (2) [AISI S110](#), "Standard for Seismic Design of Cold-Formed Steel Structural Systems - Special Bolted Moment Frames".
  - (3) [AISI S200](#), "North American Standard for Cold-Formed Steel Framing - General Provision".
  - (4) [AISI S201](#), "North American Standard for Cold-Formed Steel Framing



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- Product Data".

- (5) **AISI S202**, "Code of Standard Practice for Cold-Formed Steel Structural Framing".
- (6) **AISI S211**, "North American Standard for Cold-Formed Steel Framing - Wall Stud Design".
- (7) **AISI S212**, "North American Standard for Cold-Formed Steel Framing - Header Design".
- (8) **AISI S213**, "North American Standard for Cold-Formed Steel Framing - Lateral Design".
- (9) **AISI S214**, "North American Standard for Cold-Formed Steel Framing - Truss Design".

#### 1.6.1 Drawing Requirements

Submit **framing components** to show sizes, thicknesses, layout, material designations, methods of installation, and accessories including the following:

- a. Cross sections, plans, and/or elevations showing component types and locations for each framing application; including shop coatings and material thicknesses for each framing component.
- b. Connection details showing fastener type, quantity, location, and other information to assure proper installation.
- c. Drawings depicting panel configuration, dimensions, components, locations, and construction sequence if the Contractor elects to install prefabricated/prefinished frames.

Sign and seal fabrication drawings by a registered professional engineer.

#### 1.6.2 Design Data Required

Submit **metal framing calculations** with design criteria and structural loading to verify sizes, thickness, and spacing of members and connections signed and sealed by a registered professional engineer. Show methods and practices used in installation.

### PART 2 PRODUCTS

#### 2.1 STEEL **STUDS**, **JOISTS**, TRACKS, BRACING, BRIDGING AND ACCESSORIES

Framing components shall comply with **ASTM C955** and the following.

- a. Provide products with an average **recycled content of steel products** so postconsumer recycled content plus one half of preconsumer recycled content not less than 25 percent.
- b. Steel Sheet: **ASTM A1003/A1003M**, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
  - (1) Grade: As required by structural performance.
  - (2) Coating: G90 **per side**.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- c. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
  - (1) Minimum Base-Metal Thickness: As required by design.
  - (2) Flange Width: As required by design.
- d. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:
  - (1) Minimum Base-Metal Thickness: Matching steel studs.
  - (2) Flange Width: As required by design.
- e. Roof Truss Members: Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, with stiffened flanges, and as follows:
  - (1) Minimum Base-Metal Thickness: Matching steel studs.
  - (2) Flange Width: 1-5/8 inches, minimum at top and bottom chords connecting to sheathing or directly fastened construction.
- f. Floor Truss Members: Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, with stiffened flanges, and as follows:
  - (1) Minimum Base-Metal Thickness: Matching steel studs.
  - (2) Flange Width: 1-5/8 inches, minimum at top and bottom chords connecting to sheathing or directly fastened construction.

#### 2.1.1 Studs and Joists of 54 mils (0.054 Inch) and Heavier

Galvanized steel, ASTM A653/A653M and ASTM A1003/A1003M, SS Grade 50, G90.

#### 2.1.2 Studs and Joists of 43 mils (0.043 Inch) and Lighter

Studs and Joists of 43 mils (0.043 Inch) and Lighter, Track, and Accessories (All thicknesses): Galvanized steel, ASTM A653/A653M and ASTM A1003/A1003M, SS, Grade 33 33,000 psi G60.

#### 2.1.3 Sizes, Thickness, Section Modulus, and Other Structural Properties

Size and thickness as required.

### 2.2 MARKINGS

Studs and track shall have product markings stamped on the web of the section. The markings shall be repeated throughout the length of the member at a maximum spacing of 4 feet on center and shall be legible and easily read. The product marking shall include the following:

- a. An ICC number.
- b. Manufacturer's identification.
- c. Minimum delivered uncoated steel thickness.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- d. Protective coating designator.
- e. Minimum yield strength.

## 2.3 CONNECTIONS

### 2.3.1 Steel-To-Concrete Connections

- a. Anchor Rods: **ASTM F1554**, Grade **55 (weldable)**; galvanized per **ASTM A153/A153M**.
- b. Post-Installed Concrete Anchors: Adhesive or expansion anchors fabricated from corrosion-resistant materials with allowable load capacities in accordance with ICC-ES AC193 and **ACI 318** greater than or equal to the design load as determined by testing per **ASTM E488/E488M** conducted by a qualified testing agency.
- c. Power-Actuated Fasteners: Fabricated from corrosion-resistant materials with allowable load capacities in accordance with ICC-ES AC 70 greater than or equal to the design load as determined by testing per ASTM E1190 conducted by a qualified testing agency.

### 2.3.2 Steel-To-Steel Connections

- a. Screws: **ASTM C1513**, corrosion-resistant-coated, self-drilling, self-tapping steel screws of the type and size indicated. Provide low-profile head beneath sheathing and manufacturer's standard elsewhere. Electroplated to a minimum of 5 micron zinc coating per **ASTM F1941** or hot-dipped galvanized per **ASTM A123/A123M** or **ASTM A153/A153M**.
- b. Bolts: **ASTM A307** coated by hot-dip process per **ASTM F2329/F2329M** or zinc-coated by mechanical-deposition process per ASTM B695, Class 55.
- c. Welding Electrodes: Comply with AWS standards.

## 2.4 PLASTIC GROMMETS

Supply plastic grommets for stud webs as recommended by stud manufacturer, to protect electrical wires and plumbing piping. Prevent metal-to-metal contact between wiring/piping and studs.

## 2.5 SEALER GASKET

Closed-cell neoprene foam, **1/4-inch** thick, selected from manufacturer's standard widths to match width of bottom track on concrete slab or foundation.

# PART 3 EXECUTION

## 3.1 TRUSS FABRICATION

- a. Fabricate cold-formed steel trusses and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
- b. Truss must be fabricated either on site or off site prior to erection.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- c. Fabricate trusses using jigs or templates.
- d. Splices can only occur at joints.
- e. Cut truss members by sawing or shearing: do not torch cut.
- f. Fasten cold-formed steel truss members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator.
- g. Fasten other materials to cold-formed steel trusses by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- h. Reinforce, stiffen, and brace trusses to withstand handling, delivery, and erection stresses. Lift fabricated trusses to prevent damage or permanent distortion.

### 3.2 FASTENING

Fasten framing members together by welding or by using self-drilling, self-tapping screws. Electrodes and screw connections shall be as required and indicated in the design calculations.

#### 3.2.1 Welds

All welding shall be performed in accordance with AWS D1.3/D1.3M, as modified by AISI S100. All welders, welding operations, and welding procedures shall be qualified according to AWS D1.3/D1.3M. Submit certified copies of welder qualifications test records showing qualification in accordance with AWS D1.3/D1.3M. All welds shall be cleaned and coated with rust inhibitive galvanizing paint. Do not field weld materials lighter than 43 mils.

#### 3.2.2 Screws

Screws shall be of the self-drilling self-tapping type, size, and location as required. Screw penetration through joined materials shall not be less than three exposed threads. Minimum spacings and edge distances for screws shall be as specified in AISI S100. Screws covered by sheathing materials shall have low profile heads.

#### 3.2.3 Anchors

Anchors shall be of the type, size, and location as required.

#### 3.2.4 Powder-Actuated Fasteners

Powder-actuated fasteners shall be of the type, size, and location as required.

### 3.3 INSTALLATION

Install cold-formed framing in accordance with ASTM C1007 and AISI S200.

Install cold-formed steel framing according to AISI S202 and to manufacturer's written instructions unless more stringent requirements are indicated.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.3.1 Tracks

Provide accurately aligned runners at top and bottom of studs. Install sealer gasket under bottom of track on concrete slab or foundation. Anchor tracks as indicated in design calculations. Butt weld joints in tracks or splice with stud inserts. Fasteners shall be at least 3 inches from the edge of concrete slabs.

### 3.3.2 Studs

Cut studs square and set with firm bearing against webs of top and bottom tracks. Position studs vertically in tracks and space as indicated in design. Do not splice studs. Provide at least two studs at jambs of doors and other openings 2 feet wide or larger. Provide jack studs over openings, as necessary, to maintain indicated stud spacing. Provide tripled studs at corners, positioned to receive interior and exterior finishes. Fasten studs to top and bottom tracks by welding or screwing both flanges to the tracks. Framed wall openings shall include headers and supporting components as shown on the drawings. Headers shall be installed in all openings that are larger than the stud spacing in a wall. In curtain wall construction, provide for vertical movement where studs connect to the structural frame. Provide horizontal bracing in accordance with the design calculations and AISI S100. Bracing shall be not less than the following:

<u>LOAD</u>	<u>HEIGHT</u>	<u>BRACING</u>

### 3.3.3 Joists and Trusses

- a. Provide a stud directly under each joist or truss. The maximum spacing of studs as indicated shall be maintained.
- b. Install, bridge, and brace cold-formed steel trusses according to AISI S200, AISI S214, AISI's "Code of Standard Practice for Cold-Formed Steel Structural Framing," and manufacturer's written instructions unless more stringent requirements are indicated.
- c. Install temporary bracing and supports. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- d. Do not alter, cut, or remove framing members or connections of trusses.

### 3.3.4 Erection Tolerances

- a. Framing members which will be covered by finishes such as wallboard, plaster, or ceramic tile set in a mortar setting bed, shall be within the following limits:
  - (1) Layout of walls and partitions: 1/4 inch from intended position;
  - (2) Plates and runners: 1/4 inch in 8 feet from a straight line;
  - (3) Studs: 1/4 inch in 8 feet out of plumb, not cumulative; and

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

(4) Face of framing members: 1/4 inch in 8 feet from a true plane.

- b. Framing members which will be covered by ceramic tile set in dry-set mortar, latex-portland cement mortar, or organic adhesive shall be within the following limits:

(1) Layout of walls and partitions: 1/4 inch from intended position;

(2) Plates and runners: 1/8 inch in 8 feet from a straight line;

(3) Studs: 1/8 inch in 8 feet out of plumb, not cumulative; and

(4) Face of framing members: 1/8 inch in 8 feet from a true plane.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 05 50 13

## MISCELLANEOUS METAL FABRICATIONS

05/17, CHG 1: 08/18

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## ALUMINUM ASSOCIATION (AA)

AA DAF45 (2003; Reaffirmed 2009) Designation System  
for Aluminum Finishes

## AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 303 (2016) Code of Standard Practice for Steel  
Buildings and Bridges

## AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B18.2.1 (2012; Errata 2013) Square and Hex Bolts  
and Screws (Inch Series)

ASME B18.2.2 (2015) Nuts for General Applications:  
Machine Screw Nuts, Hex, Square, Hex  
Flange, and Coupling Nuts (Inch Series)

ASME B18.6.2 (2020) Square Head Set Screws and Slotted  
Headless Set Screws (Inch Series)

ASME B18.6.3 (2013; R 2017) Machine Screws, Tapping  
Screws, and Machine Drive Screws (Inch  
Series)

ASME B18.21.1 (2009; R 2016) Washers: Helical  
Spring-Lock, Tooth Lock, and Plain Washers  
(Inch Series)

ASME B18.21.2M (1999; R 2014) Lock Washers (Metric Series)

ASME B18.22M (1981; R 2017) Metric Plain Washers

## AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP A10.3 (2020) Safety Requirements for  
Powder-Actuated Fastening Systems American  
National Standard for Construction and  
Demolition Operations

## AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M (2020) Structural Welding Code - Steel

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M	(2019) Standard Specification for Carbon Structural Steel
ASTM A47/A47M	(1999; R 2018; E 2018) Standard Specification for Ferritic Malleable Iron Castings
ASTM A48/A48M	(2003; R 2016) Standard Specification for Gray Iron Castings
ASTM A53/A53M	(2020) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153/A153M	(2016a) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A307	(2021) Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A500/A500M	(2021) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A780/A780M	(2020) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A924/A924M	(2020) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM B26/B26M	(2014; E 2015) Standard Specification for Aluminum-Alloy Sand Castings
ASTM B108/B108M	(2019) Standard Specification for Aluminum-Alloy Permanent Mold Castings
ASTM B209	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B209M	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B221	(2020) Standard Specification for Aluminum



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

and Aluminum-Alloy Extruded Bars, Rods,  
Wire, Profiles, and Tubes

ASTM B221M (2013) Standard Specification for Aluminum  
and Aluminum-Alloy Extruded Bars, Rods,  
Wire, Profiles, and Tubes (Metric)

ASTM C1513 (2018) Standard Specification for Steel  
Tapping Screws for Cold-Formed Steel  
Framing Connections

ASTM D1187/D1187M (1997; E 2011; R 2011) Asphalt-Base  
Emulsions for Use as Protective Coatings  
for Metal

ASTM F1554 (2020) Standard Specification for Anchor  
Bolts, Steel, 36, 55, and 105-ksi Yield  
Strength

#### MASTER PAINTERS INSTITUTE (MPI)

MPI 79 (2016) Primer, Alkyd, Anti-Corrosive for  
Metal

#### NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM MBG 531 (2017) Metal Bar Grating Manual

NAAMM MBG 532 (2009) Heavy Duty Metal Bar Grating Manual

#### SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC SP 3 (2018) Power Tool Cleaning

SSPC SP 6/NACE No.3 (2007) Commercial Blast Cleaning

#### U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1 (2014) Safety -- Safety and Health  
Requirements Manual

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

### SD-02 Shop Drawings

Expansion Joint Covers, Installation Drawings; G

Floor Gratings, Installation Drawings; G

Embedded Angles and Plates, Installation Drawings; G

### SD-03 Product Data

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Expansion Joint Covers; G

Floor Gratings; G

Downspout Terminations Type; G

Recycled Content; S

SD-04 Samples

Expansion Joint Covers

SD-07 Certificates

Certificates of Compliance; G

### 1.3 QUALIFICATION OF WELDERS

Qualify welders in accordance with AWS D1.1/D1.1M. Use procedures, materials, and equipment of the type required for the work.

### 1.4 DELIVERY, STORAGE, AND PROTECTION

Protect from corrosion, deformation, and other types of damage. Store items in an enclosed area free from contact with soil and weather. Remove and replace damaged items with new items.

### 1.5 MISCELLANEOUS REQUIREMENTS

#### 1.5.1 Fabrication Drawings

Submit fabrication drawings showing layout(s), connections to structural system, and anchoring details as specified in AISC 303.

#### 1.5.2 Installation Drawings

Submit templates, erection, and installation drawings indicating thickness, type, grade, class of metal, and dimensions. Show construction details, reinforcement, anchorage, and installation in relation to the building construction.

## PART 2 PRODUCTS

### 2.1 RECYCLED CONTENT

Provide products with recycled content. Provide certificates of compliance for recycled content.

### 2.2 MATERIALS

Provide exposed fastenings of compatible materials (avoid contact of dissimilar metals). Coordinate color and finish with the material to which fastenings are applied. Submit the manufacturer's certified mill reports which clearly show the applicable ASTM mechanical and chemical requirements together with the actual test results for the supplied materials.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.2.1 Structural Carbon Steel

Provide in accordance with [ASTM A36/A36M](#).

#### 2.2.2 Structural Tubing

Provide in accordance with [ASTM A500/A500M](#).

#### 2.2.3 Steel Pipe

Provide in accordance with [ASTM A53/A53M](#), Type E or S, Grade B.

#### 2.2.4 Fittings for Steel Pipe

Provide standard malleable iron fittings in accordance with [ASTM A47/A47M](#).

#### 2.2.5 Gratings

a. Provide gray cast iron in accordance with [ASTM A48/A48M](#), Class 40.

b. Provide metal bar type grating in accordance with [NAAMM MBG 531](#) and [NAAMM MBG 532](#).

#### 2.2.6 Anchor Bolts

Provide in accordance with [ASTM F1554](#). Where exposed, provide anchor bolts of the same material, color, and finish as the metal to which they are applied.

##### 2.2.6.1 Adhesive Anchors

Provide adhesive anchors.

##### 2.2.6.2 Lag Screws and Bolts

Provide in accordance with [ASME B18.2.1](#), type and grade best suited for the purpose.

##### 2.2.6.3 Toggle Bolts

Provide in accordance with [ASME B18.2.1](#).

##### 2.2.6.4 Bolts, Nuts, Studs and Rivets

Provide in accordance with [ASME B18.2.2](#) or [ASTM A307](#).

##### 2.2.6.5 Powder Actuated Fasteners

Follow safety provisions in accordance with [ASSP A10.3](#).

##### 2.2.6.6 Screws

Provide in accordance with [ASME B18.2.1](#), [ASME B18.6.2](#), [ASME B18.6.3](#) and [ASTM C1513](#).

##### 2.2.6.7 Washers

Provide plain washers in accordance with [ASME B18.22M](#), [ASME B18.21.1](#). Provide beveled washers for American Standard beams and channels, square

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

or rectangular, tapered in thickness, and smooth. Provide lock washers in accordance with ASME B18.21.2M, ASME B18.21.1.

#### 2.2.7 Aluminum Alloy Products

Provide in accordance with ASTM B209M, ASTM B209 for sheet plate, ASTM B221M, ASTM B221M, ASTM B221 for extrusions and ASTM B26/B26M or ASTM B108/B108M for castings. Provide aluminum extrusions at least 1/8 inch thick and aluminum plate or sheet at least 0.050 inch thick.

### 2.3 FABRICATION FINISHES

#### 2.3.1 Galvanizing

Hot-dip galvanize items specified to be zinc-coated, after fabrication where practicable. Provide galvanizing in accordance with ASTM A123/A123M, ASTM A153/A153M, ASTM A653/A653M or ASTM A924/A924M, Z275 G90.

#### 2.3.2 Galvanize

Anchor bolts, grating fasteners, washers, and parts or devices necessary for proper installation, unless indicated otherwise.

#### 2.3.3 Repair of Zinc-Coated Surfaces

Repair damaged surfaces with galvanizing repair method and paint in accordance with ASTM A780/A780M or by application of stick or thick paste material specifically designed for repair of galvanizing, as approved by Contracting Officer. Clean areas to be repaired and remove slag from welds. Heat, with a torch, surfaces to which stick or paste material will be applied. Heat to a temperature sufficient to melt the metals in the stick or paste. Spread molten material uniformly over surfaces to be coated and wipe off excess material.

#### 2.3.4 Shop Cleaning and Painting

##### 2.3.4.1 Surface Preparation

Blast clean surfaces in accordance with SSPC SP 6/NACE No.3. Surfaces that will be exposed in spaces above ceiling or in attic spaces, crawl spaces, furred spaces, and chases may be cleaned in accordance with SSPC SP 3 in lieu of being blast cleaned. Wash cleaned surfaces which become contaminated with rust, dirt, oil, grease, or other contaminants with solvents until thoroughly clean. Steel to be embedded in concrete must be free of dirt and grease prior to embed. Do not paint or galvanize bearing surfaces, including contact surfaces within slip critical joints. Shop coat these surfaces with rust prevention.

##### 2.3.4.2 Pretreatment, Priming and Painting

Apply pre-treatment, primer, and paint in accordance with manufacturer's printed instructions. On surfaces concealed in the finished construction or not accessible for finish painting, apply an additional prime coat to a minimum dry film thickness of 1.0 mil. Tint additional prime coat with a small amount of tinting pigment.

#### 2.3.5 Nonferrous Metal Surfaces

Protect by plating, anodic, or organic coatings.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 2.3.6 Aluminum Surfaces

#### 2.3.6.1 Surface Condition

Before finishes are applied, remove roll marks, scratches, rolled-in scratches, kinks, stains, pits, orange peel, die marks, structural streaks, and other defects which will affect uniform appearance of finished surfaces.

#### 2.3.6.2 Aluminum Finishes

Unexposed sheet, plate and extrusions may have mill finish as fabricated. Sandblast castings' finish, medium, AA DAF45. Unless otherwise specified, provide all other aluminum items with an anodized finish. Provide a coating thickness not less than that specified for protective and decorative type finishes for items used in interior locations or architectural Class I type finish for items used in exterior locations. Provide in accordance with AA DAF45. Provide a polished satin finish on items to be anodized.

### 2.4 EXPANSION JOINT COVERS

Provide expansion joint covers constructed of extruded aluminum with anodized satin aluminum finish for walls and ceilings and standard mill finish for floor covers and exterior covers. Furnish plates, backup angles, expansion filler strips and anchors as indicated.

### 2.5 FLOOR GRATINGS

Design steel grating in accordance with NAAMM MBG 531 for bar type gratings, or in accordance with manufacturer's charts for plank grating. Galvanize steel floor gratings.

- a. In accordance with NAAMM MBG 531, band edges of grating with bars of the same size as the bearing bars. Weld banding in accordance with the manufacturer's standard for trim. Design tops of bearing bars, cross or intermediate bars to be in the same plane and to match grating finish.
- b. NAAMM MBG 531, band ends of gratings with bars of the same or greater thickness than the metal used for grating. Weld banding bars to bearing bars or channels at least every fourth bar or channel and in every corner. Tack weld intervening bars or channels. Band diagonal or round cuts by welding bars of the same or greater thickness as the grating and in accordance with the manufacturer's standard for trim.
- c. Anchor gratings to structural members with bolts, toggle bolts, or expansion shields and bolts.
- d. Provide slip resistant surface finishes.

### 2.6 DOWNSPOUT TERMINATIONS

Provide 5x4 inch cast iron downspout boot with cleanout access and manufacturer's standard cast iron strap.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 2.7 MISCELLANEOUS PLATES AND SHAPES

Provide items that do not form a part of the structural steel framework, such as lintels, sill angles, miscellaneous mountings and frames. Provide lintels fabricated from structural steel shapes over openings in masonry walls and partitions as indicated and as required to support wall loads over openings. Provide with connections and fasteners or welds as indicated. Construct to have at least 8 in bearing on masonry at each end unless indicated otherwise.

Provide angles and plates in accordance with ASTM A36/A36M, for embedment as indicated. Galvanize embedded items exposed to the elements in accordance with ASTM A123/A123M.

## PART 3 EXECUTION

### 3.1 GENERAL INSTALLATION REQUIREMENTS

Install items at locations indicated in accordance with manufacturer's instructions. Verify all field dimensions prior to fabrication. Include materials and parts necessary to complete each assembly, whether indicated or not. Miss-alignment and miss-sizing of holes for fasteners is cause for rejection. Conceal fastenings where practicable. Joints exposed to weather must be watertight.

### 3.2 WORKMANSHIP

Provide miscellaneous metalwork that is true and accurate in shape, size, and profile. Make angles and lines continuous and straight. Make curves consistent, smooth and unfaceted. Provide continuous welding along the entire area of contact except where tack welding is permitted. Do not tack weld exposed connections. Unless otherwise indicated and approved, provide a smooth finish on exposed surfaces. Provide countersunk rivets where exposed. Provide coped and mitered corner joints aligned flush and without gaps.

### 3.3 ANCHORAGE, FASTENINGS, AND CONNECTIONS

Provide anchorage as necessary, whether indicated or not, for fastening miscellaneous metal items securely in place. Include slotted inserts, expansion shields, powder-driven fasteners, toggle bolts (when approved for concrete), through bolts for masonry, machine and carriage bolts for steel, through bolts, lag bolts, and screws for wood. Do not use wood plugs. Provide non-ferrous attachments for non-ferrous metal. Provide exposed fastenings of compatible materials (avoid contact of dissimilar metals), that generally match in color and finish the surfaces to which they are applied. Conceal fastenings where practicable. Provide all fasteners flush with the surfaces they fasten, unless indicated otherwise.

Test a minimum of 2 bolt, nut, and washer assemblies from each certified mill batch in a tension measuring device at the job site prior to the beginning of bolting start-up.

### 3.4 BUILT-IN WORK

Where necessary and not otherwise indicated, form built-in metal work for anchorage with concrete or masonry. Provide built-in metal work in ample time for securing in place as the work progresses.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.5 WELDING

Perform welding, welding inspection, and corrective welding in accordance with AWS D1.1/D1.1M. Use continuous welds on all exposed connections. Grind visible welds smooth in the finished installation. Provide in accordance with the safety requirements of EM 385-1-1.

### 3.6 DISSIMILAR METALS

Where dissimilar metals are in contact, protect surfaces with a coating in accordance with MPI 79 to prevent galvanic or corrosive action. Where aluminum is in contact with concrete, plaster, mortar, masonry, wood, or absorptive materials subject to wetting, protect in accordance with ASTM D1187/D1187M, asphalt-base emulsion. Clean surfaces with metal shavings from installation at the end of each work day.

### 3.7 PREPARATION

#### 3.7.1 Material Coatings and Surfaces

Remove rust preventive coating just prior to field erection, using a remover approved by the metal manufacturer. Surfaces, when assembled, must be free of rust, grease, dirt and other foreign matter.

#### 3.7.2 Environmental Conditions

Do not clean or paint surfaces when damp or exposed to foggy or rainy weather, when metallic surface temperature is less than minus 5 degrees F above the dew point of the surrounding air, or when surface temperature is below 45 degrees F or over 95 degrees F, unless approved by the Contracting Officer. Metal surfaces to be painted must be dry for a minimum of 48 hours prior to the application of primer or paint.

### 3.8 EXPANSION JOINT COVERS

Provide in accordance with manufacturer's written instructions and with seismic requirements indicated. Verify installation allows specified movement prior to completion of work

### 3.9 INSTALLATION OF DOWNSPOUT TERMINATIONS

Secure downspouts terminations to downspouts and substrate per manufacturer's instructions.

### 3.10 INSTALLATION MISCELLANEOUS PLATES AND SHAPES

Provide lintels fabricated from structural steel shapes over openings in masonry walls and partitions as indicated and as required to support wall loads over openings. Provide with connections and fasteners or welds as indicated. Construct to have at least 8 inches bearing on masonry at each end.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 05 51 00

## METAL STAIRS

02/17, CHG 1: 05/17

## PART 1 GENERAL

Section 05 05 23.16 STRUCTURAL WELDING applies to work specified in this section.

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 360 (2016) Specification for Structural Steel Buildings

## AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISC/AISI 121 (2007) Standard Definitions for Use in the Design of Steel Structures

## AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B18.2.1 (2012; Errata 2013) Square and Hex Bolts and Screws (Inch Series)

ASME B18.6.1 (2016) Wood Screws (Inch Series)

ASME B18.6.3 (2013; R 2017) Machine Screws, Tapping Screws, and Machine Drive Screws (Inch Series)

ASME B18.21.1 (2009; R 2016) Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers (Inch Series)

## AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M (2020) Structural Welding Code - Steel

## ASTM INTERNATIONAL (ASTM)

ASTM A27/A27M (2020) Standard Specification for Steel Castings, Carbon, for General Application

ASTM A36/A36M (2019) Standard Specification for Carbon Structural Steel

ASTM A47/A47M (1999; R 2018; E 2018) Standard Specification for Ferritic Malleable Iron Castings

ASTM A48/A48M (2003; R 2016) Standard Specification for

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### Gray Iron Castings

ASTM A53/A53M	(2020) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A108	(2013) Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153/A153M	(2016a) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A283/A283M	(2013) Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A307	(2021) Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A500/A500M	(2021) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A512	(2006; R 2012) Standard Specification for Cold-Drawn Butt-welded Carbon Steel Mechanical Tubing
ASTM A568/A568M	(2019a) Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for
ASTM A575	(2020) Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades
ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A924/A924M	(2020) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM A1008/A1008M	(2020) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
ASTM A1011/A1011M	(2018a) Standard Specification for Steel Sheet and Strip, Hot-Rolled, Carbon,

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Structural, High-Strength Low-Alloy,  
High-Strength Low-Alloy with Improved  
Formability, and Ultra-High Strength

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 101

(2021) Life Safety Code

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

### SD-02 Shop Drawings

Iron and Steel Hardware; G

Steel Shapes, Plates, Bars, and Strips; G

Metal Stair System; G

### SD-03 Product Data

Structural Steel Plates, Shapes, and Bars; G

Structural Steel Tubing; G

Hot-Rolled Carbon Steel Sheets and Strips; G

Cold-Finished Steel Bars; G

Hot-Rolled Carbon Steel Bars; G

Cold-Rolled Carbon Steel Sheets; G

Galvanized Carbon Steel Sheets; G

Cold-Drawn Steel Tubing; G

Gray Iron Castings; G

Malleable Iron Castings; G

Concrete Inserts; G

Protective Coating; G

Steel Pan Stairs; G

Steel Stairs; G

### SD-07 Certificates

Welding Procedures; G

Welder Qualification; G

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### SD-08 Manufacturer's Instructions

Structural Steel Plates, Shapes, and Bars; G

Structural Steel Tubing; G

Hot-Rolled Carbon Steel Sheets and Strips; G

Cold-Finished Steel Bars; G

Hot-Rolled Carbon Steel Bars; G

Cold-Rolled Carbon Steel Sheets; G

Galvanized Carbon Steel Sheets; G

Cold-Drawn Steel Tubing; G

Gray Iron Castings; G

Malleable Iron Castings; G

Protective Coating; G

### 1.3 QUALITY CONTROL

#### 1.3.1 Qualifications for Welding Work

Submit [welding procedures](#) in accordance with [AWS D1.1/D1.1M](#). Make test specimens in the presence of the Contracting Officer, and have the specimens tested by an approved testing laboratory at the Contractor's expense.

Certify [welder qualification](#) by tests in accordance with [AWS D1.1/D1.1M](#), or under an equivalent approved qualification test. In addition, perform tests on test pieces in positions and with clearances equivalent to those actually encountered. If a test weld fails to meet requirements, ensure that two test welds are retested immediately and that each test weld is made and passes. Failure in the immediate retest requires that the welder be retested after further practice or training and a complete set of test welds be made.

## PART 2 PRODUCTS

### 2.1 SYSTEM DESCRIPTION

Submit complete and detailed fabrication drawings for all [iron and steel hardware](#), and for all [steel shapes, plates, bars, and strips](#) used in accordance with the design specifications referenced in this section.

### 2.2 FABRICATION

Preassemble items in the shop to the greatest extent possible. Disassemble units only to the extent necessary for shipping and handling. Clearly mark units for reassembly and coordinated installation.

For the fabrication of work exposed to view, use only materials that are smooth and free of surface blemishes, including pitting, seam marks, roller marks, rolled trade names, and roughness. Remove blemishes by

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

grinding, or by welding and grinding, before cleaning and treating surfaces and applying surface finishes, including zinc coatings.

#### 2.2.1 General Fabrication

Prepare and submit **metal stair system** shop drawings with detailed plans and elevations at scales not less than **1 inch to 1 foot** and with details of sections and connections at scales not less than **3 inches to 1 foot**. Also detail the placement drawings, diagrams, and templates for installation of anchorages, including concrete inserts, anchor bolts, and miscellaneous metal items having integral anchorage devices.

Use materials of size and thicknesses indicated or, if not indicated, of the size and thickness necessary to produce a finished product that is strong enough and durable enough for its intended use. Work the materials to the dimensions indicated on approved detail drawings, using proven methods of fabrication and support. Use the type of materials indicated or specified for the various components of work.

Form exposed work true to line and level, with accurate angles and surfaces and with straight sharp edges. Ease exposed edges to a radius of approximately **1/32 inch**, and bend metal corners to the smallest radius possible without causing grain separation or otherwise impairing the work.

Continuously weld corners and seams in accordance with the recommendations of **AWS D1.1/D1.1M**. Grind exposed welds smooth and flush to match and blend with adjoining surfaces.

Form exposed connections with hairline joints that are flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of the type indicated or, if not indicated, use Phillips flat-head (countersunk) screws or bolts.

Provide and coordinate anchorage of the type indicated for the supporting structure. Fabricate anchoring devices, and space them as indicated and as necessary to provide adequate support for the intended use of the work.

Use hot-rolled steel bars for work fabricated from bar stock unless work is indicated or specified as fabricated from cold-finished or cold-rolled stock.

#### 2.2.2 Steel Pan Stairs

##### 2.2.2.1 General

Joining pieces by welding. Fabricate units so that bolts and other fastenings do not appear on finished surfaces. Make joints true and tight, and connections between parts lighttight. Grind continuous welds smooth where exposed.

Construct metal stair units to sizes and arrangements indicated to support a minimum live load of **100 pounds per square foot**. Provide framing, hangers, columns, struts, clips, brackets, bearing plates, and other components as required for the support of stairs and platforms.

##### 2.2.2.2 Stair Framing

Fabricate stringers of structural steel channels, or plates, or a combination thereof as indicated. Provide closures for exposed ends of

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

strings.

Construct platforms of structural steel channel headers and miscellaneous framing members as indicated. Bolt headers to stringers and newels, and bolt framing members to stringers and headers.

#### 2.2.2.3 Riser, Subtread, and Subplatform Metal Pans

Form metal pans of 0.1084-inch (12-gage) galvanized structural steel sheets, conforming to ASTM A653/A653M, Grade A, with zinc coating conforming to ASTM A653/A653M and ASTM A924/A924M. Shape the pans to the configuration indicated.

Construct risers and subtread metal pans with steel angle supporting brackets, of the size indicated, welded to stringers. Secure metal pans to brackets with rivets or welds. Secure subplatform metal pans to platform frames with welds.

#### 2.2.2.4 Metal Safety Nosings

Between stringers, provide abrasive cast metal safety nosings, 4 inches wide by the full length of the step. Fabricate nosings to the thickness, profile, and surface pattern indicated. Equip each nosing with integral anchors for embedding in the pan fill material, and space the anchors not more than 4 inches from each end and not more than 15 inches on center.

#### 2.2.2.5 Steel Floor Plate Treads and Platforms

Provide raised-pattern steel floor plate fabricated from steel complying with ASTM A36/A36M. Provide the pattern indicated or, if not indicated, as selected from the manufacturer's standard patterns.

Form treads of 1/4-inch thick steel floor plate with integral nosing and back-edge stiffener. Weld steel supporting brackets to strings, and weld treads to brackets.

Fabricate platforms of steel floor plate to the thickness indicated. Provide nosing that match treads at landings. Secure floor plates to platform framing members with welds.

#### 2.2.2.6 Safety Nosings for Concrete Treads

Provide safety nosings of cast aluminum with plain abrasive surfaces, or extruded aluminum with abrasive inserts, at least 4 inches wide and 1/4 inch thick and terminating at not more than 6 inches from the ends of treads for metal-pan cement-filled treads extending the full length of the tread for stairs and as indicated for platforms and landings. Provide safety nosings with anchors embedded a minimum of 3/4 inch in the concrete and with tops flush with the top of the traffic surface.

#### 2.2.2.7 Steel Framing for Concrete Stairs

When necessary, modify fabricated units to fit actual dimensions of the supporting structure. Join steel components by welding. Provide 14-gage steel risers unless otherwise indicated. Arrange components to receive finish materials as indicated.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 2.2.3 Protective Coating

Shop-prime steelwork as indicated in accordance with AISC/AISI 121, except surfaces of steel encased in concrete; welded surfaces; high-strength, bolt-connected surfaces; and surfaces of crane rails.

Hot-dip galvanize steelwork as indicated in accordance with ASTM A123/A123M. Touch up abraded surfaces and cut ends of galvanized members with zinc-dust, zinc-oxide primer, or an approved galvanizing repair compound.

## 2.3 COMPONENTS

### 2.3.1 Steel Stairs

Provide steel stairs complete with stringers, metal-pan concrete-filled treads, landings, columns, handrails, and necessary bolts and other fastenings. Hot-dip-galvanize exterior steel stairs and rails. Shop paint interior steel stairs and accessories.

#### 2.3.1.1 Design Loads

Design stairs to sustain a live load of not less than 100 pounds per square foot, or a concentrated load of 300 lb distributed over a 2-inch by 2-inch area, applied where it is most critical. Except for a commercial product, design and fabricate steel stairs to conform to AISC 360. Design fire stairs to conform to NFPA 101.

#### 2.3.1.2 Materials

Provide steel stairs of welded construction except that bolts may be used where welding is not practicable. Do not use screw or screw-type connections.

- a. Structural Steel: ASTM A36/A36M.
- b. Support metal pan for concrete fill on angle cleats welded to stringers or treads with integral cleats, welded or bolted to the stringer. Provide sheet-steel landings with angle stiffeners welded on. Close exposed ends. For exterior stairs, form all exposed joints to exclude water.
- c. Before fabrication, obtain necessary field measurements and verify drawing dimensions.
- d. Clean metal surfaces free of mill scale, flake rust, and rust pitting before shop finishing. Weld permanent connections. Finish welds flush and smooth on surfaces that will be exposed after installation.

### 2.3.2 Concrete Inserts

Threaded-type concrete inserts consisting of galvanized ferrous castings, internally threaded to receive 3/4-inch diameter machine bolts; either malleable iron conforming to ASTM A47/A47M or cast steel conforming to ASTM A27/A27M, and hot-dip-galvanized in accordance with ASTM A153/A153M.

Wedge-type concrete inserts consisting of galvanized box-type ferrous castings designed to accept 3/4-inch diameter bolts having special wedge-shaped heads; either malleable iron conforming to ASTM A47/A47M or cast steel conforming to ASTM A27/A27M and hot-dip-galvanized in

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

accordance with ASTM A153/A153M.

Carbon steel bolts having special wedge-shaped heads, nuts, washers, and shims and galvanized in accordance with ASTM A153/A153M. Provide slotted-type concrete inserts consisting of galvanized 1/8-inch thick pressed steel plate conforming to ASTM A283/A283M; of box-type welded construction with slot designed to receive 3/4-inch diameter square-head bolt with knockout cover; and be hot-dip-galvanized in accordance with ASTM A123/A123M.

### 2.3.3 Fasteners

Select galvanized zinc-coated fasteners conforming to ASTM A153/A153M for exterior applications or where the fasteners are built into exterior walls or floor systems. Select the fasteners for the type, grade, and class required for the installation of steel stair items:

- a. Standard/regular hexagon-head bolts and nuts, conforming to ASTM A307, Grade A.
- b. Square-head lag bolts conforming to ASME B18.2.1.
- c. Cadmium-plated steel machine screws, conforming to ASME B18.6.3.
- d. Flat-head carbon steel wood screws, conforming to ASME B18.6.1.
- e. Plain, round, general-assembly-grade, carbon steel washers, conforming to ASME B18.21.1.
- f. Helical-spring, carbon steel lockwashers, conforming to ASME B18.2.1.

## 2.4 MATERIALS

### 2.4.1 Structural Steel Plates, Shapes and Bars

Structural size shapes and plates, conforming to ASTM A36/A36M, unless otherwise noted, except bent or cold-formed plates.

Steel plates - bent or cold-formed, conforming to ASTM A283/A283M, Grade C.

Steel bars and bar-size shapes, conforming to ASTM A36/A36M, unless otherwise noted for steel bars and bar-size shapes.

### 2.4.2 Structural Steel Tubing

Provide the following:

- a. Structural steel tubing, hot-formed, welded or seamless, conforming to ASTM A500/A500M, Grade B, unless otherwise noted.

### 2.4.3 Hot-Rolled Carbon Steel Bars

Provide the following:

- a. Hot-rolled carbon steel bars and bar-size shapes, conforming to ASTM A575, grade as selected by the fabricator.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.4.4 Cold-Finished Steel Bars

Provide the following:

- a. Cold-finished steel bars conforming to ASTM A108, grade as selected by the fabricator.

#### 2.4.5 Hot-Rolled Carbon Steel Sheets and Strips

Provide the following:

- a. Hot-rolled carbon sheets and strips conforming to ASTM A568/A568M and ASTM A1011/A1011M, pickled and oiled.

#### 2.4.6 Cold-Rolled Carbon Steel Sheets

Provide the following:

- a. Cold-rolled carbon steel sheets conforming to ASTM A1008/A1008M.

#### 2.4.7 Galvanized Carbon Steel Sheets

Provide the following:

- a. Galvanized carbon steel sheets conforming to ASTM A653/A653M, with galvanizing conforming to ASTM A653/A653M and ASTM A924/A924M.

#### 2.4.8 Cold-Drawn Steel Tubing

Provide the following:

- a. Cold-drawn steel tubing conforming to ASTM A512, sunk drawn, butt-welded, cold-finished, and stress-relieved.

#### 2.4.9 Gray Iron Castings

Provide the following:

- a. Gray iron castings conforming to ASTM A48/A48M, Class 30.

#### 2.4.10 Malleable Iron Castings

Provide the following:

- a. Malleable iron castings conforming to ASTM A47/A47M, grade as selected.

#### 2.4.11 Steel Pipe

Provide the following:

- a. Steel pipe conforming to ASTM A53/A53M, type as selected, Grade B; primed finish, unless galvanizing is required; standard weight (Schedule 40).

### PART 3 EXECUTION

#### 3.1 PREPARATION

Clean surfaces thoroughly before installation. Prepare surfaces using the

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions. Examine materials upon arrival at site. Notify the carrier and manufacturer of any damage.

Protect installed products until completion of project. Touch up, repair or replace, damaged products before substantial completion

### 3.2 INSTALLATION

Install in accordance with the manufacturer's instructions and approved submittals. Install in proper relationship with adjacent construction.

Install items at locations indicated, according to the manufacturer's instructions. Verify all measurements and take all field measurements necessary before fabrication. Ensure that exposed fastenings are compatible with generally match the color and finish of, and harmonize with the material to which they are applied. Include materials and parts necessary to complete each item, even though such work is not definitely shown or specified. Poor matching of holes for fasteners is cause for rejection. Conceal fastenings where practicable. Select thickness of metal and details of assembly and supports that adequately strengthen and stiffen the construction. Form joints exposed to the weather to exclude water.

#### 3.2.1 Field Preparation

Remove rust-preventive coating just before field erection, using a remover approved by the coating manufacturer. Provide surfaces, when assembled, free of rust, grease, dirt and other foreign matter.

#### 3.2.2 Field Welding

Comply with AWS D1.1/D1.1M in executing manual shielded-metal arc welding, (for appearance and quality of new welds) and in correcting existing welding.

#### 3.2.3 Safety Nosings

Completely embed nosing in concrete before the initial set of the concrete occurs and finish flush with the top of the concrete surface.

#### 3.2.4 Touchup Painting

Immediately after installation, clean all field welds, bolted connections, and abraded areas of the shop-painted material, and repaint exposed areas with the same paint used for shop painting. Apply paint by brush or spray to provide a minimum dry-film thickness of 2 mils.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 05 52 00

## METAL RAILINGS

02/18, CHG 1: 02/20

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M (2020) Structural Welding Code - Steel

## ASTM INTERNATIONAL (ASTM)

ASTM A27/A27M (2020) Standard Specification for Steel Castings, Carbon, for General Application

ASTM A36/A36M (2019) Standard Specification for Carbon Structural Steel

ASTM A47/A47M (1999; R 2018; E 2018) Standard Specification for Ferritic Malleable Iron Castings

ASTM A53/A53M (2020) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

ASTM A108 (2013) Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished

ASTM A123/A123M (2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A153/A153M (2016a) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A283/A283M (2013) Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates

ASTM A500/A500M (2021) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

ASTM A512 (2006; R 2012) Standard Specification for Cold-Drawn Buttweld Carbon Steel Mechanical Tubing

ASTM A575 (2020) Standard Specification for Steel

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Bars, Carbon, Merchant Quality, M-Grades

ASTM B26/B26M

(2014; E 2015) Standard Specification for  
Aluminum-Alloy Sand Castings

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM AMP 521

(2001; R 2012) Pipe Railing Systems Manual

## 1.2 ADMINISTRATIVE REQUIREMENTS

### 1.2.1 Preinstallation Meetings

Within 30 days of contract award, submit [fabrication drawings](#) to the Contracting Officer for the following items:

- a. Iron and steel hardware
- b. Steel shapes, plates, bars and strips
- c. Steel railings and handrails
- d. Aluminum railings and handrails
- e. Anchorage and fastening systems

Submit manufacturer's catalog data, including two copies of manufacturers specifications, load tables, dimension diagrams, and anchor details for the following items:

- a. Structural-steel plates, shapes, and bars
- b. Structural-steel tubing
- c. Cold-finished steel bars
- d. Hot-rolled carbon steel bars
- e. Cold-drawn steel tubing
- f. Concrete inserts
- g. Protective coating
- h. Steel railings and handrails
- i. Aluminum railings and handrails
- j. [Anchorage and fastening systems](#)

## 1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section [01 33 00](#) SUBMITTAL PROCEDURES:

[SD-02 Shop Drawings](#)

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Fabrication Drawings; G

Iron and Steel Hardware; G

Steel Shapes, Plates, Bars and Strips; G

#### SD-03 Product Data

Structural-Steel Plates, Shapes, and Bars; G

Structural-Steel Tubing; G

Cold-Finished Steel Bars; G

Hot-Rolled Carbon Steel Bars; G

Cold-Drawn Steel Tubing; G

Concrete Inserts; G

Protective Coating; G

Steel Railings and Handrails; G

Anchorage and Fastening Systems; G

#### SD-07 Certificates

Welding Procedures; G

Welder Qualification; G

#### SD-08 Manufacturer's Instructions

Installation Instructions

### 1.4 QUALITY CONTROL

#### 1.4.1 Welding Procedures

Section 05 05 23.16 STRUCTURAL WELDING applies to work specified in this section.

Submit results of welding procedures testing in accordance with AWS D1.1/D1.1M made in the presence of the Contracting Officer and by an approved testing laboratory at the Contractor's expense.

#### 1.4.2 Welder Qualification

Submit certified welder qualification by tests in accordance with AWS D1.1/D1.1M, or under an equivalent approved qualification test. In addition, perform tests on test pieces in positions and with clearances equivalent to those actually encountered. If a test weld fails to meet requirements, conduct an immediate retest of two test welds and ensure that each test weld passes. Failure in the immediate retest will require that the welder be retested after further practice or training and make a complete set of test welds.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## PART 2 PRODUCTS

### 2.1 FABRICATION

Preamble items in the shop to the greatest extent possible. Disassemble units only to the extent necessary for shipping and handling. Clearly mark units for reassembly and coordinated installation.

For the fabrication of work exposed to view, use only materials that are smooth and free of surface blemishes, including pitting, seam marks, roller marks, rolled trade names, and roughness. Remove blemishes by grinding, or by welding and grinding, before cleaning, treating, and applying surface finishes, including zinc coatings.

Provide railing and handrail detail plans and elevations at not less than 1 inch to 1 foot. Provide details of sections and connections at not less than 3 inches to 1 foot. Also detail setting drawings, diagrams, templates for installation of anchorages, including concrete inserts, anchor bolts, and miscellaneous metal items having integral anchors.

Use materials of size and thicknesses indicated or, if not indicated, of the size and thickness necessary to produce adequate strength and durability in the finished product for its intended use. Work the materials to the dimensions indicated on approved detail drawings, using proven details of fabrication and support. Use the type of materials indicated or specified for the various components of work.

Form exposed work true to line and level, with accurate angles and surfaces and straight sharp edges. Ensure that all exposed edges are eased to a radius of approximately 1/32 inch. Bend metal corners to the smallest radius possible without causing grain separation or otherwise impairing the work.

Weld corners and seams continuously and in accordance with the recommendations of AWS D1.1/D1.1M. Grind exposed welds smooth and flush to match and blend with adjoining surfaces.

Form the exposed connections with hairline joints that are flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of the type indicated or, if not indicated, use countersunk Phillips flathead screws or bolts.

Provide anchorage of the type indicated and coordinated with the supporting structure. Fabricate anchoring devices and space as indicated and as required to provide adequate support for the intended use of the work.

Use hot-rolled steel bars for work fabricated from bar stock unless work is indicated or specified to be fabricated from cold-finished or cold-rolled stock.

#### 2.1.1 Aluminum Railings

Fabrication: Provide fabrication jointing by one of the following methods:

- a. Use flush-type rail fittings, welded and ground smooth with splice locks secured with 3/8 inch recessed-head set screws.
- b. Ensure that mitered and welded joints made by fitting; post to top

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

rail; intermediate rail to post; and corners, are groove welded and ground smooth. Where allowed by the Contracting Officer, provide butt splices reinforced by a tight-fitting dowel or sleeve not less than 6 inches in length. Tack-weld or epoxy-cement the dowel or sleeve to one side of the splice.

- c. Assemble railings using slip-on aluminum-magnesium alloy fittings for joints. Fasten fittings to pipe or tube with 1/4 or 3/8 inch stainless-steel recessed-head setscrews. Provide assembled railings with fittings only at vertical supports or at rail terminations attached to walls. Provide expansion joints at the midpoint of panels. Provide a setscrew in only one side of the slip-on sleeve. Provide alloy fittings to conform to ASTM B26/B26M.

Provide removable railing sections as indicated. Provide toe-boards and brackets where indicated, using flange castings as appropriate.

#### 2.1.2 Steel Handrails

Fabricate joint posts, rail, and corners by one of the following methods:

- a. Flush-type rail fittings of commercial standard, welded and ground smooth, with railing splice locks secured with 3/8 inch hexagonal-recessed-head setscrews.
- b. Mitered and welded joints made by fitting post to top rail and intermediate rail to post, mitering corners, groove-welding joints, and grinding smooth. Butt railing splices and reinforce them by a tight-fitting interior sleeve not less than 6 inches long.
- c. Railings may be bent at corners in lieu of jointing, provided that bends are made in suitable jigs and the pipe is not crushed.

Provide removable sections as indicated.

#### 2.1.3 Protective Coating

Shop-prime the steelwork as indicated in accordance with Section 09 90 00 PAINTS AND COATINGS except the following:

- a. steel surfaces encased in concrete
- b. steel surfaces for welding
- c. high-strength bolt-connected contact surfaces
- d. crane rail surfaces

Provide hot-dipped galvanized steelwork as indicated in accordance with ASTM A123/A123M. Touch up abraded surfaces and cut ends of galvanized members with zinc-dust, zinc-oxide primer, or an approved galvanizing repair compound.

### 2.2 COMPONENTS

#### 2.2.1 Structural Steel Plates, Shapes And Bars

Provide structural-size shapes and plates, except plates to be bent or cold-formed, conforming to ASTM A36/A36M, unless otherwise noted.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Provide steel plates, to be bent or cold-formed, conforming to [ASTM A283/A283M](#), Grade C.

Provide steel bars and bar-size shapes conforming to [ASTM A36/A36M](#), unless otherwise noted.

#### 2.2.2 Structural-Steel Tubing

Provide structural-steel tubing, hot-formed, welded or seamless, conforming to [ASTM A500/A500M](#), Grade B, unless otherwise noted.

#### 2.2.3 Hot-Rolled Carbon Steel Bars

Provide bars and bar-size shapes conforming to [ASTM A575](#), grade as selected by the fabricator.

#### 2.2.4 Cold-Finished Steel Bars

Provide cold-finished steel bars conforming to [ASTM A108](#), grade as selected by the fabricator.

#### 2.2.5 Cold-Drawn Steel Tubing

Provide tubing conforming to [ASTM A512](#), sunk-drawn, butt-welded, cold-finished, and stress-relieved.

#### 2.2.6 Steel Pipe

Provide pipe conforming to [ASTM A53/A53M](#), type as selected, Grade B; primed finish, unless galvanizing is required; standard weight (Schedule 40).

#### 2.2.7 Concrete Inserts

Provide threaded-type concrete inserts consisting of galvanized ferrous castings, internally threaded to receive [3/4 inch](#) diameter machine bolts; either malleable iron conforming to [ASTM A47/A47M](#) or cast steel conforming to [ASTM A27/A27M](#), hot-dip galvanized in accordance with [ASTM A153/A153M](#).

Provide wedge-type concrete inserts consisting of galvanized box-type ferrous castings designed to accept [3/4 inch](#) diameter bolts having special wedge-shaped heads, made of either malleable iron conforming to [ASTM A47/A47M](#) or cast steel conforming to [ASTM A27/A27M](#) and hot-dip galvanized in accordance with [ASTM A153/A153M](#).

Provide carbon steel bolts having special wedge-shaped heads, nuts, washers, and shims, galvanized in accordance with [ASTM A153/A153M](#). Provide slotted-type concrete inserts consisting of a galvanized [1/8 inch](#) thick pressed-steel plate conforming to [ASTM A283/A283M](#), made of box-type welded construction with a slot designed to receive [3/4 inch](#) diameter square-head bolt with knockout cover; and hot-dip galvanized in accordance with [ASTM A123/A123M](#).

#### 2.2.8 Steel Railings And Handrails

Design handrails to resist a concentrated load of [200 lb](#) in any direction at any point of the top of the rail or [50 lb per foot](#) applied horizontally to the top of the rail, whichever is more severe. [NAAMM AMP 521](#), provide



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

the same size rail and post. Provide pipe collars of the same material and finish as the handrail and posts.

#### 2.2.8.1 Steel Handrails

Provide steel handrails, including inserts in concrete, steel pipe conforming to **ASTM A53/A53M** or structural tubing conforming to **ASTM A500/A500M**, Grade A or B of equivalent strength. Provide steel railings of **1-1/2 inch** nominal size, hot-dip galvanized **for exterior railings** and shop-painted **for interior railings**.

Provide kickplates between railing posts where indicated and consisting of **1/8 inch** steel flat bars not less than **6 inches** high. Secure kickplates as indicated.

Galvanize exterior railings, including pipe, fittings, brackets, fasteners, and other ferrous metal components.

### PART 3 EXECUTION

#### 3.1 PREPARATION

Adjust stair railings and handrails before securing in place in order to ensure proper matching at butting joints and correct alignment throughout their length. Space posts **as indicated**. Plumb posts in each direction. Secure posts and rail ends to building construction as follows:

- a. **At the Mechanical Mezzanine:** Anchor posts in concrete by means of pipe sleeves set and anchored into concrete. Provide sleeves of galvanized, standard-weight, steel pipe, not less than **6 inches** long, and having an inside diameter not less than **1/2 inch** greater than the outside diameter of the inserted pipe post. Provide steel plate closure secured to the bottom of the sleeve, with closure width and length not less than **1 inch** greater than the outside diameter of the sleeve. After posts have been inserted into sleeves, fill the annular space between the post and sleeve with nonshrink grout or a quick-setting hydraulic cement. Cover anchorage joint with a round steel flange welded to the post.
- b. **At all areas other than the Mechanical Mezzanine, weld** posts to steel channels **as indicated**.
- c. Anchor rail ends to steel with oval or round steel flanges welded to tail ends and bolted to the structural-steel members.

Secure handrails to walls by means of wall brackets and wall return fitting at handrail ends. Provide brackets of malleable iron castings, with not less than **3 inch** projection from the finished wall surface to the center of the pipe, drilled to receive one **3/8 inch** bolt. Locate brackets not more than **60 inches** on center. Provide wall return fittings of cast iron castings, flush type, with the same projection as that specified for wall brackets. Secure wall brackets and wall return fittings to building construction as follows:

- a. For concrete and solid masonry anchorage, use bolt anchor expansion shields and lag bolts.

Install toe boards and brackets where indicated. Make splices, where required, at expansion joints. Install removable sections as indicated.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.2 INSTALLATION

Submit manufacturer's [installation instructions](#) for the following products to be used in the fabrication of steel stair railing and hand rail work:

- a. Structural-steel plates, shapes, and bars
- b. Structural-steel tubing
- c. Cold-finished steel bars
- d. Hot-rolled carbon steel bars
- e. Cold-drawn steel tubing
- f. Protective coating
- g. Masonry anchorage devices
- h. Steel railings and handrails
- i. Anchorage and fastening systems

Provide complete, detailed fabrication and installation drawings for all [iron and steel hardware](#), and for all [steel shapes, plates, bars, and strips](#) used in accordance with the design specifications cited in this section.

#### 3.2.1 Steel Handrail

[Install handrail by means of brackets secured to railing with concealed fasteners or by means of brackets secured to metal framed wall with concealed fasteners where handrail is wall mounted.](#)

#### 3.2.2 Touchup Painting

Immediately after installation, clean field welds, bolted connections, abraded areas of the shop paint, and exposed areas painted with the paint used for shop painting. Apply paint by brush or spray to provide a minimum dry-film thickness of [2 mils](#).

### 3.3 FIELD QUALITY CONTROL

#### 3.3.1 Field Welding

Ensure that procedures of manual shielded metal arc welding, appearance and quality of welds made, and methods used in correcting welding work comply with [AWS D1.1/D1.1M](#).

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 06 10 00

## ROUGH CARPENTRY

08/16, CHG 2: 11/18

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN FOREST FOUNDATION (AFF)

ATFS STANDARDS (2015) American Tree Farm System Standards  
of Sustainability 2015-2020

## AMERICAN LUMBER STANDARDS COMMITTEE (ALSC)

ALSC PS 20 (2015) American Softwood Lumber Standard

## AMERICAN WOOD COUNCIL (AWC)

AWC WFCM (2012) Wood Frame Construction Manual for  
One- and Two-Family Dwellings

## AMERICAN WOOD PROTECTION ASSOCIATION (AWPA)

AWPA BOOK (2015) AWPA Book of Standards

AWPA M2 (2019) Standard for the Inspection of  
Preservative Treated Wood Products for  
Industrial Use

AWPA M6 (2013) Brands Used on Preservative Treated  
Materials

AWPA P5 (2015) Standard for Waterborne  
Preservatives

AWPA P18 (2014) Nonpressure Preservatives

AWPA P49 (2015; R 2021) Standard for Fire Retardant  
FR-1

AWPA T1 (2021) Use Category System: Processing and  
Treatment Standard

AWPA U1 (2021) Use Category System: User  
Specification for Treated Wood

## APA - THE ENGINEERED WOOD ASSOCIATION (APA)

APA L870 (2010) Voluntary Product Standard, PS  
1-09, Structural Plywood

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

ASTM INTERNATIONAL (ASTM)

ASTM D2898 (2010; R 2017) Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing

CALIFORNIA AIR RESOURCES BOARD (CARB)

CARB 93120 (2007) Airborne Toxic Control Measure (ATCM) to Reduce Formaldehyde Emissions from Composite Wood Products

CSA GROUP (CSA)

CSA Z809-08 (R2013) Sustainable Forest Management

FOREST STEWARDSHIP COUNCIL (FSC)

FSC STD 01 001 (2015) Principles and Criteria for Forest Stewardship

PROGRAMME FOR ENDORSEMENT OF FOREST CERTIFICATION (PEFC)

PEFC ST 2002:2013 (2015) PEFC International Standard Chain of Custody of Forest Based Products Requirements

SUSTAINABLE FOREST INITIATIVE (SFI)

SFI 2015-2019 (2015) Standards, Rules for Label Use, Procedures and Guidance

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 770 Formaldehyde Standards for Composite Wood Products

UNDERWRITERS LABORATORIES (UL)

UL 2818 (2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Preservative-treated Lumber and Plywood

SD-07 Certificates

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Certificates of Grade

Preservative Treatment

1.3 DELIVERY AND STORAGE

Deliver materials to the site in an undamaged condition. Store, protect, handle, and install prefabricated structural elements in accordance with manufacturer's instructions and as specified. Store materials off the ground to provide proper ventilation, with drainage to avoid standing water, and protection against ground moisture and dampness. Store materials with a moisture barrier at both the ground level and as a cover forming a well ventilated enclosure. Do not use materials that have visible moisture or biological growth. Remove defective and damaged materials and provide new materials. Store separated reusable wood waste convenient to cutting station and area of work.

1.4 GRADING AND MARKING

1.4.1 Lumber

Mark each piece of framing and board lumber or each bundle of small pieces of lumber with the grade mark of a recognized association or independent inspection agency. Such association or agency must be certified by the Board of Review, American Lumber Standards Committee, to grade the species used. Surfaces that are to be exposed to view must not bear grademarks, stamps, or any type of identifying mark.

1.4.2 Plywood

Mark each sheet with the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of the plywood. The mark must identify the plywood by species group or span rating, exposure durability classification, grade, and compliance with **APA L870**. Surfaces that are to be exposed to view must not bear grademarks or other types of identifying marks.

1.4.3 **Preservative-Treated** Lumber

The Contractor is responsible for the quality of treated wood products. Each treated piece must be inspected in accordance with **AWPA M2** and permanently marked or branded, by the producer, in accordance with **AWPA M6**. The Contractor must provide Contracting Officer's Representative (COR) with the inspection report of an approved independent inspection agency that offered products comply with applicable AWPA Standards. The appropriate Quality Mark on each piece will be accepted, in lieu of inspection reports, as evidence of compliance with applicable AWPA treatment standards.

1.4.4 Fire-Retardant Treated Lumber

Mark each piece in accordance with **AWPA M6**, except pieces that are to be natural or transparent finished. In addition, exterior fire-retardant lumber must be distinguished by a permanent penetrating blue stain. Labels of a nationally recognized independent testing agency will be accepted as evidence of conformance to the fire-retardant requirements of **AWPA M6**.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 1.5 SIZES AND SURFACING

**ALSC PS 20** for dressed sizes of yard and structural lumber. Lumber must be surfaced four sides. Size references, unless otherwise specified, are nominal sizes, and actual sizes must be within manufacturing tolerances allowed by the standard under which the product is produced.

## 1.6 MOISTURE CONTENT

Air-dry or kiln-dry lumber. Kiln-dry treated lumber after treatment. Maximum moisture content of wood products must be as follows at the time of delivery to the job site:

- a. Framing lumber and board, 19 percent maximum

## 1.7 PRESERVATIVE TREATMENT

Treat wood products with waterborne wood preservatives conforming to **AWPA P5**. Pressure treatment of wood products must conform to the requirements of **AWPA BOOK** Use Category System Standards U1 and T1. Pressure-treated wood products must not contain arsenic, chromium, or other agents classified as carcinogenic, probably carcinogenic, or possibly carcinogenic to humans (compounds in Groups 1, 2A, or 2B) by the International Agency for Research on Cancer (IARC), Lyon, France. Pressure-treated wood products must not exceed the limits of the U.S. EPA's Toxic Characteristic Leaching Procedure (TCLP), and must not be classified as hazardous waste. Submit certification from treating plant stating chemicals and process used and net amount of preservatives retained are in conformance with specified standards. In accordance with **AWPA U1** provide non-copper preservative treatment such as EL2, PTI or SBX, DOT for products in direct contact with sheet metal.

- a. 0.25 pcf intended for above ground use.
- b. All wood must be air or kiln dried after treatment. Specific treatments must be verified by the report of an approved independent inspection agency, or the AWP Quality Mark on each piece. Do not incise surfaces of lumber that will be exposed. Minimize cutting and avoid breathing sawdust. Brush coat areas that are cut or drilled after treatment with either the same preservative used in the treatment or with a 2 percent copper naphthenate solution. Plastic lumber must not be preservative treated. The following items must be preservative treated:
  - (1) Wood plates, furring, and sleepers that are less than 24 inches from the ground, furring and nailers that are set into or in contact with concrete or masonry.
  - (2) Nailers, edge strips, blocking, and curbs for roof decks as indicated on drawings.

### 1.7.1 New Construction

Use a boron-based preservative conforming to **AWPA P18**, sodium silicate wood mineralization process, or Ammoniacal Copper Quaternary Compound to treat wood. Use boron-based preservatives for above-ground applications only.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 1.8 FIRE-RETARDANT TREATMENT

Fire-retardant treated wood must be pressure treated with fire retardants conforming to [AWPA P49](#). Fire retardant treatment of wood products must conform to the requirements of [AWPA U1](#), Commodity Specification H and [AWPA T1, Section H](#). Treatment and performance inspection must be by an independent and qualified testing agency that establishes performance ratings. Each piece or bundle of treated material must bear identification of the testing agency to indicate performance in accordance with such rating. Treated materials to be exposed to rain wetting must be subjected to an accelerated weathering technique in accordance with [ASTM D2898](#) prior to being tested. Such items which will not be inside a building, and such items which will be exposed to heat or high humidity, must receive exterior fire-retardant treatment. Fire-retardant-treated wood products must be free of halogens, sulfates, ammonium phosphate, and formaldehyde.

## 1.9 CERTIFICATIONS

### 1.9.1 Certified Wood Grades

Provide [certificates of grade](#) from the grading agency on graded but unmarked lumber or plywood attesting that materials meet the grade requirements specified herein.

### 1.9.2 Certified Sustainably Harvested Wood

Provide wood certified as sustainably harvested by [FSC STD 01 001](#), [ATFS STANDARDS](#), [CSA Z809-08](#), [SFI 2015-2019](#), or other third party program certified by [PEFC ST 2002:2013](#). Provide a letter of Certification of Sustainably Harvested Wood signed by the wood supplier. Identify certifying organization and their third party program name and indicate compliance with chain-of-custody program requirements. Submit sustainable wood certification data; identify each certified product on a line item basis. Submit copies of invoices bearing certification numbers.

### 1.9.3 Indoor Air Quality Certifications

Submit required indoor air quality certifications in one submittal package.

#### 1.9.3.1 Adhesives and Sealants

Provide products certified to meet indoor air quality requirements by [UL 2818](#) (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification or validation by other third-party programs that products meet the requirements of this Section. Provide current product certification documentation from certification body. When product does not have certification, provide validation that product meets the indoor air quality product requirements cited herein.

#### 1.9.3.2 Composite Wood, Wood Structural Panel and Agrifiber Products

For purposes of this specification, composite wood and agrifiber products include particleboard, medium density fiberboard (MDF), strawboard, panel substrates, and door cores. Provide products certified to meet requirements of both [40 CFR 770](#) and [CARB 93120](#). Provide current product certification documentation from certification body.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## PART 2 PRODUCTS

Not Used.

## PART 3 EXECUTION

### 3.1 INSTALLATION

Do not install building construction materials that show visual evidence of biological growth.

Conform to AWC WFCM and install in accordance with the National Association of Home Builders (NAHB) Advanced Framing Techniques: Optimum Value Engineering, unless otherwise indicated or specified. Select lumber sizes to minimize waste. Fit framing lumber and other rough carpentry, set accurately to the required lines and levels, and secure in place in a rigid manner.

### 3.2 MISCELLANEOUS

#### 3.2.1 Wood Nailers, Nailer Strips, Blocking, and Curbs

Provide sizes and configurations indicated or specified and anchored securely to continuous construction.

##### 3.2.1.1 Roof Nailing Strips

Provide nailing strips as indicated.

##### 3.2.2 Wood Blocking

Provide proper sizes and shapes at proper locations for the installation and attachment of wood and other finish materials, fixtures, equipment, and items indicated or specified.

##### 3.2.3 Wood Furring

Provide where shown and as necessary for facing materials specified. Except as shown otherwise, furring strips must be nominal one by 3, continuous, and spaced 16 inches o.c. Erect furring vertically or horizontally as necessary. Furring must be plumb, rigid, and level and must be shimmed as necessary to provide a true, even plane with surfaces suitable to receive the finish required.

##### 3.2.4 Temporary Closures

Provide with hinged doors and padlocks and install during construction at exterior doorways and other ground level openings that are not otherwise closed. Cover windows and other unprotected openings with polyethylene or other approved material, stretched on wood frames. Provide dustproof barrier partitions to isolate areas as directed.

### 3.3 WASTE MANAGEMENT OF WOOD PRODUCTS

In accordance with the Waste Management Plan and as specified. Separate members larger than 16 inches, and multiple offcuts of any size larger than 12 inches. Clearly separate damaged wood and other scrap lumber for acceptable alternative uses on site, including bracing, blocking, cripples, ties, and shims.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Separate treated, stained, painted, and contaminated wood and place in designated area for hazardous materials. Dispose of according to local regulations. Do not leave any wood, shavings, sawdust, or other wood waste buried in fill or on the ground. Prevent sawdust and wood shavings from entering the storm drainage system. Do not burn scrap lumber that has been pressure treated, or lumber that is less than one year old.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 06 41 16.00 10

PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS  
08/10, CHG 1: 11/18

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A161.2 (1998) Decorative Laminate Countertops,  
Performance Standards for Fabricated High  
Pressure

## ASTM INTERNATIONAL (ASTM)

ASTM D1037 (2012) Evaluating Properties of Wood-Base  
Fiber and Particle Panel Materials

ASTM E84 (2020) Standard Test Method for Surface  
Burning Characteristics of Building  
Materials

ASTM F547 (2017) Standard Terminology of Nails for  
Use with Wood and Wood-Base Materials

## BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

ANSI/BHMA A156.9 (2020) Cabinet Hardware

## COMPOSITE PANEL ASSOCIATION (CPA)

CPA A208.1 (2016) Particleboard

CPA A208.2 (2016) Medium Density Fiberboard (MDF) for  
Interior Applications

## NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI/NEMA LD 3 (2005) Standard for High-Pressure  
Decorative Laminates

## SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS SCS Global Services (SCS) Indoor Advantage

## U.S. GREEN BUILDING COUNCIL (USGBC)

LEED BD+C (2009; R 2010) Leadership in Energy and  
Environmental Design(tm) Building Design  
and Construction (LEED-NC)

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### UL ENVIRONMENT (ULE)

##### ULE Greenguard

UL Greenguard Certification Program

#### WINDOW AND DOOR MANUFACTURERS ASSOCIATION (WDMA)

##### ANSI/WDMA I.S.1A

(2013) Interior Architectural Wood Flush  
Doors

#### WOODWORK INSTITUTE (WI)

##### NAAWS 3.1

(2017; 2018 Errata Edition) North American  
Architectural Woodwork Standards

### 1.2 SYSTEM DESCRIPTION

Work in this section includes laminate clad custom casework cabinets and vanities as shown on the drawings and as described in this specification. This Section includes high-pressure laminate surfacing and cabinet hardware. Comply with EPA requirements in accordance with Section 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING. All exposed and semi-exposed surfaces, whose finish is not otherwise noted on the drawings or finish schedule, shall be sanded smooth and shall receive a clear finish of polyurethane. Wood finish may be shop finished or field applied in accordance with Section 09 90 00 PAINTS AND COATINGS.

### 1.3 SUSTAINABILITY REPORTING

Materials in this technical specification may contribute towards contract compliance with sustainability requirements. See Section 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING for project LEED BD+C local/regional materials, low-emitting materials, recycled content, certified wood, and rapidly renewable materials LEED documentation requirements.

### 1.4 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-02 Shop Drawings

Shop Drawings; G, AE

Installation

#### SD-03 Product Data

Wood Materials

Wood Finishes

Finish Schedule

Certification

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### SD-04 Samples

Plastic Laminates; G, AE

Cabinet Hardware; G, AE

#### SD-07 Certificates

Quality Assurance

Laminate Clad Casework

#### SD-11 Closeout Submittals

LEED Documentation

### 1.5 QUALITY ASSURANCE

#### 1.5.1 General Requirements

Unless otherwise noted on the drawings, all materials, construction methods, and fabrication shall conform to and comply with the custom grade quality standards as outlined in **NAAWS 3.1**, Section for laminate clad cabinets. These standards shall apply in lieu of omissions or specific requirements in this specification. Contractors and their personnel engaged in the work shall be able to demonstrate successful experience with work of comparable extent, complexity and quality to that shown and specified. Submit a quality control statement which illustrates compliance with and understanding of **NAAWS 3.1** requirements, in general, and the specific **NAAWS 3.1** requirements provided in this specification. The quality control statement shall also certify a minimum of ten years Contractor's experience in laminate clad casework fabrication and construction. The quality control statement shall provide a list of a minimum of five successfully completed projects of a similar scope, size, and complexity.

#### 1.5.2 Sustainable Design Certification

Product shall be third party certified in accordance with **ULE Greenguard** Gold, **SCS** Scientific Certification Systems Indoor Advantage Gold or equal. Certification shall be performed annually and shall be current.

### 1.6 DELIVERY, STORAGE, AND HANDLING

Casework may be delivered knockdown or fully assembled. Deliver all units to the site in undamaged condition, stored off the ground in fully enclosed areas, and protected from damage. The storage area shall be well ventilated and not subject to extreme changes in temperature or humidity.

### 1.7 SEQUENCING AND SCHEDULING

Coordinate work with other trades. Units shall not be installed in any room or space until painting, and ceiling installation are complete within the room where the units are located. Floor cabinets shall be installed before finished flooring materials are installed.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## PART 2 PRODUCTS

### 2.1 WOOD MATERIALS

#### 2.1.1 Lumber

- a. All framing lumber shall be kiln-dried Grade III to dimensions as shown on the drawings. Frame front, where indicated on the drawings, shall be nominal 3/4 inch hardwood.
- b. Standing or running trim casework components, which are specified to receive a transparent finish, shall be Maple hardwood species, plain sawn. AWI grade shall be premium. Location, shape, and dimensions shall be as indicated on the drawings.

#### 2.1.2 Panel Products

##### 2.1.2.1 Plywood

All plywood panels used for framing purposes shall be veneer core hardwood plywood, NAAWS 3.1 Grade AA. Nominal thickness of plywood panels shall be as indicated in this specification and on the drawings.

##### 2.1.2.2 Particleboard

All particleboard shall be industrial grade, medium density ( 40 to 50 pounds per cubic foot), 3/4 inch thick. A moisture-resistant particleboard in grade Type 2-M-2 or 2-M-3 shall be used as the substrate for plastic laminate covered countertops, backsplashes, components as located on the drawings and other areas subjected to moisture. Particleboard shall meet the minimum standards listed in ASTM D1037 and CPA A208.1.

##### 2.1.2.3 Medium Density Fiberboard

Medium density fiberboard (MDF) shall be an acceptable panel substrate where noted on the drawings. Medium density fiberboard shall meet the minimum standards listed in CPA A208.2.

### 2.2 SOLID POLYMER MATERIAL

Solid surfacing casework components shall conform to the requirements of Section 06 61 16 SOLID SURFACING FABRICATIONS.

### 2.3 HIGH PRESSURE DECORATIVE LAMINATE (HPDL)

All plastic laminates shall meet the requirements of ANSI/NEMA LD 3 and ANSI A161.2 for high-pressure decorative laminates. Design, colors, surface finish and texture, and locations shall be as indicated on the drawings. Submit two samples of each plastic laminate pattern and color. Samples shall be a minimum of 5 by 7 inches in size. Plastic laminate types and nominal minimum thicknesses for casework components shall be as indicated in the following paragraphs.

#### 2.3.1 Horizontal General Purpose Standard (HGS) Grade

Horizontal general purpose standard grade plastic laminate shall be 0.048 inches (plus or minus 0.005 inches) in thickness. This laminate grade is intended for horizontal surfaces where postforming is not required.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 2.3.2 Vertical General Purpose Standard (VGS) Grade

Vertical general purpose standard grade plastic laminate shall be 0.028 inches (plus or minus 0.004 inches) in thickness. This laminate grade is intended for exposed exterior vertical surfaces of casework components where postforming is not required.

### 2.3.3 Horizontal General Purpose Postformable (HGP) Grade

Horizontal general purpose postformable grade plastic laminate shall be 0.042 inches (plus or minus 0.005 inches) in thickness. This laminate grade is intended for horizontal surfaces where post forming is required.

### 2.3.4 Vertical General Purpose Postformable (VGP) Grade

Vertical general purpose postformable grade plastic laminate shall be 0.028 inches (plus or minus 0.004 inches) in thickness. This laminate grade is intended for exposed exterior vertical surfaces of components where postforming is required for curved surfaces.

### 2.3.5 Horizontal General Purpose Fire Rated (HGF) Grade

Horizontal general purpose fire rated grade plastic laminate shall be 0.048 inches (plus or minus 0.005 inches) in thickness. Laminate grade shall have a class 1, class A fire rating in accordance with ASTM E84.

### 2.3.6 Vertical General Purpose Fire Rated (VGF) Grade

Vertical general purpose fire rated grade plastic laminate shall be 0.028 inches (plus or minus 0.004 inches) in thickness. This laminate grade shall have a class 1, class A fire rating in accordance with ASTM E84.

### 2.3.7 Cabinet Liner Standard (CLS) Grade

Cabinet liner standard grade plastic laminate shall be 0.020 inches in thickness. This laminate grade is intended for light duty semi-exposed interior surfaces of casework components.

### 2.3.8 Backing Sheet (BK) Grade

Undecorated backing sheet grade laminate is formulated specifically to be used on the backside of plastic laminated panel substrates to enhance dimensional stability of the substrate. Backing sheet thickness shall be 0.020 inches. Backing sheets shall be provided for all laminated casework components where plastic laminate finish is applied to only one surface of the component substrate.

## 2.4 THERMOSET DECORATIVE OVERLAYS (MELAMINE)

Thermoset decorative overlays (melamine panels) shall be used for casework cabinet interior, drawer interior, all semi-exposed surfaces.

## 2.5 EDGE BANDING

Edge banding for casework doors and drawer fronts shall be PVC vinyl and shall be 0.020 inch thick. Material width shall be as indicated on the drawings. Color and pattern shall be as indicated on the drawings.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 2.6 CABINET HARDWARE

Submit one sample of each cabinet hardware item specified to include hinges, pulls, and drawer glides. All hardware shall conform to ANSI/BHMA A156.9, unless otherwise noted, and shall consist of the following components:

### 2.6.1 Door Hinges

European type, ANSI/BHMA A156.9, B01602, 110 degrees of opening, self-closing, soft close self regulated closing speed hinge, cover caps and mounting plate.

### 2.6.2 Cabinet Pulls

Pulls type, ANSI/BHMA A156.9, Doug Mockett, 3-inch tab drawer pull, 1-1/2-inch projection, 3-inch-long, 2-inch on center with 1/2-inch wood screws, finish as indicated on drawings.

### 2.6.3 Drawer Slide

Side mounted full-extension type; zinc-plated steel ball bearing slides type, ANSI/BHMA A156.9 with full extension and a minimum 75 pound load capacity. Slides shall include an integral stop to avoid accidental drawer removal.

### 2.6.4 Adjustable Shelf Support System

Recessed (mortised) metal standards, BHMA No. B04071, finish: 324. Support clips for the standards shall be open type, BHMA No. B04091, finish: 324 Multiple holes with metal pin supports.

## 2.7 FASTENERS

Nails, screws, and other suitable fasteners shall be the size and type best suited for the purpose and shall conform to ASTM F547 where applicable.

## 2.8 ADHESIVES, CAULKS, AND SEALANTS

### 2.8.1 Adhesives

Adhesives shall be of a formula and type recommended by AWI. Adhesives shall be selected for their ability to provide a durable, permanent bond and shall take into consideration such factors as materials to be bonded, expansion and contraction, bond strength, fire rating, and moisture resistance. Adhesives shall meet local regulations regarding VOC emissions and off-gassing.

#### 2.8.1.1 Wood Joinery

Adhesives used to bond wood members shall be a Type II for interior use. Shall not contain urea formaldehyde. Adhesives shall withstand a bond test as described in ANSI/WDMA I.S.1A.

#### 2.8.1.2 Laminate Adhesive

Adhesive used to join high-pressure decorative laminate to wood shall be consistent with AWI and laminate manufacturer's recommendations. PVC edgebanding shall be adhered using a polymer-based hot melt glue.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 2.8.2 Caulk

Caulk used to fill voids and joints between laminated components and between laminated components and adjacent surfaces shall be clear, 100 percent silicone.

## 2.8.3 Sealant

Sealant shall be of a type and composition recommended by the substrate manufacturer to provide a moisture barrier at sink cutouts and all other locations where unfinished substrate edges may be subjected to moisture.

## 2.9 WOOD FINISHES

Paint, stain, varnish and their applications required for laminate clad casework components shall be as indicated in Section 09 90 00 PAINTS AND COATINGS. Color and location shall be as indicated on the drawings.

## 2.10 ACCESSORIES

### 2.10.1 Grommets

Grommets shall be metal material for cutouts with a diameter of 2 inches. Locations shall be as indicated on the drawings.

## 2.11 FABRICATION

Verify field measurements as indicated in the shop drawings before fabrication. Fabrication and assembly of components shall be accomplished at the shop site to the maximum extent possible. Construction and fabrication of cabinets and their components shall meet or exceed the requirements for AWI custom grade unless otherwise indicated in this specification. Cabinet style, in accordance with NAAWS 3.1, Section 400-G descriptions, shall be flush overlay.

### 2.11.1 Base and Wall Cabinet Case Body

#### 2.11.1.1 Cabinet Components

Frame members shall be glued-together, kiln-dried hardwood lumber. Top corners, bottom corners, and cabinet bottoms shall be braced with either hardwood blocks or water-resistant glue and nailed in place metal or plastic corner braces. Cabinet components shall be constructed from the following materials and thicknesses:

##### 2.11.1.1.1 Body Members (Ends, Divisions, Bottoms, and Tops)

3/4 inch medium density fiberboard (MDF) panel product

##### 2.11.1.1.2 Face Frames and Rails

3/4 inch panel product

##### 2.11.1.1.3 Shelving

3/4 inch medium density fiberboard (MDF) panel product

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.11.1.1.4 Cabinet Backs

1/4 inch medium density fiberboard (MDF) panel product

#### 2.11.1.1.5 Drawer Sides, Backs, and Subfronts

1/2 inch panel product

#### 2.11.1.1.6 Drawer Bottoms

1/4 inch medium density fiberboard (MDF) panel product

#### 2.11.1.1.7 Door and Drawer Fronts

3/4-inch medium density fiberboard (MDF) panel product

### 2.11.1.2 Joinery Method for Case Body Members

#### 2.11.1.2.1 Tops, Exposed Ends, and Bottoms

- a. Steel "European" assembly screws ( 1-1/2 inch from end, 5 inch on center, fasteners will not be visible on exposed parts).
- b. Doweled, glued under pressure (approx. 4 dowels per 12 inches of joint).
- c. Stop dado, glued under pressure, and either nailed, stapled or screwed (fasteners will not be visible on exposed parts).
- d. Spline or biscuit, glued under pressure.

#### 2.11.1.2.2 Exposed End Corner and Face Frame Attachment

##### 2.11.1.2.2.1 Mitered Joint

lock miter or spline or biscuit, glued under pressure (no visible fasteners)

##### 2.11.1.2.2.2 Non-Mitered Joint (90 degree)

butt joint glued under pressure (no visible fasteners)

##### 2.11.1.2.2.3 Butt Joint

glued and nailed

#### 2.11.1.2.3 Cabinet Backs (Wall Hung Cabinets)

Wall hung cabinet backs must not be relied upon to support the full weight of the cabinet and its anticipated load for hanging/mounting purposes. Method of back joinery and hanging/mounting mechanisms should transfer the load to case body members. Fabrication method shall be:

##### 2.11.1.2.3.1 Full Bound

Full bound, captured in grooves on cabinet sides, top, and bottom. Cabinet backs for floor standing cabinets shall be side bound, captured in grooves; glued and fastened to top and bottom.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.11.1.2.3.2 Full Overlay

Full overlay, plant-on backs with minimum back thickness of  $1/2$  inch and minimum No. 12 plated (no case hardened) screws spaced a minimum 3 inches on center. Edge of back shall not be exposed on finished sides. Anchor strips are not required when so attached.

#### 2.11.1.2.3.3 Side Bound

Side bound, captured in groove or rabbetts; glued and fastened.

#### 2.11.1.2.4 Cabinet Backs (Floor Standing Cabinets)

##### 2.11.1.2.4.1 Side Bound

Side bound, captured in grooves; glued and fastened to top and bottom.

##### 2.11.1.2.4.2 Full Overlay

Full overlay, plant-on backs with minimum back thickness of  $1/2$  inch and minimum No. 12 plated (no case hardened) screws spaced a minimum 3 inches on center. Edge of back shall not be exposed on finished sides. Anchor strips are not required when so attached.

##### 2.11.1.2.4.3 Side Bound with Rabbetts

Side bound, placed in rabbetts; glued and fastened in rabbetts.

##### 2.11.1.2.5 Wall Anchor Strips

Wall Anchor Strips shall be required for all cabinets with backs less than  $1/2$  inch thick. Strips shall consist of minimum  $1/2$  inch thick lumber, minimum 2- $1/2$  inches width; securely attached to wall side of cabinet back - top and bottom for wall hung cabinets, top only for floor standing cabinets.

#### 2.11.2 Cabinet Floor Base

Floor cabinets shall be mounted on a base constructed of nominal 2 inch thick lumber. Base assembly components shall be a moisture-resistant panel product. Finished height for each cabinet base shall be as indicated on the drawings. Bottom edge of the cabinet door or drawer face shall be flush with top of base as indicated on the drawings.

#### 2.11.3 Cabinet Door and Drawer Fronts

Door and drawer fronts shall be fabricated from  $3/4$  inch medium density fiberboard (MDF). All door and drawer front edges shall be surfaced with high pressure plastic laminate, color and pattern as indicated on the drawings.

#### 2.11.4 Drawer Assembly

##### 2.11.4.1 Drawer Components

Drawer components shall consist of a removable drawer front, sides, backs, and bottom. Drawer components shall be constructed of the following materials and thicknesses:

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.11.4.1.1 Drawer Sides and Backs For Laminate Finish

1/2 inch thick 7-ply hardwood veneer core substrate

#### 2.11.4.1.2 Drawer Bottom

1/4 inch thick veneer core panel product for transparent or plastic laminate finish.

#### 2.11.4.2 Drawer Assembly Joinery Method

- a. Multiple dovetail (all corners) or French dovetail front/dadoed back, glued under pressure.
- b. Doweled, glued under pressure.
- c. Lock shoulder, glued and pin nailed.
- d. Bottoms shall be set into sides, front, and back, 1/4 inch deep groove with a minimum 3/8 inch standing shoulder.

#### 2.11.5 Shelving

##### 2.11.5.1 General Requirements

Shelving shall be fabricated from 3/4 inch medium density fiberboard (MDF). All shelving top and bottom surfaces shall be finished with HPDL plastic laminate. Shelf edges shall be finished in a HPDL plastic laminate.

##### 2.11.5.2 Shelf Support System

The shelf support system shall be:

###### 2.11.5.2.1 Recessed (Mortised) Metal Shelf Standards

Mortise standards flush with the finishes surface of the cabinet interior side walls, two per side. Position and space standards on the side walls to provide a stable shelf surface that eliminates tipping when shelf front is weighted. Install and adjust standards vertically to provide a level, stable shelf surface when clips are in place.

###### 2.11.5.2.2 Pin Hole Method

Drill holes on the interior surface of the cabinet side walls. Evenly space holes in two vertical columns. Space the holes in each column at 1 inch increments starting 6 inches from the cabinet interior bottom and extending to within 6 inches of the top interior surface of the cabinet. Drill holes to provide a level, stable surface when the shelf is resting on the shelf pins. Coordinate hole diameter with pin insert size to provide a firm, tight fit.

#### 2.11.6 Laminate Clad Countertops

Construct laminate countertop substrate of 3/4 inch medium density fiberboard (MDF). The substrate shall be moisture-resistant where countertops receive sinks, lavatories, or are subjected to liquids. All substrates shall have sink cutout edges sealed with appropriate sealant against moisture. No joints shall occur at any cutouts. A balanced backer sheet is required.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.11.6.1 Edge Style

Front and exposed side countertop edges shall be in shapes and to dimensions as shown on the drawings. The countertop edge material shall be:

##### 2.11.6.1.1 Post Formed Plastic Laminate

Laminate edge shall be integral with countertop surface. Shape and profile shall be as indicated and to dimensions as indicated.

##### 2.11.6.1.2 Hardwood

Species, finish, profile, shape, and dimensions shall be as indicated on the drawings. Hardwood edge shall overlap the exposed countertop laminate edge and shall be installed flush with the countertop laminate surface.

##### 2.11.6.1.3 Plastic Laminate Self Edge

Flat, 90 degree "self " edge. Edge must be applied before top. Laminate edge shall overlap countertop laminate and shall be eased to eliminate sharp corners.

#### 2.11.6.2 Laminate Clad Splashes

Countertop splash substrate shall be 3/4 inch MDF fiberboard. Laminate clad backsplash shall be loose, to be installed at the time of countertop installation. Side splashes shall be straight profile and provided loose, to be installed at the time of countertop installation. Back and side splash laminate pattern and color shall match the adjacent countertop laminate.

#### 2.11.7 Laminate Application

Laminate application to substrates shall follow the recommended procedures and instructions of the laminate manufacturer and ANSI/NEMA LD 3, using tools and devices specifically designed for laminate fabrication and application. Provide a balanced backer sheet (Grade BK) wherever only one surface of the component substrate requires a plastic laminate finish. Apply required grade of laminate in full uninterrupted sheets consistent with manufactured sizes using one piece for full length only, using adhesives specified herein or as recommended by the manufacturer. Fit corners and joints hairline. All laminate edges shall be machined flush, filed, sanded, or buffed to remove machine marks and eased (sharp corners removed). Clean up at easing shall be such that no overlap of the member eased is visible. Fabrication shall conform to ANSI A161.2. Laminate types and grades for component surfaces shall be as follows unless otherwise indicated on the drawings:

##### 2.11.7.1 Base/Wall Cabinet Case Body

- a. Exterior (exposed) surfaces to include exposed and semi-exposed face frame surfaces: HPDL Grade VGS.
- b. Interior (semi-exposed) surfaces to include interior back wall, bottom, and side walls: Decorative Overlay (melamine).

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.11.7.2 Adjustable Shelving

##### 2.11.7.2.1 Top and Bottom Surfaces

HPDL Grade HGS

##### 2.11.7.2.2 All Edges

HPDL Grade VGS

#### 2.11.7.3 Fixed Shelving

##### 2.11.7.3.1 Top and Bottom Surfaces

HPDL Grade HGS

##### 2.11.7.3.2 Exposed Edges

HPDL Grade VGS

#### 2.11.7.4 Door, Drawer Fronts, Access Panels

##### 2.11.7.4.1 Exterior (Exposed) and Interior (Semi-Exposed) Faces

HPDL Grade VGS

##### 2.11.7.4.2 Edges

HPDL Grade VGS

#### 2.11.7.5 Drawer Assembly

All interior and exterior surfaces: HPDL Grade CLS.

#### 2.11.7.6 Countertops and Splashes

All exposed and semi-exposed surfaces: HPDL Grade HGS

#### 2.11.7.7 Tolerances

Flushness, flatness, and joint tolerances of laminated surfaces shall meet the [NAAWS 3.1](#) premium grade requirements.

#### 2.11.8 Finishing

##### 2.11.8.1 Filling

No fasteners shall be exposed on laminated surfaces. All nails, screws, and other fasteners in non-laminated cabinet components shall be countersunk and the holes filled with wood filler consistent in color with the wood species.

##### 2.11.8.2 Sanding

All surfaces requiring coatings shall be prepared by sanding with a grit and in a manner that scratches will not show in the final system.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 2.11.8.3 Coatings

Types, method of application and location of casework finishes shall be in accordance with the [finish schedule](#), drawings and Section [09 90 00 PAINTS AND COATINGS](#). All cabinet reveals shall be painted. Submit descriptive data which provides narrative written verification of all types of construction materials and finishes, methods of construction, etc. not clearly illustrated on the submitted shop drawings. Data shall provide written verification of conformance with [NAAWS 3.1](#) for the quality indicated to include materials, tolerances, and types of construction. Both the manufacturer of materials and the fabricator shall submit available literature which describes re-cycled product content, operations and processes in place that support efficient use of natural resources, energy efficiency, emissions of ozone depleting chemicals, management of water and operational waste, indoor environmental quality, and other production techniques supporting sustainable design and products.

## PART 3 EXECUTION

### 3.1 [INSTALLATION](#)

Installation shall comply with applicable requirements for [NAAWS 3.1](#) custom quality standards. Countertops and fabricated assemblies shall be installed level, plumb, and true to line, in locations shown on the drawings. Cabinets and other [laminate clad casework](#) assemblies shall be attached and anchored securely to the floor and walls with mechanical fasteners that are appropriate for the wall and floor construction.

#### 3.1.1 Anchoring Systems

##### 3.1.1.1 Floor

Base cabinets shall utilize a floor anchoring system. Anchoring and mechanical fasteners shall not be visible from the finished side of the casework assembly. Cabinet assemblies shall be attached to anchored bases without visible fasteners as indicated in the drawings. Where assembly abuts a wall surface, anchoring shall include a minimum [1/2 inch](#) thick lumber or panel product hanging strip, minimum [2-1/2 inch](#) width; securely attached to the top of the wall side of the cabinet back.

##### 3.1.1.2 Wall

Cabinet vanity to be wall mounted shall utilize minimum [1/2 inch](#) thick lumber or panel product hanging strips, minimum [2-1/2 inch](#) width; securely attached to the wall side of the cabinet back, both top and bottom.

#### 3.1.2 Countertops

Countertops shall be installed in locations as indicated on the drawings. Countertops shall be fastened to supporting casework structure with mechanical fasteners, hidden from view. All joints formed by the countertop or countertop splash and adjacent wall surfaces shall be filled with a clear silicone caulk. Loose back [and](#) side splashes shall be adhered to both the countertop surface perimeter and the adjacent wall surface with adhesives appropriate for the type of materials to be adhered. Joints between the countertop surface and splash shall be filled with clear silicone caulk in a smooth consistent concave bead. Bead size shall be the minimum necessary to fill the joint and any surrounding voids or cracks.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.1.3 Hardware

Casework hardware shall be installed in types and locations as indicated on the drawings. Where fully concealed European-style hinges are specified to be used with particleboard or fiberboard doors, the use of plastic or synthetic insertion dowels shall be used to receive 3/16 inch "Euro screws". The use of wood screws without insertion dowels is prohibited.

### 3.1.4 Doors, Drawers and Removable Panels

The fitting of doors, drawers and removable panels shall be accomplished within target fitting tolerances for gaps and flushness in accordance with NAAWS 3.1 premium grade requirements.

### 3.1.5 Plumbing Fixtures

Install sinks, sink hardware, and other plumbing fixtures in locations as indicated on the drawings and in accordance with Section 22 00 00 PLUMBING, GENERAL PURPOSE.

-- End of Section --



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 06 61 16

SOLID SURFACING FABRICATIONS  
08/20

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## ASTM INTERNATIONAL (ASTM)

ASTM C920	(2018) Standard Specification for Elastomeric Joint Sealants
ASTM D570	(1998; E 2010; R 2010) Standard Test Method for Water Absorption of Plastics
ASTM D638	(2014) Standard Test Method for Tensile Properties of Plastics
ASTM D696	(2016) Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30 degrees C and 30 degrees C With a Vitreous Silica Dilatometer
ASTM D790	(2017) Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
ASTM D2583	(2013a) Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM G21	(2015) Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

## CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350	(2010; Version 1.1) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers
--------------------	--

## INTERNATIONAL CAST POLYMER ASSOCIATION (ICPA)

ICPA SS-1	(2001) Performance Standard for Solid Surface Materials
-----------	---

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI/NEMA LD 3

(2005) Standard for High-Pressure  
Decorative Laminates

NSF INTERNATIONAL (NSF)

NSF/ANSI 51

(2012) Food Equipment Materials

1.2 SYSTEM DESCRIPTION

- a. Work under this section includes Countertops, window sills, and other items utilizing solid surfacing material fabrications as indicated on the drawings and as described in this specification. Do not change source of supply for materials after work has started, if the appearance of finished work would be affected.
- b. In most instances, installation of solid surfacing material fabricated components and assemblies requires strong correctly located structural support provided by other trades. To provide a stable, sound, secure installation, close coordination is required between the solid surfacing material fabricator/installer and other trades to ensure that necessary structural wall support, cabinet counter top structural support, proper clearances, and other supporting components are provided for the installation of wall panels, counter tops, shelving, and all other solid surfacing material fabrications to the degree and extent recommended by the solid surfacing material manufacturer.
- c. Provide appropriate staging areas for solid surfacing material fabrications. Allow variation in component size and location of openings of plus or minus 1/8 inch.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detail Fabrication Drawings; G, AE

Installation; G

SD-03 Product Data

Solid Polymer; G

Indoor air quality for solid surface seam and sealant products; S

SD-04 Samples

Material; G, AE

Counter Tops; G, AE

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SD-06 Test Reports

### Test Report Results

## SD-07 Certificates

### Qualifications

Indoor Air Quality for solid surface fabrication products; S

## SD-10 Operation and Maintenance Data

Solid Polymer, Data Package 1; G

## 1.4 QUALITY ASSURANCE

### 1.4.1 Qualifications

To ensure warranty coverage, provide manufacturer certified solid surfacing fabricators to fabricate the solid surfacing material being utilized. Mark all fabrications with the fabricator's certification label affixed in an inconspicuous location. Minimum of 5 years of experience working with solid surfacing materials is required of fabricators. Submit solid surfacing material manufacturer's certification attesting to fabricator qualification approval.

### 1.4.2 Mock-ups

Submit [Detail Fabrication Drawings](#) indicating locations, dimensions, component sizes, fabrication and joint details, attachment provisions, installation details, and coordination requirements with adjacent work. Prior to final approval of shop drawings, provide a full-size mock-up of a typical counter top where multiple units are required. Include all solid surfacing material components required to provide a completed unit. Utilize finishes in patterns and colors as indicated; colors listed are not intended to limit the selection of equal colors from other manufacturers. in the mock-up. Should the mock-up not be approved, re-work or remake it until approval is secured. Remove rejected units from the jobsite. Approved mock-up may remain as part of the finished work.

## 1.5 DELIVERY, STORAGE, AND HANDLING

Do not deliver materials to project site until areas are ready for installation. Deliver components and materials to the site undamaged, in containers clearly marked and labeled with manufacturer's name. Store materials indoors and take adequate precautions to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation, for duration of project.

## 1.6 WARRANTY

Provide manufacturer's warranty to repair or replace defective materials and workmanship for a period of 10 years from date of final acceptance of the work.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## PART 2 PRODUCTS

### 2.1 MATERIAL

Submit detail fabrication drawings and installation drawings of each solid surfacing fabrication indicated. Include elevations, dimensions, clearances, details of construction and anchorage, and details of joints and connections.

Submit manufacturers' descriptive product data for each type of solid polymer indicated. Include manufacturers' literature, finishes, profiles and thicknesses of materials.

Submit manufacturers' operations and maintenance data for each type of solid polymer fabrication in accordance with Section 01 78 23 OPERATIONS AND MAINTENANCE DATA.

#### 2.1.1 Solid Surfacing Material

Provide solid polymer that is a homogeneous filled solid polymer; not coated, laminated or of a composite construction, complying with ICPA SS-1. Provide material that meets or exceeds the minimum physical and performance properties specified. Superficial damage to a depth of 0.01 inch must be repairable by sanding or polishing. Material thickness is as indicated on the drawings; required minimum thickness is 1/4 inch. Submit a minimum 4 inch by 4 inch sample of each color and pattern for approval; include full range of color and pattern variation. Retain approved samples as a standard for this work. Submit test report results from an independent testing laboratory attesting that the submitted solid surfacing materials meet or exceed each of the specified performance requirements.

- a. Horizontal Surfaces: 3/4 inch thick material
- b. Vertical Surfaces: 1/4 inch thick material
- c. Provide materials that meet the emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type). Provide certification or validation of indoor air quality for solid surface fabrication products.

#### 2.1.2 Cast, 100 Percent Acrylic Polymer Solid Surfacing Material

Cast, 100 percent acrylic solid polymer material composed of acrylic polymer, mineral fillers, and pigments. Provide acrylic polymer that meets or exceeds the following minimum performance requirements:

PROPERTY	REQUIREMENT (min. or max.)	TEST PROCEDURE
Tensile Strength	4000 psi (max.)	ASTM D638
Hardness	55-Barcol Impressor (min.)	ASTM D2583

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

PROPERTY	REQUIREMENT (min. or max.)	TEST PROCEDURE
Thermal Expansion	.000023 in/in/F (max.)	ASTM D696
Boiling Water Surface Resistance	No Change	ANSI/NEMA LD 3-3.05
High Temperature Resistance	No Change	ANSI/NEMA LD 3-3.06
Impact Resistance (Ball drop)		ANSI/NEMA LD 3-303
1/4 inch sheet	36-inches, 1/2 lb ball, no failure	
1/2 inch sheet	140-inches, 1/2 lb ball, no failure	
Mold & Mildew Growth	No growth	ASTM G21
Bacteria Growth	No growth	ASTM G21
Liquid Absorption (Weight in 24 hrs.)	0.1 percent max.	ASTM D570
Flammability		ASTM E84
Flame Spread	25 max.	
Smoke Developed	30 max.	
Sanitation	"Food Contact" approval	NSF/ANSI 51
Flexural Strength	10,000 psi (min.)	ASTM D790

### 2.1.3 Material Patterns and Colors

Provide pattern and color for all solid surfacing material components and fabrications as indicated; colors listed are not intended to limit the selection of equal colors from other manufacturers. Provide products with consistent patterned color throughout thickness of the product.

### 2.1.4 Surface Finish

Provide a uniform appearance on exposed finished surfaces and edges. Exposed surface finish is matte; gloss rating of 5-20 as indicated.

## 2.2 ACCESSORY PRODUCTS

Provide accessory products, as specified below, as manufactured by the solid surfacing material manufacturer or as approved by the solid surfacing material manufacturer for use with the solid surfacing materials being specified.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.2.1 Adhesives

Provide a two-part seam adhesive kit to create permanent, inconspicuous, non-porous, hard seams and joints by chemical bond between solid surfacing materials and components to create a monolithic appearance of the fabrication. Provide adhesive approved by the solid surfacing material manufacturer. Color-match adhesive to the surfaces being bonded where solid-colored, solid surfacing materials are being bonded together. Provide clear or color matched seam adhesive where particulate patterned, solid surfacing materials are being bonded together.

#### 2.2.2 Seam and Sealant Emissions

Provide seam and other accessory materials that meet the emissions requirements of [CDPH SECTION 01350](#) (limit requirements for either office or classroom spaces regardless of space type). Provide validation of [indoor air quality for solid surface seam and sealant products](#).

#### 2.2.3 Silicone Sealant

Provide silicone sealant, mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, acid-curing; [ASTM C920](#), Type S, Grade NS, Class 25, Use NT; clear formulation; approved for use by the solid surfacing material manufacturer.

#### 2.2.4 Conductive Tape

Provide manufacturer's standard conductive foil tape, [4 mils](#) thick, applied around the edges of cut outs containing hot or cold appliances.

#### 2.2.5 Insulating Tape

Provide manufacturer's standard insulating tape for use with drop-in food wells used in commercial food service applications to insulate solid surfacing material from hot or cold appliances.

#### 2.2.6 Heat Reflective Tape

Provide heat reflective tape as recommended by the solid surfacing material manufacturer for use with cutouts for heat sources.

#### 2.2.7 Mounting Hardware

Provide mounting hardware, including sink/bowl clips, inserts and fasteners for attachment of undermount sinks and lavatories.

### 2.3 FABRICATIONS

Provide factory or shop fabricate components to sizes and shapes indicated, to the greatest extent practical, in accordance with approved Shop Drawings and manufacturer's requirements. Provide factory cutouts for sinks, lavatories, and plumbing fixtures where indicated on the drawings. Contours and radii must be routed to template, with edges smooth. Defective and inaccurate work will be rejected. Submit product data indicating product description, fabrication information, and compliance with specified performance requirements for solid surfacing material, joint adhesive, sealants, and heat reflective tape. Both the manufacturer of materials and the fabricator are required to submit a detailed description of operations and processes in place that support

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

efficient use of natural resources, energy efficiency, emissions of ozone depleting chemicals, management of water and operational waste, indoor environmental quality, and other production techniques supporting sustainable design and products.

#### 2.3.1 Joints and Seams

Form joints and seams between solid surfacing material components using manufacturer's approved seam adhesive. Provide inconspicuous joints in appearance without voids to create a monolithic appearance.

#### 2.3.2 Edge Finishing

Rout and finish component edges to a smooth, uniform appearance and finish. Provide edge shapes and treatments, including any inserts, as detailed on the drawings. Rout all cutouts, then sand all edges smooth. Repair or reject defective or inaccurate work.

#### 2.3.3 Counter Top Splashes

Fabricate backsplashes and end splashes from 1/2 inch thick solid surfacing material to be 4 inches high. Provide backsplashes and end splashes at locations indicated. Shop fabricate backsplashes and provide loose, to be field attached.

##### 2.3.3.1 End Splashes

Provide end splashes loose for installation at the jobsite after horizontal surfaces to which they are to be attached have been installed.

#### 2.3.4 Window Stools

Fabricate window stools from 1/2 inch thick solid surfacing material; dimensions, edge shape, and other details as indicated equal to the width of the window opening by a 1/2 inch overhang of the window sill depth. Provide square edge profile.

#### 2.3.5 Counter Tops

Fabricate all solid surfacing material, counter top components from 1/2 inch thick material. Indicate details, dimensions, locations, and quantities on the drawings. Provide counter tops with 4 inch high loose, 90 degrees backsplash and loose endsplashes as indicated. Attach 2 inch wide reinforcing strip of solid surfacing material under each horizontal counter top seam. Submit a minimum 1 foot wide by 6 inch deep, full size sample for each type of counter top shown on the project drawings; include the edge profile and backsplash as detailed on the drawings and at least one seam. Retain approved sample as standard for this work. Provide square edge profile.

##### 2.3.5.1 Counter Tops with Sinks

- a. Provide stainless steel or vitreous china sink; include cutouts to template for counter tops with sinks as furnished by the sink manufacturer. Provide manufacturer's standard sink mounting hardware for rimless installation. Seal between sink and counter top with specified silicone sealant. Provide sink, faucet, and plumbing requirements in accordance with Section 22 00 00 PLUMBING, GENERAL PURPOSE.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.3.5.2 Counter Tops with Bowls

- a. Provide manufacturer's standard solid polymer bowls, pre-molded product specifically designed for attachment to solid surfacing material counter tops. See paragraph SOLID POLYMER BOWLS for additional requirements
- b. Provide manufacturer's standard pre-fabricated one-piece counter top and bowl fabrications. Each unit includes a counter top with integral backsplash and sink bowl. See paragraph SOLID POLYMER BOWLS for additional requirements.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

##### 3.1.1 Components

Install all components and fabricated units plumb, level, and rigid. Make field joints between solid surfacing material components using solid surfacing material manufacturer's approved seam adhesives, to provide a monolithic appearance with joints inconspicuous in the finished work. Attach metal or vitreous china sinks and lavatory bowls to counter tops using solid surfacing material manufacturer's recommended clear silicone sealant and mounting hardware. Install solid polymer sinks and bowls using a color-matched seam adhesive.

##### 3.1.1.1 Loose Counter Top Splashes

Mount loose splashes in the locations noted on the drawings. Adhere loose splashes to the counter top with a color matched silicone sealant when the solid surfacing material components are solid colors. Use a clear silicone sealant to provide adhesion of particulate patterned solid surfacing material splashes to counter tops.

##### 3.1.2 Silicone Sealant

Use specified silicone sealant to seal all expansion joints between solid surfacing material components and all joints between solid surfacing material components and other adjacent surfaces such as walls, floors, ceiling, and plumbing fixtures. Provide sealant bead smooth and uniform in appearance and minimum size necessary to bridge any gaps between the solid surfacing material and the adjacent surface. Provide continuous bead and run the entire length of the joint being sealed.

##### 3.1.3 Plumbing

Make plumbing connections to sinks and lavatories in accordance with Section 22 00 00 PLUMBING, GENERAL PURPOSE.

#### 3.2 CLEAN-UP

Components must be cleaned after installation and covered to protect against damage during completion of the remaining project items. Damaged components must be repaired or replaced at the Contractor's sole expense.

-- End of Section --



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 07 05 23

PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS  
08/19

## PART 1 GENERAL

## 1.1 SUMMARY

Employ an independent agency to conduct the pressure test on the building envelope in accordance with this specification section and [ASTM E779](#).

## 1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referenced within the text by the basic designation only.

## AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)

<a href="#">ANSI/ASNT CP-105</a>	(2020) ASNT Standard Topical Outlines for Qualification of Nondestructive Testing Personnel
<a href="#">ANSI/ASNT CP-189</a>	(2020) ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel
<a href="#">ASNT SNT-TC-1A</a>	(2020) Recommended Practice for Personnel Qualification and Certification in Nondestructive Testing

## ASTM INTERNATIONAL (ASTM)

<a href="#">ASTM E779</a>	(2019) Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
<a href="#">ASTM E1186</a>	(2017) Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems
<a href="#">ASTM E1258</a>	(1988; R 2018) Standard Test Method for Airflow Calibration of Fan Pressurization Devices
<a href="#">ASTM E1827</a>	(2011; R 2017) Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door

## INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

<a href="#">ISO 6781</a>	(1983) Thermal Insulation - Qualitative Detection of Thermal Irregularities in Building Envelopes - Infrared Method
<a href="#">ISO 6781-2</a>	(2010) Performance of Buildings -

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Detection of Heat, Air, and Moisture  
Irregularities in Buildings by Infrared  
Methods - Part2: Equipment Requirements

ISO 6781-3

(2015) Performance of Buildings -  
Detection of Heat, Air, and Moisture  
Irregularities in Buildings by Infrared  
Methods - Part 3: Qualifications of  
Equipment Operators, Data Analysts, and  
Report Writers

### 1.3 DEFINITIONS

The following terms as they apply to this section:

#### 1.3.1 Air Barrier Envelope

The surface that separates the inside air from the outside air. The combination of air barrier assemblies and air barrier components, connected by air barrier accessories are designed to provide a continuous barrier to the movement of air through an environmental separator. A single building may have more than one air barrier envelope. The air barrier surface includes the top, bottom, and sides of the envelope. The term "air barrier envelope" is also known as "air barrier system" or simply "air barrier".

#### 1.3.2 Air Leakage Rate

How leaky, or conversely how air tight a building envelope is. The air leakage is normally described in terms of air flow rate for the surface area of the envelope at a defined differential pressure.

#### 1.3.3 Bias Pressure

Also known as zero flow pressure, baseline pressure, offset pressure or background pressure. With the envelope not artificially pressurized, bias is the differential pressure that always exists between the envelope that has been prepared (sealed) for the pressure test and the outdoors. Bias pressure is made up of two components, fixed static offset (usually due to stack effect or the HVAC system) and fluctuating pressure (usually due to wind or a moving elevator). Because of pressure fluctuations many bias pressure readings are recorded and averaged for use in the calculations.

#### 1.3.4 Blower Door

Commonly used term for an apparatus used to pressurize and depressurize the space within the building envelope and quantify air leakage through the envelope. The blower door typically includes a door fan and an air resistant fabric or a series of hard panels that extends to cover and seal the door opening between the fan shroud and door frame. The door fan is a calibrated fan capable of measuring air flow and is usually placed in the opening of an exterior door. With the air barrier otherwise sealed, air produced by the door fan pressurizes or de-pressurizes the envelope, depending on the fan's orientation.

#### 1.3.5 Environmental Separator

The parts of a building that separate the controlled interior environment from the uncontrolled exterior environment, or that separate spaces within

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

a building that have dissimilar environments. The term "environmental separator" is also known as the "control layer".

#### 1.3.6 Pressure Test

A generic term for a test in which the envelope is either pressurized or de-pressurized with respect to the outdoors.

##### 1.3.6.1 Negative Pressure Test (Depressurization Test)

A test wherein air inside the envelope is drawn to the outdoors. This places the envelope at a lower (negative) pressure with respect to the outdoors.

##### 1.3.6.2 Positive Pressure Test (Pressurization Test)

A test wherein outdoor air is pushed into the envelope. This air movement places the envelope at a higher (positive) pressure with respect to the outdoors.

#### 1.4 WORK PLAN

Submit the following not later than 90 calendar days after contract award, but before start of pressure testing work, steps to be taken by the lead pressure test technician to accomplish the required testing.

a. Memorandum of test procedure.

(1) Proposed dates for conducting the pressure, thermographic and fog tests.

(2) Submit detailed pressure test procedures prior to the test.  
Provide a plan view showing proposed locations (personnel doors or other similar openings) to install blower doors or flexible ducts (for trailer-mounted fans), if used.

b. Test equipment to be used.

c. Scaffolding, scissor lifts, power, electrical extension cords, duct tape, plastic sheeting and other Contractor's support equipment required to perform all tests.

d. Other Contractor's support personnel who will be on site for testing.

#### 1.5 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Work Plan; G

SD-03 Product Data

Thermal Imaging Camera; G

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SD-07 Certificates

Pressure Test Agency

Thermographer Qualifications

Test Instruments

Date Of Last Calibration

## SD-06 Test Reports

Pressure Test Procedures; G

Air Leakage Test Report; G

Diagnostic Test Report; G

## 1.6 QUALITY ASSURANCE

### 1.6.1 Modification of References

Perform all pressure and diagnostic tests according to the referenced publications listed in paragraph REFERENCES and as modified by this section. Consider the advisory or recommended provisions, of the referred references, as mandatory.

### 1.6.2 Qualifications

#### 1.6.2.1 Pressure Test Agency

Submit, no later than 15 calendar days after contract award, information certifying that the pressure test agency is not affiliated with any other company participating in work on this contract. The work of the test agency is limited to pressure testing the building envelope, performing a thermography test and fog test, and investigating, through various methods, the location of air leaks through the air barrier. See paragraph PRESSURE TEST AGENCY for additional requirements. For thermographer qualifications, see paragraph THERMOGRAPHER QUALIFICATIONS.

Use the sample TEST AGENCY QUALIFICATIONS SHEET form (Appendix C), to submit the following information.

- a. Verification of 2 years of experience as an agency in pressure testing commercial and/or industrial buildings.
- b. List of at least ten commercial/industrial facilities with building envelopes that the agency has tested within the past 2 years. Include building name, address, and name of prime construction contractor and contractor's point-of-contact information.
- c. Confirmation of 2 years of commercial and or industrial building pressure test experience for the lead pressure test technician and the thermographer in using the specified ASTM E779 testing standard. References from five Contracting Officers for facilities where the lead test technician has supervised commercial and or industrial building pressure tests in the last 2 years.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- d. Verification that the lead pressure test technician has been employed by a building pressure testing agency in the capacity of a lead pressure test technician for not less than 1 year.

#### 1.6.2.2 Thermographer Qualifications

To perform an infrared diagnostic evaluation, use a lead thermographer who has at least an active Level II Certification that is based on the requirements in ANSI/ASNT CP-105 or ANSI/ASNT CP-189 and is in accordance with ASNT SNT-TC-1A. The course of study is to be specifically focused on infrared thermography for building science. The thermographer must have at least two years of building science thermography experience in IR testing commercial or industrial buildings. The thermographer must also have experience in building envelopes and building science in order to make effective recommendations to the contractor should the envelope require additional sealing. Thermographic equipment operators, data analysts and report writers must comply with the requirements of ISO 6781-3. Submit the thermographer's certificate for approval. Submit a list of at least ten commercial/industrial buildings on which the thermographer has performed IR thermography in the past two years. The thermographer is to have a current active certification. Submit certification at least 60 days prior to thermography testing.

#### 1.6.3 Test Instruments and Date of Last Calibration

Submit a signed and dated list of test instruments, their application, manufacturer, model, serial number, range of operation, accuracy and date of most recent calibration. Calibration data applicable to fan systems must be in accordance with ASTM E1258.

#### 1.6.4 Test Reports

No later than 14 days after completion of the pressure test, submit electronic copies of an organized report and six bound paper copies in a durable 3-ring binder. The report is to contain a table of contents, an executive summary, an introduction, a results section and a discussion of the results. Submit the air leakage test report as described in paragraph AIR LEAKAGE TEST REPORT. Submit a diagnostic test report as described in paragraph LOCATING LEAKS BY DIAGNOSTIC TESTING. The diagnostic test report is to include the Thermographic Investigation Report and the Fog Test Report (if performed).

Submit field data and completed report forms found in the appendices. Use the sample forms, Test Agency Qualification Sheet, Air Leakage Test Form and Air Leakage Test Results Form to summarize the tests for the appropriate building envelope. Submit both electronically populated and field hand filled-in forms.

Report Data. Include in the report the following information for all tests:

- a. Date of issue
- b. Project title and number
- c. Name, address, and telephone number of testing agency
- d. Dates and locations of samples and tests or inspections

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- e. Names of individuals making the inspection or test
- f. Designation of the work and test method
- g. Identification of product and specification section
- h. Complete inspection or test data
- i. Test results and an interpretation of test results
- j. Comments or professional opinion on whether inspected or tested work complies with contract document requirements
- k. Recommendations on retesting

#### 1.7 CLIMATE CONDITIONS SUITABLE FOR A PRESSURE TEST

As the test date approaches, monitor the weather forecast for the test site. Avoid testing on days forecast to experience high winds, rain, or snow. Monitor weather forecasts prior to shipping pressure test equipment to the site. Based on current and forecast weather conditions, the Contracting Officer's representative is to grant final approval for testing to occur.

##### 1.7.1 Rain

For safety reasons, avoid testing during rain or if rain is anticipated during testing. If pneumatic hoses are installed and exposed to rain inspect the hose to ensure rainwater has not migrated into the hose ends. Orient all exposed hose ends to keep them out of water puddles. Success in temporarily sealing outdoor ventilation components such as louvers and exhaust fans may also be compromised by rain. Don't seal roof-mounted ventilation components during times of potential lightning.

##### 1.7.2 Wind

Because wind can skew pressure test results, test only on days and at times when winds are anticipated to be the calmest. Avoid pressure testing during gusty or high wind conditions. Avoid installing test fans on the windward side of the building if wind gusts during the test are anticipated to be greater than 10 miles per hour.

## PART 2 PRODUCTS

### 2.1 PRESSURE TEST EQUIPMENT

Depending on site conditions and size of the envelope, the test may be conducted using blower door equipment and/or trailer-mounted fans. The testing agency is to supply sufficient quantity of blower equipment that will produce a minimum of 75 Pa differential pressure between the envelope and outdoors using the test methods described herein. Supplying additional blower test equipment to provide additional airflow capacity or to act as a backup is highly recommended.

#### 2.1.1 Blower Door Fans and Trailer Mounted Fans

Each air flow measuring system including blower door fans and trailer mounted fans are to be calibrated within the last 5 years. Calibrated blower door fans and trailer mounted fans must measure accurately to

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

within plus or minus 5 percent of the flow reading. Blower door equipment and trailer mounted fans are to be specifically designed to pressurize building envelopes. Each set of blower door equipment is to include fan(s), digital gage(s), door frame, door fabric or hard panels.

#### 2.1.2 Digital Gages as Test Instruments

Use only digital gages as measuring instruments in the pressure test; analog gages are not acceptable. The gauges must be accurate to within 1.0 percent of the pressure reading or 0.15 Pa, whichever is greater. Each gage is to have been calibrated within two years of the test. The calibration is to be checked against a National Institute of Standards and Technology (NIST, formerly National Bureau of Standards) traceable standard.

#### 2.2 THERMAL IMAGING CAMERA REQUIREMENTS

The thermal imaging camera used in the thermography test must have a thermal sensitivity (Noise Equivalent Temperature Difference.) of +/- 0.18 degrees F at 86 degrees F or less. Ensure the camera's operating spectral range falls between 2 and 15 micrometers. Ensure the camera's IR image viewing screen resolution measures at least 320x240 pixels. Ensure the camera has a means of recording thermal images seen on the camera viewing screen. The camera is to display output as individual still frame images that also can be downloaded and inserted into an electronic Thermographic Investigation Report. All thermographic equipment must comply with the requirements of ISO 6781-2. Submit camera make and model, and catalog information that defines the camera thermal sensitivity for approval.

### PART 3 EXECUTION

#### 3.1 PRESSURE TEST AGENCY

The test agency is to be an independent third party subcontractor, not an affiliated or subsidiary of the prime contractor, subcontractors or A/E firm. The agency is to be regularly engaged in pressure testing of commercial/industrial building envelopes. If using blower door or trailer-mounted fans, the lead test technician must have at least two years of experience in using such equipment in building envelope pressurization tests. Formal training using pressure test equipment is highly recommended. Technicians using the building's air handling system for pressure testing are to have tested at least five commercial/industrial buildings within the past two years with each building having over 50,000 square feet of floor area. Submit the name, address and floor areas of each of these five buildings for approval.

##### 3.1.1 Field Work

The lead pressure test technician and thermographer are to be present at the project site while testing is performed and is to be responsible for conducting, supervising, and managing of their respective test work. Management includes health and safety of test agency employees.

##### 3.1.2 Reporting Work

The lead pressure test technician is to prepare, sign, and date the test agenda, equipment list, and submit a certified Air Leakage Test Report. The thermographer is to prepare, sign, and date the test agenda, equipment list, and submit a certified Thermographic Investigation Report. The

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

contractor is to prepare a final report that identifies improvements that were made to the envelope to reduce air leaks, mitigate thermal bridging, eliminate moisture migration, repair insulation voids discovered during diagnostic tests. Jointly submit all reports.

### 3.2 ENVELOPE SURFACE AREA CALCULATION

The architectural air barrier boundary includes the floor, walls, and ceiling. After construction of the air barrier envelope is complete, field measure the envelope to ensure the physical measurements match the design drawings and the air barrier envelope surface area calculations are generated. If the calculation result is not within 10 percent of the defined air barrier boundary calculation result as indicated, submit the envelope surface area calculation and results for review.

### 3.3 PREPARING THE BUILDING ENVELOPE FOR THE PRESSURE TEST

#### 3.3.1 Testing During Construction

The pressure test cannot be conducted until all components of the air barrier system have been installed. After all sealing as described herein has been completed, inspect the envelope to ensure it has been adequately prepared. During the pressure test, stop all ongoing construction within and neighboring the envelope which may impact the test or the air barrier integrity. The pressure test may be conducted before finishes that are not part of the air barrier envelope have been installed. For example, if suspended ceiling tile, interior gypsum board or cladding systems are not part of the air barrier the test can be conducted before they are installed. Recommend testing prior to installing the finished ceilings within the envelope and immediately surrounding it. The absence of finished ceilings allows for inspection and diagnostic testing of the roof/wall interface and for implementation of repairs to the air barrier, if necessary to comply with the maximum allowed leakage.

#### 3.3.2 Sealing the Air Barrier Envelope

Seal all penetrations through the air barrier. Unavoidable penetrations due to electrical boxes or conduit, plumbing, and other assemblies that are not air tight are to be made so by sealing the assembly and the interface between the assembly and the air barrier or by extending the air barrier over the assembly. Support the air barrier so as to withstand the maximum positive and negative air pressure to be placed on the building without displacement or damage, and transfer the load to the structure. Durably construct the air barrier to last the anticipated service life of the assembly and to withstand the maximum positive and negative pressures placed on it during pressure testing. Do not install lighting fixtures that are equipped with ventilation holes through the air barrier.

#### 3.3.3 Sealing Plumbing

Prime all plumbing traps located within the envelope full of water.

#### 3.3.4 Close and Lock Doors

Close and lock all doors and windows in the envelope perimeter. For doors not equipped with latching hardware, temporarily secure them in the closed position. Secure the doors in such a way that they remain fully closed even when the maximum anticipated differential air pressure produced during the test acts on them.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.3.5 Hold Excluded Building Areas at the Outdoor Pressure Level

Keep building areas immediately surrounding but excluded from the test envelope at the outdoor pressure level during the pressure test. Maintain these areas at the outdoor pressure level by propping exterior doors open, opening windows and de-energizing all air moving devices in or serving these areas.

### 3.3.6 Maintain an Even Pressure within the Envelope

Ensure the pressure differences within the envelope are minimized by opening all internal air pathways including propping open all interior doors. Distribute test fans throughout the envelope as necessary to ensure the internal pressures are uniform (within 10 percent of the average differential pressure). Ideally, do not install suspended ceilings until after all pressure tests have been completed. If, however the envelope includes finished suspended ceiling spaces, temporarily remove approximately 5 percent of all ceiling tiles or a minimum of 1 tile from each isolated suspended ceiling space, whichever comprises the greatest surface area. Temporarily remove additional ceiling tiles during testing to allow for inspection and diagnostic testing of the ceiling/wall interface. An alternative to removing ceiling tiles is to measure the differential pressure between each isolated suspended ceiling space and the outdoors when the area below the suspended ceiling is maintained at a differential pressure of 75 Pa with respect to the outdoors. If the suspended ceiling differential pressure measurement is within ten percent of the 75 Pa pressure below the suspended ceiling no ceiling tiles need to be removed.

### 3.3.7 Maintain Access to Mechanical and Electrical Rooms

Maintain access to mechanical rooms and electrical rooms associated with the envelope to allow for de-energizing ventilation equipment and resetting circuit breakers tripped by blower door equipment, if used.

### 3.3.8 Minimize Potential for Blowing Dust and Debris

Because high velocity air will be blown into and out of the envelope during the test, debris, including dust and litter, may become airborne. Airborne debris may become trapped or entangled in test equipment, thereby skewing test results. Ensure areas within and surrounding the envelope are free of dust, litter and construction materials that are easily airborne. If pressurizing existing, occupied areas, provide adequate notice to building occupants of blowing dust and debris, and general disruption of normal activities during the test.

### 3.3.9 De-energize Air Moving Devices

De-energize all air moving devices serving the envelope to keep air within the envelope as still as reasonably achievable. De-energize all fans that deliver air to, exhaust air from, or recirculate air within the envelope. Also de-energize all fans serving areas adjacent to but excluded from the envelope.

### 3.3.10 Installing Blower Door Equipment in a Door Opening

Where blower door fans are used, before installing blower door equipment, select a door opening that does not restrict air flow into and out of the

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

envelope and has at least 5 feet clear distance in front of and behind the door opening. Disconnect the door actuator and secure the door open to prevent it from being drawn into the fan by fan pressure. Avoid installing blower door equipment on the windward side of the building.

### 3.4 BUILDING ENVELOPE AIR TIGHTNESS REQUIREMENT

For each building envelope, perform the Architectural Only test and if noted below, the Architectural Plus HVAC System test. The purpose of the pressure (air leakage) test is to determine final compliance with the airtightness requirement by demonstrating the performance of the continuous air barrier. An effective air barrier envelope minimizes infiltration and exfiltration through unintended air paths (leaks). The tests may be performed in any desired order.

#### 3.4.1 Architectural Only Test

The test envelope is the architectural air barrier boundary as defined on the contract drawings. This boundary includes connecting walls, roof and floor which comprise a complete, whole, and continuous three dimensional envelope. Perform both a positive pressure test and a negative pressure test on this envelope, unless otherwise directed.

##### 3.4.1.1 Test Goal

Input data from the test into the Air Leakage Rate by Fan Pressurization spreadsheet as described in paragraph CALCULATION PROGRAM via the Air Leakage Test Form. Compare output from the spreadsheet against the maximum allowable leakage defined in Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM. The envelope passes the test if the leakage rate, as calculated using the spreadsheet, is equal to or lower than the Architectural Only leakage rate goal.

##### 3.4.1.2 Preparing the Envelope for the Pressure Test - Seal All Openings through the Air Barrier

Temporarily close all perimeter windows, roof hatches and doors in the envelope perimeter except for those doors that are to remain open to accommodate blower door or trailer mounted fan test equipment installation. Seal, or isolate all other intentional openings, pathways and fenestrations through the architectural envelope prior to pressure testing. Follow the Recommended Test Envelope Conditions identified in ASTM E1827, Table 1, for the Closed Envelope condition. These openings may include boiler flues, fuel-burning water heater flues, fuel-burning kitchen equipment, clothes dryer vents, fireplaces, wall or ceiling grilles, diffusers etc. Before sealing flues, close their associated fuel valves and verify the associated pilot lights are extinguished. Prime all plumbing traps located within the envelope full of water. In lieu of applying tape and/or plastic, typical temporary sealing materials include tape and sheet plastic or a self-adhesive grille wrap. Use and apply tape and plastic in a manner that does not deface or remove paint or mar the finish of permanent surfaces. Be especially aware of residue that remains from tape applied to stainless steel surfaces such as kitchen hoods or rollup doors. For painted surfaces, use tape types that do not remove finish paint when the tape is removed. If paint is removed from the finished surface, repaint to match existing surfaces. Secure dampers closed either manually or by using the building's HVAC system controls.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.4.2 Architectural Plus HVAC System Test

This test envelope includes the architectural air barrier boundary as defined on the contract drawings plus all HVAC supply, return and exhaust systems that penetrate and terminate within said architectural air barrier boundary and that extends outward from said boundary. All associated ductwork, intake and exhaust dampers, and air moving devices, including air handling units and fans, are included in this test envelope even if they are physically located outside of the architectural air barrier boundary. The boundary extends to and includes the low leakage intake and exhaust dampers. Perform both a positive pressure test and a negative pressure test on this envelope, unless otherwise indicated.

#### 3.4.2.1 Test Goal

Data from the test is to be input into the Air Leakage Rate by Fan Pressurization spreadsheet as described in paragraph CALCULATION PROGRAM via the Air Leakage Test Form. If both a positive and negative pressure tests were performed, both data sets are together to be input in the spreadsheet. Compare output from the spreadsheet against the leakage rate goal. The envelope passes the test if the leakage rate, as calculated using the spreadsheet, is equal to or lower than the Architectural Plus HVAC System leakage rate goal.

#### 3.4.2.2 Preparing the Building for the Pressure Test

In preparation of this test, de-energize all air moving devices within this envelope by putting their controls in the Unoccupied mode. This allows the building's HVAC controls to close all associated motorized intake, exhaust, and relief dampers. Make no other changes to the HVAC systems. Temporarily sealing diffusers, grilles, registers, kitchen hoods, exhaust hoods, fans, air handling units and all other HVAC system elements with tape and/or plastic sheeting or any other means is not allowed. If the envelope includes a fireplace hearth do not seal it with tape and plastic.

### 3.5 CONDUCTING THE PRESSURE TEST

Notify the Contracting Officer at least 10 working days before conducting the pressure tests to provide the Government the opportunity to witness the tests and to monitor weather forecasts for conditions favorable for testing. Do not pressure test until verifying that the continuous air barrier is in place and installed without failures in accordance with installation instructions. During the pressure test periodically inspect temporarily sealed items to ensure they are still sealed. Seals on temporarily sealed items tend to release more readily at higher pressures. Test data obtained after temporarily sealed items become unsealed cannot be used as input into the calculation program. Follow the Envelope Pressure Test Procedures in the paragraphs below. Submit detailed [pressure test procedures](#) indicating the test apparatus, the test methods and procedures, and the analysis methods to be employed for the building envelope pressure (air tightness) test. Submit these procedures not later than 60 days after Notice to Proceed.

#### 3.5.1 Extend Pneumatic Tubes and Establish a Reference Differential Pressure

Confirm the various zones within the envelope have a relatively uniform interior pressure distribution by establishing a representative

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

differential pressure between the envelope and the outdoors with blower door or trailer-mounted fans operating. The number of indoor pressure difference measurements (pneumatic hoses) required depends on the number of interior zones separated by bottle necks that could create significant pressure drops (e.g. doorways and stairwells). Extend at least four pneumatic hoses (differential pressure monitoring ports) to locations within the envelope that are physically opposite of each other. In multiple story buildings, especially those over three stories, extend hoses to multiple floors. Locate the hose ends away from the effects of air discharge from blower test equipment. Select one of the four (or more) interior hoses, one judged by the test agency to be the most unaffected by air velocity produced by blower test equipment, to serve as the interior reference pressure port. Extend at least one additional pneumatic hose to the outdoors (outdoor pressure port). To the end of this hose manifold at least four hoses together and terminate each hose on a different side of the building. With the envelope sealed and the blowers energized, measure the differential pressure using the interior reference pressure port and the four outdoor pressure ports. Then measure and record the differential pressure by individually using each of the remaining three interior hoses. Ensure each reading is within plus or minus 10 percent of the reference reading. Thus at an average 75 Pa maximum pressure difference across the envelope, the difference between the highest and lowest interior pressure difference measurements should be 15 Pa or less. If this condition cannot be met, attempt to create additional air pathways within the envelope to minimize pressure differences within the envelope. If necessary, move the interior hose ends. See step 2.13 of the Air Leakage Test Form in Appendix A.

### 3.5.2 Bias Pressure Readings

With the fan pressurization equipment de-energized and the envelope sealed, obtain the differential pressure between the outdoors and the envelope. Record 12 bias pressure readings before the pressure test and 12 bias pressure readings after the pressure test. Each reading is the average of ten or more 1-second measurements. Include positive and negative signs for each reading. To help dampen bias pressures that significantly contribute to test pressure, reduce temperature differences between indoor and outdoor air. Temperature differences can be reduced by operating test fan equipment for a few minutes to replace most of the indoor air with outdoor air.

### 3.5.3 Testing in Both Positive and Negative Directions

The preferred method for testing a building envelope is to test in both the pressurized and depressurized directions. Testing in one direction is only allowed if opposite direction testing cannot logistically be performed due to test equipment limitations or restrictions. After obtaining the pre-test bias differential pressure readings, conduct the pressure test. Record the envelope pressures (in units of Pascals) from one interior pneumatic hose (monitoring port) and the outdoor pneumatic hose(s), averaged or manifolded, with corresponding flows (in units of cfm) for each fan. Record the flow rates at at least 10 to 12 positive and 10 to 12 negative building pressure readings. If conducting both positive and negative pressure tests the lowest allowable test pressure is 40 Pa and the highest test pressure is 85 Pa. Keep at least 25 Pa difference between the lowest and highest test pressure readings. Include the 75 Pa pressure value between the lowest and highest readings. The 10 to 12 readings in each direction are to be roughly evenly spaced along the range of pressures and flows. After testing is complete de-energize the

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

equipment used to provide pressurization and obtain an additional 10 to 12 post-test bias pressure readings. None of the bias pressure readings are allowed to exceed 30 percent of the minimum test pressure. If these limits are exceeded the test fails and must be repeated.

#### 3.5.4 Single Direction Testing

After obtaining the 12 aforementioned bias pressure readings, conduct the positive pressure test. Obtain flow rates at 10 to 12 roughly evenly spaced pressure readings over a pressure range of 50 to 85 Pa. After the data is recorded, de-energize the blower equipment and obtain an additional 10 to 12 bias pressure readings. None of the bias pressure readings may exceed 10 percent of the minimum test pressure. If these limits are exceeded the test fails.

#### 3.5.5 Pressure Testing - Special Cases

##### 3.5.5.1 Pressure Testing a Building Addition

If the existing building is occupied, coordinate the pressure test with building representatives. In preparation of the test, de-energize the air handling system serving that portion of the existing building that shares surfaces with the new building addition. Pressure testing a new building addition may also require pressurizing that part of the existing building that shares surfaces in common with the new building addition. If an air barrier is applied to the common surfaces separating the existing building from the new addition, prior to the test prop open a sufficient quantity of doors and/or windows to keep the existing building at the same pressure as the outdoors. If an air barrier is not applied to the common surfaces separating the existing building from the new addition, pressurize that part of the existing building that shares surfaces in common with the building addition to the same level as the as the addition using separate test pressurization equipment.

##### 3.5.6 Failed Pressure Test

If the pressure test fails to meet the established criteria, use diagnostic test methods described in paragraph LOCATING LEAKS BY DIAGNOSTIC TESTING to discover the leak locations. Provide additional permanent sealing measures to reduce or eliminate leak sources discovered during diagnostic testing. Retest (perform another pressure test) after sealing has been completed. Repeat this sequence of documenting test results in the test report, performing diagnostic tests, documenting recommendations for additional sealing measures in the test report, sealing leak locations per recommendations, and re-testing as necessary until the building envelope passes the pressure test and is in compliance with the performance requirements.

##### 3.5.7 [Air Leakage Test Report](#)

Report volumetric flow rates and corresponding differential pressures in [cubic feet per minute \(cfm\)](#) and Pascals (Pa), respectively, on the Air Leakage Test Form sample form found in Appendix A. Populate the accompanying spreadsheet file entitled Pressure Test Data Analysis with information obtained during the test. The spreadsheet uses equations found in [ASTM E779](#) as a basis for calculating the envelope leakage rate. Other similar leakage rate calculation programs cannot be used or submitted for review. Submit a printout of the data input and output in the report. Should any air tightness (pressure) test fail, the pressure

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

test report is to include data and results from all previous failed tests along with the final successful test data and results. Indicate if the resulting leakage rate did or did not meet the goal leakage requirement. Identify and document deficiencies in the building construction upon failure of a test to meet the specified maximum leakage rate.

Include the Test Agency Qualification Sheet, Air Leakage Test Form and Air Leakage Test Results Form in the written report. Document every test set-up condition with diagrams and photos to ensure the tests can be made repeatable. Document all pneumatic hose termination locations. Record in detail how the building envelope was prepared for the tests. Also describe in detail which building items were temporarily sealed. Include photos of test equipment and sealing measures in the report. Include an electronic (pdf) version of all test reports on a CD. If the building envelope fails to meet the leakage rate goal, provide recommendations to further seal the envelope and document these recommendations in the test report.

### 3.6 LOCATING LEAKS BY DIAGNOSTIC TESTING

Use diagnostic test methods described herein to discover obvious leaks through the envelope. Perform diagnostic tests on the building envelope regardless of the envelope meeting or failing to meet the designated leakage rate goal. Use diagnostic test methods in accordance with [ASTM E1186](#) and in conjunction with pressurization equipment as necessary. Use the thermography diagnostic test to establish a baseline for envelope leakage. Apply additional diagnostic tests (find, feel, fog or other tests) as necessary to further define leak locations and pathways discovered using thermography or to find additional leaks not readily detected by thermography. Using a variety of diagnostic tests may help locate leaks that would otherwise go undetected if only a single diagnostic test were used. Pay special attention to locating leaks at interfaces where there is a change in materials or a change in direction of like materials. These interfaces, at a minimum, include roof/wall, wall/wall, floor/wall, wall/window, wall/door, wall/louver, roof mounted equipment/roof curb interfaces and all utility penetrations (ducts, pipes, conduit, etc) through the envelope's architecture. Also use diagnostic tests to check for leakage between the air duct and duct damper, when the damper, under normal control power, is placed in the closed position. Should leaks be discovered during diagnostic tests, thoroughly document their exact locations on a floor plan so that sealing can be later applied, if required or as directed. If the envelope passes the leakage test, use the diagnostic test procedure described above to identify obvious leakage locations. Seal the leaks at the discretion of the COR based on the magnitude, location, potential for liquid moisture penetration or retention, potential for condensation, presence of daylight through an architectural surface or if the leakage location could potentially cause rapid deterioration or mold growth of, or in the building envelope materials and assemblies. Apply sealing measures after diagnostic testing is complete and all pressurization blowers are off. To verify that the applied sealing measures that are effective, re-test for leaks using the same diagnostic methods that discovered the leak. Reseal and retest until the envelope meets the leakage rate goal and all obvious leaks through the envelope are sealed.

#### 3.6.1 Find Test

Use visual observation to locate daylight and/or artificial light streaming from the opposite side of the envelope. Observe all interfaces

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

identified above.

### 3.6.2 Feel Test

Use the building's air handling system or blower door equipment to negatively pressurize the building envelope, to at least 25 Pa but no greater than 85 Pa, with respect to the outdoors. The larger the pressure difference, the easier discovering leaks by feeling them becomes. While inside the envelope, hand feel roof/wall, wall/wall, and floor/wall interfaces and utility penetrations (ducts, pipes, conduit, etc) for leaks and note the leak locations on a floor plan. The "Feel" test may also be used to check for leaks between the ductwork and ductwork damper. To do this, positively pressurize the envelope and check for air movement from the envelope exterior.

### 3.6.3 Infrared Thermography Test

Avoid performing thermography tests just after pressure testing the building envelope (pressurizing and/or depressurizing the building envelope) as thermography readings may be inaccurate due to excessive air-wash. Perform thermography either before the pressure test or wait an appropriate amount of time after pressure test completion for the temperatures within the building envelope to stabilize before starting the thermography tests. Coordinate thermography examination with the pressure test agency and the test agency's pressurization equipment. The pressure test agency is to allow adequate time for the thermographer to perform a complete thermographic examination, as described hereinafter, of the envelope interior and exterior.

#### 3.6.3.1 Thermography Test Methods

Before thermographic testing, remove furniture, construction equipment, and all other obstructions both inside and outside the building as necessary to gain a clear field of view. In the Thermographic Investigation Report, document all areas where obstructions remain. For exterior thermal examination of the envelope, verify that no direct solar radiation has heated the envelope surfaces to be examined for a period of approximately 3 hours for frame construction and for approximately 8 hours for masonry veneer construction. Conduct exterior investigations after sunset, before sunrise, or on an overcast day when the influence of solar radiation can be determined to be minimal. Limit exterior examinations to times when the influence of solar radiation is minimal, such as after sunset or before sunrise or during an overcast day. Conduct thermal imaging tests only when wind speeds are less than 8 mph at the time of analysis and at the end of analysis. Document any variations in wind during the test. Document all variations of test conditions in the Thermographic Investigation Report. Test only when exterior surfaces are dry. Monitor and document ongoing test parameters, such as the temperatures inside and outside the air barrier envelope, wind speed, and differential pressure.

##### 3.6.3.1.1 Thermography Testing of the Air Barrier

Test the building envelope in accordance with [ISO 6781](#), and [ASTM E1186](#). Perform a complete thermographic inspection consisting of the full inspection of the interior and exterior of the complete air barrier envelope. Document envelope areas that are inaccessible for testing. Use infrared thermography technology in concert with standard pressurization methods (blower doors, trailer mounted fans and/or the building's own air

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

handling systems) to locate leaks through the air barrier. Because thermography works best with at least a 18 degree F temperature difference between the envelope interior and the exterior, adjust the HVAC system, if possible, to create or enhance this temperature difference. The minimum allowable temperature difference is 3 degrees F. Maintain this temperature difference for at least 3 hours prior to the test. Use pressurization methods to establish a minimum of +20 Pa pressure difference with respect to the outdoors while using an infrared camera to view the envelope from outdoors. When viewing with the camera from inside the envelope, keep the envelope at a pressure differential of -20 Pa with respect to the outdoors using pressure testing equipment or the building's own air handling system.

#### 3.6.3.2 Thermography Test Results

Document the location of all leaks, anomalies, and unusual thermal features on a floor plan and/or elevation view and catalog them with a visible light picture for locating the defect for correction. The thermographer is to recommend corrective actions to eliminate the leaks, anomalies and unusual thermal features. Where leaks are found perform corrective sealing as necessary to achieve the whole envelope air leakage rate specified. After sealing, again use thermography in concert with standard pressurization methods to verify that the air leakage has been reduced. After these leaks have been permanently sealed note all actions taken on the drawings or in the Thermographic Investigation Report. Submit the drawings for approval as part of the Thermographic Investigation Report. Also include thermographic photos that show where leaks were discovered. Include thermograms using an imaging palette that clearly shows the observed thermal patterns indicating air leakage. The Contracting Officer's Representative is to witness all testing.

#### 3.6.4 Fog Test

Before using a theatrical fog generator, disable all building smoke detectors as they may alarm when fog is issued. Coordinate fog tests and the disabling of all smoke detectors with the Contracting Officer's representative and the local fire department as necessary. Use pressure test equipment or the buildings own air handling system to positively pressurize the building envelope to at least 25 Pa but not greater than 85 Pa over the outdoors. Using a theatrical fog generator within the envelope, direct fog at suspected leakage points such as at building interfaces. Test the following interfaces: roof/wall, wall/wall, floor/wall, wall/window, roof/mounted mechanical equipment. From the vantage point immediately outside the envelope and opposite that of the interface being tested, observe the effect as the fog is issued. Detection may also be further enhanced by using a scented fog liquid or a fog liquid that produces a colored fog. Look for fog and smell for associated odor percolating through the interface. Also use smoke puffers and smoke sticks as necessary to locate leaks at these and other interface locations. If the Architectural Plus HVAC System pressure test will be/was performed introduce fog into ductwork to check for leakage between ductwork and associated dampers. After fog testing has ended, reactivate the building smoke detectors and notify the Contracting Officer and local fire department that the test has ended. After sealing has been completed retest these areas using fog. Seal additional leaks that are found.

#### 3.6.5 Diagnostic Test Report

Once the diagnostic tests have been completed and the leakage locations



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

identified and sealed, document these procedures, locations and recommendations in the diagnostic test report. Submit plan and/or profile drawings that thoroughly identify leak locations. Describe in detail all leak locations so that the seal-up crew knows where to apply sealing measures. After sealing measures have been applied, describe the methods used along with applicable photos of the final sealed condition.

#### 3.6.5.1 Thermographic Investigation Report

Submit a report of each thermographic investigation identifying the thermal discontinuities in the thermal control layer. Indicate in the final report locations to which improvements for both the air control layer and the thermal control layer were made to reduce air leaks and correct discontinuities in the thermal control layer. Include in the report some selected radiometric images of suspected failure points in the air barrier envelope that indicate before and after conditions. Indicate in the final report improvements that were made to the envelope to reduce air leaks. Include the following items in the report:

- a. Brief description of the building construction
- b. Types of interior and exterior surface materials used in the building.
- c. Geographical orientation of the building with a description of the exterior surroundings including other buildings, vegetation, landscaping, and surface water drainage.
- d. Camera brand, model and serial number, and date of most recent calibration date; optional lenses with serial numbers (if applicable)
- e. Thermographer's and Government Inspector's names
- f. Date and time of tests
- g. Air temperature and humidity inside the air barrier envelope
- h. Outdoor air temperature and humidity
- i. General information for the last 12 hours on the solar radiation conditions in the geographic area where the test is being performed.
- j. Ambient conditions such as precipitation and wind direction and speed occurring with the last 24 hours, as applicable. Refer to specific requirements in each section of each thermographic inspection type for requirements in each specific area.
- k. Documentation of those portions of the building envelop which were not within test conditions when the scan was performed and which portions were obstructed by adjacent structures, interior furnishings, intervening cavities or reflective surfaces.
- l. Other relevant information, which may have influenced test results.
- m. Drawings, sketches, floor plans and/or photographs detailing the locations in the buildings where thermograms were taken detailing possible irregularities in the components being tested.
- n. Thermal images taken during the inspection with their relative locations and written or voiced recorded explanations of the anomaly

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

listed along with visual and reference images.

- o. An identification of the aspects or components of the building being examined.
- p. Explanations for the type and the extent of each construction defect observed during the inspection.
- q. Any results from additional measurements and investigations. Identify additional equipment used and support with type, model number, serial number and date of most recent calibrated.

#### 3.6.5.2 Fog Test Report

Document all turbulent air flow and dead air spaces within the envelope. Report fog behavior as it exits from and/or is entrained within the building. Include a floor plan in the report that documents the locations where fog passed through the envelope.

### 3.7 CALCULATION PROGRAM

To calculate the envelope leakage rate and other required outputs, input the data obtained during the pressure tests as documented in the Air Leakage Test Form (Appendix A) into the Air Leakage Rate by Fan Pressurization Excel spreadsheet. This spreadsheet can be found at the following web site:

<http://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/forms-graphic>

### 3.8 AFTER COMPLETION OF THE PRESSURE AND/OR DIAGNOSTIC TEST

After all pressure and/or diagnostic testing has been completed unseal all temporarily sealed items. Unless otherwise directed by the Contracting Officer, return all dampers, doors, and windows to their pre-test condition. Remove tape and plastic from all temporarily sealed openings, being careful not to deface painted surfaces. If paint is removed from finished surfaces, repaint to match existing surfaces. Unless otherwise directed by the Contracting Officer's representative, return fuel (gas) valves to their pre-test position and relight pilot lights. Return all fans and air handling units to pre-test conditions.

### 3.9 REPAIR AND PROTECTION

Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for testing, inspection, and similar services. Upon completion of inspection, testing, or sample taking and similar services, repair damaged construction and restore substrates and finishes, protect construction exposed by or for quality control service activities, and protect repaired construction.

### 3.10 APPENDICES

The following forms are available for download as a MS Word file at

<http://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/forms-graphic>

Appendix A - Air Leakage Test Form

Appendix B - Air Leakage Test Results Form

Appendix C - Test Agency Qualifications Sheet

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 07 21 13

## BOARD AND BLOCK INSULATION

02/16, CHG 2: 08/20

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## ASTM INTERNATIONAL (ASTM)

ASTM C203	(2005; R 2012) Breaking Load and Flexural Properties of Block-Type Thermal Insulation
ASTM C272/C272M	(2016) Standard Test Method for Water Absorption of Core Materials for Sandwich Constructions
ASTM C578	(2019) Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
ASTM C930	(2019) Standard Classification of Potential Health and Safety Concerns Associated with Thermal Insulation Materials and Accessories
ASTM D1621	(2016) Standard Test Method for Compressive Properties of Rigid Cellular Plastics
ASTM D3833/D3833M	(1996; R 2011) Water Vapor Transmission of Pressure-Sensitive Tapes
ASTM E96/E96M	(2021) Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

## SD-03 Product Data

Manufacturer's Standard Details; G

Board Insulation; G

Pressure Sensitive Tape; G

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Protection Board or Coatings; G

Accessories including sealants; G

#### SD-07 Certificates

Board Insulation; G

Draft Special Warranties; G

Final Special Warranties; G

#### SD-08 Manufacturer's Instructions

Board Insulation

Adhesive

### 1.3 MANUFACTURER'S DETAILS

Submit manufacturer's standard details indicating methods of attachment and spacing, transition and termination details, and installation details. Include verification of existing conditions.

### 1.4 PRODUCT DATA

Include data for material descriptions, recommendations for product shelf life, requirements for protection board or coatings, and precautions for flammability and toxicity. Include data to verify compatibility of sealants with insulation.

### 1.5 CERTIFICATIONS

Not Used.

### 1.6 DELIVERY, STORAGE, AND HANDLING

#### 1.6.1 Delivery

Deliver materials to the site in original sealed wrapping bearing manufacturer's name and brand designation, specification number, type, grade, R-value, and class. Store and handle to protect from damage. Do not allow insulation materials to become wet, soiled, crushed, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storing, and protecting of materials before and during installation.

#### 1.6.2 Storage

Inspect materials delivered to the site for damage and store out of weather in manufacturer's original packaging. Store only in dry locations, not subject to open flames or sparks, and easily accessible for inspection and handling. Keep materials wrapped and separated from off-gassing materials (such as drying paints and adhesives). Do not use materials that have visible moisture or biological growth. Comply with manufacturer's recommendations for handling, storage, and protection of materials before and during installation.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 1.7 SAFETY PRECAUTIONS

### 1.7.1 Safety Considerations

Comply with the safety requirements of [ASTM C930](#).

## 1.8 SPECIAL WARRANTIES

### 1.8.1 Guarantee

Guarantee insulation installation against failure due to ultraviolet light exposure for a period of three years from the date of Contract Completion Date or Substantial Completion. Submit draft and final guarantees in accordance with Section [01 78 23](#) OPERATION AND MAINTENANCE DATA.

### 1.8.2 Warranty

Provide manufacturer's material warranty for all system components for a period of three years from the date of Contract Completion Date or Substantial Completion.

## PART 2 PRODUCTS

### 2.1 BOARD INSULATION

Provide thermal insulating materials as recommended by manufacturer for each type of application indicated. Provide insulation with the following physical properties and in accordance with the following standards:

- a. Extruded Preformed Cellular Polystyrene: [ASTM C578](#) REV A

#### 2.1.1 Thermal Resistance

Unless otherwise indicated, Wall R-Value of 13.0 plus a minimum R-Value of 7.5 for continuous insulation.

Unless otherwise indicated, roofs are required to have a minimum R-Value of 25.0 for continuous insulation.

#### 2.1.2 Other Material Properties

Provide thermal insulating materials with the following properties:

- a. Rigid cellular plastics: Compressive Resistance at Yield: Not less than [15 pounds per square inch \(psi\)](#) when measured according to [ASTM D1621](#).
- b. Block-type insulation: Block-type insulation: Flexural strength: Not less than [40 psi](#) when measured according to [ASTM C203](#) REV A.
- c. Water Vapor Permeance: Not more than [1.5 perms](#) or less when measured according to [ASTM E96/E96M](#), desiccant method, in the thickness required to provide the specified thermal resistance, including facings, if any.
- d. Water Absorption: Not more than 3 percent by total immersion, by volume, when measured according to [ASTM C272/C272M](#).

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 2.2 VAPOR RETARDER AND DAMPPROOFING

Not Used.

## 2.3 PRESSURE SENSITIVE TAPE

As recommended by manufacturer of vapor retarder(s). Match water vapor permeance rating for each vapor retarder specified. Provide tape in accordance with [ASTM D3833/D3833M](#).

## 2.4 PROTECTION BOARD OR COATING

Not Used.

## 2.5 ACCESSORIES

### 2.5.1 Adhesive

As recommended by insulation manufacturer.

## PART 3 EXECUTION

### 3.1 EXISTING CONDITIONS

Prior to installation, ensure all areas that are in contact with the insulation are dry and free of projections that could cause voids, compressed insulation, or punctured vapor retarders. For foundation perimeter or under slab applications, check that subsurface fill is flat, smooth, dry, and well tamped. Do not proceed with installation if moisture or other conditions are present and notify the Contracting Officer of such conditions. Do not proceed with the work until conditions have been corrected and verified to be dry.

### 3.2 PREPARATION

Not Used.

### 3.3 INSTALLATION

#### 3.3.1 Installation and Handling

Provide insulation in accordance with the manufacturer's printed installation instructions. Keep material dry and free of extraneous materials.

#### 3.3.2 Electrical Wiring

Do not install insulation in a manner that would enclose electrical wiring between two layers of insulation.

#### 3.3.3 Continuity of Insulation

Butt tightly against adjoining boards, studs, rafters, joists, sill plates, headers and obstructions. Provide continuity and integrity of insulation at corners, wall to ceiling joint, roof, and floor. Avoid creating thermal bridges and voids. Provide and verify continuity of insulative barrier throughout the building enclosure.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 3.3.4 Coordination

Verify final installed insulation thicknesses comply with thicknesses indicated, R-values specified herein, and with the approved insulation submittal(s).

### 3.4 INSTALLATION ON WALLS

#### 3.4.1 Installation using Furring Strips

Install insulation between members as recommended by insulation manufacturer.

#### 3.4.2 Installation on Masonry Walls

Apply board directly to masonry with adhesive or fasteners as recommended by the insulation manufacturer. Fit between obstructions without impaling board on ties or anchors. Apply in parallel courses with joints breaking midway over course below. Place boards in moderate contact with adjoining insulation without forcing and without gaps. Cut and shape as required to fit around wall penetrations, projections or openings to accommodate conduit or other utilities. Seal around cutouts with sealant. Install insulation in wall cavities so that it leaves at least a nominal 1 inch air space outside of the insulation to allow for cavity drainage.

#### 3.4.3 Adhesive Attachment to Concrete and Masonry Walls

Apply adhesive to wall and completely cover wall with insulation.

- a. As recommended by the insulation manufacturer.
- b. Use only full back method for pieces of 1 square foot or less.
- c. Butt all edges of insulation and seal edges with tape.

#### 3.4.4 Protection Board or Coating

Install protection board or coating in accordance with manufacturer's printed instructions. Install protection over all exterior exposed insulation and to 1 foot below grade.

### 3.5 INSTALLATION ON UNDERSIDE OF CONCRETE FLOOR SLAB

#### 3.5.1 Adhesively Bonded Systems

Apply adhesive to underside of slab and completely cover wall with insulation.

- a. Full back bed method or
- b. Spot method: Provide at least six spots having a diameter of approximately 4 inches, located at each corner and mid-point of each of the longer sides.
- c. As recommended by insulation manufacturer.
- d. Use full back method for insulation pieces 1 square foot or less.
- e. Butt all edges of insulation and seal with tape.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

3.6 PERIMETER AND UNDER SLAB INSULATION

Not Used.

3.7 VAPOR RETARDER

Not Used.

3.8 ACCESS PANELS AND DOORS

Not Used.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 07 21 16

### MINERAL FIBER BLANKET INSULATION

**11/11, CHG 4: 08/18**

#### PART 1 GENERAL

##### 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

#### ASTM INTERNATIONAL (ASTM)

ASTM C665	(2017) Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
ASTM C930	(2019) Standard Classification of Potential Health and Safety Concerns Associated with Thermal Insulation Materials and Accessories
ASTM D3833/D3833M	(1996; R 2011) Water Vapor Transmission of Pressure-Sensitive Tapes
ASTM D5359	(2015) Standard Specification for Glass Cullet Recovered from Waste for Use in Manufacture of Glass Fiber
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E136	(2019a) Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 Degrees C

#### CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350	(2010; Version 1.1) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers
--------------------	--

#### GREEN SEAL (GS)

GS-36	(2013) Adhesives for Commercial Use
-------	-------------------------------------

#### SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS	SCS Global Services (SCS) Indoor Advantage
-----	--

#### SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168	(2017) Adhesive and Sealant Applications
------------------	--

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.134

Respiratory Protection

UNDERWRITERS LABORATORIES (UL)

UL 2818

(2013) GREENGUARD Certification Program  
For Chemical Emissions For Building  
Materials, Finishes And Furnishings

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

### SD-03 Product Data

Insulation for each type

Accessories

### SD-07 Certificates

Indoor Air Quality for Adhesives; G

### SD-08 Manufacturer's Instructions

Insulation

## 1.3 CERTIFICATIONS

Submit required indoor air quality certifications and validations in one submittal package.

### 1.3.1 Insulation Products

Provide product certified to meet indoor air quality requirements by UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification by other third-party programs. Provide current product certification from certification body.

### 1.3.2 Adhesives and Sealants

Provide products certified to meet indoor air quality requirements by UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification or validation by other third-party programs that products meet the requirements of this Section. Provide current product certification documentation from certification body. When product does not have certification, provide validation that product meets the indoor air quality product requirements cited herein.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.4 DELIVERY, STORAGE, AND HANDLING

##### 1.4.1 Delivery

Deliver materials to site in original sealed wrapping bearing manufacturer's name and brand designation, specification number, type, grade, R-value, and class. Store and handle to protect from damage. Do not allow insulation materials to become wet, soiled, crushed, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storing, and protecting of materials before and during installation.

##### 1.4.2 Storage

Inspect materials delivered to the site for damage; unload and store out of weather in manufacturer's original packaging. Store only in dry locations, not subject to open flames or sparks, and easily accessible for inspection and handling.

#### 1.5 SAFETY PRECAUTIONS

##### 1.5.1 Respirators

Provide installers with dust/mist respirators, training in their use, and protective clothing, all approved by National Institute for Occupational Safety and Health (NIOSH)/Mine Safety and Health Administration (MSHA) in accordance with 29 CFR 1910.134.

##### 1.5.2 Other Safety Concerns

Consider other safety concerns and measures as outlined in ASTM C930.

#### PART 2 PRODUCTS

##### 2.1 SOUND ATTENUATION FIRE BATT INSULATION/MINERAL WOOL

ASTM C665, Type I, blankets without membrane coverings with a flame spread rating of 5 or less and a smoke developed rating of 0 when tested in accordance with ASTM E84.

###### 2.1.1 Therma Batt Fiberglass Insulation

ASTM C665, Type I, blankets without membrane coverings with a flame spread rating of 25 or less and a smoke developed rating of 50 when tested in accordance with ASTM E84.

###### 2.1.2 Sound Attenuation Fire Blankets

ASTM C665, Type I, blankets without membrane coverings with a flame spread rating of 0 or less and a smoke developed rating of 0 when tested in accordance with ASTM E84.

###### 2.1.3 Fire Safing Blankets

ASTM C665, Type I, blankets without membrane coverings with a flame spread rating of 0 or less and a smoke developed rating of 0 when tested in accordance with ASTM E84.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.1.4 Thermal Resistance Value (R-VALUE)

The R-Value must be as indicated on drawings.

#### 2.1.5 Recycled Materials

Provide insulation materials containing the following minimum percentage of recycled material content by weight:

Fiberglass: 20 percent glass cullet complying with [ASTM D5359](#)

Provide data identifying percentage of recycled content for insulation materials.

#### 2.1.6 Prohibited Materials

Do not provide asbestos-containing materials.

### 2.2 BLOCKING

Wood, metal, unfaced mineral fiber blankets in accordance with [ASTM C665](#), Type I, or other approved materials. Use only non-combustible materials meeting the requirements of [ASTM E136](#) for blocking around chimneys and heat producing devices.

### 2.3 PRESSURE SENSITIVE TAPE

As recommended by the vapor retarder manufacturer and having a water vapor permeance rating of [one perm](#) or less when tested in accordance with [ASTM D3833/D3833M](#).

### 2.4 ACCESSORIES

#### 2.4.1 Adhesive

As recommended by the insulation manufacturer. Provide non-aerosol adhesive products used on the interior of the building (defined as inside of the weatherproofing system) that meet either emissions requirements of [CDPH SECTION 01350](#) (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of [SCAQMD Rule 1168](#). Provide aerosol adhesives used on the interior of the building that meet either emissions requirements of [CDPH SECTION 01350](#) (use the office or classroom requirements, regardless of space type) or VOC content requirements of [GS-36](#). Provide certification or validation of [indoor air quality for adhesives](#).

#### 2.4.2 Mechanical Fasteners

Corrosion resistant fasteners as recommended by the insulation manufacturer.

## PART 3 EXECUTION

### 3.1 EXISTING CONDITIONS

Before installing insulation, ensure that areas that will be in contact with the insulation are dry and free of projections which could cause voids, [or](#) compressed insulation. If moisture or other conditions are found that do not allow the workmanlike installation of the insulation, do

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

not proceed but notify Contracting Officer of such conditions.

### 3.2 INSTALLATION

#### 3.2.1 Insulation

Install and handle insulation in accordance with manufacturer's instructions. Keep material dry and free of extraneous materials. Any materials that show visual evidence of biological growth due to presence of moisture must not be installed on the building project. Ensure personal protective clothing and respiratory equipment is used as required. Observe safe work practices.

##### 3.2.1.1 Electrical wiring

Do not install insulation in a manner that would sandwich electrical wiring between two layers of insulation.

##### 3.2.1.2 Continuity of Insulation

Install blanket insulation to butt tightly against adjoining blankets and to studs, rafters, joists, sill plates, headers and any obstructions. Provide continuity and integrity of insulation at corners, wall to ceiling joints, roof, and floor. Avoid creating thermal bridges.

##### 3.2.1.3 Installation at Bridging and Cross Bracing

Insulate at bridging and cross bracing by splitting blanket vertically at center and packing one half into each opening. Butt insulation at bridging and cross bracing; fill in bridged area with loose or scrap insulation.

##### 3.2.1.4 Insulation without Affixed Vapor Retarder

Provide snug friction fit to hold insulation in place. Stuff pieces of insulation into cracks between trusses, joists, studs and other framing, such as at attic access doors, door and window heads, jambs, and sills, band joists, and headers.

##### 3.2.1.5 Sizing of Blankets

Provide only full width blankets when insulating between trusses, joists, or studs. Size width of blankets for a snug fit where trusses, joists or studs are irregularly spaced.

##### 3.2.1.6 Special Requirements for Ceilings

Place insulation under electrical wiring occurring across joists. Pack insulation into narrowly spaced framing. Do not block flow of air through soffit vents.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 07 22 00

### ROOF AND DECK INSULATION

**02/16, CHG 3: 11/18**

#### PART 1 GENERAL

##### 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

##### ASTM INTERNATIONAL (ASTM)

**ASTM C1177/C1177M** (2017) Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing

**ASTM C1289** (2020) Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board

**ASTM E84** (2020) Standard Test Method for Surface Burning Characteristics of Building Materials

##### FM GLOBAL (FM)

**FM 4450** (1989) Approval Standard for Class 1 Insulated Steel Deck Roofs

**FM APP GUIDE** (updated on-line) Approval Guide  
<http://www.approvalguide.com/>

##### INTERNATIONAL CODE COUNCIL (ICC)

**ICC IBC** (2018) International Building Code

##### SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

**SCS** SCS Global Services (SCS) Indoor Advantage

##### UNDERWRITERS LABORATORIES (UL)

**UL 2818** (2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

##### 1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section **01 33 00** SUBMITTAL PROCEDURES:

**SD-02 Shop Drawings**

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Insulation Board Layout and Attachment; G

Verification of Existing Conditions; G

#### SD-03 Product Data

Insulation; G

Cover Board; G

Fasteners; G

#### SD-06 Test Reports

Flame Spread Rating; G

#### SD-07 Certificates

Installer Qualifications; G

Certificates Of Compliance For Felt Materials; G

Indoor Air Quality For Insulation; G

#### SD-08 Manufacturer's Instructions

Nails and Fasteners; G

Roof Insulation; G

### 1.3 SHOP DRAWINGS

Submit [insulation board layout](#) and attachment indicating methods of attachment and spacing, transitions, tapered components, thicknesses of materials, and closure and termination conditions. Show locations of ridges, valleys, crickets, interface with, and slope to, roof drains. Base shop drawings on verified field measurements and include [verification of existing conditions](#).

### 1.4 PRODUCT DATA

Include data for material descriptions, recommendations for product shelf life, requirements for [cover board](#) or coatings, and precautions for flammability and toxicity. Include data to verify compatibility of sealants with insulation.

### 1.5 MANUFACTURER'S INSTRUCTIONS

Include field of roof and perimeter attachment requirements.

Provide a complete description of installation sequencing for each phase of the roofing system. Include weatherproofing procedures.

### 1.6 QUALITY CONTROL

Provide certification of [installer qualifications](#) from the insulation manufacturer confirming the specific installer has the required qualifications for installing the specific roof insulation system(s) indicated.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Provide certificates of compliance for felt materials.

#### 1.7 FM APPROVAL REQUIREMENTS

Provide fastening patterns in accordance with FM 1-90 for insulation on steel decks.

#### 1.8 FIRE PERFORMANCE REQUIREMENTS

##### 1.8.1 Insulation in Roof Systems

Comply with the requirements of ICC IBC Roof insulation to have a flame spread rating of 75 or less when tested in accordance with ASTM E84. Additional documentation of compliance with flame spread rating is not required when insulation of the type used for this project as part of the specific roof assembly is listed and labeled as FM Class 1 approved.

##### 1.8.2 Thermal Barrier Requirements

Separate insulation from a combustibile steel deck with a thermal barrier of glass mat gypsum roof board or other approved barrier material in accordance with the requirements of the ICC IBC.

##### 1.8.3 Fire Resistance Ratings for Roofs

Provide in accordance with ICC IBC Chapter 7 and Table 721.1(3) Min Protection For Floor and Roof Systems.

#### 1.9 CERTIFICATIONS

Provide products certified to meet indoor air quality requirements by UL 2818(Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification by other third-party programs. Provide current product certification documentation from certification body.

#### 1.10 DELIVERY, STORAGE, AND HANDLING

##### 1.10.1 Delivery

Deliver materials to the project site in manufacturer's unopened and undamaged standard commercial containers bearing the following legible information:

- a. Name of manufacturer
- b. Brand designation
- c. Specification number, type, and class, as applicable, where materials are covered by a referenced specification

Deliver materials in sufficient quantity to allow continuity of the work.

##### 1.10.2 Storage and Handling

Store and handle materials in accordance with manufacturer's printed instructions. Protect from damage, exposure to open flame or other ignition sources, wetting, condensation, and moisture absorption. Keep materials wrapped and separated from off-gassing materials (such as drying

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

paints and adhesives). Do not use materials that have visible moisture or biological growth. Store in an enclosed building or trailer that provides a dry, adequately ventilated environment. Replace damaged material with new material.

#### 1.11 ENVIRONMENTAL CONDITIONS

Do not install roof insulation during inclement weather or when air temperature is below 40 degrees F and interior humidity is 45 percent or greater, or when there is visible ice, frost, or moisture on the roof deck.

#### 1.12 PROTECTION

Not Used.

### PART 2 PRODUCTS

#### 2.1 INSULATION

##### 2.1.1 Insulation Types

Provide the following roof insulation materials. Provide roof insulation that is compatible with attachment methods for the specified insulation and roof membrane.

- a. Polyisocyanurate Board: Provide in accordance with ASTM C1289 REV A Type II, fibrous felt or glass mat membrane both sides, except minimum compressive strength of 20 pounds per square inch (psi).

##### 2.1.2 Indoor Air Quality

Provide certification of indoor air quality for insulation.

##### 2.1.3 Insulation Thickness

As necessary to provide the thermal resistance (R-value) indicated. Base calculation on the R-value for aged insulation. For insulation over steel decks, satisfy both specified R-value and minimum thickness for width of rib opening recommended in insulation manufacturer's published literature.

#### 2.2 COVER BOARD

For use as a cover board for applied roofing membrane over roof insulation.

##### 2.2.1 Glass Mat Gypsum Roof Board

ASTM C1177/C1177M, 0 Flame Spread and 0 Smoke Developed when tested in accordance with ASTM E84, 500 psi, Class A, non-combustible, 1/2 inch thick, 4 by 8 feet board size.

#### 2.3 BITUMENS

Not Used.

#### 2.4 SHEATHING PAPER FOR WOOD DECKS

Not Used.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 2.5 MOISTURE CONTROL

Not Used.

## 2.6 FASTENERS

Provide flush-driven fasteners through flat round or hexagonal steel or plastic plates. Provide zinc-coated steel plates, flat round not less than 1 3/8 inch diameter, hexagonal not less than 28 gage. Provide high-density plastic plates, molded thermoplastic with smooth top surface, reinforcing ribs and not less than 3 inches in diameter. Fully recess fastener head into plastic plate after it is driven. Form plates to prevent dishing. Do not use bell or cup shaped plates. Provide fasteners in accordance with insulation manufacturer's recommendations for holding power when driven, or a minimum of 40 pounds each in steel deck, whichever is the higher minimum. Provide fasteners for steel or concrete decks in accordance with FM APP GUIDE (<http://www.approvalguide.com/>) for Class I roof deck construction, and spaced to withstand uplift pressure of 60 pounds per square foot.

### 2.6.1 Fasteners for Steel Decks

Approved hardened penetrating fasteners or screws in accordance with FM 4450 and listed in FM APP GUIDE for Class I roof deck construction. Quantity and placement to withstand a minimum uplift pressure of 60 psf in accordance with FM APP GUIDE.

## 2.7 WOOD NAILERS

Pressure-preservative treated as specified in Section 06 10 00 ROUGH CARPENTRY.

## PART 3 EXECUTION

### 3.1 EXAMINATION AND PREPARATION

#### 3.1.1 Surface Inspection

Ensure surfaces are clean, smooth, and dry prior to application. Check roof deck surfaces, including surfaces sloped to roof drains and outlets, for defects before starting work.

The Contracting Officer will inspect and approve the surfaces immediately before starting installation. Prior to installing insulation, perform the following:

- a. Examine steel decks to ensure that panels are properly secured to structural members and to each other and that surfaces of top flanges are flat or slightly convex.

#### 3.1.2 Surface Preparation

Correct defects and inaccuracies in roof deck surface to eliminate poor drainage from hollow or low spots, perform the following:

- a. Provide wood nailers of the same thickness as the insulation at eaves, edges, curbs, walls, and roof openings for securing flashing flanges.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.2 INSTALLATION OF VAPOR RETARDER

Not Used.

### 3.3 INSTALLATION OF VENTILATING FELT

Not Used.

### 3.4 INSULATION INSTALLATION

Apply insulation in two layers with staggered joints when total required thickness of insulation exceeds  $\frac{1}{2}$  inch. Lay insulation so that continuous longitudinal joints are perpendicular to direction of roofing and end joints of each course are staggered with those of adjoining courses. When using multiple layers of insulation, provide joints of each succeeding layer that are parallel and offset in both directions with respect to the layer below. Keep insulation  $\frac{1}{2}$  inch clear of vertical surfaces penetrating and projecting from roof surface. Verify required slopes to each roof drain.

#### 3.4.1 Installation Using Only Mechanical Fasteners

Secure total thickness of insulation with penetrating type fasteners.

#### 3.4.2 Special Precautions for Installation of Foam Insulation

##### 3.4.2.1 Polyisocyanurate Insulation

Where polyisocyanurate foam board insulation is provided, install  $\frac{1}{2}$  inch thick wood fiberboard, glass mat gypsum roof board, or  $\frac{3}{4}$  inch thick expanded perlite board insulation over top surface of foam board insulation. Stagger joints of insulation with respect to foam board insulation below.

### 3.5 PROTECTION

#### 3.5.1 Protection of Applied Insulation

Completely cover each day's installation of insulation with finished roofing specified. Phased construction is not permitted. Protect open spaces between insulation and parapets or other walls and spaces at curbs, scuttles, and expansion joints, until permanent roofing and flashing are applied. Storing, walking, wheeling, or trucking directly on insulation or on roofed surfaces is not permitted. Provide smooth, clean board or plank walkways, runways, and platforms near supports, as necessary, to distribute weight in accordance with indicated live load limits of roof construction. Protect exposed edges of insulation with cutoffs at the end of each work day or whenever precipitation is imminent. Cutoffs must be two layers of bituminous-saturated felt set in plastic bituminous cement or single ply membrane set in manufacturer's approved sealant. Fill all profile voids in cutoffs to prevent trapping moisture below the membrane. Remove cutoffs when work resumes.

#### 3.5.2 Damaged Work and Materials

Restore work and materials that become damaged during construction to original condition or replace with new materials.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.6 INSPECTION

Establish and maintain inspection procedures to assure compliance of the installed roof insulation with contract requirements. Remove, replace, correct in an approved manner, any work found not in compliance. Quality control must include, but is not limited to, the following:

- a. Observation of environmental conditions; number and skill level of insulation workers; start and end time of work.
- b. Verification of certification, listing or label compliance with FM Data Sheets. (  
<https://www.fmglobal.com/fmglobalregistration/Downloads.aspx>)
- c. Verification of proper storage and handling of insulation and vapor retarder materials before, during, and after installation.
- d. Inspection of mechanical fasteners; type, number, length, and spacing.
- e. Coordination with other materials, cants, sleepers, and nailing strips.
- f. Inspection of insulation joint orientation and laps between layers, joint width and bearing of edges of insulation on deck.
- g. Installation of cutoffs and proper joining of work on subsequent days.
- h. Continuation of complete roofing system installation to cover insulation installed same day.
- i. Verification of required slope to each roof drain.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 07 27 10.00 10

### BUILDING AIR BARRIER SYSTEM 08/19, CHG 1: 02/20

#### PART 1 GENERAL

##### 1.1 SUMMARY

This Section specifies the construction and quality control of the installation of an air barrier system **that are contiguous across its six surfaces**. Construct the air barrier system indicated, taking responsibility for the means, methods, and workmanship of the installation of the air barrier system. The air barrier must be contiguous and connected across all surfaces of the enclosed air barrier envelope indicated. The maximum leakage requirements of individual air barrier components and materials are specified in the other specification sections covering these items.

This section also defines the maximum allowable leakage of the final air barrier system. The workmanship must be adequate to meet the maximum allowable leakage requirements of this specification. Test the assembled air barrier system to demonstrate that the building envelope is properly sealed and insulated. Passing the air barrier system leakage test and thermography test will result in system acceptance. Conform air barrier system leakage and thermography testing and reporting to the requirements of Section **07 05 23** PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS.

##### 1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referenced within the text by the basic designation only.

#### ASTM INTERNATIONAL (ASTM)

<b>ASTM D4541</b>	(2017) Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
<b>ASTM E96/E96M</b>	(2021) Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials
<b>ASTM E2178</b>	(2021a) Standard Test Method for Air Permeance of Building Materials
<b>ASTM E2357</b>	(2017) Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

#### NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

<b>NFPA 285</b>	(2012) Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior
-----------------	---

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Non-Load-Bearing Wall Assemblies  
Containing Combustible Components

### 1.3 DEFINITIONS

The following terms as they apply to this section:

#### 1.3.1 Air Barrier Accessory

Products designated to maintain air tightness between air barrier materials, air barrier assemblies and air barrier components, to fasten them to the structure of the building, or both (e.g., sealants, tapes, backer rods, transition membranes, fasteners, strapping, primers).

#### 1.3.2 Air Barrier Assembly

The combination of air barrier materials and air barrier accessories that are designated and designed within the environmental separator to act as a continuous barrier to the movement of air through the environmental separator.

#### 1.3.3 Air Barrier Component

Pre-manufactured elements such as windows, doors, dampers and service elements that are installed in the environmental separator.

#### 1.3.4 Air Barrier Envelope

The combination of air barrier assemblies and air barrier components, connected by air barrier accessories that are designed to provide a continuous barrier to the movement of air through an environmental separator. There may be more than one air barrier envelope in a single building. Also known as Air Barrier System.

#### 1.3.5 Air Barrier Material

A building material that is designed, tested and/or produced to provide the primary resistance to airflow through an air barrier assembly of a wall system.

#### 1.3.6 Air Barrier System

Same as AIR BARRIER ENVELOPE.

#### 1.3.7 Air Leakage Rate

The rate of airflow (CFM or L/S) driven through a unit surface area (sq.ft.) of an assembly or system by a unit static pressure difference (Pa) across the assembly. (example: 0.25 CFM/sq.ft. @ 75 Pa)

#### 1.3.8 Air Leakage

The total airflow (CFM or L/S) driven through the air barrier system by a unit static pressure difference (Pa) across the air barrier envelope. (example: 6500 CFM @ 75 Pa)

#### 1.3.9 Air Permeance

The tested rate of airflow (CFM) through a unit area (sq.ft.) of a

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

material driven by unit static pressure difference (Pa) across the material (example: 0.004 CFM/sq.ft. @ 75 Pa) as established by ASTM E2178.

#### 1.3.10 Environmental Separator

The parts of a building that separate the controlled interior environment from the uncontrolled exterior environment, or that separate spaces within a building that have dissimilar environments. Also known as the Control Layer.

#### 1.3.11 Vapor Permeance

Vapor permeance is separated into three classes based on the water vapor permeance of a material as tested via ASTM E96/E96M

Class I Vapor Barrier/Retarder 0.1 perm or less

Class II Vapor Barrier/Retarder 0.1 perm to 1.0 perm

Class III Vapor Barrier/Retarder 1.0 perm to 10 perm

#### 1.4 PREPARATORY PHASE OR PRECONSTRUCTION CONFERENCE

Organize preconstruction conferences between the air barrier inspector and the subcontractors involved in the construction of or penetration of the air barrier system to discuss where the work of each subcontractor begins and ends, the sequence of installation, and each subcontractor's responsibility to ensure airtight joints, junctures, penetrations and transitions between materials. Discuss the products, and assemblies of products specified in the different sections to be installed by the different subcontractors.

#### 1.5 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

##### SD-02 Shop Drawings

Air Barrier System Shop Drawings; G, Manufacturer produced warranted air barrier system

##### SD-03 Product Data

Air Barrier System Product Data; G

##### SD-04 Samples

Material Samples For Air Barrier System; G

##### SD-06 Test Reports

Testing and Inspection; G

##### SD-07 Certificates

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### Air Barrier Inspector; G

### 1.6 AIR BARRIER ENVELOPE SURFACE AREA AND LEAKAGE REQUIREMENTS

The building air barrier systems must meet the following leakage requirements. The allowable leakage rate and the maximum leakage are at a differential test pressure of 75 Pa.

### 1.7 AIR BARRIER INSPECTOR

Employ a designated Air Barrier Inspector on this project. The Air Barrier Inspector performs a Design Review, oversees quality control testing specified in these specifications, performs quality control air barrier inspection as specified, interfaces with the designer and product manufacturer's representatives to assure all installation requirements are met, and verifies that the constructed work is in accordance with both the manufacturer's recommendations for products used, the content of this specification and other contract drawings or documents. Qualification for the Air Barrier Inspector are as follows:

- a. Training and certification as an Air Barrier Auditor from the Air Barrier Association of America (ABAA) or other third party air barrier association.
- b. Or, provide documentation in resume format that demonstrates that the individual proposed has the experience, knowledge, skills and abilities to fulfill the above stated duties as the air barrier inspector.
- c. It is acceptable that this individual be employed by the firm who will be performing the building pressurization test or another independent third party entity, provided they meet the above requirements but shall not be a member of the installing contractor or firm.

Provide copies of Air Barrier Inspector qualifications 30 days after Notice to Proceed.

### 1.8 DESIGN REVIEW

Review the Contract Plans and Specifications and advise the Contracting Officer of any deficiencies that would prevent the construction of an effective air barrier system.

## PART 2 PRODUCTS

### 2.1 AIR BARRIER

Provide air barrier system of compatible parts from one or several manufacturers coordinated by the contractor or provide a single warranted system provided by a primary manufacturer. The air barrier system as part of a tested exterior wall assembly must meet the conditions of acceptance as tested in accordance with NFPA 285. Materials used for roof assembly air barrier must conform to the appropriate UL and FM wind and fire requirements for the specified roof assemblies.

If a complete air barrier system from a single manufacturer is utilized, whether warranted or not warranted, the air barrier system must conform to ASTM E2357.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Materials in the following categories as used in the air barrier system or assembly of the exterior wall system are tested and are required to conform to [ASTM E2178](#): Self-adhered sheet membranes, fluid applied membranes, spray polyurethane foam, mechanically fastened commercial building wrap, factory bonded membranes to sheathing, and adhesive backed commercial building wrap and accessory products.

Other materials used as an air barrier such as concrete, glass, wood, metal or gypsum board may or may not conform to [ASTM E2178](#) but are acceptable provided that when integrated into the air barrier system or assemblies that they are not subject to material or environmental induced degradation in their final produced state and once incorporated in the permanent construction.

All materials used must be identifiable through manufacturer testing data and/or literature to be compatible with all the attached or adjoining materials or substrates used in the system.

Provide [Air Barrier System Shop Drawings](#), [Material Samples for Air Barrier System](#) and [Air Barrier System Product Data](#).

## PART 3 EXECUTION

### 3.1 QUALITY CONTROL

#### 3.1.1 Documentation and Reporting

Document the entire installation process on daily job site reports. These reports include information on the Installer, substrates, substrate preparation, products used, ambient and substrate temperature, the location of the air barrier installation, the results of the quality control procedures, and testing results.

#### 3.1.2 Quality Control [Testing And Inspection](#)

Conduct the following tests and inspections as applicable in the presence of the Contracting Officer during installation of the air barrier system and submit quality control reports as indicated below.

- a. Provide a Daily Report of Observations with a copy to the Contracting Officer.
- b. Inspect to assure continuity of the air barrier system throughout the building enclosure and that all gaps are covered, the covering is structurally sound, and all penetrations are sealed allowing for no infiltration or exfiltration through the air barrier system.
- c. Inspect to assure structural support of the air barrier system to withstand design air pressures.
- d. Inspect to assure masonry surfaces receiving air barrier materials are smooth, clean, and free of cavities, protrusions and mortar droppings, with mortar joints struck flush or as required by the manufacturer of the air barrier material.
- e. Inspect and test to assure site conditions for application temperature, and dryness of substrates are within guidelines.
- f. Inspect to assure substrate surfaces are properly primed if applicable

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

and in accordance with manufacturer's instructions. Priming must extend at least 2 inches beyond the air barrier material to make it obvious that the primer was applied to the substrate before the air barrier material.

- g. Inspect to assure laps in materials are at least a 2-inch minimum, shingled in the correct direction or mastic applied in accordance with manufacturer's recommendations, and with no fishmouths.
- h. Inspect to assure that a roller has been used to enhance adhesion. Identify any defects such as fishmouths, wrinkles, areas of lost adhesion, and improper curing. Note the intended remedy for the deficiencies.
- i. Measure application thickness of liquid applied materials to assure that manufacturer's specifications for the specific substrate are met.
- j. Inspect to assure that the correct materials are installed for compatibility.
- k. Inspect to assure proper transitions for change in direction and structural support at gaps.
- l. Inspect to assure proper connection between assemblies (membrane and sealants) for cleaning, preparation and priming of surfaces, structural support, integrity and continuity of seal.
- m. Perform adhesion tests for fluid-applied and self-adhered air barrier membranes to assure that the manufacturer's specified adhesion strength properties are met. Determine the bond strength of coatings to substrate in accordance with ASTM D4541.
- n. Provide written test reports of all tests performed.

### 3.2 REPAIR AND PROTECTION

Upon completion of inspection, testing, sample removal and similar services, repair damaged construction and restore substrates, coatings and finishes. Protect construction exposed by or for quality control service activities and protect repaired construction.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 07 27 19.01

## SELF-ADHERING AIR BARRIERS

05/17, CHG 2: 08/20

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AIR BARRIER ASSOCIATION OF AMERICA (ABAA)

ABAA Accreditation

Accreditation

ABAA QAP

Quality Assurance Program

## ASTM INTERNATIONAL (ASTM)

ASTM D146/D146M

(2004; E 2012; R 2012) Sampling and  
Testing Bitumen-Saturated Felts and Woven  
Fabrics for Roofing and Waterproofing

ASTM D412

(2016) Standard Test Methods for  
Vulcanized Rubber and Thermoplastic  
Elastomers - Tension

ASTM D570

(1998; E 2010; R 2010) Standard Test  
Method for Water Absorption of Plastics

ASTM D903

(1998; R 2017) Standard Test Method for  
Peel or Stripping Strength of Adhesive  
Bonds

ASTM D1876

(2008; R 2015; E 2015) Standard Test  
Method for Peel Resistance of Adhesives  
(T-Peel Test)

ASTM D4263

(1983; R 2018) Standard Test Method for  
Indicating Moisture in Concrete by the  
Plastic Sheet Method

ASTM D4541

(2017) Standard Test Method for Pull-Off  
Strength of Coatings Using Portable  
Adhesion Testers

ASTM E84

(2020) Standard Test Method for Surface  
Burning Characteristics of Building  
Materials

ASTM E154/E154M

(2008a; R 2013; E 2013) Water Vapor  
Retarders Used in Contact with Earth Under  
Concrete Slabs, on Walls, or as Ground  
Cover

ASTM E283

(2019) Standard Test Method for

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Determining the Rate of Air Leakage  
Through Exterior Windows, Curtain Walls,  
and Doors Under Specified Pressure  
Differences Across the Specimen

ASTM E331

(2000; R 2016) Standard Test Method for  
Water Penetration of Exterior Windows,  
Skylights, Doors, and Curtain Walls by  
Uniform Static Air Pressure Difference

ASTM E2178

(2021a) Standard Test Method for Air  
Permeance of Building Materials

ASTM E2357

(2017) Standard Test Method for  
Determining Air Leakage of Air Barrier  
Assemblies

#### NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 285

(2012) Standard Fire Test Method for  
Evaluation of Fire Propagation  
Characteristics of Exterior  
Non-Load-Bearing Wall Assemblies  
Containing Combustible Components

### 1.2 RELATED REQUIREMENTS

Coordinate the requirements of Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM, Section 07 05 23 PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS and other building enclosure sections to provide a complete building air barrier system. Submit all materials, components, and assemblies of the air barrier system together as one complete submittal package.

### 1.3 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-01 Preconstruction Submittals

Qualifications of Manufacturer; G

Qualifications of Installer; G

#### SD-02 Shop Drawings

Self-adhering Air Barrier; G

#### SD-03 Product Data

Self-adhering Air Barrier; G

Primers, Adhesives, and Mastics; G

Safety Data Sheets; G



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### SD-04 Samples

Self-adhering Air Barrier Mockup; G

#### SD-06 Test Reports

Field Peel Adhesion Test; G

Flame Propagation of Wall Assemblies; G

Flame Spread and Smoke Developed Index Ratings; G

Site Inspections and Testing; G

#### SD-07 Certificates

Self-adhering Air Barrier; G

#### SD-08 Manufacturer's Instructions

Self-adhering Air Barrier; G

Primers, Adhesives, and Mastics; G

### 1.4 MISCELLANEOUS REQUIREMENTS

For [self-adhering air barrier](#) provide the following:

#### 1.4.1 Shop Drawings

Submit self-adhering air barrier shop drawings showing locations and extent of air barrier assemblies and details of all typical conditions, intersections with other building enclosure assemblies and materials, and membrane counterflashings. Show details for bridging of gaps in construction, treatment of inside and outside corners, expansion joints, methods of attachment of materials covering the self-adhered barrier without compromising the barrier. Indicate how miscellaneous penetrations such as conduit, pipes, electric boxes, brick ties, and similar items will be sealed.

#### 1.4.2 Product Data

Submit manufacturer's technical data indicating compliance with performance and environmental requirements, manufacturer's printed instructions for evaluating, preparing, and treating substrates, temperature and other limitations of installation conditions, safety requirements for installation, and [Safety Data Sheets](#). Indicate flame and smoke spread ratings for all products.

#### 1.4.3 Mockup

Provide a mockup of the self-adhering air barrier system specified. Apply product in an area designated by the Contracting Officer. Apply an area of not less than [54 square feet](#). Include all components specified as representative of the complete system. Notify the Contracting Officer a minimum of 48 hours prior to the test application. Select a test area representative of conditions to be covered including window or door openings, wall to ceiling transitions, flashings, and penetrations, as

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

applicable.

#### 1.4.4 Test Reports

Submit test reports indicating that field peel-adhesion tests on all materials have been performed and the changes made, if required, in order to achieve successful and lasting adhesion. Submit test reports for [flame propagation of wall assemblies](#) tested in accordance with [NFPA 285](#). Submit test reports for [flame spread and smoke developed index ratings](#) of barrier system materials tested in accordance with [ASTM E84](#).

### 1.5 DELIVERY, STORAGE, AND HANDLING

#### 1.5.1 Delivery

Deliver and store materials in sufficient quantity to allow for uninterrupted flow of work. Inspect materials delivered to the site for damage and store out of weather. Deliver materials to the jobsite in their original unopened packages, clearly marked with the manufacturer's name, brand designation, description of contents, and shelf life of containerized materials. Store and handle to protect from damage.

#### 1.5.2 Storage

Inspect materials delivered to the site for damage; unload and store out of weather in manufacturer's original packaging. Store only in dry locations, not subject to open flames or sparks, and easily accessible for inspection and handling. Protect stored materials from direct sunlight. Keep materials sealed and separated from absorptive materials, such as wood and insulation.

### 1.6 FIELD PEEL ADHESION TEST

Perform a [field peel-adhesion test](#) on the construction mockup. Test the self-adhering air barrier for adhesion in accordance with [ASTM D4541](#) using a Type II pull tester except use a disk that is [4 inches](#) in diameter and cut through the membrane to separate the material attached to the dish from the surrounding material. Perform test after curing period in accordance with manufacturer's written recommendations. Record mode of failure and area which failed in accordance with [ASTM D4541](#). Compare adhesion values with the manufacturer's established minimum values for the particular combination of material and substrate. Indicate on the inspection report whether the manufacturer's requirement has been met. Where the manufacturer has not declared a minimum adhesion value for their product and substrate combination, the inspector must record actual values.

### 1.7 AIR BARRIER TESTING

Perform air barrier testing in accordance with Section [07 27 10.00 10](#) BUILDING AIR BARRIER SYSTEM and Section [07 05 23](#) PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS.

### 1.8 QUALITY ASSURANCE

#### 1.8.1 [Qualifications of Manufacturer](#)

Submit documentation verifying that the manufacturer of the self-adhering air barrier is currently accredited by Air Barrier Association of America ( [ABAA Accreditation](#) <https://www.airbarrier.org/> ).

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 1.8.2 Qualifications of Installer

Submit documentation verifying that installers of the self-adhering air barrier are currently certified in accordance with the ABAA QAP Quality Assurance Program (<https://www.airbarrier.org/qap/>).

### 1.9 PRECONSTRUCTION MEETING

Conduct a preconstruction meeting a minimum of two weeks prior to commencing work specified in this Section. Agenda must include, at a minimum, construction and testing of mockup, sequence of construction, coordination with substrate preparation, materials approved for use, compatibility of materials, coordination with installation of adjacent and covering materials, and details of construction. Attendance is required by representatives of related trades including covering materials, substrate materials, adjacent materials, and materials and components of the air barrier system.

### 1.10 ENVIRONMENTAL CONDITIONS

#### 1.10.1 Temperature

Install air barrier within the range of ambient and substrate temperatures as recommended in writing by the air barrier manufacturer. Verify that the surface to receive self-adhering air barrier is dry for a minimum of 48 hours prior to the installation of the barrier. Do not apply air barrier to damp or wet substrates. Do not apply during inclement weather or when ice, frost, surface moisture, or visible dampness is present on surfaces to be covered, or when precipitation is imminent.

#### 1.10.2 Exposure to Weather and Ultraviolet Light

Protect air barrier products from direct exposure to rain, snow, sunlight, mist, and other extreme weather conditions. Replace, at no additional cost to the government, barrier products that have been exposed to ultraviolet (sun)light longer than allowed by manufacturer's written requirements.

## PART 2 PRODUCTS

### 2.1 SELF ADHERING AIR BARRIER

Provide minimum 0.040 inch thick self-adhering, vapor retarding, air barrier membrane consisting of a cross-laminated high density polyethylene (HDPE) film, fully coated with rubberized asphalt adhesive. Provide membrane in rolls of various widths interleaved with disposable silicone release paper. Self-adhering air barrier must exhibit no visible water leakage when tested in accordance with ASTM E331 and must perform as a liquid water drainage plane flashed to discharge to the exterior any incidental condensation or water penetration. Use regular or low temperature formulation depending on site conditions, within temperature ranges specified by manufacturer.

#### 2.1.1 Physical Properties

- a. Air Permeance (ASTM E2178): In accordance with Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- b. Air Leakage (ASTM E2357, ASTM E283): In accordance with Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM and Section 07 05 23 PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS.
- c. Tensile Strength (ASTM D412 die C modified): Not less than 400 psi.
- d. Tensile Elongation (ASTM D412 die C modified): Not less than 200 percent.
- e. Puncture Resistance (ASTM E154/E154M): Not less than 40 lbs.
- f. Pliability (ASTM D146/D146M): Unaffected at minus 25 degrees F, 0.063 inch mandrel.
- g. Lap Adhesion (ASTM D1876 modified): Not less than 4.0 lbs per inch.
- h. Peel Adhesion (ASTM D903): Not less than 5.0 lbs per inch.
- i. Water Absorption (ASTM D570): Not to exceed 0.12 percent by weight.
- j. Flame propagation of wall assemblies (NFPA 285): Pass
- k. Surface Burning Characteristics (ASTM E84):
  - (1) Flame Spread Index Rating not higher than 75.
  - (2) Smoke Developed Index Rating not higher than 150.

## 2.2 PRIMERS, ADHESIVES, AND MASTICS

Provide primers, adhesives, mastics and other accessory materials as recommended in writing by the manufacturer of the self-adhering air barrier for adequate bonding to each type of substrate.

## 2.3 SHEET METAL FLASHING

Provide as specified in Section 07 60 00 FLASHING AND SHEET METAL.

## 2.4 JOINT SEALANTS

Provide as specified in Section 07 92 00 JOINT SEALANTS. Verify compatibility with adjacent products that are or will be in contact with one another.

# PART 3 EXECUTION

## 3.1 EXAMINATION

Before installing air barrier, examine substrates, areas, and conditions under which air barrier assemblies will be applied, with Installer present, for compliance with requirements. Ensure the following conditions are met:

- a. Surfaces are sound, dry, even, and free of oil, grease, dirt, excess mortar or other contaminants.
- b. Concrete surfaces are cured and dry, smooth without large voids, spalled areas or sharp protrusions.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- c. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method in accordance with **ASTM D4263** and take suitable measures until substrate passes moisture test.
- d. Verify sealants used in sheathing are compatible with membrane proposed for use. Perform field peel adhesion test on materials to which sealants are adhered.

### 3.2 PREPARATION

Clean, prepare, and treat substrate in accordance with manufacturer's written instructions. Ensure clean, dust-free, and dry substrate for air barrier application.

- a. Prime masonry and concrete substrates with conditioning primer.
- b. Prime gypsum sheathing an adequate number of coats to achieve required bond, with adequate drying time between coats.
- c. Prime wood, metal, and painted substrates with primer.
- d. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through air barrier and at protrusions.

### 3.3 INSTALLATION

#### 3.3.1 Installation of Self-adhering Air Barrier

Install materials in accordance with manufacturer's recommendations and the following:

- a. Apply primer at rate recommended by manufacturer prior to membrane installation. Allow primer to dry completely before membrane application. Apply as many coats as necessary for proper adhesion.
- b. When membrane is properly positioned, press into place and roll membrane with roller immediately after placement.
- c. Apply membrane sheets to shed water naturally without interception by a sheet edge, unless that edge is sealed with permanently flexible termination mastic.
- d. Position subsequent sheets of membrane applied above so that membrane overlaps the membrane sheet below by a minimum of **2-1/2 inches**, unless greater overlap is recommended by manufacturer. Roll into place with roller.
- e. Make all side laps a minimum of **2-1/2 inches** and all end laps a minimum of **5 inches**, unless greater overlap is recommended by manufacturer. Roll seams with roller.
- f. Roll membrane to adhere to substrate. Cover corners and joints with two layers of reinforcement by first applying a **12 inch** width of membrane centered along the axis. Flash drains and projections with a second ply of membrane for a distance of **6 inches** from the drain or projection.
- g. Seal around all penetrations through the air barrier resulting from

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

pipes, vents, conduit, electrical fixtures, structural members, or other construction passing through it. Seal with termination mastic, extruded silicone sealant, membrane counterflashing or other sealing methods in accordance with manufacturer's written recommendations.

- h. Continuously connect the air barrier between walls, roof, floor and below grade assemblies to form a continuous integrated air barrier system around the entire building enclosure. Extend the air barrier membrane into rough openings such as doors, windows, louvers, and other exterior penetrations. Seal edges of barrier at junctures with rough openings.
- i. At changes in substrate plane, provide transition material (e.g. bead of sealant, mastic, extruded silicone sealant, membrane counterflashing or other material recommended by manufacturer) under membrane to eliminate all sharp 90 degree inside corners and to make a smooth transition from one plane to another.
- j. Provide mechanically fastened non-corrosive metal sheet to span gaps in substrate plane and to make a smooth transition from one plane to the other. Continuously support membrane with substrate.
- k. At deflection and control joints, provide backup for the membrane to accommodate anticipated movement.
- l. At expansion and seismic joints provide transition to the joint assemblies.
- m. Apply a bead or trowel coat of mastic along membrane seams at reverse lapped seams, rough cuts, and as recommended by the manufacturer.
- n. At end of each working day, seal top edge of membrane to substrate with termination mastic.
- o. Do not allow materials to come in contact with chemically incompatible materials.
- p. Counterflash upper edge of thru-wall flashing and air barrier. Counter flashing and thru-wall flashing are specified in Section 07 60 00 FLASHING AND SHEET METAL.

### 3.4 FIELD QUALITY CONTROL

#### 3.4.1 Site Inspections and Testing

Provide site inspections and testing in accordance with ABAA protocol to verify conformance with the manufacturer's instructions, the ABAA QAP Quality Assurance Program (<https://www.airbarrier.org/qap/>), Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM, Section 07 05 23 PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS, and this section.

- a. Conduct inspections and testing at 5, 50, and 95 percent completion of this scope of work. Forward written site inspections and testing reports to the Contracting Officer within five working days of the inspection and test being performed.
- b. If inspections reveal any defects, promptly remove and replace defective work at no additional expense to the Government.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.5 FIELD PEEL ADHESION TEST

Conduct in accordance with test protocol indicated in Part 1, paragraph FIELD PEEL ADHESION TEST.

### 3.6 PROTECTION AND CLEANING

#### 3.6.1 Protection

##### 3.6.1.1 Adjacent Surfaces

Protect exposed adjacent surfaces that could be damaged by primers and adhesives associated with air barrier membrane. Provide protection during application and the remainder of construction in accordance with manufacturer's written instructions.

##### 3.6.1.2 The Air Barrier Assembly

Protect finished portions of the air barrier assembly from damage during ongoing application and throughout the remainder of the construction period in accordance with manufacturer's written instructions. Coordinate timing of installation of materials that will cover the air barrier membrane to ensure the exposure period does not exceed that recommended by the air barrier manufacturer's written installation instructions. Remove and replace, at no additional cost to the government, membrane products that exceed the manufacturer's allowed exposure limits.

#### 3.6.2 Cleaning

Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction and as acceptable to the primary material manufacturer.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 07 27 36

## SPRAY FOAM AIR BARRIERS

05/17, CHG 2: 08/20

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AIR BARRIER ASSOCIATION OF AMERICA (ABAA)

ABAA Accreditation

Accreditation

ABAA QAP

Quality Assurance Program

## AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP Z9.2

(2018) Fundamentals Governing the Design  
and Operation of Local Exhaust Ventilation  
Systems

ASSP Z88.2

(2015) American National Standard  
Practices for Respiratory Protection

## ASTM INTERNATIONAL (ASTM)

ASTM C518

(2017) Standard Test Method for  
Steady-State Thermal Transmission  
Properties by Means of the Heat Flow Meter  
Apparatus

ASTM C1029

(2015) Standard Specification for  
Spray-Applied Rigid Cellular Polyurethane  
Thermal Insulation

ASTM C1060

(2015) Standard Practice for Thermographic  
Inspection of Insulation Installations in  
Envelope Cavities of Frame Buildings

ASTM C1303/C1303M

(2015) Standard Test Method for Predicting  
Long-Term Thermal Resistance of  
Closed-Cell Foam Insulation

ASTM C1338

(2014) Standard Test Method for  
Determining Fungi Resistance of Insulation  
Materials and Facings

ASTM D1621

(2016) Standard Test Method for  
Compressive Properties of Rigid Cellular  
Plastics

ASTM D1622

(2014) Apparent Density of Rigid Cellular  
Plastics

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

ASTM D1623	(2017) Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
ASTM D2126	(2009) Response of Rigid Cellular Plastics to Thermal and Humid Aging
ASTM D2842	(2012) Water Absorption of Rigid Cellular Plastics
ASTM D4541	(2017) Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
ASTM D6226	(2015) Standard Test Method for Open Cell Content of Rigid Cellular Plastics
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E96/E96M	(2021) Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials
ASTM E119	(2020) Standard Test Methods for Fire Tests of Building Construction and Materials
ASTM E283	(2019) Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM E736	(2000; R 2011) Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
ASTM E2178	(2021a) Standard Test Method for Air Permeance of Building Materials
ASTM E2357	(2017) Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

ICC EVALUATION SERVICE, INC. (ICC-ES)

ICC-ES AC377	(2016) Acceptance Criteria for Spray-Applied Foam Plastic Insulation
--------------	--

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2018) International Building Code
ICC IECC	(2015) International Energy Conservation Code

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION (ISEA)

ANSI/ISEA Z87.1 (2020) Occupational and Educational  
Personal Eye and Face Protection Devices

#### NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10 (2018; ERTA 1-2 2018) Standard for  
Portable Fire Extinguishers

NFPA 275 (2017) Standard Method of Fire Tests for  
the Evaluation of Thermal Barriers

NFPA 285 (2012) Standard Fire Test Method for  
Evaluation of Fire Propagation  
Characteristics of Exterior  
Non-Load-Bearing Wall Assemblies  
Containing Combustible Components

#### SPRAY POLYURETHANE FOAM ALLIANCE (SPFA)

SPFA TechDocs (2015) SPFA Technical Documents Library,  
four categories: General, Insulation,  
Roofing, Specialty

#### U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-600-01 (2016; with Change 6, 2021) Fire  
Protection Engineering for Facilities

#### U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.132 Personal Protective Equipment

29 CFR 1910.133 Eye and Face Protection

29 CFR 1910.134 Respiratory Protection

#### UNDERWRITERS LABORATORIES OF CANADA (ULC)

ULC S705.2 (2005) Standard for Thermal Insulation -  
Spray Applied Rigid Polyurethane Foam,  
Medium Density - Application

### 1.2 RELATED REQUIREMENTS

Coordinate the requirements of Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM, Section 07 05 23 PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS, Section 07 27 19.01 SELF-ADHERING AIR BARRIERS, and other building envelope sections to provide a complete air barrier system. Submit all materials, components, and assemblies of the air barrier system together as one complete submittal package.

### 1.3 DEFINITIONS

#### 1.3.1 Long Term Thermal Resistance (LTTR)

The thermal resistance value of a closed cell foam insulation product measured using accelerated aging ASTM C1303/C1303M equivalent to the

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

time-weighted average thermal resistance value over 15 years. Loss in thermal resistance is attributable to changes in cell gas composition caused by diffusion of air into and blowing agent out of the foam cells.

#### 1.3.2 SPFA TechDocs

Reformatted documents, named **SPFA TechDocs** (<http://www.sprayfoam.org/technical/spfa-technical-documents>), places each document in one of four categories for easy reference and identification: Roofing, Insulation, Specialty and General.

Spray Polyurethane Foam: Thermal and air/vapor barrier system consisting of sprayed polyurethane foam (SPF).

#### 1.4 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section **01 33 00 SUBMITTAL PROCEDURES**:

##### SD-01 Preconstruction Submittals

Qualification of Manufacturer; G

Qualification of Installer; G

Quality Control Plan; G

Safety Plan; G

Fire Prevention Plan; G

Respirator Plan; G

##### SD-02 Shop Drawings

Spray Foam Air Barrier System

Foam Air Barrier System; G

##### SD-03 Product Data

Closed Cell SPF; G

Transition Membrane; G

Primers, Adhesives, and Mastics; G

Sealants; G

Safety Data Sheets; G

##### SD-04 Samples

Spray Foam Air Barrier Mockup; G

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### SD-06 Test Reports

Field Peel Adhesion Test; G

Thermographic Test; G

Air Barrier Test; G

Primers; G

Flame Spread And Smoke Developed Index Ratings Of SPF Products; G

Flame Propagation Of Wall Assemblies; G

#### SD-07 Certificates

Closed cell SPF; G

Transition Membrane; G

Indoor Air Quality for Spray Foam Air Barrier; S

#### SD-08 Manufacturer's Instructions

SPF Handling, Storage, and Spray Procedures; G

Substrate Preparation; G

Thermal Barrier; G

Transition Membrane; G

Primers, Adhesives, and Mastics; G

#### SD-09 Manufacturer's Field Reports

Core Samples; G

Daily Work Record; G

Visual Inspection and Thermal Scanning; G

### 1.5 MISCELLANEOUS REQUIREMENTS

For the **spray foam air barrier** system provide the following:

#### 1.5.1 Shop Drawings

Submit spray foam air barrier shop drawings showing locations, detailing, and extent of spray foam air barrier assemblies. Provide details of all typical conditions, intersections with other envelope assemblies and materials, membrane counter-flashings. Provide details and indicate materials for **thermal barriers**. Show details for bridging of gaps in construction, treatment of inside and outside corners, expansion joints, methods of attachment of materials covering the SPF without compromising the barrier. Indicate how miscellaneous penetrations such as conduit, pipes, electric boxes, brick ties, and similar items will be sealed.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.5.2 Product Data

Submit manufacturer's technical data indicating compliance with performance and environmental requirements, manufacturer's printed instructions for evaluating, preparing, and treating substrates, temperature and other limitations of installation conditions, safety requirements for installation, and [Safety Data Sheets](#). Indicate flame and smoke spread ratings for all products. Submit literature including material description, physical properties, and fire-ratings.

#### 1.5.3 Mockup

Provide a mockup of each foam system specified. Apply foam in an area designated by the Contracting Officer. Apply an area of not less than [50 square feet](#). Include all components specified for the finished assembly including [primers](#), support components, expansion and contraction joints, thermal barriers, and other accessories as representative of the complete system. Isolate the area and protect workers as required by [29 CFR 1910.132](#), [29 CFR 1910.133](#) and [29 CFR 1910.134](#). Notify the Contracting Officer a minimum of 48 hours prior to the test application. Select a test area representative of conditions to be sprayed including window or door openings, wall to ceiling transitions, flashings, and penetrations, as applicable.

#### 1.5.4 Test Reports

Submit test reports indicating that [field peel adhesion tests](#) on all materials have been performed and the changes made, if required, in order to achieve successful and lasting adhesion. Submit test reports for [flame spread and smoke developed index ratings of SPF products](#) tested in accordance with [ASTM E84](#). Submit test reports for [flame propagation of wall assemblies](#) tested in accordance with [NFPA 285](#).

### 1.6 DELIVERY, STORAGE, AND HANDLING

#### 1.6.1 Delivery

Deliver and store materials in sufficient quantity to allow for uninterrupted flow of work. Inspect materials delivered to the site for damage; unload and store out of weather. Deliver materials to the jobsite in their original unopened packages, clearly marked with the manufacturer's name, brand designation, description of contents, and shelf life of containerized materials. Store and handle to protect from damage. Submit [SPF Handling, Storage, and Spray Procedures](#) in accordance with submittal procedures.

#### 1.6.2 Storage

Store materials in clean, dry areas, away from excessive heat, sparks, and open flame. Maintain temperatures in the storage area below the materials' flash point(s) and within limits recommended by the manufacturer's printed instructions. Provide ventilation in accordance with [ASSP Z9.2](#) to prevent build-up of flammable gases. Store MDI (A-side) drums in locations that limit the risk of contact with water, acids, caustics (such as lye), alcohols, and strong oxidizing and reducing agents.

#### 1.6.3 Handling

Handle materials and containers safely and in accordance with

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

manufacturer's recommendations. Store liquids in airtight containers and keep containers closed except when removing materials. Do not use equipment or containers containing remains of dissimilar materials. Do not expose foam component containers to direct sunlight. Do not use materials from containers with content temperatures in excess of 80 degrees F.

Containers exposed to long periods of cold may also exhibit separation and poor performance. Do not use materials exposed to temperature ranges outside of manufacturer's instructions for exposure limits.

Mark and remove from job site materials which have been exposed to moisture, that exceed shelf life limits, or that have been exposed to temperature extremes.

#### 1.6.3.1 Venting and Handling of Material Containers

Partially unscrew material container and drum caps to gradually vent the containers prior to opening. Do not inhale vapors. Decontaminate empty component containers by filling with water and allowing to stand for 48 hours with bung caps removed. Do not, under any circumstances seal, stop, or close containers which have been emptied of foam components.

#### 1.7 FIELD PEEL ADHESION TEST

Perform a field peel adhesion test on the construction mockup. Test the SPF for adhesion in accordance with ASTM D4541 using a Type II pull tester except use a disk that is 4 inches in diameter and cut through the membrane to separate the material attached to the dish from the surrounding material. Perform test after curing period in accordance with manufacturer's written recommendations. Record mode of failure and area which failed in accordance with ASTM D4541. Compare adhesion values with the manufacturer's established minimum values for the particular combination of material and substrate. Indicate on the inspection report whether the manufacturer's requirement has been met. Where the manufacturer has not declared a minimum adhesion value for their product and substrate combination, the inspector must record actual values.

#### 1.8 AIR BARRIER TESTING

Perform air barrier testing in accordance with Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM and Section 07 05 23 PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS.

#### 1.9 SAFETY PROVISIONS

##### 1.9.1 Fire Prevention

Provide a written fire prevention plan for the SPF application. Address specific fire hazards such as spontaneous combustion from exothermic heat build-up of SPF components during curing. Provide a continuous fire watch during mixing and spraying of SPF and for a minimum of two hours after completion of work at the end of each day. Maintain fire watch for additional time as required to ensure no potential ignition conditions exist.

##### 1.9.1.1 Fire Extinguishers

Furnish fire extinguishers of minimum 15 pounds capacity each, in

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

accordance with [NFPA 10](#), in the immediate vicinity of the work. CAUTION: Do not discharge high pressure carbon dioxide extinguishers where explosive vapors exist since the discharge can cause a spark which will ignite the vapors.

#### 1.9.2 Respirator Plan

Provide a written respirator plan in accordance with OSHA regulations that protects installers during application and addresses separation of the area to prevent other workers from entering the work area during spraying.

#### 1.9.3 Isolation

Isolate the work area as recommended by spray foam manufacturer's written requirements. Prevent workers without respiratory, skin, and eye Personal Protective Equipment (PPE) or training from entering the work area or otherwise being exposed to off-gassing of the insulation in excess of permissible exposure limits.

#### 1.9.4 Respirators and Eye Protection

Respiratory protective devices (respirators) must meet the requirements of [ASSP Z88.2](#). Eye and face protective equipment must meet the requirements of [ANSI/ISEA Z87.1](#). Additionally, sprayers and workers in the immediate vicinity of the spray must wear NIOSH-approved, full-face, supplied air respirators (SAR) operated in positive pressure or continuous flow mode. Workers not in the immediate vicinity of the sprayer must wear air purifying respirators (APR) with an organic gas / P100 particulate cartridge. Instruct personnel in the use of devices. Maintain such equipment and inspect regularly. All workers are required to have undergone pulmonary function testing and fit testing and must provide certification that they have done so. Change APR cartridges in accordance with manufacturer's written recommendations.

#### 1.9.5 Clothing and Gloves

Sprayers and workers must wear protective clothing and gloves in accordance with OSHA requirements during materials application. Disposable coveralls must be worn and must cover all exposed skin. Sprayers and workers must wear fabric gloves coated with nitrile, neoprene, butyl or PVC.

#### 1.9.6 Additional Requirements

Require personnel to review the Health, Safety and Environmental Aspects of Spray Polyurethane Foam and Coverings published by the Spray Polyurethane Foam Alliance (SPFA). Verify compliance prior to allowing personnel on site for installation work. <http://www.sprayfoam.org>.

### 1.10 QUALITY ASSURANCE

#### 1.10.1 Qualification of Manufacturer

Submit documentation verifying that the manufacturer of the SPF is currently accredited by the Air Barrier Association of America ([ABAA Accreditation https://www.airbarrier.org/](#)) and by the Spray Polyurethane Foam Alliance (SPFA).



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.10.2 Qualification of Installer

Submit documentation verifying that installers of the spray foam air barrier are currently certified by ABAA/BPQI (Building Performance Quality Institute) or by the Spray Polyurethane Foam Alliance (SPFA) Professional Certification Program (PCP). Installers must provide photo identification certification cards for inspection upon request.

#### 1.10.3 General Quality Requirements

Provide all products and installation in accordance with **SPFA TechDocs** requirements (<http://www.sprayfoam.org/technical/spfa-technical-documents>) and documented best practices.

#### 1.11 PRECONSTRUCTION MEETING

Conduct a preconstruction meeting after approval of submittals and a minimum of two weeks prior to commencing work specified in this Section. Attendance is required by the Contracting Officer's designated personnel, Contractor, and representatives of related trades including covering materials, substrate materials, adjacent materials, and materials and components of the air/vapor/thermal barrier system. Agenda must include, at a minimum, the following items:

- a. Drawings, specifications and submittals related to the SPF work;
- b. Sequence of construction;
- c. Coordination with substrate preparation work and responsibility of repairing defects in substrates. Determine method of ensuring SPF work does not begin until substrates have been inspected and accepted;
- d. Compatibility of materials;
- e. Construction and testing of construction mockup;
- f. Application of self-adhering air barrier transitions strips and primer as required for sealing the spray foam air barrier system at openings including but not limited to windows, doors and louvers;
- g. **Spray foam air barrier system** installation; including methods to be used to provide a continuous barrier at thru-wall flashing, penetrations, and covering of embed items;
- h. **Quality control plan** including methods of applying the product so that a consistent thickness across the face of the substrate is achieved.
- i. Procedures for SPF manufacturer's technical representative's onsite inspection and acceptance of substrates, contact info for the representative, frequency of visits, and distribution of copies of inspection reports. Determine where **core samples** will be taken and review procedures for daily documentation of SPF application.
- j. Property protection measures, including isolation of the work, and prevention of overspray and clean-up should overspray occur.
- k. Safety requirements, including review of PPE, fire prevention, **safety plan**, respirator plan, ventilation and separation of the work area, fall protection, and posting of warning signs. Provide a complete

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

schedule and a detailed, written fire protection plan including temporary isolation of the product and the work area until permanent isolation or thermal barrier is in place.

## 1.12 ENVIRONMENTAL CONDITIONS

### 1.12.1 Temperature and Weather

Install SPF within the range of ambient and substrate surface temperatures in accordance with manufacturer's written instructions. Do not apply SPF to damp or wet substrates. Do not apply SPF during inclement weather or when ice, frost, surface moisture, or visible dampness is present on surfaces to be covered, or when precipitation is imminent. Do not apply SPF to exterior building surfaces when wind speeds exceed 25 miles per hour. Use moisture measuring methods and equipment to verify that the moisture conditions of substrate surfaces are in accordance with SPF manufacturer requirements prior to application. Substrate temperatures must be within limits recommended by the manufacturer's printed instructions.

### 1.12.2 Conditions for Primers

Follow manufacturer's printed application and curing instructions. Do not apply primer when ambient temperature is below 40 degrees F or when ambient temperature is expected to fall below 35 degrees F for the duration of the drying or curing period.

### 1.12.3 Conditions for Ignition Barriers

Ensure that sprayed surfaces comply with manufacturer's written requirements for application coverage, thickness, and curing prior to application of ignition barrier coatings.

### 1.12.4 Temporary Ventilation

Provide temporary ventilation for work of this section in accordance with manufacturer's written instructions and with OSHA requirements for this type of application.

## 1.13 FOAM SPRAY EQUIPMENT

### 1.13.1 Applicator

Use an air purge foam spray gun.

### 1.13.2 Equipment Calibration

Fully calibrate the foam metering equipment to monitor each liquid component to within 2 percent of the SPF manufacturer's required metering ratio. Calibrate spray equipment each day at the start of operations, after each restart if spraying operations have been terminated for more than one hour, whenever there is a change in fan pattern or pressure, whenever slow curing areas are noticed, whenever a change is made in hose length or working height, and after changeover between materials. Calibration consists of demonstrating that the equipment is adjusted to deliver components in proper mix and proportion. Conduct calibration tests on cardboard or plywood on a wall adjacent to the area to be sprayed.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 1.13.3 Metering Equipment Requirements

Use foam metering equipment capable of developing and maintaining the SPF manufacturer's required liquid component pressures and temperatures. Foam metering equipment must have gages for visual monitoring. Equipment must provide temperature control of foam components to within the temperature ranges recommended by the foam manufacturer's printed instructions.

### 1.13.4 Moisture Protection

Protect surfaces of supply containers and tanks used to feed foam metering equipment from moisture.

### 1.13.5 Compressed Air

Supply compressed air that is in contact with SPF during mixing or atomization through moisture traps that are continuously bled.

### 1.13.6 Dispense Excess Materials

Do not deposit materials used for cleaning of equipment or materials dispensed for calibration purposes and establishment of spray gun pattern onto the ground. Dispense such materials into scrap containers or onto plastic film, or cardboard, and dispose of in accordance with safety requirements and jobsite regulations.

## PART 2 PRODUCTS

### 2.1 SPRAY FOAM AIR BARRIER

#### 2.1.1 General

Provide a closed cell, sprayed in place, SPF that forms a continuous air /vapor/thermal barrier at the building enclosure. Provide in accordance with [ASTM C1029](#), with the requirements of [UFC 3-600-01](#), [ICC IBC Chapter 26](#), [ICC-ES AC308](#), and [NFPA 285](#). In the event of a conflict, the most stringent requirement applies. Provide all system components necessary for a complete, code compliant installation, whether indicated or not, including material support components, expansion and contraction joints, and accessories.

#### 2.1.2 Physical Properties

Provide a [closed cell](#) product with the following characteristics:

- a. Density ([ASTM D1622](#)): [2.0 lb per cf](#), nominal
- b. Thermal Resistance ([ASTM C518](#))
  - (1) Initial R-value per inch thickness: [7 sf·degrees F h per Btu](#)
  - (2) Aged R-value per inch thickness (180 days at [76 degrees F](#)): [6.6 sf·degrees F·h per Btu](#)
- c. Air Permeance ([ASTM E2178](#)): In accordance with Section [07 27 10.00 10 BUILDING AIR BARRIER SYSTEM](#).
- d. Air Leakage ([ASTM E2357](#), [ASTM E283](#)): In accordance with Section [07 27 10.00 10 BUILDING AIR BARRIER SYSTEM](#) and Section [07 05 23](#)

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS.

- e. Compressive Strength (ASTM D1621): Minimum 28.3 psi
- f. Tensile Strength (ASTM D1623)
  - (1) Medium density: 15 psi
  - (2) Roofing: 40 psi
- g. Water Vapor Permeance (ASTM E96/E96M, water method): less than 1.2 US Perms at one inch thickness
- h. Vapor Retarder (ICC IBC, ICC IECC) Class III
- i. Surface Burning Characteristics (ASTM E84) 3 inch thickness:
  - (1) Flame Spread (FS) Index Rating less than 25.
  - (2) Smoke Developed (SD) Index Rating less than 300.
- j. Closed Cell Content (ASTM D6226): 90 percent
- k. Dimensional Stability (Humid Aging) (ASTM D2126): 15 percent at 28 days at 158 degrees F with 97 percent relative humidity.
- l. Water Absorption (ASTM D2842): Maximum 1.0 per volume
- m. Fungi Resistance (ASTM C1338): Pass, with no growth

#### 2.1.3 Expansion and Contraction

Provide an assembly that allows for relative movement due to temperature, moisture, and air pressure changes. Provide expansion and contraction measures as required by the manufacturer's written recommendations.

#### 2.1.4 Fire-ratings, Flame Spread and Smoke Developed Index Ratings

Where fire-rated materials are indicated, provide products with the appropriate markings of a qualified testing agency. Submit fire-rating test reports. Submit flame spread (FS) and smoke developed (SD) index data. Where FS and SD values of foam products do not meet requirements, provide corresponding barrier products or assemblies and verify complete encapsulation of the spray foam air barrier through product data or on shop drawings. Submit for approval in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

#### 2.1.5 Prohibited Materials

Products that contain hexabromocyclododecane (HBCD) flame retardants are prohibited. Products that contain hydrochlorofluorocarbons (HCFCs), chlorofluorocarbons (CFCs), or other high ozone depleting blowing agents, are prohibited. For a list of acceptable substitute foam blowing agents see <https://www.epa.gov/snap/foam-blowing-agents>. Provide validation of indoor air quality for spray foam air barrier that no prohibited materials are used.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.1.6 Thermal Barrier Materials

Provide a thermal barrier in locations where SPF is exposed to the interior of the building, including attics and plenum spaces. Provide thermal barriers in accordance with ICC IBC Chapter 26 "Plastics," with ICC-ES AC308, ASTM E736, and NFPA 275.

- a. Separate the SPF from the occupied interior of a building by an intumescent thermal barrier coating or thermal barrier board identical to a third party tested thermal barrier to limit the average temperature rise of the surface of the SPF to not more than 250 degrees F after 15 minutes of fire exposure (using the standard time-temperature curve of ASTM E119). Provide in accordance with NFPA 275.

#### 2.2 TRANSITION MEMBRANE

Provide as specified in Section 07 27 19.01 SELF-ADHERING AIR BARRIERS.

#### 2.3 PRIMERS, ADHESIVES, AND MASTICS

Provide primers, adhesives, mastics and other accessory materials as recommended by spray foam manufacturer's printed literature.

#### 2.4 FLASHING

As specified in Section 07 60 00 FLASHING AND SHEET METAL.

#### 2.5 JOINT SEALANTS

As specified in Section 07 92 00 JOINT SEALANTS. Verify compatibility with other system products.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

Before installing the spray foam air barrier and with the installer present, examine substrates, areas, and conditions under which SPF will be applied, for compliance with requirements. Ensure that surfaces are sound, dry, even, and free of oil, grease, dirt, excess mortar or other contaminants. Ensure that concrete surfaces are cured and dry, smooth without large voids, spalled areas or sharp protrusions. Correct defects that adversely affect the spray foam application or performance. Verify that work by other trades is in place and complete prior to application of spray foam.

#### 3.2 PREPARATION

##### 3.2.1 Substrate Preparation

Clean, prepare, and treat substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for spray foam application.

- a. Prepare surfaces by brushing, scrubbing, scraping, or grinding to remove loose mortar, dust, oil, grease, oxidation, mill scale and other contaminants which will affect adhesion of the SPF.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- b. Wipe down metal surfaces to remove release agents or other non-compatible coatings, using clean sponges or rags soaked in a solvent compatible with the SPF.

### 3.2.2 Protection

Protect adjacent areas and surfaces from spray applied materials in accordance with the following:

- a. Mask and cover adjacent areas to protect from over spray.
- b. Ensure required foam stops and back up materials are in place to achieve a complete seal.
- c. Seal off ventilation equipment. Install temporary ducting and fans to provide required exhaust of spray fumes. Provide make-up air as required.
- d. Erect barriers, isolate area, and post warning signs to notify non-protected personnel of the requirement to avoid the spray area.

### 3.2.3 Fire and Explosion Hazards

Prohibit open flames, sparks, welding, and smoking in the application area. Provide and maintain fire extinguishers of appropriate type, size and distance, as required by NFPA, in the application area. Mix batches in small enough quantities to avoid spontaneous combustion from exothermic heat build-up of SPF components during curing.

### 3.2.4 Warning Signs

Post warning signs at ground level adjacent to the work area and a minimum of 150 feet from the application area stating the area is off limits to unauthorized persons and warning of potential hazards. Place clearly visible and legible warning sign at entrance to primary road leading to the project facility warning of presence of flammable materials, irritating fumes, and potential of overspray damage.

### 3.2.5 Prime Substrate

Provide as recommended by the manufacturer for each substrate to be primed. Use primers at full strength. Do not dilute primers unless required and as recommended in writing by the manufacturer. Do not use cleaning solvents for thinning primers or other materials. Ensure that diluted primer(s) meet VOC requirements.

## 3.3 INSTALLATION

### 3.3.1 Sequencing and Coordination

Sequence the work so as to prevent access to the work area by other trades during foam application and curing. Limit access of non-essential workers during application. Notify the Contracting Officer 24 hours in advance of spraying operations. Sequence spray foam work with other trades to permit continuous self-flashing of the spray foam air barrier. Ensure expansion and control joints are provided as detailed on the manufacturer's shop drawings to accommodate the expansion of each layer of the air/vapor /thermal envelope.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.3.2 Installation of Transition Membrane

Install transition membrane materials in accordance with the details on the drawings, Section 07 27 19.01 SELF-ADHERING AIR BARRIERS, and the following:

- a. Install transition membrane at all required locations prior to installation of the fluid-applied membrane air barrier.
- b. Verify transition membrane is fully adhered to substrate and that its surface is clean, dry and wrinkle free prior to installation of the fluid-applied membrane air barrier.
- c. Verify transition membrane completely covers all transition areas and will provide continuity of the finished SPF air barrier without gaps or cracks.

### 3.3.3 Installation of Spray Foam Air Barrier

Install materials in accordance with paragraph SAFETY PROVISIONS, in accordance with manufacturer's recommendations, ULC S705.2 Installation Standard, and in accordance with the following:

- a. Use spray equipment that complies with foam manufacturer's recommendations for the specific type of application, and as specified herein. Record equipment settings on the Daily Work Record. Each proportioned unit can supply only one spray gun.
- b. Apply only when surfaces and environmental conditions are within limits prescribed by the material manufacturer.
- c. Continuously connect the spray foam air barrier between walls, roof, floor, and below grade assemblies to form a continuous integrated air barrier system around the entire building enclosure. Extend the spray foam air barrier into rough openings such as doors, windows, louvers, and other exterior penetrations. Use self-adhering air barrier transition strips if necessary to achieve full extension and continuity of the barrier at these locations. Seal edges of barrier at junctures with rough openings.
- d. Install within manufacturer's tolerances, but not more than minus 1/4 inch or plus 1/2 inch.
- e. Sequence work so as to completely seal all penetrations resulting from pipes, vents, wires, conduit, electrical fixtures, structural members, or other construction. If penetrations through the spray foam air barrier are made after the initial SPF application, reapply in accordance with manufacturer's written instructions for such remedial work.
- f. Do not install SPF within 3 inches of heat emitting devices such as light fixtures and chimneys.
- g. Finished surface of SPF must be free of voids and embedded foreign objects.
- h. Remove masking materials and over spray from adjacent areas immediately after foam surface has hardened. Ensure cleaning methods do not damage work performed by other sections.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- i. Trim, as required, any excess thickness that would interfere with the application of cladding and covering system by other trades.
- j. Clean and restore surfaces soiled or damaged by work of other trades. Before cleaning and restoring damaged work, consult with other trades for appropriate and approved methods for cleaning and restoration to prevent further damage.
- k. Complete connections to other components and repair any gaps, holes or other damage using material approved by the manufacturer.
- l. Provide expansion joints in the SPF application aligned with expansion joints in the building enclosure, where substrate materials change, and in accordance with manufacturer's recommendations.
- m. Provide a continuous fire watch in accordance with paragraph SAFETY PROVISIONS.

### 3.4 FIELD QUALITY CONTROL

#### 3.4.1 General Site Inspections and Testing

Provide site inspections and testing in accordance with ABAA protocol to verify conformance with the manufacturer's instructions, the [ABAA QAP](https://www.airbarrier.org/qap/) Quality Assurance Program (<https://www.airbarrier.org/qap/>), Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM, Section 07 05 23 PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS, and this section.

- a. Conduct inspections and testing at 5, 50, and 95 percent of completion of this scope of work. Forward written inspection reports to the Contracting Officer within 5 working days of the inspection and test being performed.
- b. If inspections reveal any defects, promptly remove and replace defective work at no additional expense to the Government.

#### 3.4.2 Manufacturer Site Inspections

Manufacturer's technical representative must visit the site during the installation process to ensure the SPF and accessories are being applied in compliance with requirements. At a minimum, manufacturer's technical representative must be present at work startup and perform field inspection of the first day's completed application and at substantial completion, prior to demobilization. After each inspection, submit an inspection report signed by the manufacturer's technical representative, to the Contracting Officer within five working days. The inspection report must note overall quality of work, deficiencies, and recommended corrective actions in detail. Notify the Contracting Officer a minimum of two working days prior to site visits by manufacturer's technical representative.

#### 3.4.3 Contractor's Site Inspections

Establish and maintain an inspection procedure to ensure compliance of the foam installation with contract requirements. Conduct inspections and testing at 5, 50, and 95 percent completion of application. Forward written inspection reports to the Contracting Officer within five working days of the inspection and test being performed. Work not in compliance



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

must be promptly removed and replaced or corrected, in an approved manner, at no additional cost to the Government. Quality control must include, but is not limited to, the following:

- a. Observation of environmental conditions; number and skill level of insulation workers.
- b. Verification of certification, listing, or label.
- c. Verification of proper storage and handling of materials before, during, and after installation.
- d. Inspection of SPF, support structure, primer, expansion joints, and accessories.

#### 3.4.4 Field Peel Adhesion Test

Conduct in accordance with test protocol indicated in Part 1 paragraph FIELD PEEL ADHESION TEST.

#### 3.4.5 Visual Inspection and Thermal Scanning

Following completion of installation, inspect the SPF surface or cavity using infrared (IR) scanning as specified in ASTM C1060. Where the IR inspection indicates construction inconsistencies including wet insulation, remove inconsistent portions of the assembly and replace insulation to correct thermal anomalies. Reinspect and document corrections to the satisfaction of the Contracting Officer.

##### 3.4.5.1 Thermographic Test Report

Include thermographs in color and a color temperature scale to define the temperature indicated by the various colors. Identify the high temperature reading, the outdoor air temperature, the building indoor air temperature, and the wind speed and direction. Note areas of compromise in the building enclosure, and note actions required and taken to correct those areas. Final thermography test report must demonstrate that the problem areas have been corrected. Submit the complete test and analysis.

#### 3.5 CORRECTION OF DEFICIENCIES

Upon completion of inspection, testing, or sample taking, repair damaged construction, restore substrates and finishes, and protect repaired construction. Deficiencies found during inspection must be corrected within 5 working days following notification.

#### 3.6 CLEANUP OF SPILLS

Conduct cleanup of uncured product spillage in accordance with paragraph SAFETY PROVISIONS and the manufacturer's written safe handling instructions. In the event of a conflict, the most stringent requirement governs.

#### 3.7 PROTECTION AND CLEANING

##### 3.7.1 Protection of Installed Work

Protect SPF installation from damage during application and remainder of construction period in accordance with manufacturer's written

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

instructions. Repair damaged areas to new condition.

### 3.7.2 Cleaning of Adjacent Surfaces

Clean overspray from adjacent construction using cleaning agents and procedures as recommended in writing by the manufacturer of each type of affected construction and as acceptable to same.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 07 42 13.19

## INSULATED CORE METAL WALL PANELS

11/19

## PART 1 GENERAL

## 1.1 SYSTEM DESCRIPTION

## 1.1.1 Insulated Core Metal Wall Panel System

Factory-foamed horizontal and vertical wall panel system consisting of exterior metal sheet with interior metal liner panel, bonded to factory foamed-in-place core in thermally-separated profile, with factory sealed tongue-and-groove and rainscreen-design pressure-equalized-chamber horizontal joint, and attached to supports using concealed fasteners.

- a. System is provided complete with secondary subgirt metal framing.

## 1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

- AAMA 501 (2015) Methods of Test for Exterior Walls
- AAMA 501.1 (2017) Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure
- AAMA 501.2 (2015) Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls and Sloped Glazing Systems
- AAMA 508 (2014) Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding (Panel) Systems

## AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

- ASCE 7-16 (2017; Errata 2018; Supp 1 2018) Minimum Design Loads and Associated Criteria for Buildings and Other Structures

## ASTM INTERNATIONAL (ASTM)

- ASTM A653/A653M (2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- ASTM A755/A755M (2018) Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Process for Exterior Exposed Building  
Products

ASTM C1363	(2011) Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus
ASTM C209	(2015) Standard Test Methods for Cellulosic Fiber Insulating Board
ASTM C518	(2017) Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
ASTM C645	(2014; E 2015) Nonstructural Steel Framing Members
ASTM C754	(2020) Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
ASTM D3359	(2017) Standard Test Methods for Rating Adhesion by Tape Test
ASTM E1592	(2005; R 2012) Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference
ASTM E1886	(2019) Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials
ASTM E1996	(2017) Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes
ASTM E283	(2019) Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM E329	(2020) Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection
ASTM E331	(2000; R 2016) Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
ASTM E72	(2015) Conducting Strength Tests of Panels

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

for Building Construction

ASTM E84

(2020) Standard Test Method for Surface  
Burning Characteristics of Building  
Materials

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 285

(2012) Standard Fire Test Method for  
Evaluation of Fire Propagation  
Characteristics of Exterior  
Non-Load-Bearing Wall Assemblies  
Containing Combustible Components

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION  
(SMACNA)

SMACNA 1793

(2012) Architectural Sheet Metal Manual,  
7th Edition

UNDERWRITERS LABORATORIES (UL)

UL 1715

(1997) Standard for Fire Test of Interior  
Finish Material

UL 723

(2018) UL Standard for Safety Test for  
Surface Burning Characteristics of  
Building Materials

### 1.3 PERFORMANCE REQUIREMENTS

Provide metal wall panel system meeting performance requirements as determined by application of specified tests by a qualified testing agency on manufacturer's standard assemblies.

#### 1.3.1 Delegated Design

Engage a qualified engineer to provide design and engineering analysis of composite wall panel system including secondary subgirt framing based on Project performance requirements and design criteria.

#### 1.3.2 Air Infiltration

Maximum 0.01 cfm/sq. ft. air infiltration per ASTM E283 at a static-air-pressure difference of 6.24 lbf/sq ft, using minimum 10-foot by 10-foot test panel that includes horizontal and vertical joints.

#### 1.3.3 Water Penetration, Static Pressure

No uncontrolled water penetration per ASTM E331 at a minimum static differential pressure of 15 lbf/sq ft, using minimum 8-foot by 8-foot test panel that includes either horizontal or vertical joints.

#### 1.3.4 Water Penetration, Dynamic Pressure

No uncontrolled water penetration per AAMA 501.1 at a minimum static differential pressure of 15 lbf/sq ft, using minimum 8-foot by 8-foot test panel that includes either horizontal or vertical joints.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.3.5 System Performance

A third-party test report utilizing the standard [ASTM E283](#), [ASTM E331](#), and [AAMA 501](#) procedures following the test protocol described in [AAMA 508](#) must be submitted. Test panel must include a horizontal joint, with an imperfect air barrier. For panels installed horizontally only.

- a. Bidders supplying panel systems that have not successfully passed [AAMA 508](#) shall provide a backup system that meets the air and water infiltration values as listed above in Paragraphs 1.3.2 - 1.3.4.

#### 1.3.6 Water Absorption

Maximum 1.0 percent absorption rate by volume when tested according to [ASTM C209](#).

#### 1.3.7 Structural Performance

Provide metal [wall panel assemblies](#) capable of withstanding the effects of indicated loads and stresses within limits and under conditions indicated, per [ASTM E72](#) and complying with the load and stress requirements in accordance with [ASTM E1592](#). Wind Load force due to wind action governs the design for panels. Submit [wind load tests](#) and [seismic tests](#) to the Contracting Officer.

- a. Wind Loads: Determine loads based on uniform pressure, importance factor, exposure category, and basic wind speed indicated on drawings.
- b. Limits of Deflection: Composite wall panel system shall withstand scheduled wind pressure with the following allowable deflection:
  1. Maximum allowable deflection limited to L/175 deflection of panel perimeter normal to plane of wall with no evidence of failure.
- c. Secondary Metal Framing: Design secondary metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions." Provide minimum 5-inch-wide bearing surface for metal wall panels at the following locations:
  1. Horizontal Panel System: At vertical joints.
  2. Vertical Panel System: At horizontal stack joints.
- d. Windborne-Debris-Impact-Resistance Performance: Pass cyclic-pressure tests per [ASTM E1886](#) and [ASTM E1996](#) for Wind Zone indicated on Drawings.
- e. Seismic Performance: Comply with [ASCE 7-16](#), Section 9, Earthquake Loads.

#### 1.3.8 Thermal Movements

Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction.

#### 1.3.9 Thermal Performance

Thermal-resistance (R) value indicated, based [ASTM C1363](#) and maintained

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

ASTM C518 testing and finite element modeling.

#### 1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

##### SD-01 Preconstruction Submittals

Qualification of Manufacturer; G

Qualification of Installer; G

Qualification of Engineer; G

##### SD-02 Shop Drawings

Wall Panel Assemblies; G

Flashing and Accessories; G

Anchorage Systems; G

Closure Materials, including metal closure strips.

##### SD-03 Product Data

Submit manufacturer's catalog data for specified products:

Factory Color Finish

Wall Panel Assemblies; G

Flashing and Accessories

Secondary Metal Framing

Repair Paint

Insulation

Flashing Tape

Fasteners

##### SD-04 Samples

Wall Panel Assemblies; G

Sealants; G

##### SD-05 Design Data

Calculations; G

Wind design analysis; G

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### SD-06 Test Reports

Wind load tests; G

Seismic tests; G

Rated Wall Assembly test data; G

#### SD-07 Certificates

Fasteners

Repair Paint

Qualification of Manufacturer; G

Qualification of Installer

wall system assembly wind load and fire rating classification listings.

#### SD-08 Manufacturer's Instructions

Installation of Wall Panels

#### SD-09 Manufacturer's Field Reports

Water-Spray Test; G

Field Service Report; G

#### SD-11 Closeout Submittals

Warranty; G

Instructions To:; G

Material Safety Data Sheets; G

### 1.5 QUALITY ASSURANCE

#### 1.5.1 Qualification of Manufacturer

Metal wall panel system manufacturer must have a minimum of 5 years' experience in manufacturing metal wall system and accessory products.

#### 1.5.2 Qualification of Engineer

Provide engineering services by an authorized engineer; currently licensed in the geographical area where construction will take place, having a minimum of 4 years' experience as an engineer knowledgeable in wind load design analysis, protocols and procedures for [ASCE 7-16](#) and [ASTM E1592](#). Provide certified engineering [calculations](#) using the products submitted for wind load requirements in accordance with FM Wind Design Guide and [ASCE 7-16](#).



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 1.5.3 Qualification of Installer

Installation contractor must be approved and certified by wall panel manufacturer prior to beginning installation of the metal wall system.

### 1.5.4 Testing Agency Qualifications

Qualify in accordance with requirements of ASTM E329.

### 1.5.5 Adhesion Test

Prior to delivery of composite wall panel system, perform test on adhesives and sealants per ASTM D3359. Test each adhesive and sealant utilizing specified panel finish.

- a. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as specified in Division 07 Section "Joint Sealants."

### 1.5.6 Fire Performance Characteristics

Provide metal composite wall systems with the following fire-test characteristics determined by indicated test standard as applied by UL or other testing and inspection agency acceptable to authorities having jurisdiction.

- a. Surface-Burning Characteristics: Provide metal composite wall system panels with the following characteristics when tested per ASTM E84 or UL 723.
  1. Flame spread index: 25 or less.
  2. Smoke developed index: 450 or less.
- b. Fire Performance of Insulated Wall: Third Party Design Listing CSG/GWP 30-03
- c. Room Corner Test: NFPA 285 or UL 1715.
- d. Intermediate Scale Multistory Fire Test: Representative mockup tested per NFPA 285.

### 1.5.7 Mockups

Build mockup in size and location indicated. Show details of composite wall panel system. Demonstrate methods and details of installation. Show details of gasketed return vertical joints, penetrations, doors, windows, louvers, pipe openings, inside and outside corners, top and bottom of wall, horizontal and vertical joints.

- a. Perform water spray test of mockup to demonstrate working principles of rainscreen design.
- b. Approval of mockup does not relieve Contractor of responsibility to comply with all requirements of contract documents.
- c. Approved mockup may become part of installation if approved by Architect.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 1.6 ADMINISTRATIVE REQUIREMENTS

### 1.6.1 Pre-installation Conference

Conduct preinstallation meeting at site attended by Owner, Architect, manufacturer's technical representative, and other trade contractors, to review the following:

- a. Coordinate building framing in relation to composite wall panel system.
- b. Coordinate installation of building air and water barrier behind composite wall panel system.
- c. Coordinate window, door and louver, and other openings and penetrations of composite wall panel system.
- d. Review drawings, including Fabrication and Installation drawings, showing complete [Wall Panel Assemblies](#), and specifications. Include review of submittal items as applicable for the following:

[Flashing and accessories Anchorage systems](#)

[Manufacturer's catalog data](#)

[Factory Color Finish](#)

[Insulation](#)

[Closure Materials](#), including [metal closure strips](#).

[Flashing Tape](#)

[Rated Wall Assembly](#) test data

[Fasteners](#)

Submit manufacturer's color charts and chips, approximately 4 by 4 inches, showing full range of colors, textures and patterns available for wall panels with factory applied finishes.

- e. Finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
- f. Methods and procedures related to metal wall panel installation, including manufacturer's written [instructions](#) for [Installation of Wall panels](#), and verification of [wall system assembly wind load and fire rating classification listings](#).
- g. Support conditions for compliance with requirements, including alignment between and attachment to structural members. Provide details of [wind design analysis](#) including wind speed, exposure category, co-efficient, importance factor, designates type of facility, negative pressures for each zone, methods and requirements of attachment. Wind design analysis to include wall plan delineating dimensions and attachment patterns for each zone. Wind design analysis to be prepared and sealed by Licensed Project Engineer in the geographic area where the construction will take place.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- h. Flashing, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
- i. Governing regulations and requirements for insurance, certificates, tests and inspections if applicable. Include review of Sustainable Design Requirements, wall system assembly wind load, and fire rating classification. Safety plan review must include applicable [Material Safety Data Sheets](#).
- j. Temporary protection requirements for metal wall panel assembly during and after installation.
- k. Wall panel observation and repair procedures after metal wall panel installation. Include review of sample [repair paint](#).
- l. Sample Warranty.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

Protect products of composite wall panel system during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage.

- a. Deliver, unload, store, and erect composite wall panel system and accessory items without misshaping panels or exposing panels to surface damage from weather or construction operations.

#### 1.8 [WARRANTY](#)

##### 1.8.1 Special Manufacturer's Warranty

On manufacturer's standard form, in which manufacturer agrees to repair or replace metal wall panel assemblies that fail in materials and workmanship within 2 years from date of Substantial Completion.

##### 1.8.2 Special Panel Finish Warranty

On manufacturer's standard form, in which manufacturer agrees to repair or replace wall panels that evidence deterioration of finish within 20 years from date of Substantial Completion.

## PART 2 PRODUCTS

### 2.1 PANEL MATERIALS

#### 2.1.1 Exposed Coated Finish

- a. IMP-1 to [match panels on existing facility](#).
- b. Color: [To match panels on existing facility](#).

#### 2.1.2 Steel Liner Sheet

Coil-coated, [ASTM A755/A755M](#), 0.030 inch/22 gage thick.

- a. Zinc-Coated (Galvanized) Steel Sheet: [ASTM A653/A653M](#), G90, structural quality.
- b. Interior Liner Panel Finish: 0.2 mil primer with 0.6 mil acrylic

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

color coat.

### 2.1.3 Exposed Trim and Fasteners

Match panel finish.

## 2.2 INSULATION FOR PANEL CORES

Metal Panel Foamed-Insulation-Core: Halogen-Free, Factory-foamed-in-place polyisocyanurate, density 3.1 lb/cu. ft., minimum compressive strength 20 lb/sq. in., and containing no CFC or HCFC compounds.

## 2.3 FOAMED INSULATION-CORE METAL WALL PANELS

Foamed-Insulation-Core Metal Wall Panels: Halogen-Free, Factory-foamed-in-place horizontal and vertical wall panel system consisting of an exterior metal face sheet with interior metal liner panel, bonded to factory foamed-in-place core in thermally-separated profile, with no glues or adhesives, and with factory sealed tongue-and-groove and rainscreen-design pressure-equalized-chamber horizontal joint, attached to supports using concealed fasteners.

### 2.3.1 Panel Joinery

- a. **Vertical** Panels: Rainscreen design with pressure equalized chamber.
- b. Panel Ends: Trimless.

### 2.3.2 Panel Width

**3 feet 0 inch width to match existing facility.**

### 2.3.3 Panel Profile

Flat in locations indicated.

- a. Reveals: 1-3/16 inch deep by width indicated.
- b. Segmented-faced Panels: As indicated.

### 2.3.4 Panel Thickness

Panel Thickness: **2.00 inch.**

### 2.3.5 Thermal-Resistance (R) Value

Thermal-Resistance (R) Value: **13.**

## 2.4 METAL WALL PANEL ACCESSORIES

Provide complete metal wall panel assembly incorporating trim, copings, fascia, parapet caps, soffits, sills, inside and outside corners, and miscellaneous flashings. Provide manufacturer's factory-formed clips, shims, flashings, IMVs (or gaskets), lap tapes, closure strips, and caps for a complete installation. Fabricate accessories in accordance with **SMACNA 1793.**

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.4.1 Formed Flashing and Trim

Match material, thickness, and color of metal wall panel face sheets.

#### 2.4.2 Extrusion Trim

Provide manufacturer-provided extruded trim for the following locations and as indicated on Drawings:

- a. Base trim.
- b. Coping.
- c. Panel installation perimeter.
- d. Opening perimeters.

#### 2.4.3 Backer Flash

A continuous back-up flash behind the end joint is required with two beads of field applied noncuring butyl sealant between the panel and back up flashing for each panel. Field applied noncuring butyl sealant shall be married to the panels shop applied noncuring butyl sealant within the panel's side joint.

- a. Insulated Metal Vertical Joint (IMV): End joint shall include an integrated, Insulated Metal Vertical Joint. Insulated Metal Vertical Joint shall be recessed 1-3/16-inch deep and be 5/8-inch wide. Insulated Metal Vertical Joint shall be constructed of an EPDM Foam Block adhered to a metal face of the same material, gage, and color as the face of the panel.

#### 2.4.4 Sealants

Type recommended by metal wall panel system manufacturer for application, meeting requirements of Section 07 92 00 JOINT SEALANTS.

#### 2.4.5 Flashing Tape

4-inch wide self-adhering butyl flashing tape.

#### 2.4.6 Panel Clips

Concealed stainless steel clip configured specifically for metal wall panel profile, engaging face and liner panel edge without compressing panel insulation.

#### 2.4.7 Fasteners

Self-tapping screws, bolts, nuts, and other acceptable fasteners recommended by panel manufacturer. Where exposed fasteners cannot be avoided, supply corrosion-resistant fasteners with heads matching color of metal wall panels by means factory-applied coating.

### 2.5 SECONDARY METAL FRAMING

Miscellaneous Framing Components, General: Cold-formed metallic-coated steel sheet, ASTM C645, Grade 50, with ASTM A653/A653M, G90 (Z180) hot-dip galvanized zinc coating.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 2.5.1 Subgirts

C-shaped or Z-shaped sections, 0.064-inch minimum.

### 2.5.2 Sill Channels

0.064-inch minimum.

### 2.5.3 Hat Channels

0.040-inch minimum.

## PART 3 EXECUTION

### 3.1 EXAMINATION

Examine metal wall panel system substrate with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal wall panels.

#### 3.1.1 Framing

Inspect framing that will support metal wall panels to determine if support components are installed as indicated on approved shop drawings. Confirm presence of acceptable framing members at recommended spacing to match installation requirements of metal wall panels.

#### 3.1.2 Wall Sheathing

Confirm that wall sheathing is within tolerances acceptable to metal wall panel system manufacturer.

##### a. Maximum deviations acceptable:

- 1) 1/4-inch in 20 feet vertically or horizontally from face plane of framing.
- 2) 1/2-inch maximum deviation from framing face plane on any building elevation.
- 3) 1/8-inch in 5 feet.

#### 3.1.3 Openings

Verify that window, door, louver and other penetrations match layout on shop drawings.

#### 3.1.4 Air/Moisture Barriers

Confirm that work has been completed, inspected, and tested as required.

#### 3.1.5 Correction

Correct out-of-tolerance work and other deficient conditions prior to proceeding with metal wall panel system installation.

### 3.2 PREPARATION

Secondary Metal Framing: Install secondary metal framing components as

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

indicated. Install secondary metal framing and other metal panel supports per [ASTM C754](#) and metal wall panel manufacturer's recommendations.

### 3.3 METAL WALL PANEL SYSTEM INSTALLATION

Install metal wall panel system in accordance with approved shop drawings and manufacturer's recommendations. Install metal wall panels in orientation, sizes, and locations indicated. Anchor metal wall panels and other components securely in place. Provide for thermal and structural movement.

- a. Attach panels to metal framing using recommended clips, screws, fasteners, sealants, and adhesives indicated on approved shop drawings.
  - 1) Fasteners for Steel Wall Panels: Stainless-steel for exterior locations and locations exposed to moisture; carbon steel for interior use only.
  - 2) Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated or, if not indicated, as approved by manufacturer.
  - 3) Do not field cut metal wall panels.
  - 4) Fasten metal wall panels to supports with concealed clips at each joint at location, spacing, and with fasteners recommended by manufacturer. Install clips to supports with self-tapping fasteners.
  - 5) Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.
  - 6) Horizontal Joinery: Working from base of installation to top connect upper panel to lower panel at dry seal joinery.
  - 7) Vertical Joinery: Provide reveal between vertical ends of panels as shown on shop drawings using hardware and gaskets furnished by manufacturer to form a weather tight seal between panels.
  - 8) Dissimilar Materials: Where elements of metal wall panel system will come in contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by manufacturer.
- b. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal wall panel assemblies.
  - 1) Seal panel end utilizing two beads of non-curing butyl aligning with factory-applied seal in adjacent panel pocket; apply continuously without gaps to complete panel system air barrier.
  - 2) Seal metal wall panel end laps to supports or back-up flashing sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer. Do not install sealant in locations that will interfere with drainage of pressure-equalized panel chambers.
  - 3) Prepare joints and apply sealants per requirements of Section

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

07 92 00 JOINT SEALANTS.

3.4 ACCESSORY INSTALLATION

Install metal wall panel accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

- a. Install related flashings and sheet metal trim per requirements of Section 07 60 00 SHEET METAL FLASHING AND TRIM.
- b. Install components required for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
- c. Comply with performance requirements and manufacturer's written installation instructions.
- d. Provide concealed fasteners except where noted on approved shop drawings.
- e. Set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

3.5 INTEGRATED UNIT INSTALLATION

Install through-tube supports in accordance with manufacturer's recommendations and approved shop drawings. Anchor supports to structure with approved anchors. Assemble wall components using gaskets, fasteners, and trim supplied by metal wall panel manufacturer. Separate dissimilar metals with bituminous coating.

3.6 FIELD QUALITY CONTROL

3.6.1 Testing Agency

Engage an independent testing and inspecting agency acceptable to Architect to perform field tests and inspections and to prepare field test reports.

3.6.2 Water-Spray Test

After completing portion of metal wall panel assembly including accessories and trim, test 2-bay area selected by Architect for water penetration, according to AAMA 501.2.

3.6.3 Manufacturer's Field Service

Engage a service representative authorized by metal wall panel manufacturer to inspect completed installation. Submit written field service report. Correct deficiencies noted in report.

3.7 CLEANING AND PROTECTION

Remove temporary protective films. Clean finished surfaces as recommended by metal wall panel manufacturer. Clear weep holes and drainage channels of obstructions, dirt, and sealant. Maintain in a clean condition during construction.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Replace damaged panels and accessories that cannot be repaired by finish touch-up or minor repair.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

SECTION 07 54 23  
THERMOPLASTIC POLYOLEFIN (TPO) ROOFING  
11/08

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7-16 (2017; Errata 2018; Supp 1 2018) Minimum Design Loads and Associated Criteria for Buildings and Other Structures

ASTM INTERNATIONAL (ASTM)

ASTM C1371 (2004a) Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers

ASTM C1549 (2016) Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer

ASTM D1149 (2007; R 2012) Standard Test Method for Rubber Deterioration - Surface Ozone Cracking in a Chamber

ASTM D1204 (2014) Linear Dimensional Changes of Nonrigid Thermoplastic Sheet or Film at Elevated Temperature

ASTM D2137 (2005) Standard Test Methods for Rubber Property-Brittleness Point of Flexible Polymers and Coated Fabrics

ASTM D471 (2016a) Standard Test Method for Rubber Property - Effect of Liquids

ASTM D6878 (2008e1) Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing

ASTM D751 (2006; R 2011) Coated Fabrics

ASTM E108 (2011) Fire Tests of Roof Coverings

ASTM E1980 (2011) Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

ASTM G151 (2006) Standard Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources

ASTM G154 (2016) Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials

ASTM G155 (2021) Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials

FM GLOBAL (FM)

FM 4470 (2016) Single-Ply, Polymer-Modified Bitumen Sheet, Built-up Roof (BUR), and Liquid Applied Roof Assemblies for Use in Class 1 and Noncombustible Roof Deck Construction

FM P7825 (2005) Approval Guide

UNDERWRITERS LABORATORIES (UL)

UL 790 (2004; Reprint Jul 2014) Standard Test Methods for Fire Tests of Roof Coverings

UL RMSD (2012) Roofing Materials and Systems Directory

## 1.2 SYSTEM DESCRIPTION

Self-Adhered TPO roof membrane system applied over insulation and protection board substrate.

### 1.2.1 General

Roofing membrane sheet widths shall be consistent with membrane attachment methods and wind uplift requirements and shall be as large as practical. In order to minimize joints and three-way overlaps, prefabricated sheets are not accepted. Membrane shall be free of defects and foreign material. Coordinate flashing work to permit continuous roof-surfacing operations. Insulation shall be applied and weatherproofed on the same day.

### 1.2.2 Fire Resistance

Complete roof system assembly shall:

- a. Be Class A rated in accordance with ASTM E108, FM 4470, or UL 790.
- b. Be listed as part of Fire-Classified roof deck construction in the UL RMSD or Class I roof deck construction in the FM P7825 or [FM RoofNav](http://www.roofnav.com) (www. roofnav.com).

FM or UL approved components of the roof covering assembly shall bear the appropriate FM or UL label.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 1.2.3 Wind Uplift Resistance

Complete roof covering assembly, including insulation, shall be rated Class 1-90 in accordance with [FM RoofNav](http://www.roofnav.com) (www. roofnav.com) or FM P7825 and capable of withstanding an uplift pressure of 90 psf. Nonrated systems shall not be installed. Provide wind load calculations and submit engineering calculations and substantiating data to validate wind resistance of any nonrated roof system. Base wind uplift calculations on a design wind speed of 90 mph in accordance with ASCE 7-16.

### 1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-02 Shop Drawings

##### Detail Drawings; G

Roof plan depicting wind loads and boundaries of enhanced perimeter and corner attachments of roof system components, location of perimeter half-sheets, spacing of perimeter, corner, and infield fasteners, as applicable. The drawing shall reflect the project roof plan of each roof level and conditions indicated.

#### SD-03 Product Data

##### TPO Roofing Membrane; G

##### Flashing

##### Membrane Fasteners and Plates

##### Roof Insulation

##### Pre-manufactured accessories

##### Water Cutoffs

##### Information Card

Data as required by Section 07 22 00 ROOF AND DECK INSULATION together with requirements of this section. Data shall include written acceptance by the roof membrane manufacturer of the insulation and other products and accessories to be provided by and warranted under the full system guarantee of the roof membrane manufacturer. Products shall be as listed in the applicable wind uplift and fire rating classification listings, unless approved otherwise by the Contracting Officer.

#### SD-05 Design Data

##### Wind uplift calculations; G

Engineering calculations validating the wind resistance of roof system.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### SD-07 Certificates

##### Qualification of ENERGY STAR-labeled TPO; G

Certificate from TPO membrane roofing manufacturer certifying that the roof membrane, meets specified requirements.

##### Qualifications of Applicator; G

Certificate stating that the applicator meets requirements specified.

##### Wind Uplift Resistance; G

##### Fire Resistance; G

Roof system assembly wind uplift and fire rating classification listings.

##### Minimum Polymer Thickness; G

Certification from TPO membrane manufacturer that the proposed TPO membrane roofing product meets the minimum polymer thickness specified.

##### warranty; G

Sample certificate

#### SD-08 Manufacturer's Instructions

##### Application Method; G

Instructions including pattern and frequency of mechanical attachments required in the field for roof, corners, and perimeters to provide for the specified wind resistance

##### Membrane Flashing; G

##### Perimeter Attachment

##### Auxiliary Fasteners

##### Pre-manufactured accessories

##### cold weather; G

Detailed application instructions and standard manufacturer drawings altered as required by these specifications. Explicitly identify in writing, differences between manufacturer's instructions and the specified requirements.

#### SD-10 Operation and Maintenance Data

##### Instructions to Government Personnel

Copies of Material Safety Data Sheets for maintenance/repair materials.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.4 QUALITY ASSURANCE

##### 1.4.1 Qualification of ENERGY STAR-labeled TPO

ENERGY STAR labeled TPO membrane roofing product shall have at least 5 years of demonstrated performance experience.

##### 1.4.2 Qualifications of Applicator

TPO membrane roofing system Applicator shall be approved, authorized, or licensed in writing by the TPO membrane roof manufacturer and shall have a minimum of 3 years experience as an approved, authorized, or licensed applicator with that manufacturer's TPO membrane roofing materials and be approved at a level capable of providing the specified warranty. The applicator shall supply the names, locations and client contact information of five projects of similar size and scope that the applicator has constructed using the manufacturer's roofing products submitted for this project within the previous 3 years.

##### 1.4.3 Conformance and Compatibility

The entire roofing and flashing system (including edge metal) shall be in accordance with specified and indicated requirements, including fire and wind resistance requirements. Work not specifically addressed and any deviation from specified requirements shall be in general accordance with recommendations of the NRCA 0405, membrane manufacturer published recommendations and details and shall be compatible with surrounding components and construction. Any deviation from specified or indicated requirements shall be submitted to the Contracting Officer and TPO roof membrane manufacturer for approval prior to installation.

##### 1.4.4 Preroofing Conference

After approval of submittals and before performing roofing and insulation system installation work, hold a preroofing conference to review the following:

- a. Drawings, specifications and submittals related to the roof work;
- b. Roof system components installation;
- c. Procedure for the roof manufacturer's technical representative's onsite inspection and acceptance of the roofing substrate, the name of the manufacturer's technical representatives, the frequency of the onsite visits, distribution of copies of the inspection reports from the manufacturer's technical representative;
- d. Contractor's plan for coordination of the work of the various trades involved in providing the roofing system and other components secured to the roofing; and
- e. Quality control plan for the roof system installation;
- f. Safety requirements.

Preroofing conference scheduling shall be coordinated with the Contracting Officer. The conference shall be attended by the Contractor, the Contracting Officer's designated personnel, personnel directly responsible

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

for the installation of roofing and insulation, flashing and sheet metal work, mechanical and electrical work, other trades interfacing with the roof work, and a representative of the roofing materials manufacturer. Before beginning roofing work, provide a copy of meeting notes and action items to all attending parties. Note action items requiring resolution prior to start of roof work.

## 1.5 DELIVERY, STORAGE, AND HANDLING

### 1.5.1 Delivery

Deliver materials in their original, unopened containers or wrappings with labels intact and legible. Where materials are covered by a referenced specification number, the labels shall bear the specification number, type, class, and shelf life expiration date where applicable. Deliver materials in sufficient quantity to allow continuity of work.

### 1.5.2 Storage

Store and protect materials from damage and weather in accordance with manufacturer's instructions, except as specified otherwise. Keep materials clean and dry. Store and maintain adhesives, sealants, primers and other liquid materials above 60 degrees F. Insulated hot boxes or other enclosed warming devices may be required in cold weather subject to TPO membrane roofing manufacturer's printed instruction. Mark and remove damaged materials from the site. Use pallets to support and canvas tarpaulins to completely cover material materials stored outdoors. Do not use polyethylene as a covering. Locate materials temporarily stored on the roof in approved areas and distribute the load to stay within the live load limits of the roof construction. Remove unused materials from the roof at the end of each days work.

### 1.5.3 Handling

Prevent damage to roll materials. Damaged materials shall not be installed in the work. Select and operate material handling equipment so as not to damage materials or applied roofing. Do not use materials contaminated by exposure, incompatible materials or moisture. Remove contaminated materials from the site. When hazardous materials are involved, conform with the special precautions of the manufacturer. Adhesives may contain petroleum distillates and may be extremely flammable; prevent personnel from breathing vapors, and do not use near sparks or open flame.

## 1.6 ENVIRONMENTAL REQUIREMENTS

Follow manufacturer's printed instructions for installation during cold weather conditions.

## 1.7 SEQUENCING

Coordinate the work with other trades to ensure that components which are to be secured to or stripped into the roofing system are available and that permanent flashing and counterflashing are installed as the work progresses. Ensure temporary protection measures are in place to preclude moisture intrusion or damage to installed materials. Application of roofing shall immediately follow application of insulation as a continuous operation. Roofing operations shall be coordinated with insulation work so that all roof insulation applied each day is covered with roof membrane



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

installation the same day.

#### 1.8 WARRANTY

Provide a Full System Roof Warranty covering all TPO membrane roof system components as well as their installation workmanship and meeting all specified requirements. Revision or amendment to standard full system TPO membrane manufacturer warranty shall be provided as required to comply with the specified requirements.

##### 1.8.1 TPO Membrane Manufacturer's Full Roof System Warranty

Furnish roof membrane manufacturer's 20-year, no dollar limit, full roof system materials and installation workmanship warranty, including all flashing, insulation, and accessory materials necessary to construct a complete, watertight roof system. The warranty shall run directly from the roof system manufacturer to the Government and commence at time of Government's acceptance of the roof work. The warranty shall state that:

- a. If within the warranty period the roof system, as installed for its intended use in the normal climatic and environmental conditions of the facility, becomes non-watertight, shows evidence of moisture intrusion within the assembly, splits, tears, cracks, delaminates, separates at the seams, shrinks to the point of significant bridging or tenting membrane at transitions, or shows evidence of excessive weathering due to defective materials or installation workmanship, the repair or replacement of the defective and damaged materials of the roof system assembly and correction of defective workmanship shall be the responsibility of the roof membrane manufacturer. All costs associated with the repair or replacement work shall be the responsibility of the roof membrane manufacturer.
- b. When the manufacturer and his approved applicator fail to perform the repairs within 72 hours of notification, emergency temporary repairs performed by others shall not void the warranty.

##### 1.8.2 Roofing System Installer Warranty

The roof system installer shall warrant for a period of not less than two (2) years that the roof system, as installed, is free from defects in installation workmanship, to include the roof membrane, flashing, insulation, accessories, all attachments, including installation of all TPO membrane manufacturer-supplied edge metal which is always integral to a complete watertight roof system assembly. The warranty shall run directly to the Government. Correction of defective workmanship and replacement of damaged or affected materials shall be the responsibility of the roof system installer. All costs associated with the repair or replacement work shall be the responsibility of the installer.

##### 1.8.3 Continuance of Warranty

Any repair or replacement work that becomes necessary within the warranty period shall be approved by the roof membrane manufacturer and accomplished in a manner so as to restore the integrity of the roof system assembly and the validity of the roof membrane manufacturer warranty for the remainder of the manufacturer warranty period.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.8.4 Single-Source Contract Liability Warranty

The specified, single-source contract liability warranty of a TPO membrane roofing system manufacturer shall be furnished to the Government upon project completion. The single-source contract liability warranty shall encompass all roof system components' warranty performance coverage's, including all performance guarantees for roof system materials, roof system design and all roof system installation labor and workmanship. The single-source contract liability warranty shall be a Full Roof System Warranty that is issued by either the TPO membrane roof system manufacturer, or by a direct affiliate of the TPO membrane roof system manufacturer (100 percent owned affiliate), or by an agent of the TPO membrane roof system manufacturer possessing the authority to contractually bind the TPO membrane roof system manufacturer (manufacturer, affiliate and agent are collectively referred to as "Roofing System Supplier") and to, at said agent's discretion, underwrite and/or provide for insurance covering all of the respective warranty obligations of the TPO membrane manufacturer's Full Roof System Warranty.

- a. The Government intends to sign a contract binding all warranty and associated roof system performance guarantees of the roofing system directly with the TPO membrane roofing manufacturer, or its subsidiary, or an exclusive agent capable of enjoining said TPO membrane manufacturer; and
- b. This roofing system shall be applied only by a roofing system Applicator authorized by the TPO membrane roofing manufacturer prior to bid; and
- c. Bids must be submitted with approved [detail drawings](#) and specifications approved and furnished by the TPO membrane manufacturer, and
- d. There shall be no deviation made from the contract specification or the approved shop/detail drawings without prior written approval by the both TPO membrane roofing material manufacturer/subsidiary and by the Government; and
- e. All work shall be completed by personnel trained and authorized by the TPO membrane roof manufacturer.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- a. Coordinate with other specification sections related to the roof work. Furnish a combination of specified materials that comprise a roof system acceptable to the roof membrane manufacturer and meeting specified requirements. Materials provided shall be free of defects and suitable for the service and climatic conditions of the installation. All warranted roof system components must be sourced from the TPO roof membrane manufacturer, including but not limited to all insulation, protection boards, accessories, adhesives and edge metal.
- b. For each roof, furnish a typewritten [information card](#) for facility records and a card laminated in plastic and framed for interior display at roof access point, or a photoengraved [0.032 inch](#) thick aluminum card for exterior display. Card shall be [8 1/2 by 11 inches](#)

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

minimum. Information card shall identify facility name and number; location; contract number; approximate roof area; detailed roof system description, including deck type, membrane, method of application, manufacturer, insulation and protection board system and thickness; date of completion; installing Contractor identification and contact information; membrane manufacturer warranty expiration, warranty reference number, and contact information. Install card at roof top or access location as directed by the Contracting Officer and provide a paper copy to the Contracting Officer.

#### 2.1.1.1 Water Cutoff Mastic/Water Block

As supplied by the roof membrane manufacturer and recommended by the manufacturer's printed data.

#### 2.1.1.2 Membrane Flashing

Membrane flashing, including self-adhering membrane flashing, perimeter flashing, flashing around roof penetrations and prefabricated pipe seals, shall be [minimum polymer thickness 0.045 inch](#) (45 mils) reinforced TPO for 5, 10, 15 year warranties, and shall be utilized as recommended and supplied by the roof membrane manufacturer or minimum [0.060 inch](#) (60 mils) thick reinforced TPO roof membrane and flashings for 20 year warranties.

#### 2.1.1.3 Membrane Fasteners and Plates

Coated, corrosion-resistant fasteners as recommended and supplied by the TPO roof membrane manufacturer and meeting the requirements of [FM 4470](#) and [FM RoofNav](#) ([www.roofnav.com](http://www.roofnav.com)) or [FM P7825](#) for Class I roof deck construction and the wind uplift resistance specified. Fasteners and Plates to be supplied and warranted for the substrate type(s) by TPO membrane manufacturer and recommended by TPO membrane manufacturer's printed data.

#### 2.1.3.1 Stress Plates, Bar or Rail for Fasteners

Corrosion-resistant stress plates as recommended by the roof membrane manufacturer's printed instructions and meeting the requirements of [FM 4470](#) must be utilized and must be supplied by TPO roof membrane manufacturer. Stress plates shall be formed to prevent dishing or cupping. Manufacturer-supplied anchoring bar or rails may be utilized for high wind conditions.

#### 2.1.3.2 Auxiliary Fasteners

Corrosion resistance screws, nails, or anchors must be suitable for intended attachment purpose and be recommended and supplied for use by the TPO roof membrane manufacturer.

#### 2.1.4 Pre-manufactured Accessories

Pre-manufactured accessories shall be manufacturer's standard for intended purpose, must comply with applicable specification section, be compatible with the membrane roof system and approved for use and supplied by the TPO roof membrane manufacturer. Prefabricated Curbs shall be 24 gauge G90 galvanized or AZ55 galvalume with minimum [4 inch](#) flange for attachment to roof nailers. Curbs shall provide minimum height of [10 inches](#) above the finished roof membrane surface.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.1.5 TPO Walkway Pad

Provide the following:

##### 2.1.5.1 TPO Walkway Pad

Non-reinforced 0.156 inch thickness TPO membrane with a textured surface, compatible with and supplied by manufacturer of the TPO roof membrane.

#### 2.1.6 Roof Insulation

Insulation system and facer material shall be compatible with membrane application specified and be approved and supplied by the TPO membrane roof manufacturer and as specified in Section 07 22 00 ROOF AND DECK INSULATION.

#### 2.1.7 Wood Products

As specified in Section 06 10 00 ROUGH CARPENTRY, except that fire-retardant treated materials shall not be in contact with TPO membrane or TPO accessory products, unless approved by the membrane manufacturer and the Contracting Officer.

### 2.2 ENERGY STAR-Labeled, Reinforced, TPO Membrane

Reinforced thermoplastic polyolefin (TPO) membrane shall contain fibers or scrim and shall provide 0.060 inch minimum thickness for adhered application. Notwithstanding the ASTM standards referenced, reinforced TPO roof membranes provided under this section shall have the minimum, labeled thickness specified. Principal polymer used in manufacture of the membrane sheet shall be TPO. Width and length of TPO membrane roofing sheet shall be consistent with membrane attachment methods and wind uplift requirements and shall be as large as practical. In order to minimize joints and 3-way overlaps, prefabricated sheets are not accepted. Maximum reinforced TPO membrane roofing sheet dimensions to be the maximum width obtainable from TPO membrane roof manufacturer in order to minimize seams in the field of the roof.

#### 2.2.1 Physical Properties

Membrane shall exhibit the following properties in accordance with ASTM D6878:

Property	Unaged Properties Test Method	Nominal
Breaking Strength	ASTM D751	350 lbf
Elongation at Reinforcement break	ASTM D751	30%
Tearing Strength	ASTM D751 (8x8 inch specimen)	86 lbf
Brittleness Point	ASTM D2137	-50°F
Linear Dimension Change	ASTM D1204 (6 hrs @70° C)	±0.15%
Ozone Resistance	ASTM D1149	PASS (no cracks)
Factory Seam Strength	ASTM D751	65 lbf
Puncture Resistance	FTM 101C Method 2031	265 lbf
Solar Reflectance	ASTM C1549	0.79

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Solar Emittance	ASTM C1371	0.85
Solar Reflective Index	ASTM E1980	97

Property	Heat Aged Properties	
	Test Method	Typical
Breaking Strength	ASTM D751	350 lbf
Elongation at Reinforcement break	ASTM D751	30%
Tearing Strength	ASTM D751 (8x8 inch specimen)	86 lbf
Weight Change (Membrane)	ASTM D471	1% (change in mass)

Property	Aged Properties	
	Test Method	Typical
Ozone Resistance	ASTM D1149	PASS (No cracks)
Weather resistance (Retained Values)	ASTM G151/ ASTM G154	
Visual Inspection		PASS
Breaking Strength, % min.		90% retained
Elongation at Reinforcement Break	ASTM D751	90% retained
Resistance to Xenon-Arc Weathering	ASTM G151 ASTM G155	PASS

### PART 3 EXECUTION

#### 3.1 EXAMINATION

Ensure that the following conditions exist prior to application of the roofing materials:

- a. Curbs, roof penetrating components, and equipment supports are in place.
- b. Surfaces are rigid, clean, dry, smooth, and free from cracks, holes, and sharp changes in elevation.
- c. Substrate is sloped to provide positive drainage.
- d. Walls and vertical surfaces are constructed to receive counterflashing and will permit mechanical fastening of the base flashing materials.
- e. Treated wood nailers are in place on non-nailable surfaces, to permit nailing of base flashing at minimum height of 8 inches above finished roofing surface.
- f. Pressure-preservative treated wood nailers are fastened in place at eaves, gable ends, openings, and intersections with vertical surfaces for securing of membrane, edging strips, attachment flanges of sheet metal, and roof fixtures. Surface-applied nailers are the same thickness as the roof insulation.
- g. Avoid contact of TPO materials with fire retardant treated wood,

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

except as approved by the TPO membrane roof manufacturer and Contracting Officer.

- j. Insulation and protection boards are installed smoothly and evenly, and are not broken, cracked, or curled. There are no gaps in insulation board joints exceeding 1/4 inch in width. Insulation is attached as specified in Section 07 22 00 ROOF AND DECK INSULATION. Insulation is being roofed over on the same day the insulation is installed.

### 3.2 APPLICATION METHOD

Apply entire TPO membrane roofing utilizing adhered application method. Apply roofing materials as specified herein unless approved otherwise by the Contracting Officer.

#### 3.2.1 Special Precautions

- a. Do not dilute coatings or sealants unless specifically recommended by the material manufacturer's printed application instructions. Do not thin liquid materials or cleaners used for cleaning TPO sheet.
- b. Keep liquids in airtight containers, and keep containers closed except when removing materials.
- c. Use liquid components, including adhesives, within their shelf life period. Store adhesives at 60 to 80 degrees F prior to use. Avoid excessive adhesive application and adhesive spills, as they can be destructive to some thermoplastic sheets and insulations; follow adhesive manufacturer's printed application instructions. Mix and use liquid components in accordance with label directions and manufacturer's printed instructions.
- d. Provide clean, dry cloths or pads for applying membrane cleaners and cleaning of membrane.
- e. Do not use heat guns or open flame to expedite drying of adhesives or primers.
- f. Require workmen and others who walk on the membrane to wear clean, soft-soled shoes to avoid damage to roofing materials.
- g. Do not use equipment with sharp edges which could puncture the TPO membrane roofing sheet.
- h. Shut down air intakes and any related mechanical systems and seal open vents and air intakes when applying solvent-based materials in the area of the opening or intake. Coordinate shutdowns with the Contracting Officer.

#### 3.2.2 TPO Roofing Membrane

Membrane shall be placed directly on protection board. Membrane shall be overlapped a minimum of 3 inches at sides and minimum 4 inches at ends. Where possible, direction of laps shall allow water to flow over and not into the lap. Membrane joints shall be free of wrinkles and fishmouths. The entire length of hot-air-welded seams shall be probe-tested and corrected during the day of installation. Defective areas shall be re-welded. Wrinkles, fishmouths, or damaged areas shall be cut out and the area covered with membrane using a continuous hot-air-welded seam on

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

all sides. Repairs shall be probe-tested for continuity. Hot-air-welded seams are to be accomplished in accordance with the TPO membrane roofing manufacturer's published requirements.

#### 3.2.2.1 Nailing

Membrane shall be fastened to nailers in accordance with the membrane manufacturer's approved instructions. Unless otherwise specified, nails shall be staggered on **4-inch** centers maximum; screws for sheet metal shall be staggered on **8-inch** centers maximum; and a row of fasteners shall be at least **1/2 inch** from edges of sheet metal.

#### 3.2.2.2 Flashing

Roof edges, projections through the roof and changes in roof planes shall be flashed. The seam shall be sealed a minimum of **3 inches** beyond the fasteners which attach the membrane to nailers. The installed flashings shall be secured at the top of the flashing a maximum of **12 inches** on centers under the counterflashing or cap. Where possible, prefabricated components shall be used for pipe seals and flashing accessories.

#### 3.2.2.3 Cutoffs

If work is terminated prior to weatherproofing the entire roof, the membrane shall be sealed to the roof deck. Flutes in metal decking shall be sealed off along the cutoff edge. Membrane shall be pulled free or cut to expose the insulation when resuming work and cut insulation sheets used for fill-in shall be removed. Asphalt or coal-tar products shall not be used for sealing.

#### 3.2.2.4 Walkway Pads

Walkway pads shall be installed on the membrane material, and heat welded to the roof membrane.

#### 3.2.3 Perimeter Attachment

Adhesive bond or mechanically secure roof membrane sheet at roof perimeter in a manner to comply with wind resistance requirements and in accordance with membrane manufacturer's printed application instructions. When adhesively bonding a mechanically fastened system in perimeter areas, the perimeter boundary of the adhesive bond shall be the same as the boundary required for additional perimeter mechanical fastening to meet wind resistance requirements.

#### 3.2.4 Securement at Base Tie-In Conditions

Mechanically fasten the roof membrane at penetrations, at base of curbs and walls, and at all locations where the membrane turns and angles greater than 4 degrees (1:12). Space fasteners a maximum of **12 inches** on center, except where more frequent attachment is required to meet specified wind resistance or where recommended by the roof membrane manufacturer. Cover over fasteners with a layer of flashing material. Hot-air-weld all seams of flashing material as recommended by the roof membrane manufacturer's printed data.

#### 3.2.5 Membrane Flashing

- a. Install flashing and flashing accessories as the roof membrane is

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

installed. Apply flashing to cleaned surfaces and as recommended by the roof membrane manufacturer and as specified. Utilize reinforced TPO membrane flashing and prefabricated accessory flashing's as recommended by the roof membrane manufacturer.

- b. Completely adhere flashing sheets in place. Hot-air-weld the seams of flashing membrane in the same manner as roof membrane, except as otherwise recommended by the membrane manufacturer's printed instructions and approved by the Contracting Officer. Mechanically fasten top edge of base flashing with manufacturer recommended termination bar fastened at maximum 12 inches on center. Sheet metal counter-flashing shall be installed over the termination bar in the completed work. Mechanically fasten top edge of base flashing for all other terminations in a manner recommended by the roof membrane manufacturer. Apply reinforced TPO flashing membrane over top of exposed nailers and blocking and to overlap top edge of base flashing installation at curbs and as otherwise indicated. Metal flashings are specified under Section 07 60 00 FLASHING AND SHEET METAL.

### 3.2.6 Prefabricated Curbs

Prefabricated curbs shall be securely anchored to nailer or other base substrate and flashed with TPO membrane flashing materials.

#### 3.2.6.1 Set-On Accessories

Where pipe or conduit blocking, supports and similar roof accessories are set on the membrane, adhere reinforced membrane or walkway material, as recommended by the roof membrane manufacturer, to bottom of accessories prior to setting on roofing membrane. Specific method of installing set-on accessories must permit normal movement due to expansion, contraction, vibration, and similar occurrences without damaging roofing membrane. Do not mechanically secure set-on accessories through roofing membrane into roof deck substrate.

### 3.2.7 Roof Walkway Pads

Install walkway pads where otherwise indicated for traffic areas and for access to mechanical equipment, in accordance with the TPO membrane roof manufacturer's printed instructions.

### 3.2.8 Correction of Deficiencies

Where any form of deficiency is found, additional measures shall be taken as deemed necessary by the Contracting Officer to determine the extent of the deficiency and corrective actions shall be as directed by the Contracting Officer.

### 3.2.9 Clean Up

Remove debris, scraps, containers and other rubbish and trash resulting from installation of the roofing system from job site each day.

## 3.3 PROTECTION OF APPLIED ROOFING

At the end of the day's work and when precipitation is imminent, protect applied membrane roofing system from water intrusion.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.3.1 Water Cutoffs

Straighten insulation line using loose-laid cut insulation sheets and seal the terminated edge of the roof membrane system in an effective manner. Seal off flutes in metal decking along the cutoff edge. Remove the water cut-offs to expose the insulation when resuming work, and remove the insulation sheets used for fill-in.

### 3.3.2 Temporary Flashing for Permanent Roofing

Provide temporary flashing at curbs, walls and other penetrations and terminations of roofing sheets until permanent flashings can be applied. Remove temporary flashing before applying permanent flashing.

### 3.3.3 Temporary Walkways, Runways, and Platforms

Do not permit storing, walking, wheeling, and trucking directly on applied roofing system. Provide temporary walkways, runways, and platforms of smooth clean boards, mats or planks as necessary to avoid damage to applied roofing materials, and to distribute weight to conform to live load limits of roof construction. Use rubber-tired equipment for roofing work.

## 3.4 FIELD QUALITY CONTROL

### 3.4.1 Construction Monitoring

During progress of the roof work, make visual inspections as necessary to ensure compliance with specified parameters. Additionally, verify the following:

- a. Equipment is in working order. Metering devices are accurate.
- b. Materials are not installed in adverse weather conditions.
- c. Substrates are in acceptable condition, in compliance with specification, prior to application of subsequent materials.
  1. Nailers and blocking are provided where and as needed.
  2. Insulation substrate is smooth, properly secured to its substrate, and without excessive gaps prior to membrane application.
  3. The proper number, type, and spacing of fasteners are installed.
  4. Materials comply with the specified requirements.
  5. All materials are properly stored, handled and protected from moisture or other damages. Liquid components are properly mixed prior to application.
  6. Adhesives are applied uniformly to both mating surfaces and checked for proper set prior to bonding mating materials. Mechanical attachments are spaced as required, including additional fastening of membrane in corner and perimeter areas as required.
  7. Membrane is properly overlapped.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

8. Membrane seaming is as specified by TPO membrane manufacturer. All seams are checked at the end of each work day.
9. Applied membrane is inspected and repaired as necessary prior to paver installation.
10. Membrane is adhered without ridges, wrinkles, kinks, fishmouths.
11. Installer adheres to specified and detailed application parameters.
12. Associated flashing's and sheet metal are installed in a timely manner in accord with the specified requirements.
13. Temporary protection measures are in place at the end of each work shift.

#### 3.4.2 Manufacturer's Inspection

Manufacturer's technical representative shall visit the site a minimum of three times during the installation for purposes of reviewing materials installation practices and adequacy of work in place. Inspections shall occur during the first 20 squares of membrane installation, at mid-point of the installation, and at substantial completion, at a minimum. After each inspection, a report, signed by the manufacturer's technical representative shall be submitted by the roofing Contractor to the Contracting Officer within 3 working days. The report shall note overall quality of work, deficiencies and any other concerns, and recommended corrective action.

#### 3.5 INSTRUCTIONS TO GOVERNMENT PERSONNEL

Furnish written and verbal instructions on proper maintenance procedures to designated Government personnel. Furnish instructions by a competent representative of the roof membrane manufacturer and include a minimum of 4 hours on maintenance and emergency repair of the membrane. Include a demonstration of membrane repair and give sources of required special tools. Furnish information on safety requirements during maintenance and emergency repair operations.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 07 60 00

## FLASHING AND SHEET METAL

05/17, CHG 2: 11/18

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN WELDING SOCIETY (AWS)

AWS D1.2/D1.2M (2014; Errata 1 2014; Errata 2 2020)  
Structural Welding Code - Aluminum

## ASTM INTERNATIONAL (ASTM)

ASTM A308/A308M (2010) Standard Specification for Steel  
Sheet, Terne (Lead-Tin Alloy) Coated by  
the Hot Dip Process

ASTM A480/A480M (2020a) Standard Specification for General  
Requirements for Flat-Rolled Stainless and  
Heat-Resisting Steel Plate, Sheet, and  
Strip

ASTM A653/A653M (2020) Standard Specification for Steel  
Sheet, Zinc-Coated (Galvanized) or  
Zinc-Iron Alloy-Coated (Galvannealed) by  
the Hot-Dip Process

ASTM B32 (2020) Standard Specification for Solder  
Metal

ASTM B69 (2020) Standard Specification for Rolled  
Zinc

ASTM B101 (2012; R 2019) Standard Specification for  
Lead-Coated Copper Sheet and Strip for  
Building Construction

ASTM B209 (2014) Standard Specification for Aluminum  
and Aluminum-Alloy Sheet and Plate

ASTM B221 (2020) Standard Specification for Aluminum  
and Aluminum-Alloy Extruded Bars, Rods,  
Wire, Profiles, and Tubes

ASTM B370 (2012; R 2019) Standard Specification for  
Copper Sheet and Strip for Building  
Construction

ASTM D41/D41M (2011; R 2016) Standard Specification for  
Asphalt Primer Used in Roofing,  
Dampproofing, and Waterproofing

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

ASTM D226/D226M	(2017) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D1784	(2020) Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
ASTM D4586/D4586M	(2007; E 2012; R 2012) Asphalt Roof Cement, Asbestos-Free

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION  
(SMACNA)

SMACNA 1793	(2012) Architectural Sheet Metal Manual, 7th Edition
-------------	--

## 1.2 GENERAL REQUIREMENTS

Finished sheet metal assemblies must form a weathertight enclosure without waves, warps, buckles, fastening stresses or distortion, while allowing for expansion and contraction without damage to the system. The sheet metal installer is responsible for cutting, fitting, drilling, and other operations in connection with sheet metal modifications required to accommodate the work of other trades. Coordinate installation of sheet metal items used in conjunction with roofing with roofing work to permit continuous, uninterrupted roofing operations.

## 1.3 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

### SD-02 Shop Drawings

Exposed Sheet Metal Coverings; G

Downspouts; G

Expansion Joints; G

Base Flashing; G

Counterflashing; G

Flashing at Roof Penetrations and Equipment Supports; G

Reglets; G

Scuppers; G

Copings; G

Drip Edges; G

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Conductor Heads; G

SD-04 Samples

Finish Samples; G

SD-08 Manufacturer's Instructions

Instructions for Installation; G

Quality Control Plan; G

SD-10 Operation and Maintenance Data

Cleaning and Maintenance; G

#### 1.4 MISCELLANEOUS REQUIREMENTS

##### 1.4.1 Product Data

Indicate thicknesses, dimensions, fastenings, anchoring methods, expansion joints, and other provisions necessary for thermal expansion and contraction. Scaled manufacturer's catalog data may be submitted for factory fabricated items.

##### 1.4.2 Finish Samples

Submit two color charts and two finish sample chips from manufacturer's standard color and finish options for each type of finish indicated.

##### 1.4.3 Operation and Maintenance Data

Submit detailed [instructions for installation](#) and quality control during installation, [cleaning and maintenance](#), for each type of assembly indicated.

#### 1.5 DELIVERY, HANDLING, AND STORAGE

Package and protect materials during shipment. Uncrate and inspect materials for damage, dampness, and wet-storage stains upon delivery to the job site. Remove from the site and replace damaged materials that cannot be restored to like-new condition. Handle sheet metal items to avoid damage to surfaces, edges, and ends. Store materials in dry, weather-tight, ventilated areas until installation.

### PART 2 PRODUCTS

#### 2.1 MATERIALS

Do not use lead, lead-coated metal, or galvanized steel. Use any metal listed by [SMACNA 1793](#) for a particular item, unless otherwise indicated. Provide materials, thicknesses, and configurations in accordance with [SMACNA 1793](#) for each material. Different items need not be of the same metal, except that contact between dissimilar metals must be avoided.

Furnish sheet metal items in [8 to 10 foot](#) lengths. Single pieces less than [8 feet](#) long may be used to connect to factory-fabricated inside and outside corners, and at ends of runs. Factory fabricate corner pieces

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

with minimum 12 inch legs. Provide accessories and other items essential to complete the sheet metal installation. Provide accessories made of the same or compatible materials as the items to which they are applied. Fabricate sheet metal items of the materials specified below and to the gage, thickness, or weight shown in Table I at the end of this section. Provide sheet metal items with mill finish unless specified otherwise. Where more than one material is listed for a particular item in Table I, each is acceptable and may be used, except as follows:

#### 2.1.1 Exposed Sheet Metal Items

Must be of the same material. Consider the following as exposed sheet metal: downspouts; cap, base, and parapet flashings and related accessories.

#### 2.1.2 Drainage

Do not use copper for an exposed item if drainage from that item will pass over exposed masonry, stonework or other metal surfaces. In addition to the metals listed in Table I, lead-coated copper may be used for such items.

#### 2.1.3 Copper, Sheet and Strip

Provide in accordance with ASTM B370, cold-rolled temper, H 00 (standard).

#### 2.1.4 Lead-Coated Copper Sheet

Provide in accordance with ASTM B101.

#### 2.1.5 Lead Sheet

Provide in a minimum weight of 4 pounds per square foot.

#### 2.1.6 Steel Sheet, Zinc-Coated (Galvanized)

Provide in accordance with ASTM A653/A653M.

#### 2.1.7 Zinc Sheet and Strip

Provide in accordance with ASTM B69, Type I, a minimum of 0.024 inch thick.

#### 2.1.8 Stainless Steel

Provide in accordance with ASTM A480/A480M, Type 302 or 304, 2D Finish, fully annealed, dead-soft temper.

#### 2.1.9 Terne-Coated Steel

Provide in accordance with ASTM A308/A308M, a minimum of 14 by 20 inch with minimum of 40 pound coating per double base box. ASTM A308/A308M.

#### 2.1.10 Aluminum Alloy Sheet and Plate

Provide in accordance with ASTM B209 color to match adjacent material form alloy, and temper appropriate for use. Provide material not less than 0.065-in in thickness.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.1.10.1 Alclad

When fabricated of aluminum, fabricate the following items with Alclad 3003, Alclad 3004, or Alclad 3005, clad on both sides unless otherwise indicated.

- a. Gutters, downspouts, and hangers
- b. Gravel stops and fascia
- c. Flashing

#### 2.1.11 Finishes

Provide exposed exterior sheet metal and aluminum with a baked on, factory applied color coating of polyvinylidene fluoride (PVF2) or approved equal fluorocarbon coating. Dry film thickness of coatings must be 0.8 to 1.3 mils. Color to match adjacent surface material. Field applications of color coatings are prohibited and will be rejected.

#### 2.1.12 Aluminum Alloy, Extruded Bars, Rods, Shapes, and Tubes

ASTM B221.

#### 2.1.13 Solder

Provide in accordance with ASTM B32, 95-5 tin-antimony.

#### 2.1.14 Reglets

##### 2.1.14.1 Polyvinyl Chloride Reglets

Provide in accordance with ASTM D1784, Type II, Grade 1, Class 14333-D, 0.075 inch minimum thickness.

##### 2.1.14.2 Metal Reglets

Provide factory fabricated caulked type or friction type reglets with a minimum opening of 1/4 inch and a depth of 1-1/4 inch, as approved.

##### 2.1.14.2.1 Caulked Reglets

Provide with rounded edges, temporary reinforcing cores, and accessories as required for securing to adjacent construction. Provide built-up mitered corner pieces for inside and outside corners.

##### 2.1.14.2.2 Friction Reglets

Provide with flashing receiving slots not less than 5/8 inch deep, one inch jointing tongues, and upper and lower anchoring flanges installed at 24 inch maximum snap-lock type receiver.

#### 2.1.15 Scuppers

Line interiors of scupper openings with sheet metal. Provide a drip edge at bottom edges with returns of not less than one inch against the face of the outside wall at the top and sides. Provide the perimeter of the lining approximately 1/2 inch less than the perimeter of the scupper.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.1.16 Conductor Heads

Provide conductor heads and screens in the same material as downspouts. Provide outlet tubes not less than 4 inches long.

#### 2.1.17 Splash Pans

Provide splash pans where downspouts discharge onto roof surfaces and at locations indicated. Unless otherwise indicated, provide pans not less than 24 inches long by 18 inches wide with metal ribs across bottoms of pans. Provide sides of pans with vertical baffles not less than one inch high in the front, and 4 inches high in the back.

#### 2.1.18 Copings

Unless otherwise indicated, provide copings in copper sheets, 8 or 10 feet long, joined by a 3/4 inch locked and soldered seam.

#### 2.1.19 Bituminous Plastic Cement

Provide in accordance with ASTM D4586/D4586M, Type I.

#### 2.1.20 Roofing Felt

Provide in accordance with ASTM D226/D226M Type I.

#### 2.1.21 Asphalt Primer

Provide in accordance with ASTM D41/D41M.

#### 2.1.22 Fasteners

Use the same metal as, or a metal compatible with the item fastened. Use stainless steel fasteners to fasten. Confirm compatibility of fasteners and items to be fastened to avoid galvanic corrosion due to dissimilar materials.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

##### 3.1.1 Workmanship

Make lines and angles sharp and true. Free exposed surfaces from visible wave, warp, buckle, and tool marks. Fold back exposed edges neatly to form a 1/2 inch hem on the concealed side. Make sheet metal exposed to the weather watertight with provisions for expansion and contraction.

Make surfaces to receive sheet metal plumb and true, clean, even, smooth, dry, and free of defects and projections. For installation of items not shown in detail or not covered by specifications conform to the applicable requirements of SMACNA 1793, Architectural Sheet Metal Manual. Provide sheet metal flashing in the angles formed where roof decks abut walls, curbs, ventilators, pipes, or other vertical surfaces and wherever indicated and necessary to make the work watertight. Join sheet metal items together as shown in Table II.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.1.2 Nailing

Confine nailing of sheet metal generally to sheet metal having a maximum width of 18 inches. Confine nailing of flashing to one edge only. Space nails evenly not over 3 inch on center and approximately 1/2 inch from edge unless otherwise specified or indicated. Face nailing will not be permitted. Where sheet metal is applied to other than wood surfaces, include in shop drawings, the locations for sleepers and nailing strips required to secure the work.

### 3.1.3 Cleats

Provide cleats for sheet metal 18 inches and over in width. Space cleats evenly not over 12 inches on center unless otherwise specified or indicated. Unless otherwise specified, provide cleats of 2 inches wide by 3 inches long and of the same material and thickness as the sheet metal being installed. Secure one end of the cleat with two nails and the cleat folded back over the nailheads. Lock the other end into the seam. Where the fastening is to be made to concrete or masonry, use screws and drive in expansion shields set in concrete or masonry. Pre-tin cleats for soldered seams.

### 3.1.4 Bolts, Rivets, and Screws

Install bolts, rivets, and screws where indicated or required. Provide compatible washers where required to protect surface of sheet metal and to provide a watertight connection. Provide mechanically formed joints in aluminum sheets 0.040 inches or less in thickness.

### 3.1.5 Seams

Straight and uniform in width and height with no solder showing on the face.

#### 3.1.5.1 Flat-lock Seams

Finish not less than 3/4 inch wide.

#### 3.1.5.2 Lap Seams

Finish soldered seams not less than one inch wide. Overlap seams not soldered, not less than 3 inches.

#### 3.1.5.3 Loose-Lock Expansion Seams

Not less than 3 inches wide; provide minimum one inch movement within the joint. Completely fill the joints with the specified sealant, applied at not less than 1/8 inch thick bed.

#### 3.1.5.4 Flat Seams

Make seams in the direction of the flow.

### 3.1.6 Soldering

Where soldering is specified, apply to copper, terne-coated stainless steel, zinc-coated steel, and stainless steel items. Pre-tin edges of sheet metal before soldering is begun. Seal the joints in aluminum sheets of 0.040 inch or less in thickness with specified sealants. Do not

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

solder aluminum.

#### 3.1.6.1 Edges

Scrape or wire-brush the edges of lead-coated material to be soldered to produce a bright surface. Flux brush the seams in before soldering. Treat with soldering acid flux the edges of stainless steel to be pre-tinned. Seal the joints in aluminum sheets of 0.040 inch or less in thickness with specified sealants. Do not solder aluminum.

#### 3.1.7 Welding and Mechanical Fastening

Use welding for aluminum of thickness greater than 0.040 inch. Aluminum 0.040 inch or less in thickness must be butted and the space backed with formed flashing plate; or lock joined, mechanically fastened, and filled with sealant as recommended by the aluminum manufacturer.

##### 3.1.7.1 Welding of Aluminum

Use welding of the inert gas, shield-arc type. For procedures, appearance and quality of welds, and the methods used in correcting welding work, conform to AWS D1.2/D1.2M.

##### 3.1.7.2 Mechanical Fastening of Aluminum

Use No. 12, aluminum alloy, sheet metal screws or other suitable aluminum alloy or stainless steel fasteners. Drive fasteners in holes made with a No. 26 drill in securing side laps, end laps, and flashings. Space fasteners 12 inches maximum on center. Where end lap fasteners are required to improve closure, locate the end lap fasteners not more than 2 inches from the end of the overlapping sheet.

#### 3.1.8 Protection from Contact with Dissimilar Materials

##### 3.1.8.1 Copper or Copper-bearing Alloys

Paint with heavy-bodied bituminous paint surfaces in contact with dissimilar metal, or separate the surfaces by means of moistureproof building felts.

##### 3.1.8.2 Aluminum

Do not allow aluminum surfaces in direct contact with other metals except stainless steel, zinc, or zinc coating. Where aluminum contacts another metal, paint the dissimilar metal with a primer followed by two coats of aluminum paint. Where drainage from a dissimilar metal passes over aluminum, paint the dissimilar metal with a non-lead pigmented paint. Aluminum may be used over concrete construction, provided that required reglets are of stainless steel and aluminum surface in contact with concrete or masonry is coated with bituminous paint or zinc chromate primer.

##### 3.1.8.3 Metal Surfaces

Paint surfaces in contact with mortar, concrete, or other masonry materials with alkali-resistant coatings such as heavy-bodied bituminous paint.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 3.1.8.4 Wood or Other Absorptive Materials

Paint surfaces that may become repeatedly wet and in contact with metal with two coats of aluminum paint or a coat of heavy-bodied bituminous paint.

#### 3.1.9 Expansion and Contraction

Provide expansion and contraction joints at not more than 32 foot intervals for aluminum and at not more than 40 foot intervals for other metals. Provide an additional joint where the distance between the last expansion joint and the end of the continuous run is more than half the required interval. Space joints evenly. Join extruded aluminum gravel stops and fascia by expansion and contraction joints spaced not more than 12 feet apart.

#### 3.1.10 Base Flashing

Extend up vertical surfaces of the flashing not less than 8 inches and not less than 4 inches under the roof covering. Where finish wall coverings form a counterflashing, extend the vertical leg of the flashing up behind the applied wall covering not less than 6 inches. Overlap the flashing strips with the previously laid flashing not less than 3 inches. Fasten the strips at their upper edge to the deck. Horizontal flashing at vertical surfaces must extend vertically above the roof surface and fastened at their upper edge to the deck a minimum of 6 inches on center with hex headed, galvanized shielded screws a minimum of 2 inch lap of any surface. Solder end laps and provide for expansion and contraction. Extend the metal flashing over crickets at the up-slope side of vertical surfaces extending through sloping roofs, the metal flashings. Extend the metal flashings onto the roof covering not less than 4.5 inches at the lower side of vertical surfaces extending through the roof decks. Install and fit the flashings so as to be completely weathertight. Provide factory-fabricated base flashing for interior and exterior corners. Do not use metal base flashing on built-up roofing.

#### 3.1.11 Counterflashing

Except where indicated or specified otherwise, insert counterflashing in reglets located from 9 to 10 inches above roof decks, extend down vertical surfaces over upturned vertical leg of base flashings not less than 3 inches. Fold the exposed edges of counterflashings 1/2 inch. Where stepped counterflashings are required, they may be installed in short lengths a minimum 8 inches by 8 inches or may be of the preformed single piece type. Provide end laps in counterflashings not less than 3 inches and make it weathertight with plastic cement. Do not make lengths of metal counterflashings exceed 10 feet. Form flashings to the required shapes before installation. Factory form corners not less than 12 inches from the angle. Secure the flashings in the reglets with lead wedges and space not more than 18 inches apart; on short runs, place wedges closer together. Fill caulked-type reglets or raked joints which receive counterflashing with caulking compound. Turn up the concealed edge of counterflashings built into masonry or concrete walls not less than 1/4 inch and extend not less than 2 inches into the walls. Install counterflashing to provide a spring action against base flashing. Where bituminous base flashings are provided, extend down the counter flashing as close as practicable to the top of the cant strip. Factory form counter flashing to provide spring action against the base flashing.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.1.12 Metal Reglets

Keep temporary cores in place during installation. Ensure factory fabricated caulked type or friction type, reglets have a minimum opening of  $\frac{1}{4}$  inch and a minimum depth of  $1\frac{1}{4}$  inch, when installed.

#### 3.1.12.1 Caulked Reglets

Wedge flashing in reglets with lead wedges every 18 inches, caulked full and solid with an approved compound.

#### 3.1.12.2 Friction Reglets

Install flashing snap lock receivers at 24 inches on center maximum. When flashing has been inserted the full depth of the slot, caulk the slot, lock with wedges, and fill with sealant.

### 3.1.13 Polyvinyl Chloride Reglets for Temporary Construction

Rigid polyvinyl chloride reglets may be provided in lieu of metal reglets for temporary construction.

### 3.1.14 Gravel Stops and fascia

#### 3.1.14.1 Edge Strip

Hook the lower edge of fascia at least  $\frac{3}{4}$  inch over a continuous strip of the same material bent outward at an angle not more than 45 degrees to form a drip. Nail hook strip to a wood nailer at 6 inches maximum on center. Where fastening is made to concrete or masonry, use screws spaced 12 inches on center driven in expansion shields set in the concrete or masonry. Where horizontal wood nailers are slotted to provide for insulation venting, install strips to prevent obstruction of vent slots. Where necessary, install strips over  $\frac{1}{16}$  inch thick compatible spacer or washers.

#### 3.1.14.2 Joints

Leave open the section ends of gravel stops and fascia  $\frac{1}{4}$  inch and backed with a formed flashing plate, mechanically fastened in place and lapping each section end a minimum of 4 inches set laps in plastic cement. Face nailing will not be permitted. Install prefabricated aluminum gravel stops and fascia in accordance with the manufacturer's printed instructions and details.

### 3.1.15 Metal Drip Edges

Provide a metal drip edge, designed to allow water run-off to drip free of underlying construction, at eaves and rakes prior to the application of roofing shingles. Apply directly on the wood deck at the eaves and over the underlay along the rakes. Extend back from the edge of the deck not more than 3 inches and secure with compatible nails spaced not more than 10 inches on center along upper edge.

### 3.1.16 Downspouts

Space supports for downspouts according to the manufacturer's recommendation for the masonry or steel substrate. Types, shapes and sizes are indicated. Provide complete including elbows and offsets.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Provide downspouts in approximately 10 foot lengths. Provide end joints to telescope not less than 1/2 inch and lock longitudinal joints. Keep downspouts not less than one inch away from walls. Fasten to the walls at top, bottom, and at an intermediate point not to exceed 5 feet on center with leader straps or concealed rack-and-pin type fasteners. Form straps and fasteners of metal compatible with the downspouts.

#### 3.1.16.1 Terminations

Neatly fit into the drainage connection the downspouts terminating in drainage lines and fill the joints with a portland cement mortar cap sloped away from the downspout. Provide downspouts terminating in splash blocks with elbow-type fittings. Provide splash pans as specified.

#### 3.1.17 Scuppers

Extend the scupper liner through and project outside of, the wall it penetrates to form a bottom drip edge against the face of the wall. Fold outside edges under 1/2 inch on all sides. Join the top and sides of the lining on the roof deck side to a closure flange by a locked and soldered joint. Join the bottom edge by a locked and soldered joint to the closure flange, where required, form with a ridge to act as a gravel stop around the scupper inlet. Provide surfaces to receive the scupper lining and coat with bituminous plastic cement.

#### 3.1.18 Conductor Heads

Set the depth of the top opening equal to two-thirds of the width or the conductor head. Flat-lock solder seams. Where conductor heads are used in conjunction with scuppers, set the conductor a minimum of 2 inches wider than the scupper. Attach conductor heads to the wall with masonry fasteners. Securely fasten screens to heads.

#### 3.1.19 Sheet Metal Covering on Flat, Sloped, or Curved Surfaces

Except as specified or indicated otherwise, cover and flash all minor flat, sloped, or curved surfaces such as crickets, bulkheads, dormers and small decks with metal sheets of the material used for flashing; maximum size of sheets, 16 by 18 inches. Fasten sheets to sheathing with metal cleats. Lock seams and solder. Lock aluminum seams as recommended by aluminum manufacturer. Provide an underlayment of roofing felt for all sheet metal covering.

#### 3.1.20 Expansion Joints

Provide expansion joints in continuous sheet metal at 40 foot intervals for copper and stainless steel and at 32 foot intervals for aluminum. Provide evenly spaced joints. Provide an additional joint where the distance between the last expansion joint and the end of the continuous run is more than half the required interval spacing.

##### 3.1.20.1 Roof Expansion Joints

Consist of curb with wood nailing members on each side of joint, bituminous base flashing, metal counterflashing, and metal joint cover. Bituminous base flashing is specified in Roofing Section. Provide counterflashing as specified in paragraph COUNTERFLASHING, except as follows: Provide counterflashing with vertical leg of suitable depth to enable forming into a horizontal continuous cleat. Secure the inner edge

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

to the nailing member. Make the outer edge projection not less than **one inch** for flashing on one side of the expansion joint and be less than the width of the expansion joint plus **one inch** for flashing on the other side of the joint. Hook the expansion joint cover over the projecting outer edges of counterflashing. Provide roof joint with a joint cover of the width indicated. Hook and lock one edge of the joint cover over the shorter projecting flange of the continuous cleat, and the other edge hooked over and loose locked with the longer projecting flange.

#### 3.1.20.2 Floor and Wall Expansion Joints

Provide U-shape with extended flanges for expansion joints in concrete and masonry walls and in floor slabs.

#### 3.1.21 Flashing at Roof Penetrations and Equipment Supports

Provide metal flashing for all pipes, ducts, and conduits projecting through the roof surface and for equipment supports, guy wire anchors, and similar items supported by or attached to the roof deck.

#### 3.1.22 Single Pipe Vents

Set flange of sleeve in bituminous plastic cement and nail **3 inches** on center. Bend the top of sleeve over and extend down into the vent pipe a minimum of **2 inches**. For long runs or long rises above the deck, where it is impractical to cover the vent pipe with lead, use a two-piece formed metal housing. Set metal housing with a metal sleeve having a **4 inches** roof flange in bituminous plastic cement and nailed **3 inches** on center. Extend sleeve a minimum of **8 inches** above the roof deck and lapped a minimum of **3 inches** by a metal hood secured to the vent pipe by a draw band. Seal the area of hood in contact with vent pipe with an approved sealant.

#### 3.1.23 Stepped Flashing

Provide stepped flashing where sloping roofs surfaced with shingles abut vertical surfaces. Place separate pieces of base flashing in alternate shingle courses.

#### 3.1.24 Copings

Provide coping with locked and soldered seam. Terminate outer edges in edge strips. Install with sealed lap joints as indicated.

### 3.2 PAINTING

Touch ups in the field may be applied only after metal substrates have been cleaned and pretreated in accordance with manufacturer's written instructions and products.

Field-paint sheet metal for separation of dissimilar materials.

#### 3.2.1 Aluminum Surfaces

Clean with solvent and apply one coat of zinc-molybdate primer and one coat of aluminum paint.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.3 CLEANING

Clean exposed sheet metal work at completion of installation. Remove grease and oil films, handling marks, contamination from steel wool, fittings and drilling debris, and scrub-clean. Free the exposed metal surfaces of dents, creases, waves, scratch marks, and solder or weld marks.

### 3.4 REPAIRS TO FINISH

Scratches, abrasions, and minor surface defects of finish may be repaired in accordance with the manufacturer's printed instructions and as approved. Repair damaged surfaces caused by scratches, blemishes, and variations of color and surface texture. Replace items which cannot be repaired.

### 3.5 FIELD QUALITY CONTROL

Establish and maintain a [Quality Control Plan](#) for sheet metal used in conjunction with roofing to assure compliance of the installed sheet metalwork with the contract requirements. Remove work that is not in compliance with the contract and replace or correct. Include quality control, but not be limited to, the following:

- a. Observation of environmental conditions; number and skill level of sheet metal workers; condition of substrate.
- b. Verification that specified material is provided and installed.
- c. Inspection of sheet metalwork, for proper size(s) and thickness(es), fastening and joining, and proper installation.

#### 3.5.1 Procedure

Submit for approval prior to start of roofing work. Include a checklist of points to be observed. Document the actual quality control observations and inspections. Furnish a copy of the documentation to the Contracting Officer at the end of each day.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 07 81 00

## SPRAY-APPLIED FIREPROOFING

02/11

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## ASSOCIATION OF THE WALL AND CEILING INDUSTRY (AWCI)

AWCI TM 12-A (1997; 3rd Ed) Standard Practice for the Testing and Inspection of Field Applied Sprayed Fire-Resistive Materials; An Annotated Guide

## ASTM INTERNATIONAL (ASTM)

ASTM E84 (2020) Standard Test Method for Surface Burning Characteristics of Building Materials

ASTM E119 (2020) Standard Test Methods for Fire Tests of Building Construction and Materials

ASTM E605/E605M (1993; R 2015; E 2015) Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members

ASTM E736 (2000; R 2011) Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members

ASTM E759/E759M (1992; R 2020) Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members

ASTM E760/E760M (1992; R 2020) Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members

ASTM E761/E761M (1992; R 2020) Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members

ASTM E859/E859M (1993; R 2020) Standard Test Method for Air Erosion of Sprayed Fire-Resistive Materials (SFRMs) Applied to Structural

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### Members

ASTM E937/E937M	(1993; R 2020) Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members
ASTM E1042	(2002; R 2021) Standard Classification for Acoustically Absorptive Materials Applied by Trowel or Spray
ASTM G21	(2015; R 2021; E 2021) Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

#### ICC EVALUATION SERVICE, INC. (ICC-ES)

ICC-ES AC23	(2012; R 2016) Acceptance Criteria for Sprayed Fire-resistant Materials (SFRMs), Intumescent Fire-resistant Coatings and Mastic Fire-resistant Coatings Used to Protect Structural Steel Members
-------------	--

#### UNDERWRITERS LABORATORIES (UL)

UL 263	(2011; Reprint Aug 2021) UL Standard for Safety Fire Tests of Building Construction and Materials
UL Fire Resistance	(2014) Fire Resistance Directory

## 1.2 SYSTEM DESCRIPTION

### 1.2.1 General Requirements

Protect all structural steel, undersides of steel floors (if required) and steel roof decks (if required) with spray-applied fireproofing to a fire resistance hour-rating as indicated below, unless otherwise indicated.

### 1.2.2 Fire Resistance Rating

Fire resistance ratings shall be in accordance with the fire rated assemblies listed in [UL Fire Resistance](#). Proposed materials not listed in [UL Fire Resistance](#) shall have fire resistance ratings at least equal to the [UL Fire Resistance](#) ratings as determined by an approved independent testing laboratory, based on tests specified in [UL 263](#) or [ASTM E119](#). Submit reports and test records, attesting that the fireproofing material conforms to the specified requirements. Each test report shall conform to the report requirements specified by the test method. For the underside of the decking use metal lath installed prior to the fireproofing material or Rigid Board Fireproofing Material as outlined in the [UL Fire Resistance](#) Directory Volume 1. Apply fireproofing to structural steel members as indicated and in accordance with the following UL design or approved equivalent. Use unrestrained fire resistance ratings, unless the architect/engineer has specified that the degree of thermal restraint of the construction meets or exceeds the degree of thermal restraint of the tested assembly. Performance tests shall be in accordance with [ASTM E119](#).

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 1.2.3 Evaluation Reports - ICC-ES Reports

Materials shall be evaluated in accordance with ICC-ES AC23. ICC-ES Reports shall be included as part of the Submittals below. The reports will identify the product as code compliant and having met the physical performance requirements outlined in paragraphs "Dry Density and Cohesion/Adhesion" through "Air Erosion".

### 1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-03 Product Data

Fireproofing Material; G

#### SD-04 Samples

Spray-Applied Fireproofing; G

#### SD-06 Test Reports

Fire Resistance Rating; G

Field Tests; G

Evaluation Reports; G

#### SD-07 Certificates

Installer Qualifications; G

Surface Preparation Report; G

Manufacturer's Inspection Report; G

### 1.4 QUALITY ASSURANCE

#### 1.4.1 Installer Qualifications

Engage an experienced installer that is certified, licensed, or otherwise qualified by the spray-on fireproofing manufacturer as having the necessary experience, staff, and training to install the manufacturer's products in accordance with specified requirements. Submit manufacturer's certification that each listed installer is qualified and trained to install the specified fireproofing. Show evidence that each fireproofing installer has had a minimum of 3 years experience in installing the specified type of fireproofing. Each installer of fireproofing material shall be trained, have a minimum of 3 years experience and a minimum of three installations using fireproofing of the type specified. A manufacturer's willingness to sell its products to the Contractor or installer does not infer qualification of the buyer.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.4.2 Pre-Installation Meeting

Hold a meeting with the installer, field testing agency, the manufacturer, subcontractors (whose employees come into contact with the fireproofing), and the Contracting Officer prior to the installation of any fireproofing material to review the substrates for acceptability, method of application, applied thickness, patching, repair, inspection and testing procedures.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

Deliver packaged material in the original unopened containers, marked to show the brand name, the manufacturer, and the UL markings. Keep fireproofing material dry until ready to be used, and store off the ground, under cover and away from damp surfaces. Damaged or opened containers will be rejected. Apply material with shelf-life prior to expiration of the shelf-life.

#### 1.6 PROJECT/SITE CONDITIONS

##### 1.6.1 Temperature

Maintain substrate and ambient air temperatures above 40 degrees F during application and for 24 hours before and after application. Maintain relative humidity within the limits recommended by the fireproofing manufacturer.

##### 1.6.2 Ventilation

Provide adequate ventilation to properly dry the fireproofing after application. In enclosed areas, provide a minimum of 4 air exchanges per hour by forced air circulation.

### PART 2 PRODUCTS

#### 2.1 SPRAY-APPLIED FIREPROOFING

Provide spray-applied fireproofing material, including sealer, conforming to ASTM E1042, Class (a), Category A, either Type I or Type II, except that the dust removed shall not exceed 0.0025 gram per square foot of fireproofing material applied as specified in the project. Only products that have been evaluated at UL and bear and "investigated for exterior use" approval are allowed in waterfront areas where the fireproofing may be directly exposed to a natural body of water. Material shall be asbestos free, and shall resist fungus for a period of 28 days when tested in accordance with ASTM G21. Material shall have a flame spread of 25 or less and a smoke developed rating of 50 or less when tested in accordance with ASTM E84. Submit one sample panel, 18 inches square, for each specified type of fireproofing. Also, a designated sample area of not less than 100 square feet shall be prepared. Sample area shall be representative of typical installation of fireproofing including metal decks, beams, columns and attachments. Equipment, materials and procedures used in the sample area shall be the same as, or representative of, that to be used in the work. The sample area shall be approved prior to proceeding with fireproofing work in any other area. The approved sample area shall be used as a reference standard for applied fireproofing material. Sample area shall remain in place and open to observation until all spray-applied fireproofing is completed and accepted, at which time it may become part of the work.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.1.1.1 Dry Density and Cohesion/Adhesion

Fireproofing shall have a minimum ASTM E605/E605M dry density and ASTM E736 cohesion/adhesion properties as follows:

##### 2.1.1.1.1 Concealed Structural Components

Fireproofing for structural components concealed above the ceiling, or within a wall, chase, or furred space, shall have a minimum applied dry density of 15 pounds per cubic foot and a cohesion/adhesion strength of 200 psf.

##### 2.1.1.1.2 Exposed Structural Components

Fireproofing for exposed structural components, except where otherwise specified or indicated, shall have a minimum applied dry density of 22 pounds per cubic foot and a cohesion/adhesion strength of 434 psf.

##### 2.1.1.1.3 Mechanical Rooms and Storage Areas

Fireproofing for structural components located in mechanical rooms and storage areas shall have a minimum applied dry density of 40 pcf and a cohesion/adhesion strength of 1,000 psf.

#### 2.1.2 Deflection

Spray-applied fireproofing shall not crack, spall, or delaminate when backing to which it is applied is subject to downward deflection 1/120 of 10 foot clear span, when tested in accordance with ASTM E759/E759M.

#### 2.1.3 Bond-Impact

Spray-applied fireproofing material shall not crack, spall or delaminate when tested in accordance with ASTM E760/E760M.

#### 2.1.4 Compressive Strength

The minimum compressive strength shall be 1000 psf when tested in accordance with ASTM E761/E761M.

#### 2.1.5 Corrosion

Spray-applied fireproofing material shall not contribute to corrosion of test panels when tested as specified in ASTM E937/E937M.

#### 2.1.6 Air Erosion

Dust removal shall not exceed 0.025 gram per square foot when tested in accordance with ASTM E859/E859M.

### 2.2 SEALER

Sealer shall be the type approved by the manufacturer of the fireproofing material, shall be fungus resistant, shall have a flame spread of 25 or less and a smoke developed rating of 50 or less when tested in accordance with ASTM E84, and shall be white color.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 2.3 WATER

Water used for material mixing and surface preparation shall be potable.

## 2.4 SPRAY-APPLIED INTUMESCENT EPOXY COATING SYSTEM

Provide a two-component epoxy based intumescent fire protective coating that meets the following requirements.

- a. On curing it forms a flexible and tough epoxy barrier which transforms into a ceramic-like, insulating char to provide thermal protection of the substrate in the event of a fire.
- b. The coating system includes the manufacturer's required surface preparation, primer, and fire protective layer, and topcoat.
- c. The coating system protects the substrate from corrosion and retain its fire protection properties under aggressive chemical environments.
- d. Resistant to solvents, acids, alkalis, salts and abrasion while retaining its fire protective properties.

Provide a system that exhibits the following properties:

### 2.4.1 Percent Solids by Weight

100 percent

### 2.4.2 In Service Temperature Restrictions

Up to 150 degrees F

### 2.4.3 Application Method

Air spray or specialized plural component airless equipment approved by the manufacture. Troweling can be used for small areas or touch-up work.

### 2.4.4 Drying Time

Approximately 24 hours to achieve a Shore D hardness of 25.

### 2.4.5 Shelf Life

Minimum shelf life under proper storage condition is 1 Year from date of manufacture.

### 2.4.6 Pot Life

Approximately 40 minutes at 77 degrees F and 50 percent relative humidity. Pot life is not a factor when using specialized plural component airless spray equipment.

### 2.4.7 Flash Point

Greater than 212 degrees F Pensky-Martens for each component.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Thoroughly clean surfaces to be fireproofed of dirt, grease, oil, paint, primers, loose rust, rolling lubricant, mill scale or other contaminants that will interfere with the proper bonding of the sprayed fireproofing to the substrate. Test painted/primed steel substrates in accordance with [ASTM E736](#), with specified sprayed fireproofing material, to provide the required fire-resistance rating; painted or primed steel surfaces may require a fireproofing bond test to determine if the paint formulation will impair proper adhesion. Certify the acceptability of surfaces to receive sprayed-applied fireproofing by inspection and submit a [Surface Preparation Report](#) accordingly. The statement shall list the structural members and the areas that have been inspected and certified. Overhead areas to be fireproofed shall be cleared of all obstructions interfering with the uniform application of the spray-applied fireproofing. Hardware such as support sleeves, inserts, clips, hanger attachment devices and the like shall be installed prior to the application of the fireproofing. Condition of the surfaces shall be acceptable to the manufacturer prior to application of spray-applied fireproofing. Applications listed for use on primed surfaces shall be in accordance with the manufacturer's recommendations and standards, and detailed in submittal item SD-03 Product Data.

3.2 PROTECTION

Cover surfaces not to receive spray-applied fireproofing to prevent contamination by splatter, rebound and overspray. Cover exterior openings in areas to receive spray-applied fireproofing prior to and during application of fireproofing with tarpaulins or other approved material. Clean surfaces not to receive fireproofing of fireproofing and sealer.

3.3 FIREPROOFING MATERIAL

Mix fireproofing material in accordance with the manufacturer's recommendations. Submit data identifying performance characteristics of fireproofing material. Data includes recommended application requirements and indicate thickness of fireproofing to be applied to achieve each required fire rating.

3.4 APPLICATION

3.4.1 Sequence

Prior to application of fireproofing on each floor, the manufacturer shall inspect and approve application equipment, water supply and pressure, and the application procedures. If fireproofing is required to be applied to underside of steel roof deck and steel floor assemblies, it shall be done only after respective roof or floor construction is complete. No roof or floor traffic shall be allowed during application. Fireproofing material shall be applied prior to the installation of ductwork, piping and conduits which would interfere with uniform application of the fireproofing.

3.4.2 Application Technique

Maintain water pressure and volume to manufacturer's recommendations throughout the fireproofing application. Apply fireproofing material to

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

the thickness and density established for the specified fire resistance rating, in accordance with the procedure recommended by the manufacturer, and to a uniform density and texture. Do not tamp fireproofing material to achieve the desired density.

#### 3.4.3 Sealer Application

If sealer is required by the product used, apply it after field testing has been conducted and after corrective measures and repairs, if required, have been completed.

#### 3.4.4 Applied Thickness

The minimum average thickness shall be no less than 0.375 inches. Thicknesses shall not be less than required to achieve designated fire resistance ratings. If the specified thickness is greater than or equal to 1 inch, any individual measurement shall not be less than the specified thickness minus 0.25 inches. If the specified thickness is less than 1 inch, any individual measurement shall not be less than the specified thickness minus 25 percent.

#### 3.4.5 Application of Spray-Applied Intumescent Epoxy Coating System

Prepare surfaces and apply the spray-applied Intumescent epoxy coating system in accordance with the manufacturer's written recommendations.

### 3.5 MANUFACTURER'S SERVICES

#### 3.5.1 General

The manufacturer, or its representative, shall be onsite prior to, periodically during, and at completion of the application, to provide the specified inspections and certifications; and to ensure that preparations are adequate and that the material is applied according to manufacturer's recommendations and the contract requirements.

#### 3.5.2 Manufacturer's Inspection

The manufacturer shall inspect the fireproofing work after the work is completed on each floor or area, including testing, repair and clean-up, and shall certify that the work complies with the manufacturer's criteria and recommendations. Before the sprayed material is covered, and after all of the fireproofing work is completed, including repair, testing, and clean-up; and after mechanical, electrical and other work in contact with fireproofing material has been completed, the manufacturer shall re-inspect the work and certify that the entire project complies with the manufacturer's criteria and recommendations. Obtain and submit the [Manufacturer's Inspection Report](#) and certifications of approval stating that the spray-applied fireproofing in the entire project complies with the manufacturer's criteria and recommendations.

### 3.6 FIELD TESTS

The applied fireproofing shall be tested by an approved independent testing laboratory to be selected by the A/E and paid for by the Contractor. Submit test reports documenting results of tests on the applied material in the project. Report shall include defects identified, repair procedures, and results of the retests when required. Perform the tests in approved locations: for density in accordance with [ASTM E736](#),



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

cohesion/adhesion in accordance with ASTM E736, and for thickness in accordance with ASTM E605/E605M. Determine densities in accordance with ASTM E605/E605M or Appendix A, "Alternate Method for Density Determination" of AWC TM 12-A. Take density determinations at the flat portion of deck, beam bottom flange, beam web, column, and an equivalent area from the top of the lower beam flange. Areas showing a density less than specified will be rejected. A test sample shall be located every 10,000 square feet of floor area or two for each floor, whichever produces the greatest number of test areas. Any area showing less than minimum requirements shall be corrected. Proposed corrective measures, in writing, shall be approved before starting the corrective action. Corrected work shall be retested.

### 3.6.1 Structural Components

Test each structural component type at floor and roof decks, beams, columns, joists, and trusses. Minimum average thickness shall be as required by UL Fire Resistance. Density and cohesion/adhesion shall be as specified.

### 3.6.2 Repair

Additional fireproofing material may be added to provide proper thickness. Correct rejected areas of fireproofing to meet specified requirements by adding fireproofing material to provide the proper thickness, or by removing defects and respraying with new fireproofing material. Use same type of fireproofing material for repairs as originally applied or use patching materials recommended by the manufacturer. Retest and reinspect repaired areas. Apply fireproofing material to voids or damaged areas by hand-trowel, or by respraying.

### 3.6.3 Visual Inspections

Inspections shall be made by the certified independent laboratory prior to closure of concealed areas. These inspections may be phased but shall not occur less than 5 working days prior to the enclosure of the fireproofing. Sprayed areas shall receive a final inspection. Fireproofed surfaces shall be inspected after mechanical, electrical, and other work in contact with fireproofing material has been completed and before sprayed material is covered. Any locations missing fireproofing shall be patched in accordance with the manufacturer's requirements.

### 3.6.4 Patching

Patch and repair damaged fireproofing. The patching material shall be the same as that specified for that area.

### 3.7 CLEANUP

Thoroughly clean surfaces not indicated to receive fireproofing of sprayed material within a 24-hour period after application.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 07 92 00

## JOINT SEALANTS

08/16, CHG 3: 11/18

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## ASTM INTERNATIONAL (ASTM)

ASTM C509	(2006; R 2021) Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM C734	(2015; R 2019) Low-Temperature Flexibility of Latex Sealants After Artificial Weathering
ASTM C919	(2012; R 2017) Standard Practice for Use of Sealants in Acoustical Applications
ASTM C920	(2018) Standard Specification for Elastomeric Joint Sealants
ASTM C1193	(2013) Standard Guide for Use of Joint Sealants
ASTM C1521	(2013) Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints
ASTM D217	(2019b) Standard Test Methods for Cone Penetration of Lubricating Grease
ASTM D1056	(2014) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials

## CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350	(2010; Version 1.1) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers
--------------------	--

## SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS	SCS Global Services (SCS) Indoor Advantage
-----	--

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168 (2017) Adhesive and Sealant Applications

UNDERWRITERS LABORATORIES (UL)

UL 2818 (2013) GREENGUARD Certification Program  
For Chemical Emissions For Building  
Materials, Finishes And Furnishings

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

### SD-03 Product Data

Sealants; G

Primers; G

Bond Breakers; G

Backstops; G

### SD-06 Test Reports

Field Adhesion; G

### SD-07 Certificates

Indoor Air Quality For Interior Sealants; S

Indoor Air Quality For Interior Floor Joint Sealants; S

Indoor Air Quality For Interior Acoustical Sealants; S

## 1.3 PRODUCT DATA

Include storage requirements, shelf life, curing time, instructions for mixing and application, and accessories. Provide manufacturer's Safety Data Sheets (SDS) for each solvent, primer and sealant material proposed.

## 1.4 CERTIFICATIONS

### 1.4.1 Indoor Air Quality Certifications

Submit required indoor air quality certifications in one submittal package.

#### 1.4.1.1 Adhesives and Sealants

Provide products certified to meet indoor air quality requirements by UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification or validation by other third-party program that products meet the requirements of this Section. Provide current product

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

certification documentation from certification body. When product does not have certification, provide validation that product meets the indoor air quality product requirements cited herein.

#### 1.5 ENVIRONMENTAL CONDITIONS

Apply sealant when the ambient temperature is between 40 and 90 degrees F.

#### 1.6 DELIVERY AND STORAGE

Deliver materials to the jobsite in unopened manufacturers' sealed shipping containers, with brand name, date of manufacture, color, and material designation clearly marked thereon. Label elastomeric sealant containers to identify type, class, grade, and use. Handle and store materials in accordance with manufacturer's printed instructions. Prevent exposure to foreign materials or subjection to sustained temperatures exceeding 90 degrees F or lower than 0 degrees F. Keep materials and containers closed and separated from absorptive materials such as wood and insulation.

#### 1.7 QUALITY ASSURANCE

##### 1.7.1 Compatibility with Substrate

Verify that each sealant is compatible for use with each joint substrate in accordance with sealant manufacturer's printed recommendations for each application.

##### 1.7.2 Joint Tolerance

Provide joint tolerances in accordance with manufacturer's printed instructions.

##### 1.7.3 Mock-Up

Provide a mock-up of each type of sealant using materials, colors, and techniques approved for use on the project. Approved mock-ups may be incorporated into the Work.

##### 1.7.4 Adhesion

Provide in accordance with ASTM C1193 or ASTM C1521.

### PART 2 PRODUCTS

#### 2.1 SEALANTS

Provide sealant products that have been tested, found suitable, and documented as such by the manufacturer for the particular substrates to which they will be applied.

In areas with ambient temperatures that exceed 110 degrees F, do not use polybutene, bituminous, acrylic-latex, polyvinyl acetate latex sealants, polychloroprene (neoprene), polyvinyl chloride (PVC), and polyurethane foams, and neoprene, PVC, and styrene butadiene rubber extruded seals and closure strips due to these materials having maximum recommended surface temperature ranges from 130 to 180 degrees F.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.1.1.1 Interior Sealants

Provide [ASTM C920](#), Type S or M, Grade NS, Class 12.5, Use NT. Provide sealant products used on the interior of the building (defined as inside of the weatherproofing system) meeting either emissions requirements of [CDPH SECTION 01350](#) (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of [SCAQMD Rule 1168](#). Provide certification or validation of [indoor air quality for interior sealants](#). Location(s) and color(s) of sealant for the following.

#### 2.1.1.2 Exterior Sealants

For joints in vertical surfaces, provide [ASTM C920](#), Type S or M, Grade NS, Class 25, Use NT. For joints in horizontal surfaces, provide [ASTM C920](#), Type S or M, Grade P, Class 25, Use T. Provide location(s) and color(s) of sealant as follows.

#### 2.1.1.3 Floor Joint Sealants

[ASTM C920](#), Type S or M, Grade P, Class 25, Use T. Provide sealant products used on the interior of the building (defined as inside of the weatherproofing system) meeting either emissions requirements of [CDPH SECTION 01350](#) (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of [SCAQMD Rule 1168](#). Provide certification or validation of [indoor air quality for interior floor joint sealants](#). Provide location(s) and color(s) of sealant as follows.

#### 2.1.1.4 Acoustical Sealants

Rubber or polymer based acoustical sealant in accordance with [ASTM C919](#) to have a flame spread of 25 or less and a smoke developed rating of 50 or less when tested in accordance with [ASTM E84](#). Provide non-staining acoustical sealant with a consistency of 250 to 310 when tested in accordance with [ASTM D217](#). Acoustical sealant must remain flexible and adhesive after 500 hours of accelerated weathering as specified in [ASTM C734](#). Provide sealant products used on the interior of the building (defined as inside of the weatherproofing system) meeting either emissions requirements of [CDPH SECTION 01350](#) (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of [SCAQMD Rule 1168](#). Provide certification or validation of [indoor air quality for interior acoustical sealants](#).

#### 2.1.1.5 Preformed Sealants

Provide preformed sealants of polybutylene or isoprene-butylene based pressure sensitive weather resistant tape or bead sealants capable of sealing out moisture, air and dust when installed as recommended by the manufacturer. At temperatures from minus 30 to plus 160 degrees F, sealants must be non-bleeding and have no loss of adhesion.

##### 2.1.5.1 Tape

Tape sealant: Provide cross section dimensions of [3/4 inch](#).

##### 2.1.5.2 Bead

Bead sealant: Provide cross section dimensions of [1/4 inch to 3/8 inch](#).

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.1.5.3 Foam Strip

Provide foam strip of polyurethane foam with cross section dimensions **as indicated**. Provide foam strip capable of sealing out moisture, air, and dust when installed and compressed in accordance with manufacturer's printed instructions. Service temperature must be **minus 40 to plus 275 degrees F**. Furnish untreated strips with adhesive to hold them in place. Do not allow adhesive to stain or bleed onto adjacent finishes. Saturate treated strips with butylene waterproofing or impregnate with asphalt.

#### 2.2 PRIMERS

Non-staining, quick drying type and consistency as recommended by the sealant manufacturer for the particular application. Provide primers for interior applications that meet the indoor air quality requirements of the paragraph SEALANTS above.

#### 2.3 BOND BREAKERS

Type and consistency as recommended by the sealant manufacturer to prevent adhesion of the sealant to the backing or to the bottom of the joint. Provide bond breakers for interior applications that meet the indoor air quality requirements of the paragraph SEALANTS above.

#### 2.4 BACKSTOPS

Provide glass fiber roving, neoprene, butyl, polyurethane, or polyethylene foams free from oil or other staining elements as recommended by sealant manufacturer. Provide 25 to 33 percent oversized backing for closed cell and 40 to 50 percent oversized backing for open cell material, unless otherwise indicated. Provide backstop material that is compatible with sealant. Do not use oakum or other types of absorptive materials as backstops.

##### 2.4.1 Rubber

Provide in accordance with **ASTM D1056**, Type 2, closed cell, Class A, Grade **2A3**, round cross section for cellular rubber sponge backing.

##### 2.4.2 Synthetic Rubber

Provide in accordance with **ASTM C509**, Option I, Type I preformed rods for synthetic rubber backing.

##### 2.4.3 Neoprene

Provide in accordance with **ASTM D1056**, closed cell expanded neoprene cord Type 2, Class C, Grade 2C2 for neoprene backing.

##### 2.4.4 Silicone Rubber Base

Provide in accordance with ASTM C920, from a single component, with solvent release, Non-sag, Type **S**, Grade **NS**, Class 25. Color as selected from manufacturer's full range of color choices.

#### 2.5 CLEANING SOLVENTS

Provide type(s) recommended by the sealant manufacturer and in accordance

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

with environmental requirements herein. Protect adjacent aluminum and bronze surfaces from solvents. Provide solvents for interior applications that meet the indoor air quality requirements of the paragraph SEALANTS above.

### PART 3 EXECUTION

#### 3.1 FIELD QUALITY CONTROL

Perform a field adhesion test in accordance with manufacturer's instructions and [ASTM C1193](#), Method A or ASTM C1521, Method A, Tail Procedure. Remove sealants that fail adhesion testing; clean substrates, reapply sealants, and re-test. Test sealants adjacent to failed sealants. Submit [field adhesion](#) test report indicating tests, locations, dates, results, and remedial actions taken.

#### 3.2 SURFACE PREPARATION

Prepare surfaces according to manufacturer's printed installation instructions. Clean surfaces from dirt, frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter that would destroy or impair adhesion. Remove oil and grease with solvent; thoroughly remove solvents prior to sealant installation. Wipe surfaces dry with clean cloths. When resealing an existing joint, remove existing caulk or sealant prior to applying new sealant. For surface types not listed below, provide in accordance with sealant manufacturer's printed instructions for each specific surface.

##### 3.2.1 Steel Surfaces

Remove loose mill scale by sandblasting or, if sandblasting is impractical or would damage finished work, scraping and wire brushing. Remove protective coatings by sandblasting or using a residue free solvent. Remove resulting debris and solvent residue prior to sealant installation.

##### 3.2.2 Aluminum or Bronze Surfaces

Remove temporary protective coatings from surfaces that will be in contact with sealant. When masking tape is used as a protective coating, remove tape and any residual adhesive prior to sealant application. For removing protective coatings and final cleaning, use non-staining solvents recommended by the manufacturer of the item(s) containing aluminum or bronze surfaces.

##### 3.2.3 Concrete and Masonry Surfaces

Where surfaces have been treated with curing compounds, oil, or other such materials, remove materials by sandblasting or wire brushing. Remove laitance, efflorescence and loose mortar from the joint cavity. Remove resulting debris prior to sealant installation.

##### 3.2.4 Wood Surfaces

Ensure wood surfaces that will be in contact with sealants are free of splinters, sawdust and other loose particles.

#### 3.3 SEALANT PREPARATION

Do not add liquids, solvents, or powders to sealants. Mix multicomponent



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

elastomeric sealants in accordance with manufacturer's printed instructions.

### 3.4 APPLICATION

#### 3.4.1 Joint Width-To-Depth Ratios

Unacceptable Ratios: Where joints of acceptable width-to-depth ratios have not been provided, clean out joints to acceptable depths and grind or cut to acceptable widths without damage to the adjoining work. Grinding is prohibited at metal surfaces.

#### 3.4.2 Unacceptable Sealant Use

Do not install sealants in lieu of other required building enclosure weatherproofing components such as flashing, drainage components, and joint closure accessories, or to close gaps between walls, floors, roofs, windows, and doors, that exceed acceptable installation tolerances. Remove sealants that have been used in an unacceptable manner and correct building enclosure deficiencies to comply with contract documents requirements.

#### 3.4.3 Masking Tape

Place masking tape on the finished surface on one or both sides of joint cavities to protect adjacent finished surfaces from primer or sealant smears. Remove masking tape within 10 minutes of joint filling and tooling.

#### 3.4.4 Backstops

Provide backstops dry and free of tears or holes. Tightly pack the back or bottom of joint cavities with backstop material to provide joints in specified depths. Provide backstops where indicated and where backstops are not indicated but joint cavities exceed the acceptable maximum depths.

#### 3.4.5 Primer

Clean out loose particles from joints immediately prior to application of. Apply primer to joints in concrete masonry units, wood, and other porous surfaces in accordance with sealant manufacturer's printed instructions. Do not apply primer to exposed finished surfaces.

#### 3.4.6 Bond Breaker

Provide bond breakers to surfaces not intended to bond in accordance with, sealant manufacturer's printed instructions for each type of surface and sealant combination specified.

#### 3.4.7 Sealants

Provide sealants compatible with the material(s) to which they are applied. Do not use a sealant that has exceeded its shelf life or has jelled and cannot be discharged in a continuous flow from the sealant gun. Apply sealants in accordance with the manufacturer's printed instructions with a gun having a nozzle that fits the joint width. Work sealant into joints so as to fill the joints solidly without air pockets. Tool sealant after application to ensure adhesion. Apply sealant uniformly smooth and free of wrinkles. Upon completion of sealant

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

application, roughen partially filled or unfilled joints, apply additional sealant, and tool smooth as specified. Apply sealer over sealants in accordance with the sealant manufacturer's printed instructions.

### 3.5 PROTECTION AND CLEANING

#### 3.5.1 Protection

Protect areas adjacent to joints from sealant smears. Masking tape may be used for this purpose if removed 5 to 10 minutes after the joint is filled and no residual tape marks remain.

#### 3.5.2 Final Cleaning

Upon completion of sealant application, remove remaining smears and stains and leave the work in a clean and neat condition.

- a. Masonry and Other Porous Surfaces: Immediately remove fresh sealant that has been smeared on adjacent masonry, rub clean with a solvent, and remove solvent residue, in accordance with sealant manufacturer's printed instructions. Allow excess sealant to cure for 24 hour then remove by wire brushing or sanding. Remove resulting debris.
- b. Metal and Other Non-Porous Surfaces: Remove excess sealant with a solvent moistened cloth. Remove solvent residue in accordance with solvent manufacturer's printed instructions.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 08 11 13

### STEEL DOORS AND FRAMES

08/20

#### PART 1 GENERAL

##### 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

#### AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M (2020) Structural Welding Code - Steel

#### BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

ANSI/BHMA A156.115 (2016) Hardware Preparation in Steel Doors and Steel Frames

#### NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80 (2022) Standard for Fire Doors and Other Opening Protectives

NFPA 105 (2019) Standard for Smoke Door Assemblies and Other Opening Protectives

NFPA 252 (2022) Standard Methods of Fire Tests of Door Assemblies

#### STEEL DOOR INSTITUTE (SDI/DOOR)

SDI/DOOR A250.6 (2015) Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames

SDI/DOOR A250.8 (2017) Specifications for Standard Steel Doors and Frames

SDI/DOOR A250.11 (2012) Recommended Erection Instructions for Steel Frames

#### UNDERWRITERS LABORATORIES (UL)

UL 10C (2016; Reprint May 2021) UL Standard for Safety Positive Pressure Fire Tests of Door Assemblies

##### 1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SD-02 Shop Drawings

Doors; G

Frames; G

Show elevations, construction details, metal gages, hardware provisions, method of glazing, and installation details.

Schedule of Doors; G

Schedule of Frames; G

Submit door and frame locations.

## SD-03 Product Data

Doors; G

Frames; G

Submit manufacturer's descriptive literature for doors, frames, and accessories. Include data and details on door construction, panel (internal) reinforcement, insulation, and door edge construction.

## 1.3 DELIVERY, STORAGE, AND HANDLING

Deliver doors, frames, and accessories undamaged and with protective wrappings or packaging. Strap knock-down frames in bundles. Store doors and frames on platforms under cover in clean, dry, ventilated, and accessible locations, with 1/4 inch airspace between doors. Remove damp or wet packaging immediately and wipe affected surfaces dry. Replace damaged materials with new.

## PART 2 PRODUCTS

### 2.1 STANDARD STEEL DOORS

SDI/DOOR A250.8, except as specified otherwise. Prepare doors to receive door hardware as specified in Section 08 71 00 DOOR HARDWARE. Undercut where indicated. Provide doors at 1-3/4 inch thick.

#### 2.1.1 Classification - Level, Performance, Model

##### 2.1.1.1 Heavy Duty Doors

SDI/DOOR A250.8, Level 2, physical performance Level B, Model 1, with core construction as required by the manufacturer for interior doors and exterior doors, of size(s) and design(s) indicated. Where vertical stiffener cores are required, the space between the stiffeners must be filled with mineral board insulation.

### 2.2 STANDARD STEEL FRAMES

SDI/DOOR A250.8, Level 2, except as otherwise specified. Form frames to sizes and shapes indicated, with welded corners. Provide steel frames for doors unless otherwise indicated.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 2.2.1 Welded Frames

Continuously weld frame faces at corner joints. Mechanically interlock or continuously weld stops and rabbets. Grind welds smooth.

Weld frames in accordance with the recommended practice of the Structural Welding Code Sections 1 through 6, [AWS D1.1/D1.1M](#) and in accordance with the practice specified by the producer of the metal being welded.

### 2.2.2 Anchors

Provide anchors to secure the frame to adjoining construction. Provide steel anchors, zinc-coated or painted with rust-inhibitive paint, not lighter than 18 gage.

#### 2.2.2.1 Wall Anchors

Provide at least three anchors for each jamb. For frames which are more than 7.5 feet in height, provide one additional anchor for each jamb for each additional 2.5 feet or fraction thereof.

- a. Masonry: Provide anchors of corrugated or perforated steel straps or [3/16 inch](#) diameter steel wire, adjustable or T-shaped;
- b. Stud partitions: Weld or otherwise securely fasten anchors to backs of frames. Design anchors to be fastened to closed steel studs with sheet metal screws, and to open steel studs by wiring or welding;

#### 2.2.2.2 Floor Anchors

Provide floor anchors drilled for [3/8 inch](#) anchor bolts at bottom of each jamb member.

## 2.3 FIRE DOORS AND FRAMES

Provide fire doors and frames in accordance with [NFPA 80](#) and this specification. The requirements of [NFPA 80](#) take precedence over details indicated or specified.

### 2.3.1 Labels

Provide fire doors and frames bearing the label of Underwriters Laboratories (UL), Factory Mutual Engineering and Research (FM), or Warnock Hersey International (WHI) attesting to the rating required. Testing must be in accordance with [NFPA 252](#) or [UL 10C](#). Provide labels that are metal with raised letters, bearing the name or file number of the door and frame manufacturer. Labels must be permanently affixed at the factory to door frames. Do not paint door and labels.

## 2.4 EXTERIOR FRAMES

Provide thermal insulation in all exterior frames. Provide frames of a minimum Level 4, with frames of a minimum thickness of [0.067 inch](#), 14 gage.

## 2.5 HARDWARE PREPARATION

Provide minimum hardware reinforcing gages as specified in [SDI/DOOR A250.6](#).

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Drill and tap doors and frames to receive finish hardware. Prepare doors and frames for hardware in accordance with the applicable requirements of SDI/DOOR A250.8 and SDI/DOOR A250.6. For additional requirements refer to ANSI/BHMA A156.115. Drill and tap for surface-applied hardware at the project site. Build additional reinforcing for surface-applied hardware into the door at the factory. Punch door frames, with the exception of frames that will have weatherstripping soundproof gasketing, to receive a minimum of two rubber or vinyl door silencers on lock side of single doors and one silencer for each leaf at heads of double doors. Set lock strikes out to provide clearance for silencers.

## 2.6 FINISHES

### 2.6.1 Factory-Primed Finish

Thoroughly clean all surfaces of doors and frames then chemically treat and factory prime with a rust inhibiting coating as specified in SDI/DOOR A250.8.

## 2.7 FABRICATION AND WORKMANSHIP

Provide finished doors and frames that are strong and rigid, neat in appearance, and free from defects, waves, scratches, cuts, dents, ridges, holes, warp, and buckle. Provide molded members that are clean cut, straight, and true, with joints coped or mitered, well formed, and in true alignment. Dress exposed welded and soldered joints smooth. Design door frame sections for use with the wall construction indicated. Corner joints must be well formed and in true alignment. Conceal fastenings where practicable. On wraparound frames for masonry partitions, provide a throat opening 1/8 inch larger than the actual masonry thickness. Design other frames in exposed masonry walls or partitions to allow sufficient space between the inside back of trim and masonry to receive sealant compound.

## PART 3 EXECUTION

### 3.1 INSTALLATION

#### 3.1.1 Frames

Set frames in accordance with SDI/DOOR A250.11. Plumb, align, and brace securely until permanent anchors are set. Anchor bottoms of frames with expansion bolts or powder-actuated fasteners. Build in or secure wall anchors to adjoining construction. Backfill frames with mortar. Coat inside of frames with corrosion-inhibiting bituminous material. For frames in exterior walls, ensure that stops are filled with rigid insulation before grout is placed.

#### 3.1.2 Doors

Hang doors in accordance with clearances specified in SDI/DOOR A250.8. After erection and glazing, clean and adjust hardware.

#### 3.1.3 Fire Doors and Frames

Install fire doors and frames, including hardware, in accordance with NFPA 80. Install fire rated smoke doors and frames in accordance with NFPA 80 and NFPA 105.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.2 PROTECTION

Protect doors and frames from damage. Repair damaged doors and frames prior to completion and acceptance of the project or replace with new, as directed. Wire brush rusted frames until rust is removed. Clean thoroughly. Apply an all-over coat of rust-inhibitive paint of the same type used for shop coat.

### 3.3 CLEANING

Upon completion, clean exposed surfaces of doors and frames thoroughly. Remove mastic smears and other unsightly marks.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 08 14 00

## WOOD DOORS

08/16, CHG 1: 08/18

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

## ASTM INTERNATIONAL (ASTM)

ASTM C1048 (2018) Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass

ASTM E2226 (2015; R 2019b) Standard Practice for Application of Hose Stream

## CALIFORNIA AIR RESOURCES BOARD (CARB)

CARB 93120 (2007) Airborne Toxic Control Measure (ATCM) to Reduce Formaldehyde Emissions from Composite Wood Products

## GLASS ASSOCIATION OF NORTH AMERICA (GANA)

GANA Standards Manual (2008) Engineering Standards Manual

## NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80 (2022) Standard for Fire Doors and Other Opening Protectives

NFPA 252 (2022) Standard Methods of Fire Tests of Door Assemblies

## U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 770 Formaldehyde Standards for Composite Wood Products

16 CFR 1201 Safety Standard for Architectural Glazing Materials

## UNDERWRITERS LABORATORIES (UL)

UL 10B (2008; Reprint May 2020) Fire Tests of Door Assemblies

## WINDOW AND DOOR MANUFACTURERS ASSOCIATION (WDMA)

ANSI/WDMA I.S.1A (2013) Interior Architectural Wood Flush Doors

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

ANSI/WDMA I.S.6A

(2013) Interior Architectural Stile and  
Rail Doors

WOODWORK INSTITUTE (WI)

NAAWS 3.1

(2017; 2018 Errata Edition) North American  
Architectural Woodwork Standards

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

### SD-02 Shop Drawings

Doors; G

Submit drawings or catalog data showing each type of door unit. Indicate within drawings and data the door types and construction, sizes, thickness, methods of assembly, and glazing.

### SD-03 Product Data

Doors; G

Accessories

Water-resistant Sealer

Sample Warranty

Fire Resistance Rating; G

### SD-04 Samples

Doors

Prior to the delivery of wood doors, submit a sample section of each type of door which shows the stile, rail, veneer, finish, and core construction.

### SD-06 Test Reports

Cycle-Slam

Hinge Loading Resistance

Submit cycle-slam test report for doors tested in accordance with ANSI/WDMA I.S.1A, and hinge loading resistance test report for doors tested in accordance with ANSI/WDMA I.S.6A.

### SD-07 Certificates

Certificates of Grade

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SD-11 Closeout Submittals

### Warranty

#### 1.3 CERTIFICATIONS

##### 1.3.1 Certified Wood Grades

Provide **certificates of grade** from the grading agency on acoustical doors and fire doors.

##### 1.3.2 Indoor Air Quality Certification

###### 1.3.2.1 Composite Wood, Wood Structural Panel and Agrifiber Products

For purposes of this specification, composite wood and agrifiber products include particleboard, medium density fiberboard (MDF), wheatboard, strawboard, panel substrates, and door cores. Provide products certified to meet requirements of both **40 CFR 770** and **CARB 93120**. Provide current product certification documentation from certification body.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

Deliver doors to the site in an undamaged condition and protect against damage and dampness. Stack doors flat under cover. Support on blocking, a minimum of **4 inch** thick, located at each end and at the midpoint of the door. Store doors in a well-ventilated building so that they will not be exposed to excessive moisture, heat, dryness, direct sunlight, or extreme changes of temperature and humidity. Do not store in a building under construction until concrete, masonry work, and plaster are dry. Replace defective or damaged doors with new ones.

#### 1.5 WARRANTY

Warrant doors free of defects as set forth in the door manufacturer's standard door warranty.

## PART 2 PRODUCTS

### 2.1 DOORS

Provide doors of the types, sizes, and designs indicated **and** free of urea-formaldehyde resins.

#### 2.1.1 Flush Doors

##### 2.1.1.1 Interior Flush Doors

Provide staved lumber **or** particleboard **solid** core, Type II flush doors conforming to **ANSI/WDMA I.S.1A** with faces of premium grade **maple**. Hardwood veneers must be rotary cut book matched. Products must contain no added urea-formaldehyde resins. Provide certification of indoor air quality for particleboard.

#### 2.1.2 Acoustical Doors

**Acoustical doors as specified in Section 08 34 73 SOUND CONTROL DOOR ASSEMBLIES.**

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 2.1.3 Fire Doors

Provide doors specified or indicated to have a fire resistance rating conforming to the requirements of UL 10B, ASTM E2226, or NFPA 252 for the class of door indicated. Affix a permanent metal label with raised or incised markings indicating testing agency's name and approved hourly fire rating to hinge edge of each door.

## 2.2 ACCESSORIES

### 2.2.1 Door Light Openings

Provide glazed openings with the manufacturer's standard wood moldings. Provide moldings for doors to receive natural finish of the same wood species and color as the wood face veneers. Lip type moldings for flush doors.

### 2.2.2 Glass

Provide safety glazing material conforming to 16 CFR 1201.

#### 2.2.2.1 Clear Glass

Single-glazed frameless system should be used with 3/8 inch thick glass.

#### 2.2.2.2 Tempered Glass

ASTM C1048, Kind FT (fully tempered), Condition A (uncoated), Type I, Class 1 (transparent), Quality q3, 3/8 inch thick, 90 percent light transmittance, conforming to ASTM C1048 and GANA Standards Manual. Color must be clear. Provide at all interior door and frame vision lites.

### 2.2.3 Additional Hardware Reinforcement

Provide the minimum lock blocks to secure the specified hardware. The measurement of top, bottom, and intermediate rail blocks are a minimum 125 mm 5 inch by full core width. Comply with the manufacturer's labeling requirements for reinforcement blocking, but not mineral material similar to the core.

## 2.3 FABRICATION

### 2.3.1 Marking

Stamp each door with a brand, stamp, or other identifying mark indicating quality and construction of the door.

### 2.3.2 Quality and Construction

Identify the standard on which the construction of the door was based and identify the standard under which preservative treatment was made.

### 2.3.3 Preservative Treatment

Treat doors scheduled for restrooms, janitor closets and other possible wet locations with a water-repellent preservative treatment and so marketed at the manufacturer's plant.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.3.4 Adhesives and Bonds

**ANSI/WDMA I.S.1A.** Use Type II bond for interior doors. Provide a nonstaining adhesive on doors with a natural finish.

#### 2.3.5 Prefitting

Provide factory prefinished and factory prefitted doors for the specified hardware, door frame and door-swing indicated. Machine and size doors at the factory by the door manufacturer in accordance with the standards under which the doors are produced and manufactured. The work includes sizing, beveling edges, mortising, and drilling for hardware and providing necessary beaded openings for glass. Provide the door manufacturer with the necessary hardware samples, and frame and hardware schedules to coordinate the work.

#### 2.3.6 Finishes

##### 2.3.6.1 Factory Finish

Provide doors finished at the factory by the door manufacturer as follows:

**NAAWS 3.1** Section 1500, specification for System No. 4 Conversion varnish alkyd urea or System No. 5 Vinyl catalyzed. The coating is **NAAWS 3.1** premium, medium rubbed sheen, open grain effect. Use stain when required to produce the finish specified for color. Seal edges, cutouts, trim, and wood accessories, and apply two coats of finish compatible with the door face finish. Touch-up finishes that are scratched or marred, or where exposed fastener holes are filled, in accordance with the door manufacturer's instructions. Match color and sheen of factory finish using materials compatible for field application.

##### 2.3.6.2 Color

Provide door finish colors as selected by the Architect from the door manufacturer's full range of finish colors.

##### 2.3.7 Water-Resistant Sealer

Provide manufacturer's standard water-resistant sealer compatible with the specified finish.

#### 2.4 SOURCE QUALITY CONTROL

Meet or exceed the following minimum performance criteria of stiles of "B" and "C" label fire doors utilizing standard mortise leaf hinges:

- a. **Cycle-slam:** Standard Duty Doors: 250,000 cycles with no loose hinge screws or other visible signs of failure when tested in accordance with the requirements of **ANSI/WDMA I.S.1A**. Heavy Duty Doors: 500,000 cycles with no loose hinge screws or other visible signs of failure when tested in accordance with the requirements of **ANSI/WDMA I.S.1A**.
- b. **Hinge loading resistance:** Averages of ten test samples not less than Standard Duty doors: 400 pounds force, Heavy Duty doors: 475 pounds force when tested for direct screw withdrawal in accordance with **ANSI/WDMA I.S.6A** using a No. 12, 1-1/4 inch long, steel, fully threaded wood screw. Drill 5/32 inch pilot hole, use 1-1/2 inch opening around screw for bearing surface, and engage screw full, except for last 1/8 inch. Do not use a steel plate to reinforce screw

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

area.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

Do not install building construction materials that show visual evidence of biological growth.

Before installation, seal top and bottom edges of doors with the approved water-resistant sealer. Seal cuts made on the job immediately after cutting using approved water-resistant sealer. Fit, trim, and hang doors with a 1/16 inch minimum, 1/8 inch maximum clearance at sides and top, and a 3/16 inch minimum, 1/4 inch maximum clearance over thresholds. Provide 3/8 inch minimum, 7/16 inch maximum clearance at bottom where no threshold occurs. Bevel edges of doors at the rate of 1/8 inch in 2 inch. Door warp must not exceed 1/4 inch when measured in accordance with ANSI/WDMA I.S.1A.

##### 3.1.1 Fire Doors

Install fire doors in accordance with NFPA 80. Do not paint over labels.

#### 3.2 CLEANING

Clean glass surfaces and remove labels, paint spots, putty, and other defacement as required to prevent staining. Glass must be clean at the time the work is accepted.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 08 31 00

## ACCESS DOORS AND PANELS

05/17, CHG 1: 08/18

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M (2020) Structural Welding Code - Steel

## ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M (2019) Standard Specification for Carbon Structural Steel

ASTM A653/A653M (2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

ASTM A666 (2015) Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar

ASTM A1008/A1008M (2020) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable

ASTM E90 (2009; R2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

ASTM E119 (2020) Standard Test Methods for Fire Tests of Building Construction and Materials

ASTM E413 (2016) Classification for Rating Sound Insulation

ASTM E1332 (2016) Standard Classification for Rating Outdoor-Indoor Sound Attenuation

## MASTER PAINTERS INSTITUTE (MPI)

MPI 79 (2016) Primer, Alkyd, Anti-Corrosive for Metal

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80 (2022) Standard for Fire Doors and Other  
Opening Protectives

NFPA 252 (2022) Standard Methods of Fire Tests of  
Door Assemblies

#### UNDERWRITERS LABORATORIES (UL)

UL 10B (2008; Reprint May 2020) Fire Tests of  
Door Assemblies

UL 263 (2011; Reprint Sep 2020) UL Standard for  
Safety Fire Tests of Building Construction  
and Materials

### 1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-02 Shop Drawings

Access Doors And Panels; G

#### SD-03 Product Data

Access Doors And Panels; G

Hardware Including Locks and Keys; G

Accessories; G

Power Transfer Components; G

Recycled Content; S

#### SD-04 Samples

Finishes; G

#### SD-06 Test Reports

Acoustical Ratings of Assemblies; G

### 1.3 MISCELLANEOUS REQUIREMENTS

For access doors and panels provide the following:

#### 1.3.1 Shop Drawings

For field assembled access doors and panels, provide plans, elevations, sections, and details for each type of access door and panel assembly. Indicate frame, surface and edge construction, materials, and accessories. Indicate types of finished surfaces and details for panel



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

edge conditions. Provide a door schedule with a unique number for each access door and panel, specific location in the project, location of hinges and hardware for each door. Indicate [acoustical ratings of assemblies](#) as sound transmission class (STC) ratings, and locations and [power transfer components](#) for electrified locks and alarms.

#### 1.3.2 Product Data

For shop assembled access doors and panels, provide literature indicating sizes, types, frame and edge construction, finishes, [hardware](#), accessories such as gaskets, seals and weatherstripping, and location of each door and panel in the project. Indicate acoustical ratings of assemblies, fire-ratings of assemblies, and locations and power transfer components for electrified locks and alarms. Provide details of adjoining work for each condition indicated.

#### 1.3.3 Finish Samples

Submit two color charts from manufacturer's standard color and finish options for each type of frame and panel assembly finish indicated.

#### 1.3.4 Test Reports

Provide test reports for acoustical assemblies when tested in accordance with [ASTM E90](#) and classified in accordance with [ASTM E413](#) and [ASTM E1332](#).

### 1.4 PERFORMANCE REQUIREMENTS

#### 1.4.1 Structural Requirements

Provide floor access assemblies to support live loads indicated for floors. Deflection must not exceed 1/180 of span.

#### 1.4.2 Access Panels for Wet Areas

Provide panel assemblies that will be located in wet areas with corrosion resistant finishes and hardware and water resistant gasketing.

### 1.5 DELIVERY, STORAGE, AND PROTECTION

Protect from corrosion, deformation, and other types of damage. Store items in an enclosed area free from contact with soil and weather. Remove and replace damaged items with new items.

## PART 2 PRODUCTS

### 2.1 [RECYCLED CONTENT](#)

Provide products with recycled content. Provide data for each product with recycled content, identifying percentage of recycled content.

### 2.2 MATERIALS

#### 2.2.1 Steel Plates, Shapes, and Bars

Provide in accordance with [ASTM A36/A36M](#).

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.2.2 Sheet Steel

Provide cold rolled steel sheet substrate in accordance with [ASTM A1008/A1008M](#), Commercial Steel (CS), exposed.

#### 2.2.3 Stainless Steel

Provide in accordance with [ASTM A666](#), type 302 or 304.

#### 2.2.4 Metallic Coated Steel Sheet

Provide in accordance with [ASTM A653/A653M](#), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

#### 2.2.5 Hardware

Provide automatic closing devices. Provide latch releases operable from insides of doors.

#### 2.2.6 Hinges

Provide concealed spring hinges, 175 degrees of opening, with removable hinge pins to allow removal of door panel from frame. Provide hinges of same steel as door and frame or in accordance with manufacturer's written recommendations. If providing non-continuous hinges, provide in numbers required to maintain alignment of door panel with frame. Provide coatings as necessary to permanently protect dissimilar metals from contact with one another; see Part 3 herein for more information.

#### 2.2.7 Locks

Unless otherwise indicated, provide flush keyed lock [and](#) tamper proof screws (spanner head locks) for access panels in locations requiring such security.

#### 2.2.8 [Accessories](#)

Provide anchors in size, number, and location on four sides to secure access door to substrate. Provide anchors in types as recommended by manufacturer's written installation instructions for each substrate indicated. Provide shims, bushings, clips, gaskets, and other devices as necessary for a complete installation.

### 2.3 FABRICATION

#### 2.3.1 Thickness, Size, Edges

Fabricate frames for access doors of steel not lighter than 16 gage with welded joints and anchorage for securing to adjacent construction. Provide doors a minimum of [24 by 24 inches](#) and of not lighter than 16 gage steel, with stiffened edges and welded attachments. Provide with eased (lightly rounded) edges, without burrs, snags or sharpness and exposed welds ground smooth.

#### 2.3.2 Welding

Provide in accordance with [AWS D1.1/D1.1M](#).

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 2.4 ACCESS ASSEMBLY TYPES

Unless indicated otherwise, provide flush-face steel access doors and panels with steel frames and flanges.

### 2.4.1 Recessed Doors

Provide recessed access doors with gypsum wallboard bead flanges. Depth of door panel recess must accommodate the installed thickness of the finish material of the wall assembly for a flush finished condition of the wall and the access panel face. Reinforce panel and frame to prevent sagging.

### 2.4.2 Fire-rated Doors

#### 2.4.2.1 Door Construction

Provide ceiling access door construction in accordance with [ASTM E119](#) or [UL 263](#). Provide wall access doors in accordance with [NFPA 252](#) or [UL 10B](#).

#### 2.4.2.2 Labels

Provide class B opening according to [UL 10B](#) or test by another nationally recognized laboratory, approved by the Contracting Officer. Provide fire-rating as indicated herein, with a maximum temperature rise of [216 degrees F](#).

#### 2.4.2.3 Door Panel and Frame

Stainless steel sheet, with mineral fiber insulation core, insulated sandwich type construction.

### 2.4.3 Acoustical Doors

Manufacturer's standard assembly rated in accordance with STC requirements indicated herein. Acoustical insulating materials must have a flame spread rating of no more than 25.

## 2.5 FINISHES

Unless indicated otherwise, provide steel frames and panel surfaces with a powder coated finish. Provide manufacturer's standard two coat finish system consisting of one coat primer and one thermoset topcoat. Provide dry film thickness in 2 mils minimum. Provide steel frame and panel surfaces with a shop applied prime coat. Field paint frames and panels to match wall and ceiling surfaces in which they occur. Provide brushed aluminum frames and panels.

## PART 3 EXECUTION

### 3.1 PREPARATION

Field verify all measurements prior to fabrication. Verify access door locations and sizes provide required maintenance access to installed building services components. Protect existing construction and completed work from damage during installation.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.2 GENERAL INSTALLATION REQUIREMENTS

Install items at locations indicated, in accordance with manufacturer's written instructions. Include materials and parts as necessary for a complete installation of each item. Conceal fastenings where practicable. Poor matching of holes to fasteners is cause for rejection of the work.

### 3.3 ACCESS LOCATIONS

Install removable access panels directly below each valve, flow indicator, damper, air splitter or other utility requiring access that is located above ceilings, other than at acoustical panel ceilings, and that would otherwise not be accessible. Install access doors and panels permitting access to service valves, traps, dampers, cleanouts, and other mechanical, electrical and conveyor control items concealed in walls and partitions.

### 3.4 ACCESS LOCATIONS IN WET AREAS

When possible, avoid locating access panels in wet areas. When such locations cannot be avoided, provide moisture resistant assemblies as indicated in Part I herein.

### 3.5 RECESSED ACCESS DOORS

Install fire-rated access doors in fire-rated partitions and ceilings in accordance with NFPA 80.

### 3.6 FIELD PAINTING

Not Used.

### 3.7 DISSIMILAR MATERIALS

Where dissimilar metals are in contact, protect surfaces with a coating in accordance with MPI 79 to prevent galvanic or corrosive action.

### 3.8 ADJUSTMENT

Adjust hardware so that door panel opens freely. Adjust door when closed center door panel in frame.

### 3.9 ENVIRONMENTAL CONDITIONS

Do not paint surfaces when damp or exposed to weather, when surface temperature is below 45 degrees F or over 95 degrees F, unless approved by the Contracting Officer.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 08 34 73

## SOUND CONTROL DOOR ASSEMBLIES

11/19, CHG 1: 02/21

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## ASTM INTERNATIONAL (ASTM)

ASTM A568/A568M	(2019a) Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for
ASTM A1008/A1008M	(2020) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
ASTM A1011/A1011M	(2018a) Standard Specification for Steel Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
ASTM C143/C143M	(2020) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C476	(2020) Standard Specification for Grout for Masonry
ASTM D1056	(2014) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D6386	(2016a) Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting
ASTM E90	(2009; R2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
ASTM E1289	(2008; R 2016) Standard Specification for Reference Specimen for Sound Transmission Loss

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

# WOODWORK INSTITUTE (WI)

## NAAWS 3.1

(2017; 2018 Errata Edition) North American  
Architectural Woodwork Standards

### 1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-02 Shop Drawings

##### Fabrication Drawings

#### SD-03 Product Data

Hollow Metal Sound Retardant Doors; G

Wood Sound Retardant Doors; G

Door Frames; G

Door Hardware; G

Thresholds; G

#### SD-06 Test Reports

Acoustical Tests; G

#### SD-07 Certificates

Hollow Metal Sound Retardant Doors; G

Wood Sound Retardant Doors; G

Door Frames; G

Door Hardware; G

Thresholds; G

Astragals; G

### 1.3 QUALITY CONTROL

Ensure work within this section is designed and furnished by one manufacturer, who has been engaged in the manufacture of Sound Retardant Wood Swinging Door and Hollow Metal Door systems for at least five years prior to the start of this work.

### 1.4 DELIVERY, STORAGE, AND HANDLING

Ship all doors in the manufacturer's undamaged individual cartons, securely bundled and wrapped with moisture-resistant covers and stored in accordance with the manufacturer's printed instructions in a dry, clean,

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

and ventilated area.

Deliver and store wood doors in the building following the installation of concrete, terrazzo, plaster, or other wet materials, and only after the building has dried out and has a roof.

Store all materials on planks in a dry location. Store doors and frames vertically with minimum 1/4 inch airspace between. Store doors on the edge to eliminate any potential damage to the door bottom seal. Cover all material to protect from damage but in a manner to allow proper circulation.

Maintain relative humidity in the building between 30 and 65 percent. Maintain the ambient temperature at 60 degrees F minimum at the time of installation of wood doors.

Perform final adjustment of seals when temperatures and humidity conditions replicate the interior conditions that will exist when the building is occupied.

## PART 2 PRODUCTS

### 2.1 SYSTEM DESCRIPTION

Provide sound retardant door assemblies of the thickness, width, and height indicated, complete with perimeter seals, seal housings, gasketing, automatic door bottoms, thresholds, door frames, and astragals as required to conform to the specified STC per ASTM E90 and ASTM E1289.

Submit fabrication drawings for Hollow Metal Sound Retardant Doors, Wood Sound Retardant Doors, and Door Frames and Door Frame Sound Infill.

Submit certificates showing conformance with the referenced standards in this section, and manufacturer's catalog data including STC ratings and UL fire rating, where applicable, for the following items: Hollow metal sound retardant doors; wood sound retardant doors; door frames; door hardware; vision panels; thresholds; and astragals.

Provide assemblies that are complete with metal frame, wood door(s), sealing system, and Cam-lift hinges.

#### 2.1.1 Design Requirements

##### 2.1.1.1 Door Design

Provide sound Retardant Wood Swinging Doors that are a 1-3/4-inch thickness construction with sizes as indicated on drawings. No visible seams are permitted on door faces. Provide internal sound retardant core and perimeter door edge construction per manufacturer's standard for the specified STC rating. No lead or asbestos is permitted in door construction to achieve STC performance. Provide faces of premium grade natural select.

##### 2.1.1.2 Frame Design

Provide sound Retardant Metal Frames conforming to ASTM A1008/A1008M, not less than 0.0747-inch thick, and free from pitting, scale, stretcher strains, fluting, and surface defects with integral trim and shipped with temporary spreader. Knockdown frames are not acceptable.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Provide frames with 2 inch faces, profiles and dimensions as indicated, with mitered reinforced corners, welded the full depth of frame and trim, with exposed surfaces ground smooth and flush. Close contact edges to hairline joints.

## 2.1.2 Performance Requirements

### 2.1.2.1 STC (Sound Transmission Classification) Rating

Provide doors with an STC of at least 45 and 48 per the door schedule.

## 2.2 FABRICATION

### 2.2.1 Hollow Metal Sound Retardant Doors

#### 2.2.1.1 Construction

Conform to ASTM A1008/A1008M for door construction utilizing steel facing sheets. Conform stretcher level flatness to ASTM A568/A568M; not less than 0.0598 inch thick; free from pitting, scale, and surface defects; separated by a core construction designed to meet the required STC; and tested and rated in accordance with ASTM E90.

Provide doors that have flush seamless face sheets and vertical edges, with continuous welded and smooth joints. Provide edges that are flush or rabbeted as required for perimeter seals.

Provide door surfaces that are visually flat and free from warp, waviness, and other surface irregularities and defects. Maximum allowable warp or twist-can not exceed 1/8 inch when measured with a 7 foot straightedge along the diagonal and not exceed 1/16 inch when measured with a 7 foot straightedge in the width or in any position along the length of the door.

Provide hardware reinforcement that is steel drilled, tapped to template requirements and welded in place. Provide minimum thicknesses as follows:

- a. Butts, 0.1494 inch
- b. Lock strike, 0.1196 inch
- c. Surface applied hardware 0.0747 inch

Provide doors, including sound retardant type, to bear the UL 3/4-hour C label fire rating and the specified STC.

#### 2.2.1.2 Coating

Thoroughly clean all mill scale, rust, oil, grease, dirt, and other foreign materials from surfaces before the application of the shop coat of paint.

After cleaning, provide galvanized surfaces free of paint in accordance with ASTM D6386, Method A, B, C, or D.

Apply to clean prepared dry surfaces one shop coat of rust inhibitive metallic oxide or synthetic resin primer by brush, dipping, or other approved method to provide a continuous minimum dry film thickness (dft) of 0.9 mil.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Shop paint the exposed door surfaces, including surfaces that are galvanized.

Shop paint the concealed exterior door surfaces except galvanized surfaces.

#### 2.2.2 Wood Sound Retardant Doors

Construct doors with wood veneer facings separated by a core construction designed to meet the required STC. Test, rate, and label in accordance with [ASTM E90](#).

Comply with the [NAAWS 3.1](#), "Guide Specifications and Quality Certification Program," for premium grade constructions and to the requirements specified.

Perform beveling, prefitting, machining, mortising, and routing for hardware, perimeter seals, and door bottom cutouts at the mill.

Furnish premium grade door facings with standard thickness face veneers conforming to [NAAWS 3.1](#), in wood species, cut, and match as specified in [Section 08 14 00 WOOD DOORS](#).

#### 2.2.3 Factory Finish

[Provide doors finished as specified in Section 08 14 00 WOOD DOORS](#).

### 2.3 COMPONENTS

#### 2.3.1 Frames

Construct frames for Sound Retardant Wood Swinging Doors from formed sheet steel. Provide sheet steel that is commercial quality, level, cold rolled steel conforming to [ASTM A1008/A1008M](#) or hot rolled, pickled and oiled steel conforming to [ASTM A1011/A1011M](#).

#### 2.3.2 Door Frame Sound Infill

Grout: Comply with [ASTM C476](#), with a slump of not more than [4 inches](#) as measured according to [ASTM C143/C143M](#).

Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for [15 mil](#) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

Select the appropriate infill material.

#### 2.3.3 Hardware Reinforcements

Factory mortise, reinforce, drill and tap frames for all mortise hardware as required by hardware manufacturer's template. Provide necessary reinforcement plates as required for surface mounted hardware; installer to perform all field drilling and tapping. Provide dust cover boxes on all frame mortises. Provide minimum thicknesses as follows:

- a. Butts, [3/16 inch](#)
- b. Lock strike, [0.1196 inch](#)

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

c. Surface applied hardware 0.0747 inch

#### 2.3.4 Jamb Anchors

Provide number and spacing of anchors as follows:

##### 2.3.4.1 Masonry Type

Locate anchors not more than 18 inches from top and bottom of frame.  
Space anchors not more than 32 inches o.c. and as follows:

- a) Two anchors per jamb up to 60 inches in height.
- b) Three anchors per jamb from 60 to 90 inches in height.
- c) Four anchors per jamb from 90 to 96 inches in height.
- d) Four anchors per jamb plus one additional anchor per jamb for each 24 inches, or fraction thereof, more than 96 inches in height.

##### 2.3.4.2 Stud-Wall Type

Locate anchors not more than 18 inches from top and bottom of frame.  
Space anchors not more than 32 inches o.c. and as follows:

- a) Three anchors per jamb up to 60 inches in height.
- b) Four anchors per jamb from 60 to 90 inches in height.
- c) Five anchors per jamb from 90 to 96 inches in height.
- d) Five anchors per jamb plus one additional anchor per jamb for each 24 inches, or fraction thereof, more than 96 inches in height.
- e) Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.

#### 2.3.5 Door Hardware

Provide the following STC related hardware with the door; mortise butt hinges, perimeter seals, astragals, door bottoms, and thresholds.

Include on Fabrication drawings a finish hardware schedule for each door and a hollow metal door frame schedule for each door indicating profile, dimensions, hardware reinforcement, and frame anchorage. Also indicate perimeter seals, door-bottom devices and other hardware items that are assembled in the shop.

Refer to Section 08 71 00 DOOR HARDWARE for remaining hardware requirements.

#### 2.3.6 Head and Jamb Seals

Provide a closed-cell, expanded cellular rubber Seal material conforming to ASTM D1056, Type S, Grade SBE-42 or SCE-42 for heads, jambs, and door bottoms.

Install seals in formed steel or extruded aluminum shapes designed to

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

receive and hold seals and to provide concealed adjustable attachment to door frames. Provide concealed adjustment screws that are not more than 12 inches on center and provide at least 3/8 inch adjustment.

#### 2.3.7 Door Bottoms

Neoprene or silicone gasket held in place by metal housing; mortised into bottom edge of door.

##### 2.3.7.1 Automatic Door Bottoms

Neoprene or silicone gasket, held in place by metal housing, that automatically drops to form seal when door is closed; mounted to bottom edge of door with screws.

Mounting: Mortised or semimortised into bottom of door as required by testing to achieve STC rating indicated.

#### 2.3.8 Thresholds

Provide metal thresholds where indicated. Provide thresholds that are extruded aluminum, 6063-T5 alloy, mill finish, not less than 1/8 inch thick, with integral seal grooves formed to the indicated section.

### 2.4 TESTS, INSPECTIONS, AND VERIFICATIONS

#### 2.4.1 Sound Transmission Classification

Provide test reports prepared by a nationally recognized, independent laboratory for Acoustical Tests, Air Infiltration Tests, Wind Loading Tests, and Water Leakage Tests indicating that the sound transmission classification (STC) of the proposed door, based on tests at 16 third-octave band frequencies from 125 to 4,000 hertz, is no less than the specified STC when tested in accordance with ASTM E90, and that the door tested is hung in substantially the type of wall and frame as indicated and is fully operable with hardware and perimeter seals installed.

#### 2.4.2 Guarantee

Provide written guarantee that each door delivered to the project is equal in construction, sound transmission classification (STC), where applicable, with appropriate labeling and markings, to that of the sample door tested. Clearly state in written guarantee that each door assembly, when installed in accordance with the manufacturer's printed instructions, has an in-place STC within 3 decibels of the specimen tested. Submit the following test data and Certificates with the written Guarantee:

##### a. Acoustical Tests

### PART 3 EXECUTION

#### 3.1 PREPARATION

Upon receipt of material, thoroughly inspect all frames, doors and accessories. Verify quantities and tag numbers according to the packing list provided. Report all discrepancies, deficiencies and/or damages immediately to Contracting Officer.

Prior to installation check all doors and frames for correct size and

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

swing. Verify that frames are plumb, square and aligned without twist in accordance with tolerances published by NAAMM/HMMA and SDI.

#### 3.1.1 Frame Painting and Cleaning

Clean thoroughly all surfaces of all mill scale, rust, oil, grease, dirt, and other foreign materials before the application of the shop coat of paint.

Apply one shop coat of rust inhibitive metallic oxide or synthetic resin primer applied to clean, dry, and prepared surfaces by brush, dipping, or other approved method to provide a continuous minimum dry film thickness of 0.9 mil.

### 3.2 INSTALLATION

#### 3.2.1 Frame

Install frames plumb and true with not more than 1/32 inch deviation in vertical alignment in 8 feet. Anchor to the wall in accordance with the manufacturer's instructions. Grout frames solid with mortar in masonry, concrete, and plaster wall construction. Spot grout frames in dry wall partitions with mortar at the jamb anchor clips; fill the space between metal frame and stud partition solidly with fiberglass or mineral wool insulation.

#### 3.2.2 Door

Install and adjust all doors, hardware, and seals in accordance with the approved drawings, hardware schedules, and the printed instructions of the door manufacturer.

Install and adjust perimeter seals to provide positive compression contact with the entire sealing surface with no gaps, openings, or breaks. Hinges or hardware which distort or pinch the perimeter seal during operation of the door will be rejected.

Install door bottom devices to seal the space between the door bottoms and the finished floor and the space between the seal and seal housing.

Field apply perimeter seal housings with mitered corners and with flush, aligned hairline joints.

Install components to manufacturer's written instructions. Coordinate with wall construction for anchor placement. Set frames plumb, square, level and at correct elevation. Adjust operable parts for correct clearances and function. Install and adjust perimeter and bottom acoustic seals.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 08 41 13

## ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

08/18

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## ALUMINUM ASSOCIATION (AA)

AA DAF45 (2003; Reaffirmed 2009) Designation System  
for Aluminum Finishes

## AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 611 (2014) Voluntary Specification for  
Anodized Architectural Aluminum

AAMA 800 (2016) Voluntary Specifications and Test  
Methods for Sealants

AAMA 1503 (2009) Voluntary Test Method for Thermal  
Transmittance and Condensation Resistance  
of Windows, Doors and Glazed Wall Sections

## AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7 (2017) Minimum Design Loads for Buildings  
and Other Structures

## ASTM INTERNATIONAL (ASTM)

ASTM B221 (2020) Standard Specification for Aluminum  
and Aluminum-Alloy Extruded Bars, Rods,  
Wire, Profiles, and Tubes

ASTM E283 (2019) Standard Test Method for  
Determining the Rate of Air Leakage  
Through Exterior Windows, Curtain Walls,  
and Doors Under Specified Pressure  
Differences Across the Specimen

ASTM E330/E330M (2014) Structural Performance of Exterior  
Windows, Doors, Skylights and Curtain  
Walls by Uniform Static Air Pressure  
Difference

ASTM E783 (2002; R 2018) Standard Test Method for  
Field Measurement of Air Leakage Through  
Installed Exterior Windows and Doors

ASTM E1424 (1991; R 2016) Standard Test Method for  
Determining the Rate of Air Leakage

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Through Exterior Windows, Curtain Walls,  
and Doors Under Specified Pressure and  
Temperature Differences Across the Specimen

ASTM E1886

(2019) Standard Test Method for  
Performance of Exterior Windows, Curtain  
Walls, Doors, and Impact Protective  
Systems Impacted by Missile(s) and Exposed  
to Cyclic Pressure Differentials

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

ANSI/BHMA A156.10

(2017) Power Operated Pedestrian Doors

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC

(2018) International Building Code

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS TT-P-645

(Rev C) Primer, Paint, Zinc-Molybdate,  
Alkyd Type

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation;  
submittals not having a "G" designation are for Contractor Quality Control  
approval. Submit the following in accordance with Section 01 33 00  
SUBMITTAL PROCEDURES:

### SD-01 Preconstruction Submittals

Sample Warranty; G

### SD-02 Shop Drawings

Installation Drawings; G

Fabrication Drawings; G

### SD-03 Product Data

Finish; G

Recycled Content of Aluminum Material; S

### SD-06 Test Reports

Deflection

Air Infiltration

Condensation Resistance and Thermal Transmittance

### SD-08 Manufacturer's Instructions

Manufacturer's Instructions

### SD-11 Closeout Submittals

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### Manufacturer's Product Warranty

#### 1.3 QUALITY CONTROL

##### 1.3.1 Qualifications

###### 1.3.1.1 Installer Qualifications

Provide documentation of the installer's experience, as determined by the Contractor, in performing the work specified in this section.

Ensure that the installers are specialized in work similar to that required for this project, and that they are acceptable to product manufacturer.

###### 1.3.1.2 Manufacturer Qualifications

Ensure that manufacturers meet the requirements specified in this section and project drawings.

Ensure that the manufacturer is capable of providing field service representation during construction, approving acceptable installers and approving application methods.

##### 1.3.2 Single-Source Responsibility

Use a single source manufacturer with sole responsibility for providing design, structural engineering, and custom fabrication for door portal systems and for supplying components, materials, and products. Do not use products provided from numerous sources for assembly at the site. Ensure that the following work items and components are fabricated or supplied by a single source are:

- a. Glazed walls to be constructed around door portals as specified in this Section.
- b. Door operating hardware to be installed on or within door portals as specified in Section 08 71 00 DOOR HARDWARE.
- c. Glass as specified in Section 08 81 00 GLAZING.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

##### 1.4.1 Ordering

To avoid construction delays, comply with the manufacturer's lead-time requirements and instructions for ordering.

##### 1.4.2 Packing, Shipping, Handling and Unloading

Deliver materials in the manufacturer's original, unopened, undamaged containers with identification labels intact.

##### 1.4.3 Storage and Protection

Store materials in a way that protects them from exposure to harmful weather conditions. Avoid damaging the storefront material and components during handling. Protect storefront material against damage from

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

elements, construction activities, and other hazards before, during, and after storefront installation.

Do not use adhesive papers or sprayed coatings that become firmly bonded when exposed to sunlight. Do not leave coating residue on surfaces.

## 1.5 PROJECT / SITE CONDITIONS

### 1.5.1 Field Measurements

Verify actual measurements or openings by taking field measurements before fabrication; record these measurements on shop drawings. To avoid construction delays, coordinate field measurements, and fabrication schedule with construction progress.

## 1.6 WARRANTY

Provide a written manufacturer's warranty, executed by a company official, warranting against defects in materials and products for 2 years from the date of shipment. Warrant that the door corner construction is for the life of the project. Provide a written installer's warranty, warranting work to be free from defective materials, defective workmanship, and glass breakage as a result of defective design, and agreeing to replace components that fail within 2 years.

The warranty states the following:

- a. Watertight and airtight system installation is completed within specified tolerances.
- b. The completed installation remains free of rattles, wind whistles and noise caused by thermal movement and wind pressure.
- c. System is structurally sound and free from distortion.
- d. Glass and glazing gaskets will not break or "pop" from frames as a result of design, movement caused by expansion or contraction, or structural loading.
- e. Glazing sealants and gaskets remain free of abnormal deterioration or dislocation as a result of sunlight, weather, or oxidation.

## PART 2 PRODUCTS

### 2.1 SYSTEM DESCRIPTION

Provide impact and hurricane-resistant thermally broken aluminum storefront system with 2-3/4-inch by 5-1/2-inch aluminum mullions that accommodates insulated glazing units with laminated inboard lite as specified in Section 08 81 00 GLAZING.

Provide impact and hurricane-resistant thermally broken aluminum entrance door frames and associated flush aluminum doors specified herein.

#### 2.1.1 Design Requirements for Aluminum (Entrances and Storefronts)

Provide an aluminum entrance and storefront system designed to withstand the following loads without breakage, loss, failure of seals, product deterioration, or other defects.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- a. Dead and Live Loads: Determined by **ASCE 7** and calculated in accordance with applicable codes.
- b. Seismic Loads: Design and install the system to comply with the seismic requirements for the project location in accordance with Section 1613 of the International Building Code, **ICC IBC**.
- c. Wind Loads: Design and install the system so that the effects of wind load acting inward and outward normal to the plane of the wall are in accordance with **ASTM E330/E330M**. System shall comply with **ASTM E1886**, TAS 201, and TAS 203 for impact and cycle pressure differentials.
- d. Thermal Loads And Movement:
  - (1) Ambient Temperature Range: **120 degrees F**
  - (2) Material Surfaces Range: **180 degrees F**
- e. Water and Air Resistance: Provide weatherstripping, exterior gaskets, sealants, and other accessories to resist water and air penetration.
- f. Thermal Performance: Assembly U-value maximum of 0.30; Assembly SHGC maximum of 0.25.

#### 2.1.1.1 Material Standard

**ASTM B221**; 6063-T5 alloy and tempered.

#### 2.1.1.2 Recycled Content

Provide aluminum framed entrances and storefronts that have a minimum of 20 percent recycled content based upon the aluminum billet used in the original material. Provide data indicating percentage of **recycled content of aluminum material**.

#### 2.1.1.3 Sealants

Provide either ethylene propylene diene monomer (EPDM) elastomeric extrusions or thermoplastic elastomer glazing gaskets. Structural silicone sealant is required.

Internal Sealants: Provide sealants that according to the manufacturer will remain permanently elastic, tacky, non-drying, non-migrating, and weather tight.

#### 2.1.1.4 Thermal Barrier

Use a rigid, structural thermal barrier to separate all exterior aluminum from interior aluminum. For purposes of this specification, a structural thermal barrier is defined as a system that transfers shear during bending and, therefore, promotes composite action between the exterior and interior extrusions. Do not use a nonstructural thermal barrier. Ensure that the thermal barrier provides a structural connection between the two sides of the door.

### 2.2 FABRICATION

Provide the following information when submitting **fabrication drawings** for

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

custom fabrications:

- a. Indicate elevations, detailed design, dimensions, member profiles, joint locations, arrangement of units, and member connections.
- b. Show the following items:
  - (1) Details of special shapes.
  - (2) Reinforcing.
  - (3) Anchorage system.
  - (4) Interfacing with building construction.
  - (5) Provisions for expansion and contraction.
- c. Indicate typical glazing details, locations of various types and thickness of glass, and internal sealant requirements as recommended by the sealant manufacturer.
- d. Clearly indicate locations of exposed fasteners and joints.
- e. Clearly show where and how the manufacturer's system deviates from Contract drawings and these specifications.

#### 2.2.1 Storefront Systems

Basis-of-Design Product: Subject to compliance with requirements, provide IR501UT by Kawneer Company, Inc. or comparable product by one of the following:

- a. Oldcastle Building Envelope
- b. YKK AP America, Inc.

#### 2.2.2 Entrance Door Systems

##### 2.2.2.1 Entrance System Fabrication

- a. Provide door corner construction consisting of mechanical clip fastening, SIGMA deep penetration plug welds and 1-1/8-inch-long fillet welds inside and outside all four corners.
- b. Accurately fit and secure joints and corners. Make joints hairline in appearance. Remove burrs and smooth edges. Prepare components with internal reinforcement for door hardware. Arrange fasteners and attachments so that they are concealed from view.
- c. Separate dissimilar metals with protective coating or pre-formed separators to prevent contact and corrosion.
- d. At glazed doors, provide a hook-in type exterior glazing stop with EPDM glazing gaskets reinforced with non-stretchable cord. Provide an interior glazing stop that is mechanically fastened to the door member and incorporates a silicone-compatible spacer used with silicone sealant.
- e. At flush doors, provide face sheet of aluminum that is captured on

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

four sides by integral extruded reglets. Finish texture shall be smooth. Provide 5 lb/ft<sup>3</sup> urethane core.

### 2.2.3 Shop Assembly

Fabricate and assemble units with joints only at the intersection of aluminum members with hairline joints; rigidly secure these units, and seal them in accordance with the manufacturer's recommendations.

#### 2.2.3.1 Welding

Conceal welds on aluminum members in accordance with AWS recommendations or methods recommended by the manufacturer. Members showing welding bloom or discoloration on finish or material distortion will be rejected by the Contacting Officer.

#### 2.2.4 Finish

Before fabrication, clean the units and give them a AA-M-10-C22-A42 color anodized finish in accordance with the requirements of the AA DAF45. The finish thickness is A41, 0.4 mil or greater.

a. Color Anodized: Conforming to AA-M12C22A 44 and AAMA 611:

(1) Architectural Class I

(2) Anodic coating to match existing color of adjacent glazing assembly, 0.7 mil minimum thickness.

#### 2.2.5 Fabrication Tolerance

Fabricate and assemble units with joints only at intersection of aluminum members with hairline joints; rigidly secure these units, and seal them in accordance with the manufacturer's recommendations.

Fabricate aluminum entrances in accordance with the entrance manufacturer's prescribed tolerances.

##### 2.2.5.1 Material Cuts

Square to 1/32 inch off square, over largest dimension; proportionate amount of 1/32 inch on the two dimensions.

##### 2.2.5.2 Maximum Offset at Consecutive Members

1/64 inch in alignment between two consecutive members in line, end to end.

##### 2.2.5.3 Maximum Offset at Glazing Pocket Corners

1/64 inch between framing members at glazing pocket corners.

##### 2.2.5.4 Joints

Between adjacent members in same assembly: Joints are hairline and square to the adjacent member.

##### 2.2.5.5 Variation

In squaring diagonals for doors and fabricated assemblies: 1/16 inch.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.2.5.6 Flatness

For doors and fabricated assemblies: [plus/minus 1/16 inch](#) of neutral plane.

### 2.3 MATERIALS

#### 2.3.1 Sealants

Refer to Section [07 92 00](#) JOINT SEALANTS. Ensure that all sealants conform to [AAMA 800](#).

#### 2.3.2 Glass

Refer to Section [08 81 00](#) GLAZING.

### 2.4 ACCESSORIES

#### 2.4.1 Fasteners

Provide stainless steel fasteners in areas where the fasteners are exposed.

Use non-corrosive and compatible fasteners with components being fastened. Do not use exposed fasteners, except where unavoidable for application of hardware.

In areas where fasteners are not exposed, use aluminum, non-magnetic stainless steel, or other materials warranted by the manufacturer.

For exposed locations, provide countersunk Phillips head screws when items with a matching finish are fastened. For concealed locations, provide the manufacturer's standard fasteners.

Provide nuts or washers that have been designed with a means to prevent disengagement; do not deform fastener threads.

#### 2.4.2 Perimeter Anchors

When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

##### 2.4.2.1 Inserts and Anchorage Devices

Provide manufacturer's standard formed or fabricated assemblies, steel or aluminum, of shapes, plates, bars, or tubes. Shop-coat steel assemblies after fabrication with an alkyd zinc chromate primer complying with [FS TT-P-645](#).

#### 2.4.3 Standard Entrance Hardware

Refer to Section [08 71 00](#) DOOR HARDWARE.

## PART 3 EXECUTION

### 3.1 EXAMINATION

#### 3.1.1 Site Verification of Conditions

Verify that the condition of substrate previously installed under other

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

sections is acceptable for product installation in accordance with the manufacturer's instructions.

Verify that openings are sized to receive the storefront system and that the sill plate is level in accordance with the manufacturer's acceptable tolerances.

### 3.2 PREPARATION

Field-verify dimensions before fabricating components for the door portal assembly.

Coordinate requirements for locations of blockouts for anchorage of door portal columns and other embedded components with Section 03 30 00 CAST-IN-PLACE CONCRETE.

Coordinate the erection of door portal with installation of surrounding glass wall and door assemblies. Ensure that the door portals can provide support and anchorage for assembly components.

#### 3.2.1 Adjacent Surfaces Protection

Protect adjacent work areas and finish surfaces from damage during product installation.

#### 3.2.2 Aluminum Surface Protection

Protect aluminum surfaces from contact with lime, mortar, cement, acids, and other harmful contaminants.

### 3.3 INSTALLATION

Submit [installation drawings](#) for review and approval.

Install the entrance system in accordance with the [manufacturer's instructions](#) and the AAMA storefront and entrance guide specifications manual. Attach the entrance system to the structure, allowing it to be adjusted to accommodate construction tolerances and other irregularities. Provide alignment attachments and shims to permanently fasten the system to the building structure. Align the assembly so that it is plumb and level, and free of warp and twist. Maintain assembly dimensional tolerances aligning with adjacent work.

Set thresholds in a bed of mastic and secure the thresholds. Protect aluminum members in contact with masonry, steel, concrete, or dissimilar materials using nylon pads or a bituminous coating. Shim and brace the aluminum system before anchoring the system to the structure. Verify that weep holes are open, and the metal joints are sealed in accordance with the manufacturer's installation instructions. Seal metal-to-metal joints using a sealant recommended by the system manufacturer.

#### 3.3.1 Tolerances

Ensure that tolerances for wall thickness and other cross-sectional dimensions of entrance members are nominal and in compliance with Aluminum Standards and Data, published by the Aluminum Association.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.3.2 Adjusting

Adjust operating hardware for smooth operation, and as recommended by the manufacturer.

### 3.3.3 Related Products Installation Requirements

#### 3.3.3.1 Sealants (Perimeter)

Refer to Section 07 92 00 JOINT SEALANTS.

#### 3.3.3.2 Glass

Refer to Section 08 81 00 GLAZING.

### 3.4 FIELD QUALITY CONTROL

#### 3.4.1 Air Infiltration

Test air infiltration in accordance with ASTM E783

Submit certified test reports showing compliance with specified performance characteristics as follows:

- a. For single-acting offset pivot, butt hung, or continuous geared hinge entrances in the closed and locked position, test the specimen in accordance with ANSI/BHMA A156.10, and ASTM E283 at a pressure differential of 1.57 psf for pairs of doors; ensure that maximum infiltration for a pair of 7 foot by 8 foot entrance doors and frame is 1.2 cfm/square foot.
- b. Ensure the maximum allowable infiltration for a completed storefront system does not exceed 0.06 cfm/square foot when tested in accordance with ASTM E1424 at a differential static pressure of 6.24 psf.

#### 3.4.2 Wind Loads

Provide a completed storefront system capable of withstanding wind pressure loads, normal to an interior wall plane for pressure acting in either direction.

#### 3.4.3 Deflection

Submit certified test reports showing that the maximum allowable deflection in a member when tested in accordance with ASTM E330/E330M with allowable stress is L/175 or 3/4 inches maximum.

#### 3.4.4 Condensation Resistance and Thermal Transmittance

Submit certified test reports showing compliance with specified performance characteristics as follows:

- a. U-Value Requirements:
  - (1) Perform test in accordance with the AAMA 1503 procedure and on the configuration specified therein.
- b. CRF Class Requirements:

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- (1) Perform a test in accordance with AAMA 1503.

### 3.5 ADJUSTING AND CLEANING

#### 3.5.1 Protection

Protect the installed product's finish surfaces from damage during construction. Protect the aluminum storefront system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.

#### 3.5.2 Cleaning

Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions before acceptance remove excess mastic, mastic smears, and other foreign materials. Remove construction debris from the project site and legally dispose of this debris.

### 3.6 WARRANTY

Submit three signed copies of the manufacturer's product warranty for the entrance system as follows:

- a. Warranty Period: Five years from Date of Substantial Completion of the project, provided that the Limited Warranty begins no later than six months from the date of shipment by the manufacturer. In addition, support welded door corner construction with a limited lifetime warranty for the life of the door under normal use.

Ensure that the Warranty's language is identical to the "As Approved" version of the sample warranty submitted to and returned from the Contracting Officer.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

SECTION 08 71 00  
DOOR HARDWARE  
**02/16, CHG 3: 08/20**

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM E283	(2019) Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM F883	(2013) Standard Performance Specification for Padlocks

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

ANSI/BHMA A156.1	(2016) Butts and Hinges
ANSI/BHMA A156.3	(2020) Exit Devices
ANSI/BHMA A156.4	(2013) Door Controls - Closers
ANSI/BHMA A156.5	(2020) Cylinder and Input Devices for Locks
ANSI/BHMA A156.6	(2015) Architectural Door Trim
ANSI/BHMA A156.7	(2016) Template Hinge Dimensions
ANSI/BHMA A156.8	(2021) Door Controls - Overhead Stops and Holders
ANSI/BHMA A156.13	(2017) Mortise Locks & Latches Series 1000
ANSI/BHMA A156.14	(2013) Sliding and Folding Door Hardware
ANSI/BHMA A156.16	(2018) Auxiliary Hardware
ANSI/BHMA A156.18	(2020) Materials and Finishes
ANSI/BHMA A156.21	(2019) Thresholds
ANSI/BHMA A156.22	(2017) Door Gasketing and Edge Seal Systems
ANSI/BHMA A156.25	(2013) Electrified Locking Devices
ANSI/BHMA A156.26	(2012) Continuous Hinges

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4) National Electrical Code
NFPA 72	(2019; TIA 19-1; ERTA 1 2019) National Fire Alarm and Signaling Code
NFPA 80	(2022) Standard for Fire Doors and Other Opening Protectives
NFPA 101	(2021) Life Safety Code
NFPA 252	(2022) Standard Methods of Fire Tests of Door Assemblies

#### STEEL DOOR INSTITUTE (SDI/DOOR)

SDI/DOOR A250.8	(2017) Specifications for Standard Steel Doors and Frames
-----------------	--

#### U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

36 CFR 1191	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines
-------------	---

#### UNDERWRITERS LABORATORIES (UL)

UL Bld Mat Dir	(updated continuously online) Building Materials Directory
----------------	---

### 1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "G, AE" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. When used, a code following the "G, AE" classification identifies the AE of record will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-02 Shop Drawings

Manufacturer's Detail Drawings; G, AE  
Verification of Existing Conditions; G, AE  
Hardware Schedule; G, AE

#### SD-03 Product Data

Hardware Items; G, AE

#### SD-08 Manufacturer's Instructions

Installation

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SD-10 Operation and Maintenance Data

Hardware Schedule Items, Data Package 1; G, AE

## SD-11 Closeout Submittals

### Key Bitting

#### 1.3 SHOP DRAWINGS

Submit manufacturer's detail drawings indicating all hardware assembly components and interface with adjacent construction. Indicate power components and wiring coordination for electrified hardware. Base shop drawings on verified field measurements and include verification of existing conditions.

#### 1.4 PRODUCT DATA

Indicate fire-ratings at applicable components. Provide documentation of ABA/ADA accessibility compliance of applicable components, as required by 36 CFR 1191 Appendix D - Technical.

#### 1.5 HARDWARE SCHEDULE

Prepare and submit hardware schedule in the following form:

Hardware Item	Quantity	Size	Reference Publication Type No.	Finish	Mfr Name and Catalog No.	Key Control Symbols	UL Mark (If fire-rated and listed)	BHMA Finish Designation

In addition, submit hardware schedule data package 1 in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

#### 1.6 KEY BITTING CHART REQUIREMENTS

##### 1.6.1 Requirements

All keys, cores, and keying by Owners directive.

#### 1.7 QUALITY ASSURANCE

##### 1.7.1 Hardware Manufacturers and Modifications

Provide, as far as feasible, locks, hinges, and closers of one lock, hinge, or closer manufacturer's make. Modify hardware as necessary to provide features indicated or specified.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

Deliver hardware in original individual containers, complete with necessary appurtenances including fasteners and instructions. Mark each individual container with item number as shown on hardware schedule.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Deliver permanent keys and removable cores to the Contracting Officer, either directly or by certified mail. Deliver construction master keys with the locks.

## PART 2 PRODUCTS

### 2.1 TEMPLATE HARDWARE

Hardware applied to metal or to prefinished doors must be manufactured using a template. Provide templates to door and frame manufacturers in accordance with [ANSI/BHMA A156.7](#) for template hinges. Coordinate hardware items to prevent interference with other hardware.

### 2.2 HARDWARE FOR FIRE DOORS AND EXIT DOORS

Provide all hardware necessary to meet the requirements of [NFPA 72](#) for door alarms, [NFPA 80](#) for fire doors, [NFPA 101](#) for exit doors, [NFPA 252](#) for fire tests of door assemblies, ABA/ADA accessibility requirements, and all other requirements indicated, even if such hardware is not specifically mentioned in paragraph [HARDWARE SCHEDULE](#). Provide Underwriters Laboratories, Inc. labels for such hardware in accordance with [UL Bld Mat Dir](#) or equivalent labels in accordance with another testing laboratory approved in writing by the Contracting Officer.

### 2.3 [HARDWARE ITEMS](#)

Clearly and permanently mark with the manufacturer's name or trademark, hinges, pivots, locks, latches, exit devices, bolts and closers where the identifying mark is visible after the item is installed. For closers with covers, the name or trademark may be beneath the cover. Coordinate electrified door hardware components with corresponding components specified in Division 28 [ELECTRONIC SECURITY SYSTEMS \(ESS\)](#).

#### 2.3.1 Hinges

Provide in accordance with [ANSI/BHMA A156.1](#). Provide hinges that are [4-1/2 by 4-1/2 inch](#) unless otherwise indicated. Construct loose pin hinges for interior doors and reverse-bevel exterior doors so that pins are non-removable when door is closed. Provide concealed ball bearing hinges and manufacturer's lifetime warranty.

#### 2.3.2 Continuous Hinges

Where continuous hinges are required, provide in accordance with [ANSI/BHMA A156.26](#). Provide manufacturer's lifetime warranty.

#### 2.3.3 Locks and Latches

At exterior locations provide locksets of full stainless steel type 302 or 304 construction including fronts, strike, escutcheons, knobs, bolts and all interior working parts. Marine Grade I, fully non-ferrous.

##### 2.3.3.1 Mortise Locks and Latches

Provide in accordance with [ANSI/BHMA A156.13](#), Series 1000, Operational Grade 1, Security Grade 2. Provide mortise locks with escutcheons not less than [7 by 2-1/4 inch](#) with a bushing at least [1/4 inch](#) long. Cut escutcheons to fit cylinders and provide trim items with straight, beveled, or smoothly rounded sides, corners, and edges. Provide knobs and

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

roses of mortise locks with screwless shanks and no exposed screws. Provide manufacturer's lifetime warranty for mortise locks. For cylindrical lock applications, provide plated zinc rose and levers and manufacturer's 10-year warranty.

#### 2.3.4 Exit Devices

Provide in accordance with ANSI/BHMA A156.3, Grade 1. Provide adjustable strikes for rim type and vertical rod devices. Provide open back strikes for pairs of doors with mortise and vertical rod devices. Provide touch bars in lieu of conventional crossbars and arms. Provide forged escutcheons not less than 7 by 2-1/4 inch.

#### 2.3.5 Cylinders and Cores

Provide fully compatible cylinders of Grade 1 products from products of one manufacturer with interchangeable cores that are removable by a special control key. Factory set the cores with seven pin tumblers using the COREMAX keyway. Submit a core code sheet with the cores. Provide master keyed cores in one system for this project. Provide construction interchangeable cores.

#### 2.3.6 Push Button Mechanisms

Provide in accordance with ANSI/BHMA A156.5, Grade 1. Provide units as manufactured by mechanical lockset manufacturer.

#### 2.3.7 Electrified Hardware

Comply with the requirements of NFPA 70 for wiring of electrified hardware. Provide as specified in the Hardware Sets.

##### 2.3.7.1 Electrified Locks

Provide in accordance with ANSI/BHMA A156.25, Grade 1. Provide electrified mortise locks that remain maintained during power failure.

##### 2.3.7.1.1 Power Transfer Devices

Provide concealed rigid telescoping power transfer devices with each electrified lock that route power and monitoring signals from the lockset to the door frame. Coordinate power transfers with door frames.

##### 2.3.7.2 Card Readers and Keypad Access Control Hardware

Provide in accordance with ANSI/BHMA A156.5 and ANSI/BHMA A156.25, Grade 1 components. Provide devices that are tamper alarmed, tamper and vandal resistant, solid state, and do not contain electronics which could compromise the access control subsystem should the subsystem be attacked. Provide surface, semi-flush, pedestal, or weatherproof mountable devices as specified for each individual location. Provide proximity type card readers capable of reading magnetic stripe type access control cards. Coordinate access control hardware with corresponding devices and systems specified in Division 28 ELECTRONIC SECURITY SYSTEMS (ESS).

#### 2.3.8 Keying System

By Owner's directive.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.3.9 Lock Trim

Provide cast or forged construction and commercial plain design for lock trim. Provide stamped, extruded, or forged zinc levers with plating for cylindrical locksets.

##### 2.3.9.1 Lever Handles

Provide lever handles where indicated in the Hardware Schedule. Provide in accordance with ANSI/BHMA A156.3 for mortise locks of lever handles for exit devices. Provide lever handle locks with a breakaway feature (such as a weakened spindle or a shear key) to prevent irreparable damage to the lock when force in excess of that specified in ANSI/BHMA A156.13 is applied to the lever handle. Provide lever handles return to within 1/2 inch of the door face. Locksets shall have solid one-piece stainless steel latchbolt. Lever and concealed cylinder escutcheon similar to Best #14N.

##### 2.3.10 Door Bolts

Provide in accordance with ANSI/BHMA A156.16. Provide dustproof strikes for bottom bolts, except at doors having metal thresholds. Provide automatic latching flush bolts in accordance with ANSI/BHMA A156.3, Type 25.

##### 2.3.11 Closers

Provide in accordance with ANSI/BHMA A156.4, Series C720000, Grade 1, with PT 4C with 1-1/2 inch minimum piston bore. Provide with brackets, arms, mounting devices, fasteners, full size covers, and other features necessary for the particular application. Size closers in accordance with manufacturer's printed recommendations, or provide multi-size closers, Sizes 1 through 6, and list sizes in the Hardware Schedule. Provide manufacturer's lifetime warranty.

Use stainless steel inside bracketed or door mounted closers on exterior doors. On interior doors use closers of 302 or 304 stainless steel or non-ferrous materials. On surface-mounted closers use or apply rust inhibiting finish on all ferrous parts. Also apply this finish on concealed closers.

##### 2.3.12 Overhead Holders

Provide in accordance with ANSI/BHMA A156.8.

##### 2.3.13 Door Protection Plates

Provide in accordance with ANSI/BHMA A156.6.

##### 2.3.13.1 Sizes of Armor, Mop, and Kick Plates

2 inch less than door width for single doors; 1 inch less than door width for pairs of doors. Provide 8 inch kick plates for flush doors. Provide 4 inch mop plates.

##### 2.3.14 Door Stops and Silencers

Provide in accordance with ANSI/BHMA A156.16. Silencers Type L03011. Provide three silencers for each single door, two for each pair.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.3.15 Padlocks

Provide in accordance with [ASTM F883](#).

#### 2.3.16 Thresholds

Provide in accordance with [ANSI/BHMA A156.21](#). Use J35100, with vinyl or silicone rubber insert in face of stop, for exterior doors opening out, unless specified otherwise.

#### 2.3.17 Weatherstripping Gasketing

Provide in accordance with [ANSI/BHMA A156.22](#). Provide the type and function designation where specified in paragraph HARDWARE SCHEDULE. Provide a set to include head and jamb seals, and for pairs of doors and astragals. Air leakage of weatherstripped doors not to exceed [1.25 cubic feet](#) per minute of air per square [foot](#) of door area when tested in accordance with [ASTM E283](#). Provide weatherstripping with one of the following:

##### 2.3.17.1 Extruded Aluminum Retainers

Extruded aluminum retainers not less than [0.050 inch](#) wall thickness with vinyl, neoprene, silicone rubber, or polyurethane inserts. Provide clear (natural) anodized aluminum.

#### 2.3.18 Soundproofing Gasketing

Provide in accordance with [ANSI/BHMA A156.22](#). Provide adjustable doorstops at heads, jambs and automatic door bottoms in accordance with the hardware set, of extruded aluminum, clear (natural) anodized, surface applied, with vinyl fin seals between plunger and housing. Provide doorstops with solid neoprene tube, silicone rubber, or closed cell sponge gasket. Provide door bottoms with adjustable operating rod and silicone rubber or closed cell sponge neoprene gasket. Provide doorstops that are mitered at corners. Provide type and function designation where specified in paragraph HARDWARE SETS.

#### 2.3.19 Rain Drips

##### 2.3.19.1 Door Rain Drips

Approximately [1-1/2 inch high by 5/8 inch](#) projection. Align bottom with bottom edge of door.

#### 2.3.20 Auxiliary Hardware (Other than locks)

Provide in accordance with [ANSI/BHMA A156.16](#), Grade 1.

#### 2.3.21 Sliding and Folding Door Hardware

Provide in accordance with [ANSI/BHMA A156.14](#), Grade 1. Finishes to match other hardware specified herein.

#### 2.3.22 Special Tools

Provide special tools, such as spanner and socket wrenches and dogging keys, as required to service and adjust hardware items.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 2.4 FASTENERS

Provide fasteners of type, quality, size, and quantity appropriate to the specific application. Fastener finish to match hardware. Provide stainless steel or nonferrous metal fasteners in locations exposed to weather. Verify metals in contact with one another are compatible and will avoid galvanic corrosion when exposed to weather.

## 2.5 FINISHES

Provide in accordance with ANSI/BHMA A156.18. Provide hardware in BHMA 630 finish (satin stainless steel), unless specified otherwise. Provide items not manufactured in stainless steel in BHMA 626 finish (satin chromium plated) over brass or bronze, except aluminum paint prime coat finish for surface door closers, and except BHMA 600 finish (primed for painting) for steel hinges. Provide hinges for exterior doors in stainless steel with BHMA 630 finish. Match exposed parts of concealed closers to lock and door trim. Provide hardware finish #622 for aluminum doors to the doors.

## 2.6 KEY CABINET AND CONTROL SYSTEM

Provide in accordance with ANSI/BHMA A156.5. Type required to yield a capacity (number of hooks) 50 percent greater than the number of key changes used for door locks.

## PART 3 EXECUTION

### 3.1 INSTALLATION

Provide hardware in accordance with manufacturers' printed installation instructions. Fasten hardware to wood surfaces with full-threaded wood screws or sheet metal screws. Provide machine screws set in expansion shields for fastening hardware to solid concrete and masonry surfaces. Provide toggle bolts where required for fastening to hollow core construction. Provide through bolts where necessary for satisfactory installation.

#### 3.1.1 Weatherstripping Installation

Provide full contact, weathertight seals that allow operation of doors without binding the weatherstripping.

##### 3.1.1.1 Stop Applied Weatherstripping

Fasten in place with color matched sheet metal screws not more than 9 inch on center after doors and frames have been finish painted.

#### 3.1.2 Lightproofing and Soundproofing Installation

Provide as specified for stop applied weatherstripping.

#### 3.1.3 Threshold Installation

Extend thresholds the full width of the opening and notch end for jamb stops. Set thresholds in a full bed of sealant and anchor to floor with cadmium-plated, countersunk, steel screws in expansion sleeves. For aluminum thresholds placed on top of concrete surfaces, coat the underside



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

surfaces that are in contact with the concrete with fluid applied waterproofing as a separation measure prior to placement.

### 3.2 FIRE DOORS AND EXIT DOORS

Provide hardware in accordance with NFPA 72 for door alarms, NFPA 80 for fire doors, NFPA 101 for exit doors, and NFPA 252 for fire tests of door assemblies.

### 3.3 HARDWARE LOCATIONS

Provide in accordance with SDI/DOOR A250.8, unless indicated or specified otherwise.

- a. Kick and Armor Plates: Push side of single-acting doors. Both sides of double-acting doors.
- b. Mop Plates: Bottom flush with bottom of door.

### 3.4 KEY CABINET AND CONTROL SYSTEM

Locate where directed. Tag one set of file keys and one set of duplicate keys. Place other keys in appropriately marked envelopes or tag each key. Provide complete instructions for setup and use of key control system. On tags and envelopes, indicate door and room numbers or master or grand master key.

### 3.5 FIELD QUALITY CONTROL

After installation, protect hardware from paint, stains, blemishes, and other damage until acceptance of work. Submit notice of testing 15 days before scheduled, so that testing can be witnessed by the Contracting Officer. Adjust hinges, locks, latches, bolts, holders, closers, and other items to operate properly. Demonstrate that permanent keys operate respective locks, and give keys to the Contracting Officer. Correct, repair, and finish, errors in cutting and fitting and damage to adjoining work.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.6 HARDWARE SETS

Provide hardware for aluminum doors under this section. Deliver Hardware templates and hardware, except field applied hardware, to the aluminum door and frame manufacturer for use in fabricating doors and frames.

#### Hardware Sets

Set: 1.0

Doors: S02

1	Continuous Hinge (A31031G)	CFM (height)SLF-HD1		PE
1	Exit Device (Type 1, 03)*	16 72 8804	US32D	SA
1	Cylinder*	TYPE AS REQUIRED	626	
1	Door Pull (J402)	BF158	US32D	RO
1	Surface Closer (C02021-PT4G)*	CPS8501 M	689	NO
1	Threshold (J36100)	2009APK		PE
1	Sweep (R3D534)	345AV		PE

#### Notes:

\*Waiver may be required to comply with Buy American Act. Compliancy of this product to current Buy American-type regulations must be validated with the manufacturer.

Perimeter/meeting stile seals by frame/door supplier.

Set: 2.0

Doors: 105A, 106

1	Continuous Hinge (A31031G)	CFM (height)SLF-HD1		PE
1	Exit Device (Type 1, 01)*	8810 EO	US32D	SA
1	Door Pull (J402)	BF158	US32D	RO
1	Surface Closer (C02021-PT4G)*	CPS8501 M	689	NO
1	Threshold (J36100)	2009APK		PE
1	Sweep (R3D534)	345AV		PE

#### Notes:

\*Waiver may be required to comply with Buy American Act. Compliancy of this product to current Buy American-type regulations must be validated with the manufacturer.

Perimeter/meeting stile seals by frame/door supplier.

Set: 3.0

Doors: 140,101D

1	Continuous Hinge (A31031G)	CFM (height) HD1		PE
1	Exit Device (Type 1, 03)*	16 72 8804	US32D	SA
1	Cylinder*	TYPE AS REQUIRED	626	
1	Door Pull (J402)	BF158	US32D	RO
1	Surface Closer (C02021-PT4G)*	CPS8501 M	689	NO
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Threshold (J36100)	2009APK		PE
1	Rain Guard (R0Y976)	346C		PE
1	Gasketing (R3E164)	303AS (HEAD/JAMBS)		PE
1	Sweep (R3D534)	345AV		PE

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Notes:

\*Waiver may be required to comply with Buy American Act. Compliancy of this product to current Buy American-type regulations must be validated with the manufacturer.

Set: 4.0

Doors: 101A, 101C, 101E

1	Continuous Hinge (A31031G)	CFM (height) HD1		PE
1	Exit Device (Type 1, 01)*	8810 EO	US32D	SA
1	Surface Closer (C02021-PT4G)*	CPS8501 M	689	NO
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Threshold (J36100)	2009APK		PE
1	Gasketing (R3E164)	303AS (HEAD/JAMBS)		PE
1	Sweep (R3D534)	345AV		PE

Notes:

\*Waiver may be required to comply with Buy American Act. Compliancy of this product to current Buy American-type regulations must be validated with the manufacturer.

Set: 5.0 - X10, Card Reader Entry

Doors: 101.A

1	Hinge (A8111)	T4A3786 x USA	US26D	MK
1	Electric Power Transfer*	EL-CEPT		SU
1	Exit Device (Type 1,E01,E05)*	12 55 72 8875-24v ETL	US32D	SA
1	Cylinder*	TYPE AS REQUIRED	626	
1	Surface Closer (C02011/C02021)*	R / PR8501 M	689	NO
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Acoustic Seal Set*	PEMKOSTCSET-1A (W x H)	BL	PE
1	Frame Harness	QC-C1500P		MK
2	Door Harness	QC-C		MK
1	Harness Adaptor*	52-2946		SA
1	Position Switch (E08)	DPS-M-BK		SU
1	Card Reader*	BY SECURITY INTEGRATOR		
1	Power Supply*	AQDxx (TO SUIT)		SU

Notes:

\*Waiver may be required to comply with Buy American Act. Compliancy of this product to current Buy American-type regulations must be validated with the manufacturer.

X10 Applications: In compliance Federal requirements in all aspects.

Electronic Operation: Valid card unlocks outside lever or key retracts latchbolt. Request to exit shows authorized egress. Free egress at all times. In case of power loss, door remains unlocked and latched.

Set: 6.0

Doors: 119

3	Hinge (A8111)	T4A3786 x USA	US26D	MK
1	Electric Power Transfer*	EL-CEPT		SU
1	Fail Secure Lock (E01, E06)*	RX 72 8271-24V LNL	US26D	SA
1	Cylinder*	TYPE AS REQUIRED	626	

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

1	Surface Closer (C02011/C02021)*	R / PR8501 M	689	NO
1	Door Stop (L02251/L02121)*	403/470	US26D	RO
1	Adhesive Gasketing (R0Y154)	S88BL		PE
1	Frame Harness	QC-C1500P		MK
1	Door Harness	QC-C		MK
1	Position Switch (E08)	DPS-M-BK		SU
1	Card Reader*	BY SECURITY INTEGRATOR		
1	Power Supply*	AQDxx (TO SUIT)		SU

Notes:

\*Waiver may be required to comply with Buy American Act. Compliancy of this product to current Buy American-type regulations must be validated with the manufacturer.

Electronic Operation: Valid card unlocks outside lever or key retracts latchbolt. Request to exit shows authorized egress. Free egress at all times. In case of power loss or fire alarm, door remains locked and latched.

Set: 7.0

Doors: 117, 118

6	Hinge (A8112)	TA2714 x USA	US26D	MK
1	Automatic Flush Bolt (Type 27)	2848 / 2948	US32D	RO
1	Storeroom Lock (F07)*	72 8204 LNL	US26D	SA
1	Cylinder*	TYPE AS REQUIRED	626	
1	Coordinator (Type 21A)*	2600 Series	Black	RO
		(Brackets To Suit)		
2	Surface Closer (C02011/C02021)*	R/PR8501 M	689	NO
2	Kick Plate (J102)	K1050 10" CSK	US32D	RO
2	Door Stop (L02251 / L02121)*	403/470	US26D	RO
1	Acoustic Seal Set*	PEMKOSTCSET-1A (W x H)	BL	PE
1	Astragal (R0Y634)*	357SP		PE

Notes:

\*Waiver may be required to comply with Buy American Act. Compliancy of this product to current Buy American-type regulations must be validated with the manufacturer.

Set: 8.0

Doors: Not Used

3	Hinge (A8112)	TA2714 x USA	US26D	MK
1	Storeroom Lock (F07)*	72 8204 LNL	US26D	SA
1	Cylinder*	TYPE AS REQUIRED	626	
1	Door Stop (L02251 / L02121)*	403/470	US26D	RO
3	Silencer (L03011)*	608		RO

Notes:

\*Waiver may be required to comply with Buy American Act. Compliancy of this product to current Buy American-type regulations must be validated with the manufacturer.

Set: 9.0

Doors: 107, 115A

3	Hinge (A8112)	TA2714 x USA	US26D	MK
---	---------------	--------------	-------	----

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

1	Storeroom Lock (F07)*	72 8204 LNL	US26D	SA
1	Cylinder*	TYPE AS REQUIRED	626	
1	Surface Closer (C02011/C02021)*	R / PR8501 M	689	NO
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Door Stop (L02251/L02121)*	403/470	US26D	RO
3	Silencer (L03011)*	608		RO

Notes:

\*Waiver may be required to comply with Buy American Act. Compliancy of this product to current Buy American-type regulations must be validated with the manufacturer.

Set: 10.0

Doors: 122, 125, 125A, 204

3	Hinge (A8112)	TA2714 x USA	US26D	MK
1	Storeroom Lock (F07)*	72 8204 LNL	US26D	SA
1	Cylinder*	TYPE AS REQUIRED	626	
1	Surface Closer (C02011/C02021)*	R / PR8501 M	689	NO
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Door Stop (L02251/L02121)*	403/470	US26D	RO
1	Adhesive Gasketing (R0Y154)	S88BL		PE

Notes:

\*Waiver may be required to comply with Buy American Act. Compliancy of this product to current Buy American-type regulations must be validated with the manufacturer.

Set: 11.0

Doors: 105B, 105C, 105D, 105E

3	Hinge (A8112)	TA2714 x USA	US26D	MK
1	Office Lock (F04)*	72 8205 LNL	US26D	SA
1	Cylinder*	TYPE AS REQUIRED	626	
1	Door Stop (L02251 / L02121)*	403/470	US26D	RO
3	Silencer (L03011)*	608		RO

Notes:

\*Waiver may be required to comply with Buy American Act. Compliancy of this product to current Buy American-type regulations must be validated with the manufacturer.

Set: 12.0

Doors: 102, 103, 104, 105

3	Hinge (A8112)	TA2714 x USA	US26D	MK
1	Office Lock (F04)*	72 8205 LNL	US26D	SA
1	Cylinder*	TYPE AS REQUIRED	626	
1	Surface Closer (C02011/C02021)*	R / PR8501 M	689	NO
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Door Stop (L02251/L02121)*	403/470	US26D	RO
1	Acoustic Seal Set*	PEMKOSTCSET-1A (W x H)	BL	PE

Notes:

\*Waiver may be required to comply with Buy American Act. Compliancy of this

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

product to current Buy American-type regulations must be validated with the manufacturer.

Set: 13.0

Doors: 111, 112, 113, 114, 123, 124, 201, 202.A, 202.B, 203.A, 205

3	Hinge (A8112)	TA2714 x USA	US26D	MK
1	Classroom Lock (F05)*	72 8237 LNL	US26D	SA
1	Cylinder*	TYPE AS REQUIRED	626	
1	Surface Closer (C02011/C02021)*	R / PR8501 M	689	NO
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Door Stop (L02251/L02121)*	403/470	US26D	RO
1	Acoustic Seal Set*	PEMKOSTCSET-1A (W x H)	BL	PE

Notes:

\*Waiver may be required to comply with Buy American Act. Compliancy of this product to current Buy American-type regulations must be validated with the manufacturer.

Set: 14.0

Doors: 126.A, 126.B

3	Hinge (A8112)	TA2714 x USA	US26D	MK
1	Classroom Lock (F05)*	72 8237 LNL	US26D	SA
1	Cylinder*	TYPE AS REQUIRED	626	
1	Surface Closer (C02011/C02021)*	R / PR8501 M	689	NO
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Door Stop (L02251 / L02121)*	403/470	US26D	RO
1	Adhesive Gasketing (R0Y154)	S88BL		PE

Notes:

\*Waiver may be required to comply with Buy American Act. Compliancy of this product to current Buy American-type regulations must be validated with the manufacturer.

Set: 15.0

Doors: 102A, 200, 203.B

3	Hinge (A8112)	TA2714 x USA	US26D	MK
1	Passage Set (F01)*	8215 LNL	US26D	SA
1	Surface Closer (C02011/C02021)*	R / PR8501 M	689	NO
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Door Stop (L02251/L02121)*	403/470	US26D	RO
1	Acoustic Seal Set*	PEMKOSTCSET-1A (W x H)	BL	PE

Notes:

\*Waiver may be required to comply with Buy American Act. Compliancy of this product to current Buy American-type regulations must be validated with the manufacturer.

Set: 16.0

Doors: 108, 109

3	Hinge (A8111)	T4A3786 x USA	US26D	MK
1	Push Plate (J301)	70C-RKW	US32D	RO
1	Door Pull w/ Plate (J405)	BF 110x70C	US32D	RO

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

1	Surface Closer (C02011/C02021)*	R / PR8501 M	689	NO
1	Kick Plate (J102)	K1050 10" CSK	US32D	RO
1	Mop Plate (J103)	K1050 6" CSK	US32D	RO
1	Door Stop (L02251/L02121)*	403/470	US26D	RO
3	Silencer (L03011)*	608		RO

Notes:

\*Waiver may be required to comply with Buy American Act. Compliancy of this product to current Buy American-type regulations must be validated with the manufacturer.

Mop plate at inswinging doors only.

Set: 17.0

Doors: Not Used

1	Existing Hardware	To remain operable		OT
---	-------------------	--------------------	--	----

Set: 18.0

Doors: Not Used

1	Opening	To be tack welded shut		OT
---	---------	------------------------	--	----

Set: 19.0

Doors: Not Used

1	Mortise Cylinder (E09251)	72 40 Series	US32D	SA
		(CAM/Length to Suit)		
1	All Hardware*	By Door Supplier		

Set 20.0

Doors: 110B.A

8	Hinge (A8111)	T4A3786 x USA	US26D	MK
2	Exit Devices (Type 8, 14)	12 NB BAA WD8615 ETL	US32D	SA
2	Surface Closer (C02011/C02021)*	R / PR8501 M	689	NO
2	Kick Plate (J102)	K1050 10" CSK	US32D	RO
2	Electromagnetic holder*	994M 120VAC	689	Rixson
1	Adhesive Gasketing (R0Y154)	S88BL		PE
2	Astragal (R3E734)*	29310		PE

Notes:

\*Waiver may be required to comply with Buy American Act. Compliancy of this product to current Buy American-type regulations must be validated with the manufacturer.

Verify cylinder requirements, if any.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 08 81 00

## GLAZING

05/19

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

- AAMA 800 (2016) Voluntary Specifications and Test Methods for Sealants
- AAMA GDSG-1 (1987) Glass Design for Sloped Glazing
- AAMA TIR A7 (2011) Sloped Glazing Guidelines

## AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- ANSI Z97.1 (2015) Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test

## ASTM INTERNATIONAL (ASTM)

- ASTM C509 (2006; R 2021) Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material
- ASTM C864 (2005; R 2015) Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers
- ASTM C920 (2018) Standard Specification for Elastomeric Joint Sealants
- ASTM C1021 (2008; R 2014) Standard Practice for Laboratories Engaged in Testing of Building Sealants
- ASTM C1036 (2021) Standard Specification for Flat Glass
- ASTM C1048 (2018) Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass
- ASTM C1087 (2016) Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems
- ASTM C1172 (2019) Standard Specification for

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### Laminated Architectural Flat Glass

ASTM C1184	(2014) Standard Specification for Structural Silicone Sealants
ASTM C1281	(2016) Standard Specification for Preformed Tape Sealants for Glazing Applications
ASTM D395	(2016; E 2017) Standard Test Methods for Rubber Property - Compression Set
ASTM D2287	(2019) Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds
ASTM E1300	(2016) Standard Practice for Determining Load Resistance of Glass in Buildings
ASTM E2190	(2010) Standard Specification for Insulating Glass Unit Performance and Evaluation

#### GLASS ASSOCIATION OF NORTH AMERICA (GANA)

GANA Glazing Manual	(2008) Glazing Manual
GANA Sealant Manual	(2008) Sealant Manual
GANA Standards Manual	(2008) Engineering Standards Manual

#### INSULATING GLASS MANUFACTURERS ALLIANCE (IGMA)

IGMA TB-1200	(1983; R 2016) Guidelines for Insulating Glass Dimensional Tolerances
IGMA TB-3001	(2001) Guidelines for Sloped Glazing
IGMA TM-3000	(1990; R 2016) North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use

#### NATIONAL FENESTRATION RATING COUNCIL (NFRC)

NFRC 100	(2020) Procedure for Determining Fenestration Product U-Factors
NFRC 200	(2020) Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence

#### U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

16 CFR 1201	Safety Standard for Architectural Glazing Materials
-------------	---

### 1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S"

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Insulating Glass

Glazing Accessories

Sealants

Joint Backer

SD-04 Samples

Insulating Glass

Glazing Tape

Sealing Tapes

SD-07 Certificates

Insulating Glass

SD-08 Manufacturer's Instructions

Setting and Sealing Materials

Glass Setting

SD-11 Closeout Submittals

Warranty for Insulated Glass Units

1.3 SYSTEM DESCRIPTION

Fabricate and install watertight and airtight glazing systems to withstand thermal movement and wind loading without glass breakage, gasket failure, deterioration of glazing accessories, or defects in the work. Glazed panels must comply with the safety standards, in accordance with ANSI Z97.1, and comply with indicated wind/snow loading in accordance with ASTM E1300.

Sloped glazing must comply with AAMA GDSG-1 and AAMA TIR A7, and IGMA TB-3001.

1.4 QUALITY CONTROL

Submit two 8 by 10 inch samples of each glass specified.

1.5 DELIVERY, STORAGE, AND HANDLING

Deliver products to the site in unopened containers, labeled plainly with manufacturers' names and brands. Store glass and setting materials in safe, enclosed dry locations and do not unpack until needed for installation. Handle and install materials in a manner that will protect them from damage.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 1.6 ENVIRONMENTAL REQUIREMENTS

Do not start glazing work until the outdoor temperature is above 40 degrees F and rising, unless procedures recommended by the glass manufacturer and approved by the Contracting Officer are made to warm the glass and rabbet surfaces. Provide ventilation to prevent condensation of moisture on glazing work during installation. Do not perform glazing work during damp or rainy weather.

## 1.7 WARRANTY

### 1.7.1 Warranty for Insulated Glass Units

Warranty insulating glass units against development of material obstruction to vision (such as dust, fogging, or film formation on the inner glass surfaces) caused by failure of the hermetic seal, other than through glass breakage, for a 10-year period following acceptance of the work. Provide new units for any units failing to comply with terms of this warranty within 45 working days after receipt of notice from the Government.

## PART 2 PRODUCTS

### 2.1 PRODUCT SUSTAINABILITY CRITERIA

Not Used.

### 2.2 GLASS

ASTM C1036, unless specified otherwise. In doors and sidelights, provide safety glazing material conforming to 16 CFR 1201.

#### 2.2.1 Clear Glass

For interior glazing (i.e., pass and observation windows), 3/8 inch thick glass should be used.

Type I, Class 1 (clear), Quality q5 (B). Provide for glazing openings not indicated or specified otherwise.

#### 2.2.2 Laminated Glass

ASTM C1172, Laminated glass fabricated from two nominal 1/8 inch pieces of Type I, Kind FT, flat glass conforming to ASTM C1048. Flat glass to be laminated together with a minimum of 0.060 inch thick, clear polyvinyl butyral laminate, conforming to requirements of 16 CFR 1201 and ASTM C1172. The total thickness shall be nominally 3/8 inch. Color must match the glazing on the existing facility.

#### 2.2.3 Tempered Glass

ASTM C1048, Kind FT (fully tempered), Condition A (uncoated), Type I, Class 1 (transparent), Quality q3, 3/8 inch thick, 90 percent light transmittance, conforming to ASTM C1048 and GANA Standards Manual. Color must match the glazing on the existing facility.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 2.3 INSULATING GLASS UNITS

Two panes of glass separated by a dehydrated airspace, filled with argon gas and hermetically sealed, conforming to [ASTM E2190](#). Submit performance and compliance documentation for each type of [insulating glass](#).

Insulated glass units must have a Solar Heat Gain Coefficient (SHGC) maximum of [0.25](#) determined according to [NFRC 200](#) and a U-factor maximum of [0.30 Btu per square foot by hr by degree F](#) in accordance with [NFRC 100](#).

Dimensional tolerances must be as specified in [IGMA TB-1200](#). Spacer must be black, roll-formed, thermally broken aluminum, with bent or tightly welded or keyed and sealed joints to completely seal the spacer periphery and eliminate moisture and hydrocarbon vapor transmission into airspace through the corners. Primary seal must be compressed polyisobutylene and the secondary seal must be a specially formulated silicone.

## 2.4 PLASTIC GLAZING

[Not Used.](#)

## 2.5 SETTING AND SEALING MATERIALS

Provide as specified in the [GANA Glazing Manual](#), [IGMA TM-3000](#), [IGMA TB-3001](#), and manufacturer's recommendations, unless specified otherwise herein. Do not use metal sash putty, nonskinning compounds, nonresilient preformed sealers, or impregnated preformed gaskets. Materials exposed to view and unpainted must be gray or neutral color. Sealant testing must be performed by a testing agency qualified according to [ASTM C1021](#).

Submit glass manufacturer's recommendations for setting and sealing materials and for installation of each type of glazing material specified.

### 2.5.1 Sealants

Provide elastomeric and structural sealants.

#### 2.5.1.1 Elastomeric Sealant

[ASTM C920](#), Type S, Grade NS, Class 12.5, Use G. Use for channel or stop glazing metal sash. [Sealants](#) must be chemically compatible with setting blocks, edge blocks, and sealing tapes. Color of sealant must be white.

#### 2.5.1.2 Structural Sealant

[ASTM C1184](#), Type S.

### 2.5.2 Joint Backer

[Joint backer](#) must have a diameter size at least 25 percent larger than joint width; type and material as recommended in writing by glass and sealant manufacturer.

### 2.5.3 Glazing Tapes

#### 2.5.3.1 Back-Bedding Mastic Glazing Tapes

Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with [ASTM C1281](#) and [AAMA 800](#) for products indicated below:

- a. AAMA 804.3 tape, where indicated.
- b. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
- c. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

#### 2.5.3.2 Expanded Cellular Glazing Tapes

Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with [AAMA 800](#) for the following types:

- a. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
- b. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

#### 2.5.4 Sealing Tapes

Preformed, semisolid, PVC-based material of proper size and compressibility for the particular condition, complying with [ASTM D2287](#). Use only where glazing rabbet is designed for tape and [tape](#) is recommended by the glass or sealant manufacturer. Provide spacer shims for use with compressible tapes. Tapes must be chemically compatible with the product being set.

#### 2.5.5 Setting Blocks and Edge Blocks

Closed-cell neoprene setting blocks must be dense extruded type conforming to [ASTM C509](#) and [ASTM D395](#), Method B, Shore A durometer between 70 and 90. Edge blocking must be Shore A durometer of 50 (plus or minus 5). Provide silicone setting blocks when blocks are in contact with silicone sealant. Profiles, lengths and locations must be as required and recommended in writing by glass manufacturer. Block color must be black.

#### 2.5.6 Glazing Gaskets

Glazing gaskets must be extruded with continuous integral locking projection designed to engage into metal glass holding members to provide a watertight seal during dynamic loading, building movements and thermal movements. Glazing gaskets for a single glazed opening must be continuous one-piece units with factory-fabricated injection-molded corners free of flashing and burrs. Glazing gaskets must be in lengths or units recommended by manufacturer to ensure against pull-back at corners. Provide glazing gasket profiles as recommended by the manufacturer for the intended application.

##### 2.5.6.1 Fixed Glazing Gaskets

Fixed glazing gaskets must be closed-cell (sponge) smooth extruded compression gaskets of cured elastomeric virgin neoprene compounds conforming to [ASTM C509](#), Type 2, Option 1.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.5.6.2 Wedge Glazing Gaskets

Wedge glazing gaskets must be high-quality extrusions of cured elastomeric virgin neoprene compounds, ozone resistant, conforming to [ASTM C864](#), Option 1, Shore A durometer between 65 and 75.

#### 2.5.6.3 Aluminum Framing Glazing Gaskets

Glazing gaskets for aluminum framing must be permanent, elastic, non-shrinking, non-migrating, watertight and weathertight.

#### 2.5.7 Accessories

Provide as required for a complete installation, including glazing points, clips, shims, angles, beads, and spacer strips. Provide noncorroding metal accessories. Provide primer-sealers and cleaners as recommended by the glass and sealant manufacturers. Use [ASTM C1087](#) to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to surface.

### 2.6 MIRROR ACCESSORIES

Not Used.

## PART 3 EXECUTION

Any materials that show visual evidence of biological growth due to the presence of moisture must not be installed on the building project.

### 3.1 PREPARATION

Preparation, unless otherwise specified or approved, must conform to applicable recommendations in the [GANA Glazing Manual](#), [GANA Sealant Manual](#), [IGMA TB-3001](#), [IGMA TM-3000](#), and manufacturer's recommendations. Determine the sizes to provide the required edge clearances by measuring the actual opening to receive the glass. Grind smooth in the shop glass edges that will be exposed in finish work. Leave labels in place until the installation is approved, except remove applied labels on heat-absorbing glass and on insulating glass units as soon as glass is installed. Securely fix movable items or keep in a closed and locked position until glazing compound has thoroughly set.

### 3.2 GLASS SETTING

Shop glaze or field glaze items to be glazed using glass of the quality and thickness specified or indicated. Glazing, unless otherwise specified or approved, must conform to applicable recommendations in the [GANA Glazing Manual](#), [GANA Sealant Manual](#), [IGMA TB-3001](#), [IGMA TM-3000](#), and manufacturer's recommendations. Aluminum windows, wood doors, and wood windows may be glazed in conformance with one of the glazing methods described in the standards under which they are produced, except that face puttying with no bedding will not be permitted. Handle and install glazing materials in accordance with manufacturer's instructions. Use beads or stops which are furnished with items to be glazed to secure the glass in place. Verify products are properly installed, connected, and adjusted.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.2.1 Sheet Glass

Cut and set with the visible lines or waves horizontal.

### 3.2.2 Insulating Glass Units

Do not grind, nip, or cut edges or corners of units after the units have left the factory. Springing, forcing, or twisting of units during setting will not be permitted. Handle units so as not to strike frames or other objects. Installation must conform to applicable recommendations of **IGMA TB-3001** and **IGMA TM-3000**.

### 3.2.3 Installation of Laminated Glass

Sashes which are to receive laminated glass must be weeped to the outside to allow water drainage into the channel.

## 3.3 CLEANING

Clean glass surfaces and remove labels, paint spots, putty, and other defacement as required to prevent staining. Glass must be clean at the time the work is accepted.

## 3.4 PROTECTION

Protect glass work immediately after installation. Identify glazed openings with suitable warning tapes, cloth or paper flags, attached with non-staining adhesives. Protect reflective glass with a protective material to eliminate any contamination of the reflective coating. Place protective material far enough away from the coated glass to allow air to circulate to reduce heat buildup and moisture accumulation on the glass. Upon removal, separate protective materials for reuse or recycling. Remove and replace glass units which are broken, chipped, cracked, abraded, or otherwise damaged during construction activities with new units.

## 3.5 SCHEDULE

GL-1: 1/4-inch thick clear tempered glass.

GL-2: 1-inch thick insulated laminated glazing units with the following minimum performance properties: U-value: 0.30; SHGC: 0.25.

-- End of Section --



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 08 91 00

METAL WALL LOUVERS  
05/11

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC. (AMCA)

AMCA 500-L (2015) Laboratory Methods of Testing  
Louvers for Rating

ALUMINUM ASSOCIATION (AA)

AA DAF45 (2003; Reaffirmed 2009) Designation System  
for Aluminum Finishes

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 611 (2014) Voluntary Specification for  
Anodized Architectural Aluminum

ASTM INTERNATIONAL (ASTM)

ASTM B221 (2014) Standard Specification for Aluminum  
and Aluminum-Alloy Extruded Bars, Rods,  
Wire, Profiles, and Tubes

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Wall louvers

SD-03 Product Data

Metal Wall Louvers

SD-04 Samples

Wall louvers; G

## 1.3 DELIVERY, STORAGE, AND PROTECTION

Deliver materials to the site in an undamaged condition. Carefully store materials off the ground to provide proper ventilation, drainage, and

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

protection against dampness. Louvers shall be free from nicks, scratches, and blemishes. Replace defective or damaged materials with new.

#### 1.4 DETAIL DRAWINGS

Show all information necessary for fabrication and installation of wall louvers. Indicate materials, sizes, thicknesses, fastenings, and profiles.

#### 1.5 COLOR SAMPLES

Colors of finishes for wall louvers shall closely approximate colors indicated. Where color is not indicated, submit the manufacturer's standard colors to the Contracting Officer for selection.

### PART 2 PRODUCTS

#### 2.1 MATERIALS

##### 2.1.1 Extruded Aluminum

ASTM B221, alloy 6063-T5 or -T52.

#### 2.2 METAL WALL LOUVERS

Weather resistant type, with bird screens and made to withstand a wind load of not less than 30 pounds per square foot. Wall louvers must bear the AMCA certified ratings program seal for air performance and water penetration in accordance with AMCA 500-L. The rating must show a water penetration of 0.20 or less ounce per square foot of free area at a free velocity of 800 feet per minute.

##### 2.2.1 Extruded Aluminum Louvers

Fabricated of extruded 6063-T5 or -T52 aluminum with a wall thickness of not less than 0.081 inch.

##### 2.2.2 Screens and Frames

Provide 1/2 inch square mesh, 14 or 16 gage aluminum or 1/4 inch square mesh, 16 gage aluminum insect screening. Mount screens in removable, rewirable frames of same material and finish as the louvers.

Provide single sheet 1-inch insulated blankoff panel as provided by manufacturer.

Provide vertical security bar assembly. Refer to Section 08 34 01 FORCED ENTRY RESISTANT COMPONENTS.

#### 2.3 FASTENERS AND ACCESSORIES

Provide stainless steel screws and fasteners for aluminum louvers and zinc-coated or stainless steel screws and fasteners for steel louvers. Provide other accessories as required for complete and proper installation.

#### 2.4 FINISHES

##### 2.4.1 Aluminum

Exposed aluminum surfaces shall be factory finished with an anodic

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

coating. Color shall be as indicated. Louvers shall have the same finish.

#### 2.4.1.1 Anodic Coating

Clean exposed aluminum surfaces and provide an anodized finish conforming to AA DAF45 and AAMA 611. Finish shall be:

- a. Architectural Class I (0.7 mil or thicker), designation AA-M10-C22-A44, electrolytically deposited color as indicated.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

##### 3.1.1 Wall Louvers

Install using stops or moldings, flanges, strap anchors, or jamb fasteners as appropriate for the wall construction and in accordance with manufacturer's recommendations.

#### 3.2 PROTECTION FROM CONTACT OF DISSIMILAR MATERIALS

##### 3.2.1 Aluminum

Where aluminum contacts metal other than zinc, paint the dissimilar metal with a primer and two coats of aluminum paint.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 09 22 00

SUPPORTS FOR PLASTER AND GYPSUM BOARD  
02/10, CHG 2: 08/18

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 341 (2016) Seismic Provisions for Structural Steel Buildings

## ASTM INTERNATIONAL (ASTM)

ASTM A463/A463M (2015; R 2020; E 2020) Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process

ASTM A653/A653M (2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

ASTM C645 (2014; E 2015) Nonstructural Steel Framing Members

ASTM C754 (2020) Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products

ASTM C841 (2003; R 2013) Installation of Interior Lathing and Furring

ASTM C847 (2014a) Standard Specification for Metal Lath

## NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM EMLA 920 (2009) Guide Specifications for Metal Lathing and Furring

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### Metal Support Systems; G

Submit for the erection of metal framing, furring, and ceiling suspension systems. Indicate materials, sizes, thicknesses, and fastenings.

#### SD-03 Product Data

#### Metal Support Systems

### 1.3 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the job site and store in ventilated dry locations permitting easy access for inspection and handling. If materials are stored outdoors, stack materials off the ground, supported on a level platform, and fully protected from the weather. Handle materials carefully to prevent damage. Remove damaged items and provide new items.

## PART 2 PRODUCTS

### 2.1 MATERIALS

Provide steel materials for metal support systems with galvanized coating ASTM A653/A653M, G-60; aluminum coating ASTM A463/A463M, T1-25; or a 55-percent aluminum-zinc coating. Provide support systems and attachments per AISC 341 in seismic zones.

Provide metal support systems containing a minimum of 20 percent recycled content.

#### 2.1.1 Materials for Attachment of Lath

##### 2.1.1.1 Suspended and Furred Ceiling Systems and Wall Furring

ASTM C841, and ASTM C847.

##### 2.1.1.2 Non-load Bearing Wall Framing

NAAMM EMLA 920.

#### 2.1.2 Materials for Attachment of Gypsum Wallboard

##### 2.1.2.1 Suspended and Furred Ceiling Systems

ASTM C645.

##### 2.1.2.2 Non-load Bearing Wall Framing and Furring

ASTM C645, but not thinner than 0.0179 inch thickness, with 0.0329 inch minimum thickness supporting wall hung items such as cabinetwork, equipment and fixtures.

##### 2.1.2.3 Z-Furring Channels with Wall Insulation

Not lighter than 26 gage galvanized steel, Z-shaped, with 1-1/4 inch and 3/4 inch flanges and depth as required by the insulation thickness provided.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## PART 3 EXECUTION

### 3.1 INSTALLATION

#### 3.1.1 Systems for Attachment of Lath

##### 3.1.1.1 Suspended and Furred Ceiling Systems and Wall Furring

ASTM C841, except as indicated otherwise.

##### 3.1.1.2 Non-load Bearing Wall Framing

NAAMM EMLA 920, except provide framing members 16 inches o.c. unless indicated otherwise.

#### 3.1.2 Systems for Attachment of Gypsum Wallboard

##### 3.1.2.1 Suspended and Furred Ceiling Systems

ASTM C754, except provide framing members 16 inches o.c. unless indicated otherwise.

##### 3.1.2.2 Non-load Bearing Wall Framing and Furring

ASTM C754, except as indicated otherwise.

##### 3.1.2.3 Z-Furring Channels with Wall Insulation

Install Z-furring channels vertically spaced not more than 24 inches o.c. Locate Z-furring channels at interior and exterior corners in accordance with manufacturer's printed erection instructions. Fasten furring channels to masonry walls with powder-driven fasteners or hardened concrete steel nails through narrow flange of channel. Space fasteners not more than 24 inches o.c.

### 3.2 ERECTION TOLERANCES

Provide framing members which will be covered by finish materials such as wallboard, plaster, or ceramic tile set in a mortar setting bed, within the following limits:

- a. Layout of walls and partitions: 1/4 inch from intended position;
- b. Plates and runners: 1/4 inch in 8 feet from a straight line;
- c. Studs: 1/4 inch in 8 feet out of plumb, not cumulative; and
- d. Face of framing members: 1/4 inch in 8 feet from a true plane.

Provide framing members which will be covered by ceramic tile set in dry-set mortar, latex-portland cement mortar, or organic adhesive within the following limits:

- a. Layout of walls and partitions: 1/4 inch from intended position;
- b. Plates and runners: 1/8 inch in 8 feet from a straight line;

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- c. Studs: 1/8 inch in 8 feet out of plumb, not cumulative; and
- d. Face of framing members: 1/8 inch in 8 feet from a true plane.

-- End of Section --



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 09 29 00

## GYPSUM BOARD

08/16, CHG 4: 02/20

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A108.11 (1992; Reaffirmed 2005) Specifications for  
Interior Installation of Cementitious  
Backer Units

## ASTM INTERNATIONAL (ASTM)

ASTM C475/C475M (2017) Standard Specification for Joint  
Compound and Joint Tape for Finishing  
Gypsum Board

ASTM C840 (2020) Standard Specification for  
Application and Finishing of Gypsum Board

ASTM C954 (2018) Standard Specification for Steel  
Drill Screws for the Application of Gypsum  
Panel Products or Metal Plaster Bases to  
Steel Studs from 0.033 in. (0.84 mm) to  
0.112 in. (2.84 mm) in Thickness

ASTM C1002 (2020) Standard Specification for Steel  
Self-Piercing Tapping Screws for the  
Application of Gypsum Panel Products or  
Metal Plaster Bases to Wood Studs or Steel  
Studs

ASTM C1047 (2019) Standard Specification for  
Accessories for Gypsum Wallboard and  
Gypsum Veneer Base

ASTM C1177/C1177M (2017) Standard Specification for Glass  
Mat Gypsum Substrate for Use as Sheathing

ASTM C1178/C1178M (2013) Standard Specification for Glass  
Mat Water-Resistant Gypsum Backing Panel

ASTM C1396/C1396M (2017) Standard Specification for Gypsum  
Board

ASTM D412 (2016) Standard Test Methods for  
Vulcanized Rubber and Thermoplastic  
Elastomers - Tension

ASTM D624 (2000; R 2020) Standard Test Method for

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Tear Strength of Conventional Vulcanized  
Rubber and Thermoplastic Elastomers

ASTM D1149

(2007; R 2012) Standard Test Method for  
Rubber Deterioration - Surface Ozone  
Cracking in a Chamber

ASTM D3273

(2016) Standard Test Method for Resistance  
to Growth of Mold on the Surface of  
Interior Coatings in an Environmental  
Chamber

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350

(2010; Version 1.1) Standard Method for  
the Testing and Evaluation of Volatile  
Organic Chemical Emissions from Indoor  
Sources using Environmental Chambers

FM GLOBAL (FM)

FM APP GUIDE

(updated on-line) Approval Guide  
<http://www.approvalguide.com/>

GREEN SEAL (GS)

GS-36

(2013) Adhesives for Commercial Use

GYPSUM ASSOCIATION (GA)

GA 214

(2010) Recommended Levels of Gypsum Board  
Finish

GA 216

(2010) Application and Finishing of Gypsum  
Panel Products

GA 253

(2012) Application of Gypsum Sheathing

GA 600

(2009) Fire Resistance Design Manual

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS

SCS Global Services (SCS) Indoor Advantage

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168

(2017) Adhesive and Sealant Applications

UNDERWRITERS LABORATORIES (UL)

UL 2818

(2013) GREENGUARD Certification Program  
For Chemical Emissions For Building  
Materials, Finishes And Furnishings

UL Fire Resistance

(2014) Fire Resistance Directory

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S"

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-03 Product Data

Glass Mat Water-Resistant Gypsum Tile Backing Board

Glass Mat Covered or Reinforced Gypsum Sheathing

Glass Mat Covered or Reinforced Gypsum Sheathing Sealant

Type X Moisture and Mold Resistant Gypsum

Accessories

Submit for each type of gypsum board and for cementitious backer units.

Gypsum Board

Recycled Content for Paper Facing and Gypsum Cores; S

#### SD-07 Certificates

Asbestos Free Materials; G

Certify that gypsum board types, gypsum backing board types, cementitious backer units, and joint treating materials do not contain asbestos.

Indoor Air Quality for Gypsum Board; S

#### SD-08 Manufacturer's Instructions

Safety Data Sheets

#### SD-10 Operation and Maintenance Data

Manufacturer Maintenance Instructions

### 1.3 CERTIFICATIONS

#### 1.3.1 Indoor Air Quality Certifications

Submit required indoor air quality certifications in one submittal package.

##### 1.3.1.1 Ceiling and Wall Systems

Provide products certified to meet indoor air quality requirements by UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification or validation by other third-party program that products meet the requirements of this Section. Provide current product certification documentation from certification body. When product does not have certification, provide validation that product meets the indoor air quality product requirements cited herein.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.3.1.2 Adhesives and Sealants

Provide products certified to meet indoor air quality requirements by [UL 2818](#) (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification or validation by other third-party program that products meet the requirements of this Section. Provide current product certification documentation from certification body. When product does not have certification, provide validation that product meets the indoor air quality product requirements cited herein.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

##### 1.4.1 Delivery

Deliver materials in the original packages, containers, or bundles with each bearing the brand name, applicable standard designation, and name of manufacturer, or supplier.

##### 1.4.2 Storage

Keep materials dry by storing inside a sheltered building. Where necessary to store gypsum board and cementitious backer units outside, store off the ground, properly supported on a level platform, and protected from direct exposure to rain, snow, sunlight, and other extreme weather conditions. Provide adequate ventilation to prevent condensation. Store per manufacturer's recommendations for allowable temperature and humidity range. [Do not store gypsum wallboard with materials which have high emissions of volatile organic compounds \(VOCs\) or other contaminants.](#) Do not store panels near materials that may offgas or emit harmful fumes, such as kerosene heaters, fresh paint, or adhesives. Do not use materials that have visible moisture or biological growth.

##### 1.4.3 Handling

Neatly stack gypsum board and cementitious backer units flat to prevent sagging or damage to the edges, ends, and surfaces.

#### 1.5 QUALIFICATIONS

Furnish type of gypsum board work specialized by the installer with a minimum of 3 years of documented successful experience.

#### 1.6 ENVIRONMENTAL REQUIREMENTS

Do not expose the gypsum board to excessive sunlight prior to gypsum board application. Maintain a continuous uniform temperature of not less than [50 degrees F](#) and not more than [80 degrees F](#) for at least one week prior to the application of gypsum board work, while the gypsum board application is being done, and for at least one week after the gypsum board is set. Shield air supply and distribution devices to prevent any uneven flow of air across the plastered surfaces. Provide ventilation to exhaust moist air to the outside during gypsum board application, set, and until gypsum board jointing is dry. In glazed areas, keep windows open top and bottom or side to side [3 to 4 inches](#). Reduce openings in cold weather to prevent freezing of joint compound when applied. For enclosed areas lacking natural ventilation, provide temporary mechanical means for ventilation. In unglazed areas subjected to hot, dry winds or temperature differentials from day to night of [20 degrees F](#) or more, screen openings with

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

cheesecloth or similar materials. Avoid rapid drying. During periods of low indoor humidity, provide minimum air circulation following gypsum boarding and until gypsum board jointing complete and is dry.

## 1.7 FIRE RESISTIVE CONSTRUCTION

Comply with specified fire-rated assemblies for design numbers indicated per [UL Fire Resistance](#) or [FM APP GUIDE](#).

## PART 2 PRODUCTS

### 2.1 MATERIALS

Conform to specifications, standards and requirements specified. Provide gypsum board types, gypsum backing board types, and joint treating materials manufactured from [asbestos free materials](#) only. [Submit Safety Data Sheets and manufacturer maintenance instructions for gypsum materials including adhesives.](#)

#### 2.1.1 Gypsum Board

[ASTM C1396/C1396M](#). Gypsum board must contain a minimum of 10 percent post-consumer recycled content, or a minimum of 20 percent post-industrial recycled content. Provide data identifying percentage of recycled content for gypsum board. Paper facings must contain a minimum of 100 percent recycled paper content. Gypsum cores must contain a minimum of 95 percent post-industrial recycled gypsum content. Provide data identifying percentage of [recycled content for paper facing and gypsum cores](#). Provide gypsum wall board and panels meeting the emissions requirements of [CDPH SECTION 01350](#) (limit requirements for either office or classroom spaces regardless of space type). Provide certification or validation of [indoor air quality for gypsum board](#).

##### 2.1.1.1 Regular

[48 inch](#) wide, [5/8 inch](#) thick, tapered edges.

##### 2.1.1.2 Type X (Special Fire-Resistant)

[48 inch](#) wide, [5/8 inch](#) thick, tapered edges.

##### 2.1.1.3 Mold Resistant / Anti-Microbial Gypsum

[ASTM D3273](#). [48 inch](#) wide, [5/8 inch](#) thick, tapered edges.

#### 2.1.2 Regular Type X Moisture and Mold Resistant Gypsum

[ASTM C1396/C1396M](#).

##### 2.1.2.1 Regular

[48 inch](#) wide, [5/8 inch](#) thick, [tapered](#) edges.

##### 2.1.2.2 Type X (Special Fire-Resistant)

[48 inch](#) wide, [5/8 inch](#) thick, [tapered](#) edges.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 2.1.1.3 Glass Mat Water-Resistant Gypsum Tile Backing Board

ASTM C1178/C1178M

#### 2.1.1.3.1 Regular

48 inch wide, 5/8 inch thick, tapered edges.

### 2.1.1.4 Glass Mat Covered or Reinforced Gypsum Sheathing

Exceeds physical properties of ASTM C1396/C1396M and ASTM C1177/C1177M. Provide 1/2 inch, gypsum sheathing. Provide gypsum board of with a noncombustible water-resistant core, with glass mat surfaces embedded to the gypsum core or reinforcing embedded throughout the gypsum core. Warrant gypsum sheathing board for at least twelve months against delamination due to direct weather exposure. Seal all joints, seams, and penetrations with compatible sealant.

#### 2.1.1.4.1 Glass Mat Covered or Reinforced Gypsum Sheathing Sealant

Provide sealant compatible with glass mat covered or reinforced gypsum sheathing, rubber washers for masonry veneer anchors, and other associated cavity wall components such as anchors and through wall flashing. Provide sealants for glass mat covered or reinforced gypsum sheathing board edge seams and veneer anchor penetrations recommended by the glass mat covered or reinforced gypsum sheathing manufacturer and have the following performance requirements:

- a. ASTM D412: Tensile Strength, 80 psi
- b. ASTM D412: Ultimate Tensile Strength (maximum elongation), 170 psi
- c. ASTM D624: Tear Strength, dieB, 27 pli
- d. ASTM D1149: Joint Movement Capability after 14 Days cure, plus or minus 50 percent.

### 2.1.1.5 Joint Treatment Materials

ASTM C475/C475M. Product must be low emitting VOC types with VOC limits not exceeding 50 g/L. Provide data identifying VOC content of joint compound. Use all purpose joint and texturing compound containing inert fillers and natural binders, including lime compound. Pre-mixed compounds must be free of antifreeze, vinyl adhesives, preservatives, biocides and other slow releasing compounds.

#### 2.1.1.5.1 Embedding Compound

Specifically formulated and manufactured for use in embedding tape at gypsum board joints and compatible with tape, substrate and fasteners.

#### 2.1.1.5.2 Finishing or Topping Compound

Specifically formulated and manufactured for use as a finishing compound.

#### 2.1.1.5.3 All-Purpose Compound

Specifically formulated and manufactured to serve as both a taping and a finishing compound and compatible with tape, substrate and fasteners.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.1.5.4 Setting or Hardening Type Compound

Specifically formulated and manufactured for use with fiber glass mesh tape.

#### 2.1.5.5 Joint Tape

Use cross-laminated, tapered edge, reinforced paper, or fiber glass mesh tape recommended by the manufacturer.

#### 2.1.6 Fasteners

##### 2.1.6.1 Screws

ASTM C1002, Type "G", Type "S" or Type "W" steel drill screws for fastening gypsum board to gypsum board, wood framing members and steel framing members less than 0.033 inch thick. ASTM C954 steel drill screws for fastening gypsum board to steel framing members 0.033 to 0.112 inch thick. Provide cementitious backer unit screws with a polymer coating.

#### 2.1.7 Adhesives

Provide non-aerosol adhesive products used on the interior of the building (defined as inside of the weatherproofing system) meeting either emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of SCAQMD Rule 1168. Provide aerosol adhesive products used on the interior of the building (defined as inside of the weatherproofing system) meeting either emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of GS-36. Provide certification or validation of indoor air quality for non-aerosol adhesives applied on the interior of the building (inside of the weatherproofing system). Provide certification or validation of indoor air quality for aerosol adhesives used on the interior of the building (inside of the weatherproofing system).

##### 2.1.7.1 Adhesive for Fastening Gypsum Board to Metal Framing

Not permitted.

#### 2.1.8 Shaftwall Liner Panel

ASTM C1396/C1396M. Conform to the UL Fire Resistance for the Design Numbers(s) indicated for shaftwall liner panels. Manufacture liner panel for cavity shaftwall system, with water-resistant paper faces, bevel edges, single lengths to fit required conditions, 1 inch thick, by 24-inch wide.

#### 2.1.9 Accessories

ASTM C1047. Fabricate from corrosion protected steel or plastic designed for intended use. Accessories manufactured with paper flanges are not acceptable. Flanges must be free of dirt, grease, and other materials that may adversely affect bond of joint treatment. Provide prefinished or job decorated materials.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.1.10 Water

Provide clean, fresh, and potable water.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

##### 3.1.1 Framing and Furring

Verify that framing and furring are securely attached and of sizes and spacing to provide a suitable substrate to receive gypsum board and cementitious backer units. Verify that all blocking, headers and supports are in place to support plumbing fixtures and to receive soap dishes, grab bars, towel racks, and similar items. Do not proceed with work until framing and furring are acceptable for application of gypsum board and cementitious backer units.

##### 3.1.2 Building Construction Materials

Do not install building construction materials that show visual evidence of biological growth.

#### 3.2 APPLICATION OF GYPSUM BOARD

Apply gypsum board to framing and furring members in accordance with [ASTM C840](#) or [GA 216](#) and the requirements specified. Apply gypsum board with separate panels in moderate contact; do not force in place. Stagger end joints of adjoining panels. Neatly fit abutting end and edge joints. Use gypsum board of maximum practical length; select panel sizes to minimize waste. Cut out gypsum board to make neat, close, and tight joints around openings. In vertical application of gypsum board, provide panels in lengths required to reach full height of vertical surfaces in one continuous piece. Lay out panels to minimize waste; reuse cutoffs whenever feasible. Surfaces of gypsum board and substrate members may not be bonded together with an adhesive [except where indicated](#). Treat edges of cutouts for plumbing pipes, screwheads, and joints with water-resistant compound as recommended by the gypsum board manufacturer. [Minimize framing by floating corners with single studs and drywall clips](#). Provide type of gypsum board for use in each system specified herein as indicated.

##### 3.2.1 Application of Gypsum Board to Steel Framing and Furring

Apply in accordance with [ASTM C840](#), System VIII or [GA 216](#).

##### 3.2.2 Arches and Bending Radii

Apply gypsum board in accordance with [ASTM C840](#), System IX or [GA 216](#).

##### 3.2.3 Gypsum Board for Wall Tile or Tile Base Applied with Adhesive

In dry areas (areas other than tubs, shower enclosures, saunas, steam rooms, gang shower rooms), apply glass mat water-resistant gypsum tile backing board or water-resistant gypsum backing board in accordance with [ASTM C840](#), System X or [GA 216](#).

##### 3.2.4 Glass Mat Covered or Fiber Reinforced Gypsum Sheathing

Apply glass mat covered or fiber reinforced gypsum sheathing in accordance



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

to gypsum association publications GA 253. Follow gypsum sheathing manufacturer's requirements of design details for joints and fasteners and be properly installed to protect the substrate from moisture intrusion. Do not leave exposed surfaces of the glass mat covered or fiber reinforced gypsum sheathing beyond the manufacturer's recommendation without a weather barrier cladding. Provide continuous asphalt impregnated building felt over sheathing surface in shingle fashion with edges and ends lapped a minimum of 6 inch. Properly flash the openings. Seal all joints, seams, and penetrations with a compatible silicone sealant.

### 3.2.5 Control Joints

Install expansion and contraction joints in ceilings and walls in accordance with ASTM C840, System XIII or GA 216. Fill control joints between studs in fire-rated construction with firesafing insulation to match the fire-rating of construction.

## 3.3 APPLICATION OF CEMENTITIOUS BACKER UNITS

### 3.3.1 Joint Treatment

ANSI A108.11.

## 3.4 FINISHING OF GYPSUM BOARD

Tape and finish gypsum board in accordance with ASTM C840, GA 214 and GA 216. Finish plenum areas above ceilings to Level 1 in accordance with GA 214. Finish water resistant gypsum backing board, ASTM C1396/C1396M, to receive ceramic tile to Level 2 in accordance with GA 214. Finish walls and ceilings to receive a heavy-grade wall covering or heavy textured finish before painting to Level 3 in accordance with GA 214. Finish walls and ceilings without critical lighting to receive flat paints, light textures, or wall coverings to Level 4 in accordance with GA 214. Unless otherwise specified, finish all gypsum board walls, partitions and ceilings to Level 5 in accordance with GA 214. Provide joint, fastener depression, and corner treatment. Tool joints as smoothly as possible to minimize sanding and dust. Do not use self-adhering fiber glass mesh tape with conventional drying type joint compounds; use setting or hardening type compounds only. Provide treatment for water-resistant gypsum board as recommended by the gypsum board manufacturer. Protect workers, building occupants, and HVAC systems from gypsum dust.

### 3.4.1 Uniform Surface

Wherever gypsum board is to receive eggshell, semigloss or gloss paint finish, or where severe, up or down lighting conditions occur, finish gypsum wall surface in accordance to GA 214 Level 5. In accordance with GA 214 Level 5, apply a thin skim coat of joint compound to the entire gypsum board surface, after the two-coat joint and fastener treatment is complete and dry.

## 3.5 SEALING

Seal openings around pipes, fixtures, and other items projecting through gypsum board and cementitious backer units as specified in Section 07 92 00 JOINT SEALANTS. Apply material with exposed surface flush with gypsum board or cementitious backer units.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.5.1 Sealing for Glass Mat or Reinforced Gypsum Board Sheathing

Apply silicone sealant in a 3/8 inch bead to all joints and trowel flat. Apply enough of the same sealant to all fasteners penetrating through the glass mat gypsum board surface to completely cover the penetration when troweled flat. Do not place construction and materials behind sheathing until a visual inspection of sealed joints during daylight hours has been completed by Contracting Officer.

### 3.6 FIRE-RESISTANT ASSEMBLIES

Wherever fire-rated construction is indicated, provide materials and application methods, including types and spacing of fasteners, wall and ceiling framing in accordance with the specifications contained in UL Fire Resistance for the Design Number(s) indicated, or GA 600 for the File Number(s) indicated. Joints of fire-rated gypsum board enclosures must be closed and sealed in accordance with UL test requirements or GA requirements. Seal penetrations through rated partitions and ceilings tight in accordance with tested systems.

### 3.7 SOUND RATED ASSEMBLIES

When sound rated assemblies are required, provide materials and application methods, including panels, insulation, types and spacing of fasteners, wall and ceiling framing in accordance with the contract document and the description of the assembly in the ASTM E90 Factory Test Report. Seal partitions continuously with acoustical foam or sealant (both sides) and finished to match wall wherever it abuts another element such as the floor, ceiling, wall, column, mullion, or another system or assembly.

### 3.8 PATCHING

Patch surface defects in gypsum board to a smooth, uniform appearance, ready to receive finishes.

### 3.9 SHAFTWALL FRAMING

Install the shaftwall system in accordance with the system manufacturer's published instructions. Coordinate bucks, anchors, blocking and other items placed in or behind shaftwall framing with electrical and mechanical work. Patch or replace fireproofing materials which are damaged or removed during shaftwall construction.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 09 30 10

CERAMIC, QUARRY, AND GLASS TILING  
08/20

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A108/A118/A136.1	(2019) American National Standard Specifications for the Installation of Ceramic Tile
ANSI A137.1	(2019) American National Standards Specifications for Ceramic Tile
ANSI A137.2	(2019) American National Standards Specifications for Glass Tile
ANSI A137.3/A108.19	(2017) American National Standard Specifications for Gauged Porcelain Tile and Gauged Porcelain Tile Panels/Slabs

## ASTM INTERNATIONAL (ASTM)

ASTM C33/C33M	(2018) Standard Specification for Concrete Aggregates
ASTM C144	(2018) Standard Specification for Aggregate for Masonry Mortar
ASTM C150/C150M	(2021) Standard Specification for Portland Cement
ASTM C206	(2014) Standard Specification for Finishing Hydrated Lime
ASTM C207	(2018) Standard Specification for Hydrated Lime for Masonry Purposes
ASTM C373	(2018) Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products
ASTM C648	(2020) Standard Test Method for Breaking Strength of Ceramic Tile
ASTM C1026	(2013; R 2018) Standard Test Method for

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Measuring the Resistance of Ceramic and  
Glass Tile to Freeze-Thaw Cycling

ASTM C1027

(2009; R 2017) Standard Test Method for  
Determining Visible Abrasion Resistance of  
Glazed Ceramic Tile

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350

(2010; Version 1.1) Standard Method for  
the Testing and Evaluation of Volatile  
Organic Chemical Emissions from Indoor  
Sources using Environmental Chambers

GREEN SEAL (GS)

GS-36

(2013) Adhesives for Commercial Use

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS

SCS Global Services (SCS) Indoor Advantage

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168

(2017) Adhesive and Sealant Applications

TILE COUNCIL OF NORTH AMERICA (TCNA)

TCNA Hdbk

(2017) Handbook for Ceramic, Glass, and  
Stone Tile Installation

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

36 CFR 1191

Americans with Disabilities Act (ADA)  
Accessibility Guidelines for Buildings and  
Facilities; Architectural Barriers Act  
(ABA) Accessibility Guidelines

UNDERWRITERS LABORATORIES (UL)

UL 2818

(2013) GREENGUARD Certification Program  
For Chemical Emissions For Building  
Materials, Finishes And Furnishings

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detail Drawings; G, AE

SD-03 Product Data

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Porcelain Tile; G

Recycled Content for Porcelain Tile; S

Transition Strips; G

Metal Strips; G

Setting-Bed; G

Mortar, Grout, and Adhesive; G

Waterproof Membrane; G

Crack Isolation Membrane; G

#### SD-04 Samples

Tile; G, AE

Accessories; G, AE

Transition Strips; G, AE

Metal Strips; G, AE

Grout; G, AE

#### SD-07 Certificates

Indoor Air Quality for Adhesives; S

Indoor Air Quality for Sealants; S

Water Absorption Rates

#### SD-08 Manufacturer's Instructions

Manufacturer's Approved Cleaning Instructions

#### SD-10 Operation and Maintenance Data

Porcelain Tile, Data Package 1; G

Transition Strips, Data Package 1; G

Metal Strips, Data Package 1; G

### 1.3 CERTIFICATIONS

#### 1.3.1 Indoor Air Quality Certifications

Provide products certified to meet indoor air quality requirements by **UL 2818** (Greenguard) Gold, **SCS** Global Services Indoor Advantage Gold or provide certification or validation by other third-party programs that products meet the requirements of this Section. Provide current product certification documentation from certification body. When product does not have certification, provide validation that product meets the indoor air quality product requirements cited in this Section.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 1.3.2 Water Absorption Rates Certification

Provide certification for each tile type indicating compliance with the following water absorption (wa) rates per ANSI A137.1 criteria as tested per ASTM C373 requirements.

- a. Porcelain Tile (Impervious): Provide water absorption (wa) of 0.5 percent or less.

### 1.4 QUALITY ASSURANCE

Provide installers having a minimum of two years of experience with a company specializing in performing the type of work described. Each type and color of tile to be provided from a single source. Each type and color of mortar, adhesive, and grout to be provided from the same source.

### 1.5 DELIVERY, STORAGE, AND HANDLING

Ship tiles in sealed packages and clearly marked with the grade, type of tile, producer identification, and country of origin. Deliver materials to the project site in manufacturer's original unopened containers with seals unbroken and labels and hallmarks intact. Protect materials from weather and store them under cover in accordance with manufacturer's printed instructions. Store and handle tiles per manufacturer's instructions for gauged porcelain tile and gauged porcelain tile panels/slabs.

### 1.6 ENVIRONMENTAL REQUIREMENTS

Do not perform ceramic tile work unless the substrate and ambient temperature is at least 50 degrees F and rising. Maintain temperature above 50 degrees F while the work is being performed and for at least 7 days after completion of the work. When temporary heaters are used, ventilate the area to the outside to avoid carbon dioxide damage to new tilework.

### 1.7 WARRANTY

Provide manufacturer's warranty to repair or replace defective tiling materials and workmanship, including tile, mortar and grout products and installation as a system, for a period of one year from date of final acceptance of the work.

### 1.8 EXTRA MATERIALS

Supply an extra 2 percent of each type tile used in clean and marked cartons.

## PART 2 PRODUCTS

### 2.1 TILE

Provide tiles that comply with ANSI A137.1 and are standard grade tiles, the exception is glass tile. Furnish glass tiles that comply with ANSI A137.2, the exception is gauged porcelain tile. Furnish gauged porcelain tile that comply with ANSI A137.3/A108.19. Provide a minimum breaking strength of 125 lbs. for wall tile and 250 lbs. for floor tile in accordance with ASTM C648. Provide exterior building tile for cold

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

climate projects that is approved by the manufacturer for exterior use when tested in accordance with [ASTM C1026](#). Provide floor tiles with a minimum wet dynamic coefficient of friction (DCOF) value of 0.42 when tested in accordance with [ANSI A137.1](#) requirements. Provide glazed floor tile with a Class V-Heavy Commercial classification as rated by the manufacturer when tested in accordance with [ASTM C1027](#) for visible abrasion resistance as related to foot traffic. For materials like tile, [accessories](#), and [transition strips](#) submit samples of sufficient size to show color range, pattern, type and joints.

Submit manufacturers' descriptive product data for each type of ceramic and quarry tiling indicated. Include manufacturers' literature, finishes, profiles and thicknesses of materials.

Submit manufacturers' operations and maintenance data for each type of ceramic and quarry tiling indicated in accordance with Section [01 78 23](#) OPERATIONS AND MAINTENANCE DATA.

#### 2.1.1.1 Porcelain Tile (PFT-1, PWT-1, PWT-2)

Provide unglazed through body (surface color and pattern go all the way through the tile body), rectified porcelain tile. Provide tile with a V2 aesthetic classification. Blend tiles in factory and in packages to have same color range and continuous blend for installation. Provide nominal tile size(s) indicated on drawings.

Provide porcelain tiling materials that contain a minimum of 10 percent recycled content. Provide data identifying percentage of recycled content for porcelain tile.

#### 2.2 SETTING-BED

Submit manufacturer's catalog data. Compose the setting-bed of the following materials:

##### 2.2.1 Aggregate for Concrete Fill

Conform to [ASTM C33/C33M](#) for aggregate fill. Do not exceed one-half the thickness of concrete fill for maximum size of coarse aggregate.

##### 2.2.2 Portland Cement

Conform to [ASTM C150/C150M](#) for cement, Type I, white for wall mortar and gray for other uses.

##### 2.2.3 Sand

Conform to [ASTM C144](#) for sand.

##### 2.2.4 Hydrated Lime

Conform to [ASTM C206](#) for hydrated lime, Type S or [ASTM C207](#), Type S.

#### 2.3 WATER

Provide potable water.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 2.4 MORTAR, GROUT, AND ADHESIVE

Provide non-aerosol adhesive products used on the interior of the building (defined as inside of the weatherproofing system) meeting either emissions requirements of [CDPH SECTION 01350](#) (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of [SCAQMD Rule 1168](#). Provide aerosol adhesives used on the interior of the building meeting either emissions requirements of [CDPH SECTION 01350](#) (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of [GS-36](#). For products located on the interior of the building (inside of the weatherproofing system, provide certification or validation of [indoor air quality for adhesives](#). Provide bond coat, mortar, and grout supplied from the same manufacturer.

### 2.4.1 Latex-Portland Cement Mortar

[TCNA Hdbk](#).

### 2.4.2 Ceramic Tile Grout

[TCNA Hdbk](#); petroleum-free and plastic-free standard unsanded cement grout (dry-set grout) high-performance cement grout (latex-portland cement grout).

### 2.4.3 Epoxy Resin Grout

[TCNA Hdbk](#). Water cleanable epoxy conforming to [ANSI A108/A118/A136.1](#); provide manufacturer proportioned and packaged kit having hardener, resin and colored filler and horizontal and vertical grade products as applicable. Provide antimicrobial additive designed for prevention of mold and mildew.

### 2.4.4 Urethane Grout

[TCNA Hdbk](#); premixed, urethane, water-based grout with color consistency and antimicrobial protection; no color fading, streaking or shading, chemical and stain resistant; and UV stable.

### 2.4.5 Sealants

Comply with applicable regulations regarding toxic and hazardous materials and as specified. Provide sealant that does not change the color or alter the appearance of the grout. Refer to Section [07 92 00](#) JOINT SEALANTS.

Provide sealants used on the interior of the building (defined as inside of the weatherproofing system) meeting either emissions requirements of [CDPH SECTION 01350](#) (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of [SCAQMD Rule 1168](#). For products located on the interior of the building (inside of the weatherproofing system), provide certification or validation of [indoor air quality for sealants](#).

## 2.5 SUBSTRATES

Refer to Section [09 29 00](#) GYPSUM BOARD for cementitious backer units.

### 2.5.1 Cementitious Backer Units

Provide cementitious backer unit, for use as tile substrate as indicated, in accordance with [TCNA Hdbk](#). Furnish [5/8 inch](#) thick cementitious backer



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

units.

## 2.6 MISCELLANEOUS TRIMS

### 2.6.1 Transition Strips

Provide clear anodized aluminum transitions between tile and carpet or resilient flooring. Provide types as recommended by flooring manufacturer for both edges and transitions of flooring materials specified. Refer to Section 06 61 16 SOLID SURFACING FABRICATIONS. Provide transition strips that comply with 36 CFR 1191 requirements.

### 2.6.2 Metal Strips

Provide Cove, Angle, and L-shape, trim shapes, height to match tile and setting thickness, designed specifically for flooring, and wall applications. Provide extruded, clear anodized aluminum stainless steel cove strip where floor tile abuts wall tile for sanitary transition and elimination of cove tile base. Provide extruded square, clear anodized aluminum stainless steel edging at tile surfaces with exposed outside and inside corners. Provide profiles appropriate for finished floor and wall materials as indicated.

## 2.7 WATERPROOF MEMBRANE

### 2.7.1 General

Manufacturer's standard product that complies with ANSI A108/A118/A136.1 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

### 2.7.2 Chlorinated-Polyethylene Shower Waterproof Membrane

Nonplasticized, chlorinated polyethylene faced on both sides with nonwoven polyester fabric; 0.040 inch nominal thickness.

## 2.8 CRACK ISOLATION MEMBRANE

### 2.8.1 General

Manufacturer's standard product that complies with ANSI A108/A118/A136.1 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

### 2.8.2 Chlorinated-Polyethylene Crack Isolation Membrane

Nonplasticized, chlorinated polyethylene faced on both sides with nonwoven polyester fabric; 0.030 inch nominal thickness.

## 2.9 COLOR, TEXTURE, AND PATTERN

Provide color, pattern and texture as indicated; colors listed are not intended to limit the selection of equal colors from other manufacturers.

## PART 3 EXECUTION

### 3.1 PREPARATORY WORK AND WORKMANSHIP

Inspect surface to receive tile in conformance to the requirements of

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

**TCNA Hdbk** for surface conditions for the type setting bed specified and for workmanship. Provide variations of tiled surfaces that fall within maximum values shown below:

TYPE	WALLS	FLOORS
Dry-Set Mortar	1/8 inch in 8 ft.	1/8 inch in 10 ft.
Organic Adhesives	1/8 inch in 8 ft.	1/16 inch in 3 ft.
Latex-Portland Cement Mortar	1/8 inch in 8 ft.	1/8 inch in 10 ft.
Epoxy	1/8 inch in 8 ft.	1/8 inch in 10 ft.

### 3.2 GENERAL INSTALLATION REQUIREMENTS

Do not start tile work until roughing in for mechanical and electrical work has been completed and tested, and built-in items requiring membrane waterproofing have been installed and tested. Close space, in which tile is being set, to traffic and other work. Keep closed until tile is firmly set. Do not start floor tile installation in spaces requiring wall tile until after wall tile has been installed. Apply tile in colors and patterns indicated in the area shown on the drawings. Install tile with the respective surfaces in true even planes to the elevations and grades shown. Provide special shapes as required for sills, jambs, recesses, offsets, external corners, and other conditions to provide a complete and neatly finished installation. Solidly back tile bases and coves with mortar. Do not walk or work on newly tiled floors without using kneeling boards or equivalent protection of the tiled surface. Keep traffic off horizontal portland cement mortar installations for at least 72 hours. Keep all traffic off epoxy installed floors for at least 40 hours after grouting, and heavy traffic off for at least 7 days, unless otherwise specifically authorized by manufacturer. Dimension and draw [detail drawings](#) at a minimum scale of 1/4 inch = 1 foot. Include drawings of pattern at inside corners, outside corners, termination points and location of all equipment items such as thermostats, switch plates, mirrors and toilet accessories mounted on surface. Submit manufacturer's preprinted installation instructions.

Do not install building construction materials that show visual evidence of biological growth.

### 3.3 INSTALLATION OF SUBSTRATES

#### 3.3.1 Cementitious Backer Units Mat Water-Resistant Backing Board

Install as specified in Section [09 29 00 GYPSUM BOARD](#) in accordance with manufacturer's written instructions.

### 3.4 INSTALLATION OF WALL TILE

Install wall tile in accordance with the **TCNA Hdbk**, method [W245-18](#) or [W244f-18](#) and with grout joints as recommended by the manufacturer for the type of tile. Install thinner wall tile flush with thicker wall tile applied on same wall and provide installation materials as recommended by the tile and setting materials manufacturer's to achieve flush

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

installation.

#### 3.4.1 Latex-Portland Cement Mortar

Use latex-portland cement to install tile in accordance with TCNA Hdbk method. Use latex-portland cement when installing porcelain ceramic tile.

#### 3.4.2 Ceramic Tile Grout

Prepare and install ceramic tile grout in accordance with TCNA Hdbk method. Provide and apply manufacturer's standard product for sealing grout joints in accordance with manufacturer's recommendations.

### 3.5 INSTALLATION OF FLOOR TILE

Install floor tile in accordance with TCNA Hdbk method specified herein and with grout joints as recommended by the manufacturer for the type of tile.

#### 3.5.1 Latex-Portland Cement

Use latex-portland cement mortar to install tile directly over properly cured, plane, clean concrete slabs in accordance with TCNA Hdbk method F112A-18. Use latex-portland cement when installing porcelain ceramic tile.

#### 3.5.2 Ceramic Tile Grout

Prepare and install ceramic tile grout in accordance with TCNA Hdbk method. Provide and apply manufacturer's standard product for sealing grout joints in accordance with manufacturer's recommendations.

#### 3.5.3 Waterproof and Crack Isolation Membranes

Install as indicated in accordance with manufacturer's written instructions.

#### 3.5.4 Concrete Fill

Provide a 3500 psi concrete fill mix to dry as consistency as practicable. Compose concrete fill by volume of 1 part Portland cement to 3 parts fine aggregate to 4 parts coarse aggregate and mix with water to as dry a consistency as practicable. Spread, tamp, and screed concrete fill to a true plane, and pitch to drains or levels as shown. Thoroughly damp concrete fill before applying setting-bed material. Reinforce concrete fill with one layer of reinforcement, with the uncut edges lapped the width of one mesh and the cut ends and edges lapped a minimum 2 inch. Tie laps together with 18 gauge wire every 10 inch along the finished edges and every 6 inch along the cut ends and edges. Provide reinforcement with support and secure in the centers of concrete fills. Provide a continuous mesh; except where expansion joints occur, cut mesh and discontinue across such joints. Provide reinforced concrete fill under the setting-bed where the distance between the under-floor surface and the finished tiles floor surface is a minimum of 2 inches, and of the same thickness that the mortar setting-bed over the concrete fill with the thickness required in the specified TCNA Hdbk.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.6 INSTALLATION OF MISCELLANEOUS TRIMS

#### 3.6.1 Transition Strips

Install transition strips where indicated, in a manner similar to that of the ceramic tile floor and as recommended by the manufacturer. Provide thresholds full width of the opening. Install head joints at ends not exceeding 1/4 inch in width and grouted full.

#### 3.6.2 Metal Trims

Install trim where indicated. Embed anchoring leg in setting mortar in accordance with manufacturer's instructions. During grouting of tile joints, immediately wipe grout from finish surface.

### 3.7 EXPANSION JOINTS

Form and seal joints as specified in Section 07 92 00 JOINT SEALANTS.

#### 3.7.1 Walls

Provide expansion joints at control joints in backing material. Wherever backing material changes, install an expansion joint to separate the different materials.

#### 3.7.2 Floors

Provide expansion joints over construction joints, control joints, and expansion joints in concrete slabs in accordance with TCNA Hdbk method F116E-18 EJ171 type to suit conditions. Provide expansion joints where tile abuts restraining surfaces such as perimeter walls, curbs and columns and at intervals of 20 to 25 feet each way in large interior floor areas and 8 to 12 feet each way in large exterior areas or areas exposed to direct sunlight or moisture. Extend expansion joints through setting-beds and fill.

### 3.8 CLEANING AND PROTECTING

Upon completion, thoroughly clean tile surfaces in accordance with manufacturer's approved cleaning instructions. Do not use acid for cleaning glazed tile. Clean floor tile with resinous grout or with factory mixed grout in accordance with printed instructions of the grout manufacturer. After the grout has set, provide a protective coat of a noncorrosive soap or other approved method of protection for tile wall surfaces. Cover tiled floor areas with building paper before foot traffic is permitted over the finished tile floors. Provide board walkways on tiled floors that are to be continuously used as passageways by workmen. Replace damaged or defective tiles.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 09 51 00

ACOUSTICAL CEILINGS  
08/20

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## ASTM INTERNATIONAL (ASTM)

ASTM A489	(2018; E 2018) Standard Specification for Carbon Steel Eyebolts
ASTM A641/A641M	(2019) Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A1008/A1008M	(2020) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
ASTM B633	(2019) Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
ASTM C423	(2009a) Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
ASTM C635/C635M	(2017) Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings
ASTM C636/C636M	(2013) Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
ASTM C834	(2017) Standard Specification for Latex Sealants
ASTM E413	(2016) Classification for Rating Sound Insulation
ASTM E580/E580M	(2020) Standard Practice for Installation of Ceiling Suspension Systems for

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Acoustical Tile and Lay-in Panels in Areas  
Subject to Earthquake Ground Motions

ASTM E795

(2016) Standard Practices for Mounting  
Test Specimens During Sound Absorption  
Tests

ASTM E1111/E1111M

(2014) Standard Test Method for Measuring  
the Interzone Attenuation of Open Office  
Components

ASTM E1264

(2019) Acoustical Ceiling Products

ASTM E1414/E1414M

(2021) Standard Test Method for Airborne  
Sound Attenuation Between Rooms Sharing a  
Common Ceiling Plenum

ASTM E1477

(1998a; R 2017; E 2018) Standard Test  
Method for Luminous Reflectance Factor of  
Acoustical Materials by Use of  
Integrating-Sphere Reflectometers

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350

(2010; Version 1.1) Standard Method for  
the Testing and Evaluation of Volatile  
Organic Chemical Emissions from Indoor  
Sources using Environmental Chambers

GREEN SEAL (GS)

GS-36

(2013) Adhesives for Commercial Use

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS

SCS Global Services (SCS) Indoor Advantage

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168

(2017) Adhesive and Sealant Applications

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-301-01

(2019) Structural Engineering

UNDERWRITERS LABORATORIES (UL)

UL 2818

(2013) GREENGUARD Certification Program  
For Chemical Emissions For Building  
Materials, Finishes And Furnishings

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### Approved Detail Drawings

#### SD-03 Product Data

Recycled Content for Type XII Ceiling Tiles; S

Recycled Content for Suspension Systems

Acoustical Performance

#### SD-04 Samples

Acoustical UnitsG, AE

Acoustical Ceiling Tiles; G, AE

#### SD-07 Certificates

Indoor Air Quality for Type XII Ceiling Tiles

Indoor Air Quality for Adhesives

Indoor Air Quality for Sealants

### 1.3 CERTIFICATIONS

#### 1.3.1 Indoor Air Quality Certifications

##### 1.3.1.1 Acoustical Ceiling Tiles

Provide products certified to meet indoor air quality requirements by **UL 2818** (Greenguard) Gold, **SCS** Global Services Indoor Advantage Gold or provide certification or validation by other third-party programs that products meet the requirements of this section. Provide current product certification documentation from certification body.

##### 1.3.1.2 Adhesives and Sealants

Provide products certified to meet indoor air quality requirements by **UL 2818** (Greenguard) Gold, **SCS** Global Services Indoor Advantage Gold or provide certification or validation by other third-party programs that products meet the requirements of this Section. Provide current product certification documentation from certification body. When product does not have certification, provide validation that product meets the indoor air quality product requirements cited in this Section.

### 1.4 DELIVERY, STORAGE. AND HANDLING

Deliver materials to the site in the manufacturer's original unopened containers with brand name and type clearly marked. Carefully handle and store materials in dry, watertight enclosures. Immediately before installation, store acoustical units for not less than 24 hours at the same temperature and relative humidity as the space where they will be installed in order to assure proper temperature and moisture acclimation.

### 1.5 ENVIRONMENTAL REQUIREMENTS

Maintain a uniform temperature of not less than 60 degrees F nor more than

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

85 degrees F and a relative humidity of not more than 70 percent for 24 hours before, during, and 24 hours after installation of acoustical units.

#### 1.6 SCHEDULING

Complete and dry interior finish work such as plastering, concrete and terrazzo work before ceiling installation. Complete mechanical, electrical, and other work above the ceiling line; install and start operating heating, ventilating, and air conditioning systems in order to maintain temperature and humidity requirements.

#### 1.7 WARRANTY

Provide manufacturer's warranty to repair or replace defective materials and workmanship including but not limited to, sagging and warping of panels and rusting and of grid systems, for a period of ten years from date of final acceptance of the work.

#### 1.8 EXTRA MATERIALS

Furnish spare tiles, from the same lot as those installed, of each color at the rate of 5 tiles for each 1000 tiles installed.

### PART 2 PRODUCTS

#### 2.1 SYSTEM DESCRIPTION

Provide sound controlling units mechanically mounted on a ceiling suspension system for acoustical treatment. Provide the unit size, texture, finish, and color as specified. Coordinate the entire ceiling system with other details, like the location of access panels and ceiling penetrations, for instance, shown on the drawings. The Contractor is responsible for the final assembly and performance of the specified work. Provide the location and extent of acoustical treatment as shown on the [approved detail drawings](#). Submit drawings showing suspension system, method of anchoring and fastening, details, and reflected ceiling plan.

##### 2.1.1 Acoustical Performance

###### 2.1.1.1 Ceiling Sound Transmission

Provide ceiling systems with the specified Ceiling Attenuation Class (CAC) ratings as determined in accordance with [ASTM E1414/E1414M](#) and [ASTM E413](#). Provide sound attenuators over light fixtures, air terminals and other ceiling penetrations, provide acoustical blanket insulation on top of the ceiling or adjacent to partitions to provide lightweight acoustical plenum barriers above partitions as required to achieve the specified CAC ratings. Provide test ceiling continuous at the partition and assembled in the suspension system in the same manner that the ceiling will be installed on the project.

###### 2.1.1.2 Ceiling Sound Absorption

Determine the Noise Reduction Coefficient (NRC) in accordance with [ASTM C423](#). Determine Articulation Class (AC) in accordance with [ASTM E1111/E1111M](#).



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 2.1.2 Light Reflectance

Determine light reflectance factor in accordance with ASTM E1477 test method.

## 2.2 ACOUSTICAL UNITS

Submit samples of each type of acoustical unit and each type of suspension grid tee section showing texture, finish, and color. Conform acoustical units to ASTM E1264, Class A, and the following requirements:

### 2.2.1 Units for Exposed-Grid System A

#### 2.2.1.1 Type

XII (fiberglass base with membrane-faced overlay). Provide Type XII Acoustical Ceiling Tiles containing a minimum of 50 percent recycled content. Provide data identifying percentage of recycled content for Type XII ceiling tiles. Provide certification of indoor air quality for Type XII Ceiling Tiles.

#### 2.2.1.2 Flame Spread

Class A, 25 or less

#### 2.2.1.3 Pattern

E

#### 2.2.1.4 Minimum NRC

0.95 when tested on mounting Type E-400 of ASTM E795.

#### 2.2.1.5 Minimum Light Reflectance Coefficient

0.88

#### 2.2.1.6 Nominal Size

24 by 24 inch

#### 2.2.1.7 Edge Detail

Square Tegular

#### 2.2.1.8 Finish

Factory-applied standard finish. See paragraph COLORS AND STANDARDS.

#### 2.2.1.9 Minimum CAC

190

## 2.3 SUSPENSION SYSTEM

Provide standard exposed-grid suspension system conforming to ASTM C635/C635M for heavy-duty systems. Provide surfaces exposed to view of aluminum or steel with a factory-applied white baked-enamel finish aluminum with colored factory-applied vinyl paint finish. Provide wall

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

molding having a flange of not less than 15/16 inch. Provide standard mitered corners. Provide a suspension system with a maximum deflection of 1/360 of the span length capable of supporting the finished ceiling, light fixtures, air diffusers, and accessories, as shown. Conform seismic details to the guidance in UFC 3-301-01 and ASTM E580/E580M as indicated.

Provide Suspension System containing a minimum of 15 percent recycled content. Provide data identifying percentage of recycled content for suspension systems.

## 2.4 HANGERS

Provide hangers and attachment capable of supporting a minimum 300 pound ultimate vertical load without failure of supporting material or attachment.

### 2.4.1 Wires

Conform wires to ASTM A641/A641M, Class 1, 0.08 inch (12 gauge) in diameter.

### 2.4.2 Straps

Provide straps of 1 by 3/16 inch galvanized steel conforming to ASTM A653/A653M, with a light commercial zinc coating or ASTM A1008/A1008M with an electrodeposited zinc coating conforming to ASTM B633, Type RS.

### 2.4.3 Rods

Provide 3/16 inch diameter threaded steel rods, zinc or cadmium coated.

### 2.4.4 Eyebolts

Provide eyebolts of weldless, forged-carbon-steel, with a straight-shank in accordance with ASTM A489. Provide minimum 1/4 inch, zinc coated eyebolts.

### 2.4.5 Masonry Anchorage Devices

Comply with ASTM C636/C636M for anchorage devices for eyebolts machine screws.

## 2.5 ACCESS PANELS

Provide access panels that match adjacent acoustical units, designed and equipped with suitable framing and fastenings for removal and replacement without damage. Size panel to be not less than 12 by 12 inch or more than 12 by 24 inch.

- a. Attach an identification plate of 0.032 inch thick aluminum, 3/4 inch in diameter, stamped with the letters "AP" and finished the same as the unit, near one corner on the face of each access panel.
- b. Identify ceiling access panel by a number utilizing white identification plates or plastic buttons with contrasting numerals. Provide plates or buttons of minimum 1 inch diameter and securely attached to one corner of each access unit. Provide a typewritten card framed under glass listing the code identification numbers and corresponding system descriptions listed above. Mount the framed card

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

where directed and furnish a duplicate card to the Contracting Officer. Code identification system is as follows:

- (1) Fire detection/alarm system
- (2) Air conditioning controls
- (3) Plumbing system
- (4) Heating and steam systems
- (5) Air conditioning duct system
- (6) Sprinkler system

## 2.6 ADHESIVE

Use adhesive as recommended by tile manufacturer. Provide non-aerosol adhesive products used on the interior of the building (defined as inside of the weatherproofing system) that meet either emissions requirements of [CDPH SECTION 01350](#) (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of [SCAQMD Rule 1168](#). Provide aerosol adhesives used on the interior of the building that meet either emissions requirements of [CDPH SECTION 01350](#) (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of [GS-36](#). For products located on the interior of the building (inside of the weatherproofing system), provide certification or validation of [indoor air quality for adhesives](#).

## 2.7 FINISHES

Use manufacturer's standard textures, patterns and finishes as specified for acoustical units and suspension system members. Treat ceiling suspension system components to inhibit corrosion.

## 2.8 COLORS AND PATTERNS

Use colors and patterns for acoustical units and suspension system components as indicated; colors listed are not intended to limit the selection of equal colors from other manufacturers.

## 2.9 ACOUSTICAL SEALANT

Conform acoustical sealant to [ASTM C834](#), nonstaining. Provide sealants used on the interior of the building (defined as inside of the weatherproofing system) in accordance with requirements of Section [07 92 00](#) JOINT SEALANTS that meet either emissions requirements of [CDPH SECTION 01350](#) (limit the requirements for either office or classroom spaces regardless of space type) or VOC content requirements of [SCAQMD Rule 1168](#). For products located on the interior of the building (inside of the weatherproofing system), provide certification of [indoor air quality for Sealants](#).

## PART 3 EXECUTION

### 3.1 INSTALLATION

Do not install building construction materials that show visual evidence of biological growth.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Examine surfaces to receive directly attached acoustical units for unevenness, irregularities, and dampness that would affect quality and execution of the work. Rid areas, where acoustical units will be cemented, of oils, form residue, or other materials that reduce bonding capabilities of the adhesive. Complete and dry interior finish work such as plastering, concrete, and terrazzo work before installation. Complete and approve mechanical, electrical, and other work above the ceiling line prior to the start of acoustical ceiling installation. Provide acoustical work complete with necessary fastenings, clips, and other accessories required for a complete installation. Do not expose mechanical fastenings in the finished work. Lay out hangers for each individual room or space. Provide hangers to support framing around beams, ducts, columns, grilles, and other penetrations through ceilings. Keep main runners and carrying channels clear of abutting walls and partitions. Provide at least two main runners for each ceiling span. Wherever required to bypass an object with the hanger wires, install a subsuspension system so that all hanger wires will be plumb.

### 3.1.1 Suspension System

Install suspension system in accordance with [ASTM C636/C636M](#) and as specified herein. Do not suspend hanger wires or other loads from underside of steel decking.

#### 3.1.1.1 Plumb Hangers

Install hangers plumb and not pressing against insulation covering ducts and pipes. Where lighting fixtures are supported from the suspended ceiling system, provide hangers at a minimum of four hangers per fixture and located not more than [6 inch](#) from each corner of each fixture.

#### 3.1.1.2 Splayed Hangers

Splay (slope or slant) hangers around obstructions, offsetting the resulting horizontal force by bracing, countersplaying, or other acceptable means.

### 3.1.2 Wall Molding

Provide wall molding where ceilings abut vertical surfaces. Miter corners where wall moldings intersect or install corner caps. Secure wall molding not more than [3 inch](#) from ends of each length and not more than [16 inch](#) on centers between end fastenings. Provide wall molding springs at each acoustical unit in semi-exposed or concealed systems.

### 3.1.3 Acoustical Units

Install acoustical units in accordance with the approved installation instructions of the manufacturer. Ensure that edges of acoustical units are in close contact with metal supports, with each other, and in true alignment. Arrange acoustical units so that units less than one-half width are minimized. Hold units in exposed-grid system in place with manufacturer's standard hold-down clips, if units weigh less than [1 psf](#) or if required for fire resistance rating.

#### 3.1.4 Acoustical Sealant

Seal all joints around pipes, ducts or electrical outlets penetrating the

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

ceiling. Apply a continuous ribbon of acoustical sealant on vertical web of wall or edge moldings.

#### 3.1.5 Adhesive Application

Wipe back of tile to remove accumulated dust. Daub acoustical units on back side with four equal daubs of adhesive. Apply daubs near corners of tiles. Ensure that contact area of each daub is at least 2 inch diameter in final position. Press units into place, aligning joints and abutting units tight and uniform without differences in joint widths.

#### 3.2 CEILING ACCESS PANELS

Locate ceiling access panels directly under the items which require access.

#### 3.3 CLEANING

Following installation, clean dirty or discolored surfaces of acoustical units and leave them free from defects. Remove units that are damaged or improperly installed and provide new units as directed.

#### 3.4 RECLAMATION PROCEDURES

Neatly stack completely dry ceiling tile, designated for recycling by the Contracting Officer, on 4 by 4 foot pallets not higher than 4 foot. Shrink wrap and symmetrically stack pallets on top of each other without falling over.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 09 62 38

STATIC-CONTROL FLOORING  
08/17, CHG 1: 08/18

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## ASTM INTERNATIONAL (ASTM)

ASTM E648	(2019a) Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
ASTM F150	(2006; R 2013) Standard Test Method for Electrical Resistance of Conductive and Static Dissipative Resilient Flooring
ASTM F1700	(2020) Standard Specification for Solid Vinyl Floor Tile
ASTM F1861	(2021) Standard Specification for Resilient Wall Base
ASTM F1869	(2016a) Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
ASTM F2170	(2019a) Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

## CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350	(2010; Version 1.1) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers
--------------------	--

## ELECTROSTATIC DISCHARGE ASSOCIATION (ESD)

ESD S6.1	(2019) Standard for the Protection of Electrostatic Discharge Susceptible Items - Grounding
----------	---

## GREEN SEAL (GS)

GS-36	(2013) Adhesives for Commercial Use
-------	-------------------------------------

## RESILIENT FLOOR COVERING INSTITUTE (RFCI)

FLOORSCORE	FLOORSCORE IAQ Certification
------------	------------------------------

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS SCS Global Services (SCS) Indoor Advantage

#### SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168 (2017) Adhesive and Sealant Applications

#### UNDERWRITERS LABORATORIES (UL)

UL 2818 (2013) GREENGUARD Certification Program  
For Chemical Emissions For Building  
Materials, Finishes And Furnishings

### 1.2 SCHEDULING

Schedule static-control flooring work after any other work which would damage the finished surface of the flooring.

### 1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-03 Product Data

Static-Control Resilient Flooring; G

Recycled content for Static-Dissipative Vinyl Tile; S

Accessories; G

Adhesives; G

Warranty

#### SD-04 Samples

Static-Control Resilient Flooring; G, AE

Moldings; G, AE

Accessories; G, AE

#### SD-06 Test Reports

Fire Resistance

Moisture, Alkalinity and Bond

Testing

#### SD-07 Certificates



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Indoor Air Quality for Adhesives; S

Qualifications of Applicator

SD-08 Manufacturer's Instructions

Static-Control Resilient Flooring; G

Accessories; G

SD-10 Operation and Maintenance Data

Static-Control Resilient Flooring; G

Accessories; G

#### 1.3.1 Samples

##### 1.3.1.1 Static-Control Resilient Flooring

Submit three samples of each indicated color and type of flooring, base, moldings, and accessories sized a minimum 2-1/2 by 4 inch.

##### 1.3.1.2 Moldings

Submit three pieces of each type at least 12 inches long.

##### 1.3.1.3 Operations and Maintenance Data

- a. Submit Data Package 1 in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.
- b. Submit three copies of manufacturer's maintenance instructions for each type of flooring material describing recommended type of cleaning equipment and materials, spotting and cleaning methods, and cleaning cycles.

#### 1.4 CERTIFICATIONS

##### 1.4.1 Indoor Air Quality Certifications

###### 1.4.1.1 Floor Covering Materials

Provide Static-Dissipative Vinyl Tile and wall base products certified to meet indoor air quality requirements by FLOORSORE, UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification or validation by other third-party programs that products meet the requirements of this Section. Provide current product certification documentation from certification body.

###### 1.4.1.2 Adhesives

Provide products certified to meet indoor air quality requirements by UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification or validation by other third-party programs that products meet the requirements of this Section. Provide current product certification documentation from certification body.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.5 EXTRA MATERIALS

Provide extra material from same dye lot for future maintenance. Provide a minimum of 2 percent of total square yards of each flooring and base type, pattern, and color.

#### 1.6 QUALITY ASSURANCE

The flooring manufacturer will approve the Qualifications of Applicator and certify that he/she has a minimum of 3 years of experience in the application of the materials to be used.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the building site in original unopened containers bearing the manufacturer's name, style name, pattern color name and number, size, production run, project identification, handling instructions and related information. Observe ventilation and safety procedures specified in the Safety Data Sheets (SDS). Do not store flooring near materials that may off-gas or emit harmful fumes, such as kerosene heaters, fresh paint, or adhesives.

##### 1.7.1 Static-Control Resilient Flooring

Store materials in a clean, dry, secure, and well-ventilated area free from strong contaminant sources and residues with ambient air temperature range as recommended by the manufacturer but not less than 68 degrees F or more than 85 degrees F. Stack materials according to manufacturer's recommendations. Protect materials from the direct flow of heat from hot-air registers, radiators and other heating fixtures and appliances.

#### 1.8 ENVIRONMENTAL CONDITIONS

Provide temporary ventilation during work of this section.

##### 1.8.1 Static-Control Resilient Flooring

Maintain areas in which resilient flooring is to be installed at a temperature range as recommended by the manufacturer but not less than 68 degrees F or more than 85 degrees F for 3 days before application, during application and 2 days after application, unless otherwise directed by the flooring manufacturer for the flooring being installed. Maintain a minimum temperature range as recommended by the manufacturer but not less than 55 degrees F thereafter for the duration of the contract. Provide adequate ventilation to remove moisture from area and to comply with regulations limiting concentrations of hazardous vapors.

#### 1.9 WARRANTY

##### 1.9.1 Static-Control Resilient Flooring

Provide manufacturer's standard performance guarantees or warranties including a five year wear warranty and ten year conductivity warranty.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## PART 2 PRODUCTS

### 2.1 STATIC-CONTROL RESILIENT FLOORING

#### 2.1.1 Static-Dissipative Resilient Flooring

##### 2.1.1.1 Static-Dissipative Vinyl Tile

Static-dissipative vinyl tile must be a homogeneous vinyl product and conform to **ASTM F1700**. Provide electrical resistance from surface to surface and surface to ground between 1,000,000 ohms ( $1.0 \times 10$  to the 6th) and 1,000,000,000 ohms ( $1.0 \times 10$  to the 9th) when tested in accordance with **ASTM F150**. Tile must be as indicated on drawings.

Provide Static-Dissipative Vinyl Tile containing a minimum of 10 percent recycled content. Provide data identifying percentage of recycled content for Static-Dissipative Vinyl Tile.

Provide certification of indoor air quality for Static-Dissipative Vinyl Tile.

### 2.2 WALL BASE

#### 2.2.1 Resilient Base

Resilient base must conform to **ASTM F1861**, Type TS (vulcanized thermoset rubber) Type TP (thermoplastic rubber) Style B (coved - installed with resilient flooring). Provide 4 inch high and a minimum 1/8 inch thick wall base. Provide job formed corners in matching height, shape, and color.

### 2.3 ADHESIVES

Provide conductive adhesive as recommended by the manufacturer of the static-control flooring.

Provide non-aerosol adhesive products used on the interior of the building (defined as inside of the weatherproofing system) that meet either emissions requirements of **CDPH SECTION 01350** (use the office or classroom requirements, regardless of space type) or VOC content requirements of **SCAQMD Rule 1168**. Provide aerosol adhesives used on the interior of the building that meet either emissions requirements of **CDPH SECTION 01350** (use the office or classroom requirements, regardless of space type) or VOC content requirements of **GS-36**. Provide certification or validation of indoor air quality for adhesives.

### 2.4 MOLDINGS

Provide heavy duty tapered moldings of vinyl or rubber and types as recommended by flooring manufacturer for both edges and transitions of flooring materials specified. Provide vertical lip on molding of maximum 1/4 inch. Provide bevel change in level between 1/4 and 1/2 inch with a slope no greater than 1:2. Provide color indicated on drawings.

### 2.5 ACCESSORIES

Use accessories recommended by the manufacturer of the flooring.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 2.6 ELECTRICAL GROUND CONNECTION

Provide an electrical ground connection that meets the requirements of **ESD S6.1**. Connection between the static-control floor system and the external grounding system must be provided. Contact with the static-control floor system must be with conductive grounding strip and must have the greater of the following: a minimum contact area of **9 square inch** or the dimensions recommended by the manufacturer. Provide the grounding conductor recommended by the manufacturer of the flooring. Connect and install the grounding conductor as recommend by the flooring manufacturer.

## 2.7 MANUFACTURER'S COLOR, PATTERN AND TEXTURE

Provide color, pattern and texture as indicated **on drawings**. Provide flooring in any one continuous area or replacement of damaged flooring in continuous area from same production run with same shade and pattern.

## 2.8 FIRE RESISTANCE TESTING REQUIREMENTS

Provide a minimum average critical radiant flux of 0.45 watts per square centimeter for flooring in corridors and exits when tested in accordance with **ASTM E648**.

# PART 3 EXECUTION

## 3.1 SURFACE PREPARATION

Before any work under this section is begun, defects such as rough or scaling concrete, low spots, high spots, and uneven surfaces must be corrected, and damaged portions of concrete slabs must be repaired in accordance with flooring manufacturer's recommended instructions. Floor must be in a level plane with a maximum variation of **1/8 inch** every **10 feet**, except where indicated as sloped. Repair cracks and irregularities and prepare the subfloor in accordance with flooring manufacturer's recommended instructions. Curing and sealing compounds should not be used on concrete surfaces to receive flooring unless they have been tested and approved by the flooring manufacturer. In addition, remove paint, varnish, oils, release agents, sealers, waxes, and adhesives, as required by the flooring product in accordance with manufacturer's printed installation instructions. If a curing compound is required, it must be coordinated for compatibility with the flooring adhesive.

## 3.2 MOISTURE, ALKALINITY AND BOND TESTS

Determine the suitability of the concrete subfloor for receiving the flooring with regard to moisture content and pH level by moisture and alkalinity tests. Conduct moisture testing in accordance with **ASTM F1869** or **ASTM F2170**, unless otherwise recommended by the flooring manufacturer. Conduct alkalinity testing as recommended by the flooring manufacturer. Determine the compatibility of the flooring adhesives to the concrete floors by a bond test in accordance with the flooring manufacturer's recommendations.

## 3.3 GENERAL INSTALLATION

Do not install building construction materials that show visual evidence of biological growth.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.4 INSTALLATION OF STATIC-CONTROL RESILIENT TILE FLOORING

Install static-control resilient flooring, ground connections, heat welded joints, and accessories in accordance with the approved manufacturer's installation instructions. Tile lines and joints must be kept square, symmetrical, tight, and even. Tile at the perimeter of the area to be finished may vary as necessary to maintain full-size tiles in the field, but no perimeter tile may be less than one-half the field tile size, except where irregular shaped rooms make it impossible. Tile must be cut, fitted, and scribed to walls, partitions, and projections after field flooring has been applied. Install grounding strips in accordance with manufacturer's installation instructions. Protect edges of flooring material meeting hard surface flooring with molding and install in accordance with the molding manufacturer's printed instructions.

### 3.5 INSTALLATION OF WALL BASE

#### 3.5.1 Resilient Base

Install wall base in accordance with manufacturer's printed installation instructions. Prepare and apply adhesives in accordance with manufacturer's printed directions. Tighten base joints and make even with adjacent resilient flooring. Fill voids along the top edge of base at masonry walls with caulk. Roll entire vertical surface of base with hand roller, and press toe of base with a straight piece of wood to ensure proper alignment. Avoid excess adhesive in corners.

### 3.6 CLEANING AND PROTECTION

The flooring must be cleaned in accordance with the manufacturer's recommendations. Flooring must be protected by a covering of heavy-duty building paper before foot traffic is permitted. Lap and secure edges of kraft paper protection to provide a continuous cover. Boardwalks must be placed over flooring in areas where subsequent building operations might damage the floor. Remove and replace flooring that becomes loose, broken, or curled prior to acceptance, or flooring that does not conform to resistance requirements of [ASTM F150](#).

### 3.7 TESTING

Test the flooring in accordance with and conform to the requirements of [ESD S6.1](#).

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 09 65 00

RESILIENT FLOORING  
08/10, CHG 3: 08/18

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN FOREST FOUNDATION (AFF)

ATFS STANDARDS (2015) American Tree Farm System Standards  
of Sustainability 2015-2020

## ASTM INTERNATIONAL (ASTM)

ASTM D4078 (2002; R 2015) Water Emulsion Floor Polish

ASTM E648 (2019a) Standard Test Method for Critical  
Radiant Flux of Floor-Covering Systems  
Using a Radiant Heat Energy Source

ASTM F710 (2019; E 2020) Standard Practice for  
Preparing Concrete Floors to Receive  
Resilient Flooring

ASTM F1482 (2021) Standard Practice for Installation  
and Preparation of Panel Type  
Underlayments to Receive Resilient Flooring

ASTM F1700 (2020) Standard Specification for Solid  
Vinyl Floor Tile

ASTM F1861 (2021) Standard Specification for  
Resilient Wall Base

ASTM F1869 (2016a) Standard Test Method for Measuring  
Moisture Vapor Emission Rate of Concrete  
Subfloor Using Anhydrous Calcium Chloride

ASTM F2169 (2015; R 2020; E 2020) Standard  
Specification for Resilient Stair Treads

ASTM F2170 (2019a) Standard Test Method for  
Determining Relative Humidity in Concrete  
Floor Slabs Using in situ Probes

## CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350 (2010; Version 1.1) Standard Method for  
the Testing and Evaluation of Volatile  
Organic Chemical Emissions from Indoor  
Sources using Environmental Chambers

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

CSA GROUP (CSA)

CSA Z809-08 (R2013) Sustainable Forest Management

FOREST STEWARDSHIP COUNCIL (FSC)

FSC STD 01 001 (2015) Principles and Criteria for Forest Stewardship

GREEN SEAL (GS)

GS-36 (2013) Adhesives for Commercial Use

PROGRAMME FOR ENDORSEMENT OF FOREST CERTIFICATION (PEFC)

PEFC ST 2002:2013 (2015) PEFC International Standard Chain of Custody of Forest Based Products Requirements

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS SCS Global Services (SCS) Indoor Advantage

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168 (2017) Adhesive and Sealant Applications

SUSTAINABLE FOREST INITIATIVE (SFI)

SFI 2015-2019 (2015) Standards, Rules for Label Use, Procedures and Guidance

UNDERWRITERS LABORATORIES (UL)

UL 2818 (2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

### SD-02 Shop Drawings

Resilient Flooring and Accessories; G

### SD-03 Product Data

Resilient Flooring and Accessories; G

Adhesives

Luxury Vinyl Tile



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## Stair Treads, Risers and Stringers

### SD-04 Samples

Resilient Flooring and Accessories; G, AE

### SD-06 Test Reports

Moisture, Alkalinity and Bond Tests; G

### SD-07 Certificates

Indoor Air Quality for Luxury Vinyl Tile; S

Indoor Air Quality for Wall Base; S

Indoor Air Quality for Adhesives; S

### SD-08 Manufacturer's Instructions

Surface Preparation; G

Installation; G

### SD-10 Operation and Maintenance Data

Resilient Flooring and Accessories; G

## 1.3 CERTIFICATES

### 1.3.1 Indoor Air Quality

Submit required indoor air quality certifications and validations in one submittal package.

#### 1.3.1.1 Floor Covering Materials

Provide Vinyl Composition Tile, Rubber Tile, Luxury Vinyl Tile, and wall base products certified to meet indoor air quality requirements by FLOORSCORE, **UL 2818** (Greenguard) Gold, **SCS** Global Services Indoor Advantage Gold or provide certification by other third-party programs. Provide current product certification documentation from certification body.

#### 1.3.1.2 Adhesives, Caulking and Sealants

Provide products certified to meet indoor air quality requirements by **UL 2818** (Greenguard) Gold, **SCS** Global Services Indoor Advantage Gold or provide certification or validation by other third-party programs that products meet the requirements of this Section. Provide current product certification documentation from certification body. When product does not have certification, provide validation that product meets the indoor air quality product requirements cited herein.

### 1.3.2 Certified Sustainably Harvested Wood

Provide wood certified as sustainably harvested by **FSC STD 01 001**, **ATFS STANDARDS**, **CSA Z809-08**, **SFI 2015-2019** Standards and Rules, or other

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

third party program certified by **PEFC ST 2002:2013**. Provide a letter of Certification of Sustainably Harvested Wood signed by the wood supplier. Identify certifying organization and their third party program name and indicate compliance with chain-of-custody program requirements. Submit sustainable wood certification data; identify each certified product on a line item basis. Submit copies of invoices bearing certification numbers.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the building site in original unopened containers bearing the manufacturer's name, style name, pattern color name and number, production run, project identification, and handling instructions. Store materials in a clean, dry, secure, and well-ventilated area **free from strong contaminant sources and residues** with ambient air temperature maintained above **68 degrees F** and below **85 degrees F**, stacked according to manufacturer's recommendations. **Remove resilient flooring products from packaging to allow ventilation prior to installation.** Protect materials from the direct flow of heat from hot-air registers, radiators and other heating fixtures and appliances. Observe ventilation and safety procedures specified in the MSDS. **Do not store rubber surface products with materials that have a high capacity to adsorb volatile organic compound (VOC) emissions. Do not store exposed rubber surface materials in occupied spaces.** Do not store near materials that may offgas or emit harmful fumes, such as kerosene heaters, fresh paint, or adhesives.

#### 1.5 ENVIRONMENTAL REQUIREMENTS

Maintain areas to receive resilient flooring at a temperature above **68 degrees F** and below **85 degrees F** for 3 days before application, during application and 2 days after application, unless otherwise directed by the flooring manufacturer for the flooring being installed. Maintain a minimum temperature of **55 degrees F** thereafter. Provide adequate ventilation to remove moisture from area and to comply with regulations limiting concentrations of hazardous vapors.

#### 1.6 SCHEDULING

Schedule resilient flooring application after the completion of other work which would damage the finished surface of the flooring.

#### 1.7 WARRANTY

Provide manufacturer's standard performance guarantees or warranties that extend beyond a one year period.

#### 1.8 EXTRA MATERIALS

Provide extra flooring material of each color and pattern at the rate of 5 tiles for each 1000 tiles installed. Provide extra wall base material composed of **20 linear feet** of each type, color and pattern. Package all extra materials in original properly marked containers bearing the manufacturer's name, brand name, pattern color name and number, production run, and handling instructions. Provide extra materials from the same lot as those installed. Leave extra stock at the site in location assigned by Contracting Officer.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## PART 2 PRODUCTS

### 2.1 SHEET VINYL FLOORING

Not Used.

### 2.2 RUBBER TILE TYPE A

Not Used.

### 2.3 LUXURY VINYL TILE (LVT-1)

Conform to ASTM F1700 Class III printed film with a minimum wear layer thickness 0.200 inch (5.0mm) and minimum overall thickness 0.197 inch with nonslip/skid backing, Type B (embossed). Provide as indicated on drawings.

Provide tile with a factory protective finish that enhances cleanability and durability.

Provide certification of indoor air quality for Luxury Vinyl Tile.

### 2.4 WALL BASE

Conform to ASTM F1861, Type TS (vulcanized thermoset rubber) or Type TP (thermoplastic rubber), Style A (straight - installed with carpet), and Style B (coved - installed with resilient flooring). Provide 4 inch high and a minimum 1/8 inch thick wall base. Provide job formed corners in matching height, shape, and color.

Provide certification of indoor air quality for Wall Base.

### 2.5 STAIR TREADS, RISERS AND STRINGERS

Conform to ASTM F2169, Type TS (vulcanized thermoset rubber). Conform to ASTM F2169 for surface of treads Class 2 raised square and have Group 2 strip for visually impaired of contrasting color of abrasive material. Provide square nosing. Provide either a one piece nosing/tread/riser or a two piece nosing/tread design with a matching coved riser.

### 2.6 MOULDING

Provide tapered mouldings of vinyl or rubber and types as recommended by flooring manufacturer for both edges and transitions of flooring materials specified. Provide vertical lip on moulding of maximum 1/4 inch. Provide bevel change in level between 1/4 and 1/2 inch with a slope no greater than 1:2.

### 2.7 ADHESIVES

Provide adhesives for flooring, base and accessories as recommended by the manufacturer and comply with local indoor air quality standards. Submit manufacturer's descriptive data, documentation stating physical characteristics, and mildew and germicidal characteristics.

Provide non-aerosol adhesive products used on the interior of the building (defined as inside of the weatherproofing system) that meet either emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of SCAQMD Rule 1168. Provide aerosol adhesives used on the interior of the building that meet either emissions requirements of

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

CDPH SECTION 01350 (use the office or classroom requirements, regardless of space type) or VOC content requirements of GS-36. Provide certification or validation of indoor air quality for adhesives.

## 2.8 SURFACE PREPARATION MATERIALS

Provide surface preparation materials, such as panel type underlayment, lining felt, and floor crack fillers as recommended by the flooring manufacturer for the subfloor conditions. Comply with ASTM F1482 for panel type underlayment products. Use one of the following substrates:

a. Concrete.

## 2.9 POLISH/FINISH

Provide polish finish as recommended by the manufacturer and conform to ASTM D4078 for polish.

## 2.10 CAULKING AND SEALANTS

Provide caulking and sealants in accordance with Section 07 92 00 JOINT SEALANTS.

## 2.11 MANUFACTURER'S COLOR, PATTERN AND TEXTURE

Provide color, pattern and texture for resilient flooring and accessories as indicated on the drawings. Color listed is not intended to limit the selection of equal colors from other manufacturers. Provide floor patterns as specified on the drawings. Provide flooring in any one continuous area or replacement of damaged flooring in continuous area from same production run with same shade and pattern. Submit manufacturer's descriptive data and three samples of each indicated color and type of flooring, base, mouldings, and accessories sized a minimum 2-1/2 by 4 inch. Submit Data Package 1 in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

## 2.12 FIRE RESISTANCE TESTING REQUIREMENTS

Provide a minimum average critical radiant flux of 0.45 watts per square centimeter for flooring in corridors and exits when tested in accordance with ASTM E648.

# PART 3 EXECUTION

## 3.1 EXAMINATION

Examine and verify that site conditions are in agreement with the design package. Report all conditions that will prevent a proper installation. Do not take any corrective action without written permission from the Government. Work will proceed only when conditions have been corrected and accepted by the installer. Submit manufacturer's printed installation instructions for all flooring materials and accessories, including preparation of substrate, seaming techniques, and recommended adhesives.

## 3.2 SURFACE PREPARATION

Provide a smooth, true, level plane for surface preparation of the flooring, except where indicated as sloped. Floor to be flat to within 3/16 inch in 10 feet. Prepare subfloor in accordance with flooring

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

manufacturer's recommended instructions. Prepare the surfaces of lightweight concrete slabs (as defined by the flooring manufacturer) as recommended by the flooring manufacturer. Comply with [ASTM F710](#) for concrete subfloor preparation. Floor fills or toppings may be required as recommended by the flooring manufacturer. Install underlayments, when required by the flooring manufacturer, in accordance with manufacturer's recommended printed installation instructions. Comply with [ASTM F1482](#) for panel type underlayments. Before any work under this section is begun, correct all defects such as rough or scaling concrete, chalk and dust, cracks, low spots, high spots, and uneven surfaces. Repair all damaged portions of concrete slabs as recommended by the flooring manufacturer. Remove concrete curing and sealer compounds from the slabs, other than the type that does not adversely affect adhesion. Remove paint, varnish, oils, release agents, sealers, waxes, and adhesives, as required by the flooring product in accordance with manufacturer's printed installation instructions.

### 3.3 MOISTURE, ALKALINITY AND BOND TESTS

Determine the suitability of the concrete subfloor for receiving the resilient flooring with regard to moisture content and pH level by moisture and alkalinity tests. Conduct moisture testing in accordance with [ASTM F1869](#) or [ASTM F2170](#), unless otherwise recommended by the flooring manufacturer. Conduct alkalinity testing as recommended by the flooring manufacturer. Determine the compatibility of the resilient flooring adhesives to the concrete floors by a bond test in accordance with the flooring manufacturer's recommendations. Submit copy of test reports for moisture and alkalinity content of concrete slab, and bond test stating date of test, person conducting the test, and the area tested.

### 3.4 GENERAL INSTALLATION

Do not install building construction materials that show visual evidence of biological growth.

### 3.5 PLACING VINYL COMPOSITION, LINOLEUM AND SOLID VINYL TILES

Install tile flooring and accessories in accordance with manufacturer's printed installation instructions. Prepare and apply adhesives in accordance with manufacturer's directions. Keep tile lines and joints square, symmetrical, tight, and even. Keep each floor in true, level plane, except where slope is indicated. Vary edge width as necessary to maintain full-size tiles in the field, no edge tile to be less than one-half the field tile size, except where irregular shaped rooms make it impossible. Cut flooring to fit around all permanent fixtures, built-in furniture and cabinets, pipes, and outlets. Cut, fit, and scribe edge tile to walls and partitions after field flooring has been applied.

### 3.6 PLACING LUXURY VINYL TILES

Install luxury vinyl tile flooring using glue down installation. Install flooring and accessories in accordance with manufacturer's printed installation instructions. Prepare and apply adhesives in accordance with manufacturer's directions for installation method specified. Keep tile lines and joints square, symmetrical, tight, and even. Keep each floor in true, level plane, except where slope is indicated. Vary edge width as necessary to maintain full-size tiles in the field, no edge tile to be less than one-half the field tile size, except where irregular shaped rooms make it impossible. Cut flooring to fit around all permanent

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

fixtures, built-in furniture and cabinets, pipes, and outlets. Cut, fit, and scribe edge tile to walls and partitions after field flooring has been applied.

### 3.7 PLACING RUBBER TILE

Install rubber tile and accessories in accordance with manufacturer's printed installation instructions. Prepare and apply adhesives in accordance with manufacturer's printed directions. Provide square, symmetrical, tight, and even flooring lines and joints. Keep each floor in true, level plane, except where slope is indicated. Vary width of edge tiles as necessary to maintain full-size tiles, except where irregular-shaped rooms makes it impossible. Cut flooring to fit around all permanent fixtures, built-in furniture and cabinets, pipes, and outlets. Cut, fit, and scribe flooring to walls and partitions after field flooring has been applied.

### 3.8 PLACING RUBBER SHEET FLOORING

Install rubber sheet flooring and accessories in accordance with manufacturer's printed installation instructions. Prepare and apply adhesives in accordance with manufacturer's printed directions. Provide square, symmetrical, tight, and even flooring lines and joints. Keep each floor in true, level plane, except where slope is indicated. Cut seams by overlapping or underscribing as recommended by the manufacturer. Lay out sheets to minimize waste. Cut flooring to fit around all permanent fixtures, built-in furniture and cabinets, pipes, and outlets. Cut, fit, and scribe flooring to walls and partitions after field flooring has been applied.

### 3.9 PLACING FEATURE STRIPS

Install feature strips in accordance with manufacturer's printed installation instructions. Prepare and apply adhesives in accordance with manufacturer's printed directions.

### 3.10 PLACING MOULDING

Provide moulding where flooring termination is higher than the adjacent finished flooring and at transitions between different flooring materials. When required, locate moulding under door centerline. Moulding is not required at doorways where thresholds are provided. Secure moulding with adhesive as recommended by the manufacturer. Prepare and apply adhesives in accordance with manufacturer's printed directions.

### 3.11 PLACING WALL BASE

Install wall base in accordance with manufacturer's printed installation instructions. Prepare and apply adhesives in accordance with manufacturer's printed directions. Tighten base joints and make even with adjacent resilient flooring. Fill voids along the top edge of base at masonry walls with caulk. Roll entire vertical surface of base with hand roller, and press toe of base with a straight piece of wood to ensure proper alignment. Avoid excess adhesive in corners.

### 3.12 PLACING STAIR TREADS, RISERS, AND STRINGERS

Secure and install stair treads, risers, and stringers in accordance with manufacturer's printed installation instructions. Cover the surface of

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

treads and risers the full width of the stairs. Provide equal length pieces butted together to cover the treads and risers for stairs wider than manufacturer's standard lengths. Provide stringer angles on both the wall and banister sides of the stairs, and landing trim.

### 3.13 CLEANING

Immediately upon completion of installation of flooring in a room or an area, dry and clean the flooring and adjacent surfaces to remove all surplus adhesive. Clean flooring as recommended in accordance with manufacturer's printed maintenance instructions and within the recommended time frame. As required by the manufacturer, apply the recommended number of coats and type of polish and finish in accordance with manufacturer's written instructions.

### 3.14 PROTECTION

From the time of installation until acceptance, protect flooring from damage as recommended by the flooring manufacturer. Remove and replace flooring which becomes damaged, loose, broken, or curled and wall base which is not tight to wall or securely adhered.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 09 67 23.13

## STANDARD RESINOUS FLOORING

11/19

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## ASTM INTERNATIONAL (ASTM)

ASTM A990/A990M	(2021) Standard Specification for Castings, Iron-Nickel-Chromium and Nickel Alloys, Specially Controlled for Pressure-Retaining Parts for Corrosive Service
ASTM C881/C881M	(2020a) Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
ASTM D445	(2019a) Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)
ASTM D523	(2014; R 2018) Standard Test Method for Specular Gloss
ASTM D570	(1998; E 2010; R 2010) Standard Test Method for Water Absorption of Plastics
ASTM D638	(2014) Standard Test Method for Tensile Properties of Plastics
ASTM D696	(2016) Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30 degrees C and 30 degrees C With a Vitreous Silica Dilatometer
ASTM D1475	(2013) Standard Test Method for Density of Liquid Coatings, Inks, and Related Products
ASTM D1544	(2004; R 2010) Standard Test Method for Color of Transparent Liquids (Gardner Color Scale)
ASTM D1652	(2011; E 2012) Standard Test Method for Epoxy Content of Epoxy Resins
ASTM D2240	(2015; E 2017) Standard Test Method for Rubber Property - Durometer Hardness

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

ASTM D2471	(1999) Standard Test Method for Gel Time and Peak Exothermic Temperature of Reacting Thermosetting Resins
ASTM D4259	(2018) Standard Practice for Preparation of Concrete by Abrasion Prior to Coating Application
ASTM F2170	(2019a) Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

## 1.2 ADMINISTRATIVE REQUIREMENTS

### 1.2.1 Pre-Installation Meetings

Pre-installation Conference: Conduct conference at Project site.

### 1.2.2 Product Data

Within 30 days of contract award, submit [manufacturer's catalog data](#) for the following items:

- a. Epoxy-Resin Binder/Matrix
- b. Cured Epoxy Binder
- c. Surface Sealing Coat

### 1.2.3 Design Mix Data

Within 30 days of contract award, submit [design mix data](#) for the following items, including a complete list of ingredients and admixtures:

- a. Epoxy-Resin Binder/Matrix
- b. Cured Epoxy Binder
- c. Surface Sealing Coat

Ensure applicable test reports verify the mix has been successfully tested and meets design requirements.

## 1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section [01 33 00 SUBMITTAL PROCEDURES](#):

[SD-02 Shop Drawings](#)

[Installation Drawings](#)

[Fabrication Drawings](#)

[SD-03 Product Data](#)

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Manufacturer's Catalog Data; G

#### SD-04 Samples

Hardboard Mounted Epoxy Flooring; G, AE

Floor Topping; G, AE

#### SD-05 Design Data

Design Mix Data; G

#### SD-07 Certificates

Listing of Product Installations

Referenced Standards Certificates

#### SD-11 Closeout Submittals

Warranty; G

### 1.4 DELIVERY, STORAGE, AND HANDLING

Protect materials from weather, soil, and damage during delivery, storage, and construction. Deliver materials in original packages, containers, or bundles bearing brand name and name of material.

Maintain materials used in the installation of floor topping at a temperature between 65 and 85 degrees F.

### 1.5 QUALITY CONTROL

Prior to commencement of work, submit [referenced standards certificates](#) for the following, showing conformance with the referenced standards contained in this section:

- a. Epoxy-Resin Binder/Matrix
- b. Cured Epoxy Binder
- c. Aggregate
- d. Surface Sealing Coat

#### 1.5.1 Qualifications

Submit a [listing of product installations](#) for heavy duty epoxy flooring including identification of at least 5 units, similar to those proposed for use, that have been in successful service for a minimum period of 5 years. Identify purchaser, address of installation, service organization, and date of installation.

Ensure floor system applicators are experienced in the application of troweled thin-set floor topping.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 1.5.2 Sampling

Submit [hardboard mounted epoxy flooring](#) samples not less than 12 inch square for each required color.

Provide panels showing nominal thickness of finished toppings, color, and texture of finished surfaces. Finished floor toppings and the approved samples are to match in color and texture.

### 1.6 WARRANTY

Submit a 2 year written [warranty](#) for all materials and installation work.

## PART 2 PRODUCTS

### 2.1 SYSTEM DESCRIPTION

Submit [installation drawings](#) for heavy duty epoxy flooring systems clearly designating the areas of application and the installation plan. Include in the installation plan, methods to control sand and dust if sand blasting is required.

Submit [fabrication drawings](#) for heavy duty epoxy flooring Systems consisting of fabrication and assembly details to be performed in the factory.

### 2.2 MATERIALS

#### 2.2.1 Mixes

##### 2.2.1.1 Epoxy-Resin Binder/Matrix

Provide a clear two-component compatible system epoxy resin binder consisting of: (1) a liquid blend of a biphenyl-based epoxy resin and an aliphatic polyglyceride ether, and (2) a liquid blend of two modified amine curing agents, which individually cures the epoxy resin at room temperature to a glossy smooth film. Ensure the two components and the cured epoxy binder have the following physical properties:

<a href="#">PROPERTY</a>	<a href="#">TEST METHOD</a>	<a href="#">REQUIREMENT</a>
	<a href="#">COMPONENT A (EPOXY RESIN)</a>	
Viscosity (kinematic), at 77 degrees F, centipoises	<a href="#">ASTM D445</a>	3000 to 5000
Weight per epoxide, grams	<a href="#">ASTM D1652</a>	205 to 225
Color (Gardner Color Scale), maximum	<a href="#">ASTM D1544</a>	5
Weight per gallon, pounds	<a href="#">ASTM D1475</a>	9.46 - 9.56
	<a href="#">COMPONENT B (CURING AGENT)</a>	

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

<u>PROPERTY</u>	<u>TEST METHOD</u>	<u>REQUIREMENT</u>
Viscosity (kinematic), at 77 degrees F, centistokes	ASTM D445	75 to 125
Weight per gallon, pounds	ASTM D1475	7.50 to 7.60
Color (Gardner Color Scale), maximum	ASTM D1544	8

#### 2.2.1.2 Cured Epoxy Binder

Provide a cured epoxy binder with the following properties.

<u>PROPERTY</u>	<u>TEST METHOD</u>	<u>REQUIREMENT</u>
Tensile strength, psi* at test temperature: 77 degrees F	ASTM D638	4500 to 6500
Tensile elongation, percent* at test temperature: 77 degrees F	ASTM D638	20 to 40
Water absorption, percent 24 hours at 77 degrees F, maximum	ASTM D570	0.40
Hardness, Shore D	ASTM D2240	74 to 82
Linear shrinkage, inch/inch maximum	ASTM C881/C881M	0.006
Shrinkage, glass bow, inch divergence, maximum	ASTM A990/A990M	0.016
Coefficient of linear thermal expansion, inch/inch/degree C, maximum	ASTM D696 0 degrees C to 40 degrees C	200 X 10 <sup>-6</sup>
Gel time/peak exotherm at 77 degrees F, 100 gm mass in 4 ounce metal container	ASTM D2471	20 to 40 minutes at 300 degrees F, maximum
*1/8 inch thick castings		
**1/8 by 1 by 3 inch castings, aged in forced draft oven		

#### 2.2.1.3 Surface Sealing Coat

Provide nonambering aliphatic or aromatic moisture-curing polyurethane surface sealer into which has been incorporated a flatting agent. Add flatting agent not more than 24 hours prior to actual application of the

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

coating. Ensure cured coating with flattening agent yields 60-degree specular gloss of 10 to 20 when tested in accordance with [ASTM D523](#).

## PART 3 EXECUTION

### 3.1 PREPARATION

Prior to applying resinous flooring material, inspect substrate and immediately report any unsatisfactory conditions that exist and repair.

Verify that the concrete substrates are dry and the moisture-vapor emissions are within acceptable levels according to the manufacturer's written instructions.

Relative Humidity Test: Use in situ probes, [ASTM F2170](#). Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

Alkalinity and Adhesion Testing: Verify that concrete substrates have a pH within an acceptable range. Perform tests recommended by the manufacturer. Proceed with the application only after the substrates pass testing.

#### 3.1.1 Safety Precautions

Prior to application in confined spaces of toppings and coatings containing flammable or toxic properties, institute safety precautions recommended by the manufacturer of the product.

Erect "NO SMOKING" signs, and prohibit smoking or use of spark- or flame-producing devices within [50 feet](#) of any mixing or placing operation involving flammable materials.

Provide the personnel required to handle, mix, or apply toppings containing toxic or flammable properties with such items of personal protective equipment and apparel for eye, skin, and respiratory protection as are recommended by the manufacturer of the product. Ensure all personnel are trained in the appropriate use and wearing of personal protection equipment.

#### 3.1.2 Protection of Adjacent Surfaces

In addition to the protection of adjacent surfaces during installation, provide areas used to store and mix materials with a protective covering under the materials. After application of the sealer coats, protect finished flooring during the remainder of the construction period. In areas of expected minimum or moderate traffic, cover floors with [70 pound](#) kraft paper, with strips taped together and edges secured to prevent roll-up. Place vegetable fiberboard, plywood, or other suitable material that does not mar the flooring over the paper to protect areas used as passages by workmen and areas subject to floor damage because of subsequent building operations. Upon completion of construction, remove the protection, clean flooring and, where necessary, repair, reseal, or both, at no additional cost to the Government.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.1.3 Concrete Subfloor

#### 3.1.3.1 Existing Concrete Floors

Clean existing concrete floors, with hard troweled or contaminated areas in conformance with [ASTM D4259](#). Ensure the concrete is free of all paint, sealers, curing agents, oil, grease, moisture, dirt or any other contaminants. Remove any loose or corroded segments of existing concrete. Patch with a grouting compound as recommended by the resinous flooring manufacturer. Fill all cracks with an elastomeric jointing compound compatible with the resinous flooring system used.

#### 3.1.4 Mixing Of Materials

Select the job mix proportions on the trial batch proportions used to prepare the [floor topping](#) samples as submitted and approved.

Use mechanical equipment for mixing of materials in accordance with the manufacturer's instructions.

Use rotating paddle-type masonry mortar mixers for preblending the three sizes and color pigment, if any, of the walnut shell aggregate and addition of the mixed epoxy resin binder. Ensure mixing times are as recommended by the materials supplier(s), provided mixing times result in homogeneous mixtures. Limit quantity of material mixed at one time to that which can be applied and finished within the working life of the mixtures. Verify that the temperature of materials at the time of mixing are between [65 and 85 degrees F](#).

### 3.2 APPLICATION

#### 3.2.1 Areas of Application

Anchor plates set with the top surface at or above the finished epoxy floor level do not require coverage with this flooring material. Extend flooring under equipment, except when the equipment base is indicated to be flush against the structural floor. Cover and/or mask surfaces not to receive the epoxy floor topping, such as equipment or cabinets installed prior to surface-preparation efforts and adjacent to the flooring installation.

#### 3.2.2 Application of Prime Coat and Troweling

Combine the epoxy binder components A and B in the proportions specified by the manufacturer to form a clear compatible system immediately on mixing. Cure combined components to a clear film possessing a glossy, non-greasy surface at relative humidities less than 80 percent, having the following properties after curing 24 hours at [77 degrees F](#), followed by 24 hours at [125 degrees F](#):

Ensure that the prepared subfloor surface is dry and at a temperature of not less than [60 degrees F](#) when application of the floor topping is initiated. Immediately before application of the prime/scratch coat on the prepared surface, remove dust or other loose particles by blowing with compressed air or vacuum cleaned. Use only an air compressor equipped with an efficient oil-water trap to prevent oil contamination or wetting of surface.

Apply a thin roller coat of the epoxy binder specified to the prepared

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

subfloor as a prime coat. As an aid to placing, compacting, and finishing the floor topping, form a scratch coat by sprinkling a minimum quantity of the walnut shell aggregate on the prime coat surface immediately following the prime coat application. Prior to application of the prime/scratch coat, fill cracks in the concrete per manufacturer's instructions, and make provisions to keep control or expansion joints open.

Place the floor topping prior to final gelling of the prime/scratch coat. Immediately after the materials are mixed as specified, dump the mixture in the placement area and spread to prolong troweling life. Screed or rough trowel placed materials to the specified thickness and then compact by the use of a smooth roller prior to finish troweling to a nominal thickness of  $3/16$  inch plus or minus  $1/16$  inch. Ensure all finished surfaces are free of ridges, hollows (bird-baths), trowel marks, and smoothness varies no more than  $1/8$  inch when tested with an 8 foot straightedge. Make provisions to maintain the work areas in a relatively dust-free environment during curing of the topping.

### 3.2.3 Sealer Coat

After the floor topping has set firmly (approximately 6 to 16 hours depending on subfloor temperature) in a relatively dust-free environment, apply two thin coats of the sealer coat, by means of brush, roller, squeegee, or notched trowel to provide a pore-free, easy-to-clean surface. At the time of sealer application, ensure that the surface is dust-free. Depending on relative humidity, allow the applied sealer to cure to a tack-free condition in 2 to 4 hours. Do not apply second coat until after the initial coat has cured to a tack-free, hard film. Maintain topping areas in a relatively dust-free environment during curing of the sealer coats.

### 3.2.4 Integral Cove Base

Provide a 4 inch high cove base to all wall surfaces as indicated on the drawings. Install so as to provide a  $1/2$  inch radius at the juncture of the floor and the wall.

## 3.3 FIELD QUALITY CONTROL

### 3.3.1 Repairing

Remove and replace damaged or unacceptable portions of completed work with new work to match adjacent surfaces at no additional cost to the Government.

## 3.4 ADJUSTING AND CLEANING

Clean surfaces of the new work, and adjacent surfaces soiled as a result of the work. Remove all equipment, surplus materials, and rubbish associated with the work from the site.

-- End of Section --



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 09 68 00

## CARPETING

11/17, CHG 2: 08/20

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

AATCC 16	(2004; E 2008; E 2010) Colorfastness to Light
AATCC 107	(2013) Colorfastness to Water
AATCC 134	(2016) Electrostatic Propensity of Carpets
AATCC 165	(2013) Colorfastness to Crocking: Textile Floor Coverings - Crockmeter Method
AATCC 174	(2016) Antimicrobial Activity Assessment of New Carpets

## ASTM INTERNATIONAL (ASTM)

ASTM D297	(2015; R 2019) Rubber Products - Chemical Analysis
ASTM D1335	(2017; E 2018) Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings
ASTM D2859	(2016) Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials
ASTM D3278	(1996; R 2011) Flash Point of Liquids by Small Scale Closed-Cup Apparatus
ASTM D3676	(2013) Rubber Cellular Cushion Used for Carpet or Rug Underlay
ASTM D5793	(2018) Standard Test Method for Binding Sites Per Unit Length or Width of Pile Yarn Floor Coverings
ASTM D7330	(2015) Standard Test Method for Assessment of Surface Appearance Change in Pile Floor Coverings Using Standard Reference Scales
ASTM E648	(2019a) Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350 (2010; Version 1.1) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers

#### CARPET AND RUG INSTITUTE (CRI)

CRI 104 (2015) Carpet Installation Standard for Commercial Carpet

CRI 105 (2015) Carpet Installation Standard for Residential Carpet

CRI GLP QM (2017) Green Label Plus Quality Manual

CRI Test Method 103 (2015) Standard Test Method for the Evaluation of Texture Appearance Retention of Carpet Standards Program

#### GREEN SEAL (GS)

GS-36 (2013) Adhesives for Commercial Use

#### INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 2551 (2020) Textile Floor Coverings and Textile Floor Coverings in Tile Form-Determination of Dimensional Changes Due to the Effects of Varied Water and Heat Conditions and Distortion Out of Plane

#### SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS SCS Global Services (SCS) Indoor Advantage

#### SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1113 (2016) Architectural Coatings

SCAQMD Rule 1168 (2017) Adhesive and Sealant Applications

#### U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

16 CFR 1630 Standard for the Surface Flammability of Carpets and Rugs (FF 1-70)

#### UNDERWRITERS LABORATORIES (UL)

UL 2818 (2013) GREENGUARD Certification Program For Chemical Emissions For Building Materials, Finishes And Furnishings

### 1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-02 Shop Drawings

Installation Drawings; G

#### SD-03 Product Data

Carpet; G

Recycled Content for Carpeting; S

Moldings; G

Indoor Air Quality for Aerosol Adhesives; S

Indoor Air Quality for Non-Aerosol Adhesives; S

Indoor Air Quality for Concrete Primer; S

#### SD-04 Samples

Carpet; G, AE

Moldings; G, AE

#### SD-06 Test Reports

Moisture and Alkalinity Tests; G

#### SD-07 Certificates

Indoor Air Quality for Carpet; S

#### SD-08 Manufacturer's Instructions

Surface Preparation

#### SD-10 Operation and Maintenance Data

Cleaning and Protection

Maintenance Service

#### SD-11 Closeout Submittals

Warranty

### 1.3 CERTIFICATIONS

#### 1.3.1 Indoor Air Quality Certifications

##### 1.3.1.1 Floor Covering Materials

Provide carpet and cushion products certified to meet indoor air quality requirements by UL 2818 (GreenGuard) Gold, SCS Global Services Indoor

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Advantage Gold, **CRI GLP QM** or provide certification or validation by other third-party program that products meet the requirements of this Section. Provide current product certification documentation from certification body. When product does not have certification, provide validation that product meets the indoor air quality product requirements cited herein.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the site in the manufacturer's original wrappings and packages clearly labeled with the manufacturer's name, brand name, size, dye lot number, and related information. Remove materials from packaging and store them in a clean, dry, well ventilated area (100 percent outside air supply, minimum of 1.5 air changes per hour, and no recirculation), protected from damage, soiling, and moisture, and strong contaminant sources and residues, and maintain at a temperature above 60 degrees F for 2 days prior to installation. Do not store carpet or carpet tiles with materials which have high emissions of volatile organic compounds (VOCs) or other contaminants, including paints and adhesives. Do not store carpet near materials that may off gas or emit harmful fumes, such as kerosene heaters, fresh paint, or adhesives.

#### 1.5 AMBIENT CONDITIONS

Maintain areas in which carpeting is to be installed at a temperature above 60 degrees F and below 90 degrees F for 2 days before installation, during installation, and for 2 days after installation. Provide temporary ventilation during work of this section. Maintain a minimum temperature of 55 degrees F thereafter for the duration of the contract.

#### 1.6 WARRANTY

Provide manufacturer's standard performance guarantees or warranties including minimum ten year wear warranty, two year material and workmanship and ten year tuft bind and delamination.

### PART 2 PRODUCTS

#### 2.1 CARPET

Furnish first quality carpet that is free of visual blemishes, streaks, poorly dyed areas, fuzzing of pile yarn, spots or stains, and other physical and manufacturing defects. Provide carpet materials and treatments as reasonably nonallergenic and free of other recognized health hazards. Provide a static control construction on all grade carpets which gives adequate durability and performance. Submit manufacturer's catalog data and printed documentation stating physical characteristics, durability, resistance to fading, and flame resistance characteristics for each type of carpet material and installation accessory. Submit manufacturer's Product Data for 1) Carpet, 2) Moldings, and 3) Carpet Cushion. Also, submit Samples of the following:

- a. Carpet: Two "Production Quality" samples 18 by 18 inches of each carpet proposed for use, showing quality, pattern, and color specified
- b. Moldings: Two samples of each type minimum 12 inches long

##### 2.1.1 Recycled Content

Carpeting must contain a minimum of 20 percent recycled content. Provide

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

data identifying percentage of recycled content for carpeting.

#### 2.1.2 Indoor Air Quality Requirements

Products must meet emissions requirements of CDPH SECTION 01350. Provide certification or validation of indoor air quality for carpet.

#### 2.1.3 Physical Characteristics for Modular Tile Carpet

##### 2.1.3.1 Carpet Construction

Tufted

##### 2.1.3.2 Type

Modular tile as indicated on drawings with 0.15 percent growth/shrink rate in accordance with ISO 2551.

##### 2.1.3.3 Pile Type

Multilevel loop Level tip shear

##### 2.1.3.4 Pile Fiber

Commercial 100 percent branded (federally registered trademark) nylon continuous filament.

##### 2.1.3.5 Gauge or Pitch

Minimum 1/12 inch in accordance with ASTM D5793

##### 2.1.3.6 Stitches or Rows/Wires

Minimum 10.2-40.2 per square inch

##### 2.1.3.7 Pile Density

Minimum 5611 oz/cubic yards

##### 2.1.3.8 Dye Method

Solution dyed

##### 2.1.3.9 Attached Cushion

Provide an attached cushion mechanically frothed polyurethane with minimum weight of 22 oz/sq. yard, minimum density of 14 lb/cubic foot, minimum thickness of 0.100 inch, and maximum compression resistance of 5 psi, and compression set of 15 percent in accordance with ASTM D3676. Do not exceed the maximum ash content of 50 percent when tested in accordance with ASTM D297. Pass the accelerated aging test in accordance with ASTM D3676 for the cushion.

#### 2.2 PERFORMANCE REQUIREMENTS

##### 2.2.1 Texture Appearance Retention Rating (TARR)

Provide carpet with a greater than or equal to 3.5 (Severe) TARR traffic level classification in accordance with ASTM D7330 or CRI Test Method 103.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.2.2 Static Control

Provide static control to permanently regulate static buildup to less than 3.5 kV when tested at 20 percent relative humidity and 70 degrees F in accordance with AATCC 134.

#### 2.2.3 Flammability and Critical Radiant Flux Requirements

Comply with 16 CFR 1630 or ASTM D2859. Provide carpet in corridors and exits with a minimum average critical radiant flux of 0.45 watts per square centimeter when tested in accordance with ASTM E648.

#### 2.2.4 Tuft Bind

Comply with ASTM D1335 for tuft bind force required to pull a tuft or loop free from carpet backing with a minimum 8 pound average force for modular carpet tile.

#### 2.2.5 Colorfastness to Crocking

Comply dry and wet crocking with AATCC 165 and with a Class 4 minimum rating on the AATCC Color Transference Chart for all colors.

#### 2.2.6 Colorfastness to Light

Comply colorfastness to light with AATCC 16, Test Option E "Water-Cooled Xenon-Arc Lamp, Continuous Light" and with a minimum 4 grey scale rating after 40 hours.

#### 2.2.7 Colorfastness to Water

Comply colorfastness to water with AATCC 107 and with a minimum 4.0 gray scale rating and a minimum 4.0 transfer scale rating.

#### 2.2.8 Delamination Strength

Provide delamination strength for tufted carpet with a secondary back of minimum 2.5 lbs/inch.

#### 2.2.9 Antimicrobial

Nontoxic antimicrobial treatment in accordance with AATCC 174 Part I (qualitative), guaranteed by the carpet manufacturer to last the life of the carpet.

### 2.3 ADHESIVES AND CONCRETE PRIMER

Comply with applicable regulations regarding toxic and hazardous materials. Provide water resistant, mildew resistant, nonflammable, and nonstaining adhesives and concrete primers for carpet installation as required by the carpet manufacturer. Provide release adhesive for modular tile carpet as recommended by the carpet manufacturer. Provide adhesives flashpoint of minimum 140 degrees F in accordance with ASTM D3278. Non-aerosol adhesive products used on the interior of the building (defined as inside of the weatherproofing system) must meet either emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of SCAQMD Rule 1168. Aerosol adhesive products used on the

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

interior of the building (defined as inside of the weatherproofing system) must meet either emissions requirements of [CDPH SECTION 01350](#) (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of [GS-36](#). Provide validation of [indoor air quality for aerosol adhesives](#). Provide validation of [indoor air quality for non-aerosol adhesives](#). Concrete primer products used on the interior of the building (defined as inside of the weatherproofing system) must meet either emissions requirements of [CDPH SECTION 01350](#) (limit requirements for either office or classroom spaces regardless of space type) or VOC content requirements of [SCAQMD Rule 1113](#). Provide validation of [indoor air quality for concrete primer](#).

## 2.4 MOLDINGS

Provide carpet moldings where floor covering material changes or carpet edge does not abut a vertical surface. Provide a heavy-duty rubber molding designed for the type of carpet being installed. Provide floor flange of a minimum [1-1/2 inches](#) wide. Provide color [as indicated on drawings](#). Provide a floor flange of a minimum [1-1/2 inch](#) wide and face a minimum [5/8 inch](#) wide.

## 2.5 TAPE

Provide tape for seams as recommended by the carpet manufacturer for the type of seam used in broadloom installation. Seam sealant must have a maximum VOC content of no more than 50 grams/liter. Do not use sealants that contain 1,1,1-trichloroethane or toluene.

## 2.6 COLOR, TEXTURE, AND PATTERN

Provide color, texture, and pattern in accordance with the drawings.

# PART 3 EXECUTION

## 3.1 SURFACE PREPARATION

Do not install carpet on surfaces that are unsuitable and will prevent a proper installation. Prepare subfloor in accordance with flooring manufacturer's recommended instructions. Repair holes, cracks, depressions, or rough areas using material recommended by the carpet or adhesive manufacturer. Free floor of any foreign materials and sweep clean. Before beginning work, test subfloor with glue and carpet to determine "open time" and bond. Submit three copies of the manufacturer's printed Installation instructions for the carpet, including Surface Preparation, seaming techniques, and recommended adhesives and tapes.

## 3.2 MOISTURE AND ALKALINITY TESTS

Test concrete slab for moisture content and excessive alkalinity in accordance with [CRI 104/CRI 105](#). Submit three copies of reports of Moisture and Alkalinity Tests including content of concrete slab stating date of test, person conducting the test, and the area tested.

## 3.3 PREPARATION OF CONCRETE SUBFLOOR

Do not commence installation of the carpeting until concrete substrate is at least 90 days old. Prepare the concrete surfaces in accordance with the carpet manufacturer's instructions. Match carpet, when required, and adhesives to prevent off-gassing to a type of curing compounds, leveling

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

agents, and concrete sealer.

### 3.4 INSTALLATION

Isolate area of installation from rest of building. Perform all work by manufacturer's approved installers. Conduct installation in accordance with the manufacturer's printed instructions and CRI 104/CRI 105. Protect edges of carpet meeting hard surface flooring with molding and install in accordance with the molding manufacturer's printed instructions. Use autofoam mothproofing system for wool carpets. Follow ventilation, personal protection, and other safety precautions recommended by the adhesive manufacturer. Continue ventilation during installation and for at least 72 hours following installation. Do not permit traffic or movement of furniture or equipment in carpeted area for 24 hours after installation. Complete other work which would damage the carpet prior to installation of carpet. Submit three copies of Installation Drawings for 1) Carpet and 2) Moldings indicating areas receiving carpet, carpet types, patterns, direction of pile, location of seams, and locations of edge molding.

Do not install building construction materials that show visual evidence of biological growth.

#### 3.4.1 Modular Tile Installation

Install modular tiles with manufacturer approved adhesive tab system adhesive and snug joints. Use installation method as indicated on drawings. Comply with manufacturer installation instructions for required drying time of releasable adhesive so it sets up properly. Provide accessibility to the subfloor where required. Carpet tile on stairs and sloped surfaces must be installed with a more permanent installation method in accordance with the manufacturer's instructions and with manufacturer recommended adhesives for this application.

### 3.5 CLEANING AND PROTECTION

Submit three copies of carpet manufacturer's maintenance instructions describing recommended type of cleaning equipment and material, spotting and cleaning methods, and cleaning cycles.

#### 3.5.1 Cleaning

After installation of the carpet, remove debris, scraps, and other foreign matter. Remove soiled spots and adhesive from the face of the carpet with appropriate spot remover. Cut off and remove protruding face yarn. Vacuum carpet clean with a high-efficiency particulate air (HEPA) filtration vacuum.

#### 3.5.2 Protection

Protect the installed carpet from soiling and damage with heavy, reinforced, nonstaining kraft paper, plywood, or hardboard sheets. Lap and secure edges of kraft paper protection to provide a continuous cover. Restrict traffic for at least 48 hours. Remove protective covering when directed by the Contracting Officer.

### 3.6 REMNANTS

Manage waste as specified in the Waste Management Plan. Remove



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

non-retained scraps from site and recycle appropriately.

### 3.7 MAINTENANCE

#### 3.7.1 Extra Materials

Provide extra material from same dye lot consisting of uncut carpet tiles for future maintenance. Provide a minimum of three percent of total square yards of each carpet type, pattern, and color. Furnish three percent extra of total adhesive tabs.

#### 3.7.2 Maintenance Service

Collect information from the manufacturer about maintenance agreement options and submit to Contracting Officer. Service must reclaim materials for recycling and/or reuse. Service must not landfill or burn reclaimed materials. When such a service is not available, seek local recyclers to reclaim the materials. Submit documentation of manufacturer's maintenance agreement for carpet. Include contact information, summary of procedures, and the limitations and conditions applicable to the project. Indicate manufacturer's commitment to reclaim materials for recycling and reuse.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 09 69 13

RIGID GRID ACCESS FLOORING  
11/15, CHG 1: 08/18

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7-16 (2017; Errata 2018; Supp 1 2018) Minimum Design Loads and Associated Criteria for Buildings and Other Structures

## ASTM INTERNATIONAL (ASTM)

ASTM A780/A780M (2020) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

ASTM E648 (2019a) Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source

ASTM F150 (2006; R 2013) Standard Test Method for Electrical Resistance of Conductive and Static Dissipative Resilient Flooring

ASTM F1861 (2021) Standard Specification for Resilient Wall Base

## CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350 (2010; Version 1.1) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers

## CEILINGS AND INTERIOR SYSTEMS CONSTRUCTION ASSOCIATION (CISCA)

CISCA Access Floors (2007) Recommended Test Procedures for Access Floors

## GREEN SEAL (GS)

GS-36 (2013) Adhesives for Commercial Use

## ICC EVALUATION SERVICE, INC. (ICC-ES)

ICC-ES AC300 (2014) Acceptance Criteria for Access Floors

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC (2018) International Building Code

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI/NEMA LD 3 (2005) Standard for High-Pressure  
Decorative Laminates

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 75 (2020) Standard for the Protection of  
Information Technology Equipment

NFPA 99 (2021; TIA 20-1) Health Care Facilities  
Code

NFPA 253 (2011) Standard Method of Test for  
Critical Radiant Flux of Floor Covering  
Systems Using a Radiant Heat Energy Source

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168 (2017) Adhesive and Sealant Applications

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-301-01 (2019) Structural Engineering

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS TT-C-490 (Rev H; 2021) Cleaning Methods for Ferrous  
Surfaces and Pretreatments for Organic  
Coatings

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

36 CFR 1191 Americans with Disabilities Act (ADA)  
Accessibility Guidelines for Buildings and  
Facilities; Architectural Barriers Act  
(ABA) Accessibility Guidelines

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

### SD-02 Shop Drawings

Detailed Installation Drawings; G, AE

Fabrication Drawings; G, AE

### SD-03 Product Data

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Access Flooring System

Recycled Content of Access Flooring System; S

Indoor Air Quality For Pedestal Adhesive; S

Indoor Air Quality For Adhesives; S

#### SD-04 Samples

Floor Panels; G, AE

Floor Covering; G, AE

Panel Support System; G, AE

Accessories; G, AE

Fascia; G, AE

Exposed Step and Ramp Structure; G, AE

Perforated Directional Air Supply Panels

Cut Outs

#### SD-05 Design Data

Seismic Calculations

#### SD-06 Test Reports

Factory Tests

Concentrated Load

Uniform Live Load

Rolling Load

Impact Load

Ultimate Load

Stringer Load

Pedestal Axial Load

Bonding Strength of Pedestal Adhesive

Electrical Resistance

Field Tests

#### SD-07 Certificates

Compliance with ICC-ES AC308

Compliance with ICC IBC

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Certificate of Compliance

Qualification of Manufacturer

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals; G

SD-11 Closeout Submittals

Lifting Device

Warranty; G

### 1.3 SPARE PARTS

Furnish spare floor panels for each finish, complete pedestal assemblies, and stringers at the rate of one for each 100 or fraction thereof required.

Provide four spare panels with identical floor covering pedestals and stringers for each 1,000 square feet of access flooring and total of 10 linear feet of cut-out trim. Store extra stock in same manner and location as project materials.

### 1.4 QUALITY CONTROL

#### 1.4.1 Qualification of Manufacturer

Access flooring manufacturer must have at least 5 years experience in manufacturing access flooring systems. Certify that the manufacturer of the access flooring system meets requirements specified under paragraph entitled QUALIFICATION OF MANUFACTURER.

### 1.5 DELIVERY, STORAGE, AND HANDLING

#### 1.5.1 Delivery

Deliver materials to site in undamaged condition, in original containers or packages, complete with accessories and instructions. Label packages with manufacturer's name and brand designations. Package materials covered by specific references bearing specification number, type and class as applicable.

#### 1.5.2 Storage

Store all materials in original protective packaging in a safe, dry, and clean location. Store panels at temperatures between 40 and 90 degrees F, and between 20 and 70 percent humidity. Replace defective or damaged materials.

#### 1.5.3 Handling

Handle and protect materials in a manner to prevent damage during the entire construction period.

### 1.6 WARRANTY

Minimum manufacturer warranty must have no dollar limit, cover full system, and must have a minimum duration of 1 year. Include an agreement

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

to repair or replace floor panels, pedestals or stringers that fail within the warranty period in the standard performance guarantee or warranty. Failures include, but are not limited to, sagging and warping of panels; rusting and manufacturers defects of panels or support system. For high pressure laminate provide manufacturer's standard performance guarantees or warranties that extend beyond a one-year period for finish materials.

## PART 2 PRODUCTS

### 2.1 SYSTEM DESCRIPTION

- a. Provide for self-alignment of floor panels, adjustable pedestals and readily removable floor panels covered as specified.
- b. Lateral stability of floor support system must be independent of panels. Provide a finished assembly that is rigid and free of vibration, noises, and rocking panels. Provide bolted stringer system with equipotential plane grounding.
- c. Submit [certificate of compliance](#) attesting that the installed access floor system meets specification requirements, including all special equipment loads and specific electrical and or cable requirements for the complete access flooring system including, but not limited to the following:
  - (1) [Compliance with ICC-ES AC300](#) and [Compliance with ICC IBC](#) Acceptance Criteria for Access Floors.
  - (2) Load-bearing capabilities of pedestals, floor panels, and pedestal adhesive resisting force.
  - (3) Supporting independent laboratory test reports. For panel, stringer and pedestal load test results include concentrated loads at center of panel, panel edge midpoint, ultimate loads and uniform loads.
  - (4) Floor electrical characteristics.
  - (5) Material requirements.
  - (6) An elevated floor system free of defects in materials, fabrication, finish, and installation, that will remain so for a period of not less than 1 year after completion.
- d. Submit manufacturer's product data for [access flooring system](#) consisting of descriptive data, catalog cuts, and installation instructions. Include in the data information about any design and production techniques, total system including all accessories and finish coatings of under-floor components, procedures and policies used to conserve energy, reduce material, improve waste management or incorporate green building/recycled products into the manufacturer of their components or products. Include cleaning and maintenance instructions. Systems which contain zinc electroplated anti-corrosion coatings are prohibited.

#### 2.1.1 Design Requirements

Conduct floor panel testing in accordance with [CISCA Access Floors](#). When tested as specified, make all deflection and deformation measurements at

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

the point of load application on the top surface of the panel. Floor panels must be capable of supporting the following loads:

- a. **Concentrated load** of 1250 pounds on one square inch, at any point on panel, without a **bottom-surface** deflection more than 0.80 inch, and a permanent set not to exceed 0.01 inch in any of the specified tests. Testing must be in accordance with **CISCA Access Floors**, Section 1 Concentrated Loads with test panels being supported by understructure to be used with installed system instead of steel support blocks.
- b. **Uniform live load** of 250 psf, without a top-surface deflection more than 0.06 inch, and a permanent set not to exceed 0.01 inch in any of the specified tests, when tested in accordance with **CISCA Access Floors**, Section 7 Uniform Load Test with test panels being supported by understructure to be used with installed system instead of steel support blocks.
- c. A **rolling load** of 875 pounds applied through hard rubber surfaced wheel 6 inch diameter by 2 inch wide for 10,000 cycles over the same path. Permanent set at conclusion of test must not exceed 0.040 inch when tested in accordance with **CISCA Access Floors**, Section 3 Rolling Loads.
- d. A **rolling load** of 1125 pounds applied through a 3 inch diameter by 1-13/16 inch wide caster for 10 cycles over the same path, without developing a local overall surface deformation greater than 0.04 inch. In accordance with **CISCA Access Floors**, Section 3 Rolling Loads, the permanent deformation limit under rolling load must be satisfied in all of the specified tests.
- e. An **impact load** of 150 pounds anywhere on the panel dropped from a height of 36 inches onto a 1 square inch area without failure of the system, according to **CISCA Access Floors**, Section 8 Drop Impact Load Test.
- f. **Ultimate Load**. Panels must meet manufactures published Ultimate Load rating of 2500 pounds when tested in accordance with **CISCA Access Floors**, Section 2 Ultimate Loading.
- g. **Safety Factor**. Panels must provide a minimum Safety Factor of 5 times the uniform load specified above in accordance with **ICC-ES AC300**.
- h. **Recycled Content**. Provide Access Flooring System (panels, stringers and pedestals) containing a minimum of 18 percent recycled content. Provide data identifying percentage of **recycled content of access flooring system**.

#### 2.1.1.2 Allowable Tolerances

##### 2.1.1.2.1 Floor Panel Flatness

Plus or minus 0.035 inches on diagonal on top of panel or underneath edge.

##### 2.1.1.2.2 Floor Panel Length

Plus or minus 0.015 inch.

##### 2.1.1.2.3 Floor Panel Squareness

Plus or minus 0.02 inch in panel length.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 2.1.3 Stringers

Provide stringers capable of supporting a 250 pound concentrated load at midspan without permanent deformation in excess of 0.010 inch, when tested in accordance with CISCA Access Floors, Section 4 Stringer Load Testing.

### 2.1.4 Pedestals

Pedestals must be capable of supporting a 5000 pound axial load without permanent deformation, when tested in accordance with CISCA Access Floors, Section 5 Pedestal Axial Load Test.

### 2.1.5 Bonding Strength of Pedestal Adhesive

Adhesive for anchoring pedestal bases must have a bonding strength capable of resisting an overturning moment of 1,000 lbf-in when a force is applied to the top of the pedestal in any direction, when tested in accordance with CISCA Access Floors, Section 6 Pedestal Overturning Moment Test. Pedestal adhesive must meet emissions requirement of CDPH SECTION 01350 (use the office or classroom requirements, regardless of space type). Provide validation of indoor air quality for pedestal adhesive.

### 2.1.6 Bond Strength of Factory Installed Covering

Bond strength of floor covering must be sufficient to permit handling of the panels by use of the panel lifting device, and to withstand moving caster loads up to 1000 pounds, without separation of the covering from the panel.

### 2.1.7 Seismic Calculations

#### 2.1.7.1 Army Project Specific Requirements

Submit seismic calculations for special bracing to resist the effects of seismic or other forces in accordance with UFC 3-301-01, ICC IBC and ASCE 7-16. Submit design calculations which demonstrate that the proposed floor system meets requirements for seismic loading. Certified copies of test reports may be submitted in lieu of calculations.

## 2.2 FLOOR PANELS

### 2.2.1 Floor System Drawings And Planer Quality

- a. Submit Fabrication Drawings for elevated floor systems consisting of fabrication and assembly details to be performed in the factory.
- b. Indicate on Location Drawings exact location of pedestals, ventilation openings, cable cutouts, and the panel installation pattern.
- c. Provide Detail Drawings showing details of the pedestals, pedestal-floor interlocks, floor panels, panel edging, floor openings, floor opening edging, floor registers, floor grilles, cable cutout treatment, perimeter base, expansion, and peripheral support facilities.
- d. Design and workmanship of the floor, as installed, must be completely planar within plus or minus 0.060 inch in 10 feet, 0.100 inch for the entire floor, and 0.030 inch across panel joints.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- e. Floor-panel joint-width tolerances must not exceed 0.017 inch as measured with a feeler gage at any point in any joint when the panels are installed and as long as the air leakage requirements specified in this section are met.
- f. Submit three complete samples of floor panels.

#### 2.2.2 Detailed Installation Drawings

Submit Detailed Installation Drawings that as a minimum indicate the following:

- a. Location of panels
- b. Layout of supports, panels, and cutout locations
- c. Stair, handrail, and ramp framing
- d. Sizes and details of components
- e. Details at floor perimeter and height above structural floor
- f. Method of anchorage to structural subfloor
- g. Lateral bracing
- h. Typical cutout details
- i. Gasketing, return air grilles, supply air registers, and perforated panels. Include air transfer capacity of grilles, registers and panels
- j. Description of factory coating
- k. Floor finishes
- l. Location of connection to building grounding electrode

#### 2.2.3 Panel Construction

- a. Base access floor system on a 24 by 24 inch square module providing minimum of 6 inch clearance between structural floor and underside of panel and stringer. Fabricate so accurate job cutting and fitting may be done using standard sizes for perimeters and around columns.
- b. Do not expose metal on finished top surface of panels. Provide cutouts and cutout closures to accommodate utility systems and equipment intercabling. Reinforce cutouts to meet design load requirements. Provide extra support pedestals at each corner of cutout for cutout panels that do not meet specified design load requirements.
- c. Panel design must provide for convenient panel removal for underfloor servicing and for openings for new equipment. Use panels of uniform dimensions within specified tolerances. Permanently mark panels to indicate load rating and model number.
- d. Machine square floor panels to within plus or minus 0.015 inch with edge straightness plus or minus 0.0025 inch. If plastic edging is

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

applied to the panel, the tolerances apply to the panel before the plastic edging is applied.

#### 2.2.3.1 Cementitious-Filled Formed Steel (Composite Panels)

- a. Provide composite panels of die-formed steel construction totally enclosing the panel, including the top surface. The void spaces between the top sheet and the formed steel bottom sheet must be completely filled with an incombustible cementitious or concrete material. Seal cut edges in accordance with manufacturer's recommendations. Gravity held panels with bolted stringer understructure: Fasten end of each stringer and mid-point of each 4 foot stringer positively to pedestal heads, using manufacturer's standard screws. Provide screws that are removable from top.
- b. Grid supported panels must be further tested by supporting them at two opposite edges and applying a 500-pound load at the center of a panel selected; the panel must be similarly tested while supported at the other two edges. Weld failure at any point under this loading is not acceptable. This additional test must be applied to one panel per 500 square feet of floor in the system, but in no case less than two panels. When any weld fails, the number of panels designated by the Contracting Officer must be similarly tested; replace those panels that have a weld failure at no cost to the Government.

#### 2.2.4 Floor Covering

Surface floor panels with factory applied finish materials firmly bonded in place with waterproof adhesive. Provide finish flooring materials in corridors and exits with a critical radiant flux of not less than 0.45 watts per square centimeter (Class 1) when tested in accordance with ASTM E648 or NFPA 253. The electrical resistance must remain stable over the life expectancy of the floor covering. Any anti-static agent used in the manufacturing process must be an integral part of the material, not surface applied. Bolt heads or similar attachments must not rise above the traffic surface. Submit three separate samples of each specified floor covering finish and color.

##### 2.2.4.1 High Pressure Laminate

Provide factory applied high pressure laminate surfacing conforming to ANSI/NEMA LD 3, High-Wear type, Grade HDM, 1/16 inch thickness. Finish material must consist of one piece to cover the face of the panel. Provide edge detail that is integral to the finish material, is flush with floor finish, and is PVC. The total system electrical resistance from the wearing surface of the floor to the ground connection must be between 1,000,000 ( $1.0 \times 10^6$ ) ohms and 20,000,000,000 ohms ( $2.0 \times 10^{10}$ ).

#### 2.2.5 Accessories

Provide the manufacturer's standard registers, grilles, perforated panels, and plenum dividers type where indicated. Provide registers, grilles, and perforated panels designed to support the same static loads as floor panels without structural failure, and capable of delivering the air volumes indicated. Registers and perforated panels must be 25 percent open area and equipped with adjustable dampers. Submit three samples and colors of each accessory.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.2.6 Resilient Base

Conform to [ASTM F1861](#), Type TS (vulcanized thermoset rubber) Style B (coved - installed with resilient flooring). Provide [4 inch](#) high and a minimum [1/8 inch](#) thick wall base. Provide job formed corners in matching height, shape, and color.

#### 2.2.7 Adhesives

Provide adhesives as recommended by the manufacturer. Provide non-aerosol adhesive products that meet either emissions requirements of [CDPH SECTION 01350](#) (use the requirements for either office or classroom, regardless of space type) or VOC content requirements of [SCAQMD Rule 1168](#). Provide aerosol adhesives that meet either emissions requirements of [CDPH SECTION 01350](#) (use the requirements for office or classroom, regardless of space type) or VOC content requirements of [GS-36](#). Provide validation of [indoor air quality for adhesives](#).

#### 2.2.8 Lifting Device

At turn over provide one floor panel lifting device standard with the floor manufacturer, for each individual floor area (room or corridor). Furnish a minimum of two devices. [For AIR FORCE projects, at turnover, provide a total of two suction-type floor panel lifting devices for each floor area \(room or corridor\).](#)

### 2.3 PANEL SUPPORT SYSTEM

Design support system to allow for 360 degree clearance in laying out cable and cutouts for service to machines and so that panel and stringer together take up maximum of [2 inches](#). Submit one sample of suspension system proposed for use.

#### 2.3.1 Pedestals

Provide pedestals made of steel or aluminum or a combination thereof. Ferrous materials must have a factory-applied corrosion-resistant finish. Provide pedestal base plates with a minimum of [16 square inches](#) of bearing surface and a minimum of [1/8 inch](#) thickness. Pedestal shafts must be threaded to permit height adjustment within a range of approximately [2 inches](#), to permit overall floor adjustment within plus or minus [0.10 inch](#) of the required elevation, and to permit leveling of the finished floor surface within [0.062 inch](#) in [10 feet](#) in all directions. Provide locking devices to positively lock the final pedestal vertical adjustments in place. Pedestal caps must interlock with stringers to preclude tilting or rocking of the panels.

#### 2.3.2 Stringers

Provide stringers of rolled steel or extruded aluminum, to interlock with the pedestal heads to prevent lateral movement. Provide stringers that can be added or removed after floor is in place.

#### 2.3.3 Gaskets

Provide continuous gasketing at contact surfaces between panel and stringers to deaden sound and seal off the underfloor cavity from above for air tightness, and to maintain panel alignment.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 2.4 FASCIA

Provide aluminum or steel fascia plates at open ends of floor, at sides of ramps and steps, and elsewhere as required to enclose the free area under the raised floor. Steel plates must have a factory applied baked enamel finish. Finish on aluminum plates must be standard with the floor system manufacturer. Fascia plates must be reinforced on the back, and supported using the manufacturer's standard lateral bracing at maximum 4 feet on center. Provide trim, angles, and fasteners as required. Submit three color samples for fascia.

## 2.5 STEPS AND RAMPS

Securely fasten steps and ramps to the access flooring system and to the structural floor. Include in the construction standard floor system components and custom components as required, and all supports, fasteners, and trim necessary for a finished installation. Step nosings, threshold strips, and floor bevel strips must be cast or extruded aluminum with non-slip traffic surfaces. Submit three color samples for exposed step and ramp structure.

### 2.5.1 Steps

Height of risers must comply with applicable codes. Design steps to support a uniform load of 150 psf. Surface treads with the manufacturer's standard non-slip floor finish. Floor covering must match floor panels.

### 2.5.2 Ramps

Slope of ramps must comply with applicable codes and 36 CFR 1191 Americans with Disabilities Act (ADA). Design ramps to support the same loads as specified for floor panels. Surface ramps with the manufacturer's standard non-slip floor finish.

## 2.6 RAILINGS

Provide railings compliant with applicable codes and 36 CFR 1191 Americans with Disabilities Act (ADA). As a minimum railings must be of the double rail and post type, fabricated of at least 1 inch round seamless aluminum tubing with a satin natural anodized finish. At steps and ramps, make the top rail a minimum of 36 inches high and parallel to the incline. Make the top rail 42 inches high at open ends of the floor. Guardrails must have intermediate rails or an ornamental pattern such that a sphere 4 inches in diameter cannot pass through. Space posts maximum of 4 feet oc. Provide railings complete with anchorages, floor plates, and end caps. Submit three color samples for railings.

## 2.7 FACTORY TESTS

Factory test access flooring, using an independent laboratory, at the same position and maximum design elevation and in the same arrangement as shown on the drawings for installation so as to duplicate service conditions as much as possible.

### 2.7.1 Load Tests

Conduct floor panel, stringer, and pedestal testing in accordance with CISCA Access Floors to determine deformation and permanent set of panels and system due to concentrated, Uniform, rolling, impact and ultimate

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

loading when panels are supported by actual understructure.

#### 2.7.2 Bond Strength of Covering

Conduct test for bond strength of covering in accordance with **CISCA Access Floors** for rolling loads, except as specified. Panels must be tested with specified hard surface flooring and on the pedestals and stringers as specified for the installed floor. Brace the supports as necessary to prevent sideways movement during the test. Impose a test load of **1000 pounds** on the test assembly through a **3 inches** in diameter and **1 inch** wide hard plastic caster. Roll the caster completely across the center of the panel. The panel shall withstand 20 passes of the caster with no delamination or separation of the covering.

#### 2.8 REGISTERS AND GRILLES

Not Used.

#### 2.9 PERFORATED AIR SUPPLY PANELS

Provide air supply floor panels that meet the design criteria specified for standard panels, are fabricated of **14-gage** perforated steel sheet welded to minimum **16-gage** side channels, are covered with high pressure laminate to match standard panels, and have a uniform perforated pattern to allow even air distribution.

#### 2.10 PERFORATED DIRECTIONAL AIR SUPPLY PANELS

Provide directional air supply floor panels that meet or exceed the design criteria specified for standard panels, are fabricated of welded steel vanes with powder coat finish. Submit three color samples for **perforated directional air supply panels**.

#### 2.11 CUT OUTS

Provide cable cutouts finished with rigid polyvinylchloride or molded polypropylene edging to conform to the appearance level of the floor surface and to cover raw edges of the cutout panel. Extrusion must be of a configuration to permit its effective and convenient use when new cable openings are required. Provide at least **24 feet** of additional extrusion for future use. Submit three color samples for **cut outs**.

- a. Provide non-metallic adapter for openings less than **4 inches** wide. Secure adapter adhesively in cutout to preclude removal from panel. Provide at least two adapters per **1000 square feet** for future use.
- b. Openings larger than **4 inches** wide must use rigid polyvinylchloride or molded polypropylene edging. Perform cutting of panels, including cutouts, outside of the building.
- c. When size of cutout reduces the performance requirement of panel, provide intermediate stringers adjacent to cutouts.

#### 2.12 EDGE CLOSURE

Provide **1/16 inch** aluminum closure plate and extruded aluminum nosing at exposed edge of floor. Back up the closure plates with aluminum or steel framing braced diagonally, or anchor at bottom to continuous angle.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 2.13 COLOR

Color must be as indicated on drawings. Color listed is not intended to limit the selection of equal colors from other manufacturers.

## PART 3 EXECUTION

### 3.1 INSTALLATION

Install access flooring at the location and elevation and in the arrangement shown on the approved detailed installation drawings. The floor system must be of the rigid grid stringer type, complete with all supplemental items, and be the standard product of a manufacturer specializing in access flooring systems.

Install the floor system in accordance with the manufacturer's instructions. Open ends of the floor, where the floor system does not abut wall or other construction, must have positive anchorage and rigid support. Maintain areas to receive access flooring between 60 and 90 degrees F, and between 20 and 70 percent humidity for 24 hours prior to and during installation.

#### 3.1.1 Preparation for Installation

Clear out all debris in the area in which the floor system is to be installed. Thoroughly clean structural floor surfaces and remove all dust. Install floor coatings, required for dust or vapor control, prior to installation of pedestals, only if the pedestal adhesive will not damage the coating. If the coating and adhesive are not compatible, apply the coating after the pedestals have been installed and the adhesive has cured.

#### 3.1.2 Pedestals

Pedestals must be accurately spaced, and set plumb and in true alignment. Set base plates in full and firm contact with the structural floor, and secured to the structural floor with adhesive or steel expansion anchors in accordance with manufacturer's instructions.

#### 3.1.3 Stringers

Interlock stringers with the pedestal caps to preclude lateral movement, spaced uniformly in parallel lines at the indicated elevation.

#### 3.1.4 Auxiliary Framing

Provide auxiliary framing or pedestals around columns and other permanent construction, at sides of ramps, at open ends of the floor, and beneath panels that are substantially cut to accommodate utility systems. Use special framing for additional lateral support as shown on the approved detailed installation drawings. Provide additional pedestals and stringers designed to specific heights and lengths to meet structural irregularities and design loads. Connect auxiliary framing to main framing.

#### 3.1.5 Panels

Interlock panels with supports in a manner that will preclude lateral movement. Fasten perimeter panels, cutout panels, and panels adjoining

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

columns, stairs, and ramps to the supporting components to form a rigid boundary for the interior panels. Level floors within the specified tolerances. Exposed edges of composite panels must be coated with a silicone rubber sealant or with an adhesive recommended by the panel manufacturer. Secure extruded vinyl edging in place at all cut edges of all panel cut-outs to prevent abrasion of cables. Where the space below the floor is a plenum, close cutouts for conduit and similar penetrations using self-extinguishing sponge rubber or air sealing grommets.

#### 3.1.6 Resilient Base

Provide base at vertical wall intersections as indicated in the drawings. Apply the base after the floor system has been completely installed. Install wall base in accordance with manufacturer's printed installation instructions. Prepare and apply adhesives in accordance with manufacturer's printed directions. Tighten base joints and make even with adjacent flooring. Fill voids along the top edge of base at masonry walls with caulk. Roll entire vertical surface of base with hand roller, and press toe of base with a straight piece of wood to ensure proper alignment. Avoid excess adhesive in corners.

#### 3.1.7 Fascia Plates

Cover exposed floor ends and exposed openings of ramps and stairs with steel closures finish material as indicated on the drawings.

#### 3.1.8 Repair of Zinc Coating

Repair zinc coating that has been damaged, and cut edges of zinc-coated components and accessories, by the application of a galvanizing repair paint conforming to [ASTM A780/A780M](#). Areas to be repaired must be thoroughly cleaned prior to application of the paint.

### 3.2 FIELD TESTS

Submit certified copies of test reports from an approved testing laboratory, attesting that the proposed floor system components meet the performance requirements specified.

#### 3.2.1 Acceptance Tests

Conduct acceptance tests after installation of floor system. Make at least one test for each [1000 square feet](#) of floor area. Conduct tests in presence of Contracting Officer and representatives of manufacturer and installer. Submit certified copies of test reports from an approved testing laboratory, attesting that the proposed floor system components meet the performance requirements specified.

#### 3.2.2 Air Leakage

When the space below the finished floor is an air plenum, air leakage through the joints between panels and around the perimeter of the floor system must not exceed [0.1 cubic foot of air per minute per linear foot](#) of joint subjected to [.05 inches h2o \(Pa\)](#), water gauge, positive pressure in the plenum, when tested in accordance with [CISCA Access Floors](#), Section 10 Air Leakage Test. Measure the leakage rate on the finished raised floor system, which may include carpet.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.2.3 Grounding

Ground the access flooring system for safety hazard and static suppression. Provide positive contact between components for safe, continuous electrical grounding of entire floor system. Total system resistance from wearing surface of floor to building grounding electrode must be within range of 0.5 to 20,000 megohms.

#### 3.2.3.1 Metal Grilles

Exposed metal is not allowed at wearing surface of access floor system, except at metal grilles and registers. When grilles and metal registers are provided, insulate as required to provide same grounding resistance as wearing surface.

#### 3.2.3.2 Joint Resistance

Electrical joint resistance between individual stringer and pedestal junctions must be less than 0.1 milliohms. Electrical resistance between stringers and floor panels, as mounted in normal use, must be less than 3 ohms when tested in accordance with [ASTM F150](#).

#### 3.2.4 [Electrical Resistance](#)

Conduct testing of electrical resistance, in the completed installation, in the presence of the Contracting Officer in accordance with [NFPA 99](#), modified by placing one electrode on the center of the panel surface and connecting the other electrode to the metal flooring support. Take measurements at five or more locations. Each measurement must be the average of five readings of 15 seconds duration at each location. During the tests, relative humidity must be 45 to 55 percent and temperature set at [69 to 75 degrees F](#). Select panels used in the testing at random and include two panels most distant from the ground connection. Measure electrical resistance with instruments that are accurate within 2 percent and that have been calibrated within 60 days prior to the performance of the resistance tests. The metal-to-metal resistance from panel to supporting pedestal must not exceed 10 ohms. The resistance between the wearing surface of the floor covering and the ground connection, as measured on the completed installation, must be in accordance with paragraph FLOOR COVERING.

#### 3.2.5 SEISMIC SPECIAL INSPECTION AND TESTING

Perform special inspections and testing for seismic-resisting systems and components in accordance with [UFC 3-301-01](#) and Section [01 45 35 SPECIAL INSPECTIONS](#).

### 3.3 CLEANING AND PROTECTION

#### 3.3.1 Cleaning

Keep the space below the completed floor free of all debris. Before any traffic or other work on the completed raised floor is started, clean the completed floor in accordance with the floor covering manufacturer's instructions. Do not permit seepage of cleaner between individual panels. Cleaning of ferrous surfaces must conform to [FS TT-C-490](#).

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.3.2 Protection

Protect traffic areas of raised floor systems with a covering of building paper, fiberboard, or other suitable material to prevent damage to the surface. Cover cutouts with material of sufficient strength to support the loads to be encountered. Place plywood or similar material on the floor to serve as runways for installation of heavy equipment not in excess of design load capacity. Maintain protection until the raised floor system is accepted.

### 3.3.3 Surplus Material Removal

Clean surfaces of the work, and adjacent surfaces soiled as a result of the work. Remove all installation equipment, surplus materials, and rubbish from the work site.

### 3.4 FIRE SAFETY

Install an automatic detection system below the raised floor meeting the requirements of **NFPA 75** paragraph 5-2.1 to sound an audible and visual alarm. Air space below the raised floor must be subdivided into areas not exceeding **10,000 square feet** by tight, noncombustible bulkheads. Seal all penetrations for piping and cables to maintain bulkhead properties.

### 3.5 OPERATION AND MAINTENANCE MANUALS

Submit maintenance instructions for proper care of the floor panel surface. When conductive flooring is specified, also submit maintenance instructions to identify special cleaning and maintenance requirements to maintain "conductivity" properties of the panel finish.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 09 84 20

ACOUSTICAL WALL PANELS  
08/16, CHG 1: 08/18

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

AATCC 16 (2004; E 2008; E 2010) Colorfastness to Light

## ASTM INTERNATIONAL (ASTM)

ASTM C423 (2009a) Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

ASTM D5034 (2009; R 2017) Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)

ASTM E84 (2020) Standard Test Method for Surface Burning Characteristics of Building Materials

## CALIFORNIA AIR RESOURCES BOARD (CARB)

CARB 93120 (2007) Airborne Toxic Control Measure (ATCM) to Reduce Formaldehyde Emissions from Composite Wood Products

## CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350 (2010; Version 1.1) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers

## INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC (2018) International Building Code

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### SD-02 Shop Drawings

Approved Detail Drawings; G, AE

#### SD-03 Product Data

Installation

Acoustical Wall Panels; G, AE

Recycled Content for Fabric Panels; S

Indoor Air Quality for Composite Wood and Agrifiber Products; S

#### SD-04 Samples

Acoustical Wall Panels; G, AE

#### SD-07 Certificates

Acoustical Wall Panels

#### SD-11 Closeout Submittals

Warranty

### 1.3 CERTIFICATIONS

Not Used.

### 1.4 DELIVERY, STORAGE, AND HANDLING

Protect materials delivered and placed in storage from the weather, humidity and temperature variations, dirt, dust, or other contaminants.

### 1.5 WARRANTY

Provide manufacturer's standard performance guarantees or warranties that extend beyond a one year period.

## PART 2 PRODUCTS

### 2.1 SYSTEM DESCRIPTION

#### 2.1.1 Design

Provide fabric wrapped mineral / glass-fiber core acoustical wall panel materials in the manufacturer's standard sizes and finishes of the type, design and configuration indicated on drawings.

##### 2.1.1.1 Fabric Recycled Content

Fabric Panels must contain a minimum of 50 percent recycled content. Provide data identifying percentage of recycled content for fabric panels.

Composite wood and agrifiber products must contain no added urea-formaldehyde resins. Products containing composite wood and agrifiber components must meet emissions requirements of either CARB 93120

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

or **CDPH SECTION 01350** (limit requirements for either office or classroom spaces regardless of space type). Provide validation of **indoor air quality for composite wood and agrifiber products**.

## 2.2 FABRIC COVERED **ACOUSTICAL WALL PANELS**

Provide acoustical wall panels consisting of prefinished, factory assembled, seamless fabric covered, fiber glass or mineral fiber core system as described below manufactured to the dimensions and configurations shown on the **approved detail drawings**; submit drawings showing plan locations, elevations and details of method of anchorage, location of doors and other openings, base detail and shape and thickness of materials. Perimeter edges must be reinforced by either an aluminum frame or a formulated resin edge hardener. Acoustical wall panels installed in non-sprinklered areas must comply with the requirements of **ICC IBC**, Standard 42-2. Submit manufacturer's descriptive data and catalog cuts; fabric and vinyl swatches, minimum **18 inches** wide by **24 inches** long 3 samples of each color range specified; and certificates of compliance from an independent laboratory accredited by the National Laboratory Accreditation Program of the National Institute of Standards. A label or listing from the testing laboratory will be acceptable evidence of compliance. Wall panels must conform to the following:

### 2.2.1 Panel Width

Panel width must be as **shown on drawings**.

### 2.2.2 Panel Height

Panel height **as shown on drawings**.

### 2.2.3 Thickness

Panel thickness as required to meet the indicated NRC range.

### 2.2.4 Fabric Covering

Seamless non-woven, embossed texture, needle punched 100 percent polyester, minimum **11 ounces/linear yard**. Tear strength a minimum **25 pounds** machine direction and minimum **40 pounds** cross-machine direction. Tensile strength a minimum **50 pounds** machine direction and minimum **75 pounds** cross-machine direction in accordance with **ASTM D5034**. Stretch fabric covering free of wrinkles and then bond to the edges and back or bond directly to the panel face, edges, and back of panel a minimum distance standard with the manufacturer. Light fastness (fadeometer) approximately 40 hours in accordance with **AATCC 16**.

### 2.2.5 Fire Rating for the Complete Composite System

Class A, 200 or less smoke density and flame spread less than 25, when tested in accordance with **ASTM E84**.

### 2.2.6 Substrate

Fiber glass or mineral fiber

### 2.2.7 Noise Reduction Coefficient (NRC) Range

0.50-0.60 **ASTM C423**

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.2.8 Edge Detail

Square edge with fabric wrapped on all four sides.

#### 2.2.9 Core Type

Standard acoustical core

#### 2.2.10 Mounting Acoustical Panels

Mount acoustical panels by manufacturer's standard mechanical fasteners.

#### 2.3 COLOR

Color as indicated on drawings. Color listed is not intended to limit the selection of equal colors from other manufacturers.

### PART 3 EXECUTION

#### 3.1 SURFACE CONDITIONS

Must be clean, smooth, oil free and prepared in accordance with panel manufacturer's instructions. Do not begin installation until all wet work, such as, plastering, painting, and concrete are completely dry.

#### 3.2 INSTALLATION

Panel installation must be by personnel familiar with and normally engaged in installation of acoustical wall panels. Apply panels in accordance with the manufacturer's installation instructions. Submit manufacturer's installation instructions and recommended cleaning instructions.

#### 3.3 CLEANING

Following installation, clean dirty or stained panel surfaces in accordance with manufacturer's instructions and leave free from defects. Remove and replace panels that are damaged, discolored, or improperly installed.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 09 90 00

## PAINTS AND COATINGS

05/11

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH 0100 (2017; Suppl 2020) Documentation of the  
Threshold Limit Values and Biological  
Exposure Indices

## AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME A13.1 (2020) Scheme for the Identification of  
Piping Systems

## ASTM INTERNATIONAL (ASTM)

ASTM D235 (2002; R 2012) Mineral Spirits (Petroleum  
Spirits) (Hydrocarbon Dry Cleaning Solvent)

ASTM D523 (2014; R 2018) Standard Test Method for  
Specular Gloss

ASTM D4214 (2007; R 2015) Standard Test Method for  
Evaluating the Degree of Chalking of  
Exterior Paint Films

ASTM D4263 (1983; R 2018) Standard Test Method for  
Indicating Moisture in Concrete by the  
Plastic Sheet Method

ASTM D4444 (2013; R 2018) Standard Test Method for  
Laboratory Standardization and Calibration  
of Hand-Held Moisture Meters

ASTM D6386 (2016a) Standard Practice for Preparation  
of Zinc (Hot-Dip Galvanized) Coated Iron  
and Steel Product and Hardware Surfaces  
for Painting

ASTM F1869 (2016a) Standard Test Method for Measuring  
Moisture Vapor Emission Rate of Concrete  
Subfloor Using Anhydrous Calcium Chloride

## MASTER PAINTERS INSTITUTE (MPI)

MPI 1 (2012) Aluminum Paint

MPI 2 (2012) Aluminum Heat Resistant Enamel (up

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

	to 427 C and 800 F
MPI 4	(2016) Interior/Exterior Latex Block Filler
MPI 19	(2012) Primer, Zinc Rich, Inorganic
MPI 21	(2012) Heat Resistant Coating, (Up to 205°C/402°F), MPI Gloss Level 6
MPI 22	(2012) Aluminum Paint, High Heat (up to 590° C/1100° F)
MPI 23	(2015) Primer, Metal, Surface Tolerant
MPI 31	(2012) Varnish, Polyurethane, Moisture Cured, Gloss (MPI Gloss Level 6)
MPI 39	(2018) Primer, Latex, for Interior Wood
MPI 44	(2016) Latex, Interior, (MPI Gloss Level 2)
MPI 45	(2016) Primer Sealer, Interior Alkyd
MPI 47	(2016) Alkyd, Interior, Semi-Gloss (MPI Gloss Level 5)
MPI 48	(2016) Alkyd, Interior, Gloss (MPI Gloss Level 6-7)
MPI 49	(2015) Alkyd, Interior, Flat (MPI Gloss Level 1)
MPI 50	(2015) Primer Sealer, Latex, Interior
MPI 51	(2016) Alkyd, Interior, (MPI Gloss Level 3)2
MPI 52	(2016) Latex, Interior, (MPI Gloss Level 3)
MPI 54	(2016) Latex, Interior, Semi-Gloss (MPI Gloss Level 5)
MPI 56	(2012) Varnish, Interior, Polyurethane, Oil Modified, Gloss
MPI 57	(2012) Varnish, Interior, Polyurethane, Oil Modified, Satin
MPI 59	(2016) Floor Paint, Alkyd, Low Gloss
MPI 60	(2016) Floor Paint, Latex, Low Gloss
MPI 71	(2012) Varnish, Polyurethane, Moisture Cured, Flat (MPI Gloss Level 1)
MPI 77	(2015) Epoxy, Gloss
MPI 79	(2016) Primer, Alkyd, Anti-Corrosive for Metal



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

MPI 90	(2012) Stain, Semi-Transparent, for Interior Wood
MPI 94	(2016) Alkyd, Exterior, Semi-Gloss (MPI Gloss Level 5)
MPI 95	(2015) Primer, Quick Dry, for Aluminum
MPI 107	(2016) Primer, Rust-Inhibitive, Water Based
MPI 116	(2012) Block Filler, Epoxy
MPI 138	(2016) Latex, Interior, High Performance Architectural, (MPI Gloss Level 2)
MPI 139	(2016) Latex, Interior, High Performance Architectural, (MPI Gloss Level 3)
MPI 140	(2016) Latex, Interior, High Performance Architectural, (MPI Gloss Level 4)
MPI 141	(2016) Latex, Interior, High Performance Architectural, Semi-Gloss (MPI Gloss Level 5)
MPI 144	(2016) Latex, Interior, Institutional Low Odor/VOC, (MPI Gloss Level 2)
MPI 145	(2016) Latex, Interior, Institutional Low Odor/VOC, ( MPI Gloss Level 3)
MPI 146	(2016) Latex, Interior, Institutional Low Odor/VOC, (MPI Gloss Level 4)
MPI 147	(May 2016) Latex, Interior, Institutional Low Odor/VOC, Semi-Gloss (MPI Gloss Level 5)
MPI 151	(2016) Light Industrial Coating, Interior, Water Based (MPI Gloss Level 3)
MPI 153	(2016) Light Industrial Coating, Interior, Water Based, Semi-Gloss (MPI Gloss Level 5)
MPI 154	(2016) Light Industrial Coating, Interior, Water Based, Gloss (MPI Gloss Level 6)
MPI 161	(2016) Light Industrial Coating, Exterior, Water Based ( MPI Gloss Level 3)
MPI 163	(2016) Light Industrial Coating, Exterior, Water Based, Semi-Gloss (MPI Gloss Level 5)

#### SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS	SCS Global Services (SCS) Indoor Advantage
-----	--

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC 7/NACE No.4	(2007) Brush-Off Blast Cleaning
SSPC PA 1	(2016) Shop, Field, and Maintenance Coating of Metals
SSPC PA Guide 3	(1982; E 1995) A Guide to Safety in Paint Application
SSPC QP 1	(2019) Standard Procedure for Evaluating the Qualifications of Industrial/Marine Painting Contractors (Field Application to Complex Industrial Steel Structures and Other Metal Components)
SSPC SP 1	(2015) Solvent Cleaning
SSPC SP 2	(2018) Hand Tool Cleaning
SSPC SP 3	(2018) Power Tool Cleaning
SSPC SP 6/NACE No.3	(2007) Commercial Blast Cleaning
SSPC SP 10/NACE No. 2	(2007) Near-White Blast Cleaning
SSPC SP 12/NACE No.5	(2002) Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating
SSPC VIS 1	(2002; E 2004) Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning
SSPC VIS 3	(2004) Guide and Reference Photographs for Steel Surfaces Prepared by Hand and Power Tool Cleaning
SSPC VIS 4/NACE VIS 7	(1998; E 2000; E 2004) Guide and Reference Photographs for Steel Surfaces Prepared by Waterjetting

#### U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety -- Safety and Health Requirements Manual
------------	--

#### U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA Method 24	(2000) Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings
---------------	---

#### U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-313	(2018) Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities
-------------	---

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.1000

Air Contaminants

UNDERWRITERS LABORATORIES (UL)

UL 2818

(2013) GREENGUARD Certification Program  
For Chemical Emissions For Building  
Materials, Finishes And Furnishings

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

The current MPI, "Approved Product List" which lists paint by brand, label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use a subsequent MPI "Approved Product List", however, only one list may be used for the entire contract and each coating system is to be from a single manufacturer. Provide all coats on a particular substrate from a single manufacturer. No variation from the MPI Approved Products List is acceptable.

Samples of specified materials may be taken and tested for compliance with specification requirements.

### SD-02 Shop Drawings

Piping Identification

### SD-03 Product Data

Coating; G

### SD-04 Samples

Color; G

Textured Wall Coating System; G

Sample Textured Wall Coating System Mock-Up; G

### SD-07 Certificates

Applicator's Qualifications

Qualification Testing laboratory for coatings; G

Indoor Air Quality for Paints and Primers

Indoor Air Quality for Consolidated Latex Paints

### SD-08 Manufacturer's Instructions

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## Application Instructions

### Mixing

### Manufacturer's Safety Data Sheets

### SD-10 Operation and Maintenance Data

### Coatings; G

## 1.3 CERTIFICATES

### 1.3.1 Indoor Air Quality

Submit required indoor air quality certifications in one submittal package.

#### 1.3.1.1 Paints and Coatings

Provide paint and coating products certified to meet indoor air quality requirements by **UL 2818** (Greenguard) Gold, **SCS** Global Services Indoor Advantage Gold or provide certification by other third-party programs. Provide current product certification documentation from certification body.

## 1.4 APPLICATOR'S QUALIFICATIONS

### 1.4.1 SSPC QP 1 Certification

All contractors and subcontractors that perform **field** surface preparation or coating application must be certified by the Society for Protective Coatings (formerly Steel Structures Painting Council) (SSPC) to the requirements of **SSPC QP 1** prior to contract award and must remain certified while accomplishing any surface preparation or coating application. If a contractor's or subcontractor's certification expires, the firm will not be allowed to perform any work until the certification is reissued. Requests for extension of time for any delay to the completion of the project due to an inactive certification will not be considered and liquidated damages will apply. Notify the Contracting Officer of any change in contractor certification status.

## 1.5 QUALITY ASSURANCE

### 1.5.1 Field Samples and Tests

The Contracting Officer may choose up to two coatings that have been delivered to the site to be tested at no cost to the Government. Take samples of each chosen product as specified in the paragraph SAMPLING PROCEDURES. Test each chosen product as specified in the paragraph TESTING PROCEDURE. Remove products from the job site which do not conform and replace with new products that conform to the referenced specification. Test replacement products that failed initial testing at no cost to the Government.

Another required testing is Batch Quality Conformance Testing to prove conformance of the manufacturer's paint to the specified MPI standard. This testing is accomplished before the materials are delivered to the job site. Provide testing for all paint products. Test paint products as specified in the paragraph "Testing Procedure".

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.5.1.1 Sampling Procedure

The Contracting Officer will select paint at random from the products that have been delivered to the job site for sample testing. The Contractor will provide [one quart](#) samples of the selected paint materials. Take samples in the presence of the Contracting Officer, and label, and identify each sample. Provide labels in accordance with the paragraph PACKAGING, LABELING, AND STORAGE of this specification.

#### 1.5.1.2 Testing Procedure

Provide Batch Quality Conformance Testing for specified products, as defined by and performed by MPI. As an alternative to Batch Quality Conformance Testing, the Contractor may provide [Qualification Testing](#) for specified products above to the appropriate MPI product specification, using the third-party laboratory approved under the paragraph "Qualification Testing" laboratory for coatings. Include the backup data and summary of the test results within the qualification testing lab report. Provide a summary listing of all the reference specification requirements and the result of each test. Clearly indicate in the summary whether the tested paint meets each test requirement. Note that Qualification Testing may take 4 to 6 weeks to perform, due to the extent of testing required.

Submit name, address, telephone number, FAX number, and e-mail address of the independent third-party laboratory selected to perform testing of coating samples for compliance with specification requirements. Submit documentation that laboratory is regularly engaged in testing of paint samples for conformance with specifications, and that employees performing testing are qualified. If MPI is chosen to perform the Batch Quality Conformance testing, the above submittal information is not required, only a letter is required from the Contractor stating that MPI will perform the testing.

#### 1.5.2 Textured Wall Coating System

Three complete samples of each indicated type, pattern, and color of textured wall coating system applied to a panel of the same material as that on which the coating system will be applied in the work. Provide samples of wall coating systems minimum [5 by 7 inches](#) and of sufficient size to show pattern repeat and texture.

#### 1.5.3 Sample Textured Wall Coating System Mock-Up

After coating samples are approved, and prior to starting installation, provide a minimum [8-foot by 8-foot](#) mock-up for each substrate and for each color and type of textured wall coating, using the actual substrate materials. Use the approved mock-up samples as a standard of workmanship for installation within the facility. Submit at least 48 hour advance written notice to the Contracting Officer's Representative prior to mock-up installation.

### 1.6 REGULATORY REQUIREMENTS

#### 1.6.1 Environmental Protection

In addition to requirements specified elsewhere for environmental protection, provide coating materials that conform to the restrictions of the local Air Pollution Control District and regional jurisdiction.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Notify Contracting Officer of any paint specified herein which fails to conform.

#### 1.6.2 Lead Content

Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.

#### 1.6.3 Chromate Content

Do not use coatings containing zinc-chromate or strontium-chromate.

#### 1.6.4 Asbestos Content

Provide asbestos-free materials.

#### 1.6.5 Mercury Content

Provide materials free of mercury or mercury compounds.

#### 1.6.6 Silica

Provide abrasive blast media containing no free crystalline silica.

#### 1.6.7 Human Carcinogens

Provide materials that do not contain **ACGIH 0100** confirmed human carcinogens (A1) or suspected human carcinogens (A2).

### 1.7 PACKAGING, LABELING, AND STORAGE

Provide paints in sealed containers that legibly show the contract specification number, designation name, formula or specification number, batch number, color, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warnings and special precautions, and name and address of manufacturer. Furnish pigmented paints in containers not larger than 5 gallons. Store paints and thinners in accordance with the manufacturer's written directions, and as a minimum, stored off the ground, under cover, with sufficient ventilation to prevent the buildup of flammable vapors, and at temperatures between 40 to 95 degrees F. Do not store paint, polyurethane, varnish, or wood stain products with materials that have a high capacity to adsorb VOC emissions. Do not store paint, polyurethane, varnish, or wood stain products in occupied spaces.

### 1.8 SAFETY AND HEALTH

Apply coating materials using safety methods and equipment in accordance with the following:

Comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in Section 01 35 26 GOVERNMENT SAFETY REQUIREMENTS and in Appendix A of **EM 385-1-1**. Include in the Activity Hazard Analysis the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.8.1 Safety Methods Used During Coating Application

Comply with the requirements of [SSPC PA Guide 3](#).

#### 1.8.2 Toxic Materials

To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

- a. The applicable [manufacturer's Safety Data Sheets](#) (SDS) or local regulation.
- b. [29 CFR 1910.1000](#).
- c. [ACGIH 0100](#), threshold limit values.

Submit manufacturer's Safety Data Sheets for coatings, solvents, and other potentially hazardous materials, as defined in [FED-STD-313](#).

### 1.9 ENVIRONMENTAL CONDITIONS

Comply, at minimum, with manufacturer recommendations for space ventilation during and after installation.

#### 1.9.1 Coatings

Do not apply coating when air or substrate conditions are:

- a. Less than [5 degrees F](#) above dew point;
- b. Below [50 degrees F](#) or over [95 degrees F](#), unless specifically pre-approved by the Contracting Officer and the product manufacturer. Do not, under any circumstances, violate the manufacturer's application recommendations.

#### 1.9.2 Post-Application

Vacate space for as long as possible after application. Wait a minimum of 48 hours before occupying freshly painted rooms. Maintain one of the following ventilation conditions during the curing period, or for 72 hours after application:

- a. Supply 100 percent outside air 24 hours a day.
- b. Supply airflow at a rate of 6 air changes per hour, when outside temperatures are between [55 degrees F](#) and [85 degrees F](#) and humidity is between 30 percent and 60 percent.
- c. Supply airflow at a rate of 1.5 air changes per hour, when outside air conditions are not within the range stipulated above.

### 1.10 SCHEDULING

Allow paint, polyurethane, varnish, and wood stain installations to cure prior to the installation of materials that adsorb VOCs, including \_\_\_\_\_.

### 1.11 COLOR SELECTION

Provide colors of finish coats as indicated or specified. Allow

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Contracting Officer to select colors not indicated or specified. Manufacturers' names and color identification are used for the purpose of color identification only. Named products are acceptable for use only if they conform to specified requirements. Products of other manufacturers are acceptable if the colors approximate colors indicated and the product conforms to specified requirements.

Tint each coat progressively darker to enable confirmation of the number of coats.

Provide color, texture, and pattern of wall coating systems as indicated.

Submit manufacturer's samples of paint colors. Cross reference color samples to color scheme as indicated. Submit color stencil codes.

## 1.12 LOCATION AND SURFACE TYPE TO BE PAINTED

### 1.12.1 Painting Included

Where a space or surface is indicated to be painted, include the following unless indicated otherwise.

- a. Surfaces behind portable objects and surface mounted articles readily detachable by removal of fasteners, such as screws and bolts.
- b. New factory finished surfaces that require identification or color coding and factory finished surfaces that are damaged during performance of the work.
- c. Existing coated surfaces that are damaged during performance of the work.

#### 1.12.1.1 Exterior Painting

Includes new surfaces of the building and appurtenances. Also included are existing coated surfaces made bare by cleaning operations.

#### 1.12.1.2 Interior Painting

Includes new surfaces of the building and appurtenances as indicated and existing coated surfaces made bare by cleaning operations. Where a space or surface is indicated to be painted, include the following items, unless indicated otherwise.

- a. Exposed columns, girders, beams, joists, and metal deck; and
- b. Other contiguous surfaces.

### 1.12.2 Painting Excluded

Do not paint the following unless indicated otherwise.

- a. Surfaces concealed and made inaccessible by panelboards, fixed ductwork, machinery, and equipment fixed in place.
- b. Surfaces in concealed spaces. Concealed spaces are defined as enclosed spaces above suspended ceilings, furred spaces, attic spaces, crawl spaces, elevator shafts and chases.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- c. Steel to be embedded in concrete.
- d. Copper, stainless steel, aluminum, brass, and lead except existing coated surfaces.
- e. Hardware, fittings, and other factory finished items.
- f. Do not paint surfaces in the following areas: with identification information, labeling, or manufacturer nameplate.

#### 1.12.3 Mechanical and Electrical Painting

Includes field coating of interior and exterior new surfaces damaged during shipment or installation.

- a. Where a space or surface is indicated to be painted, include the following items unless indicated otherwise.
  - (1) Exposed piping, conduit, and ductwork;
  - (2) Supports, hangers, air grilles, and registers;
  - (3) Miscellaneous metalwork and insulation coverings.
- b. Do not paint the following, unless indicated otherwise:
  - (1) New zinc-coated, aluminum, and copper surfaces under insulation
  - (2) New aluminum jacket on piping
  - (3) New interior ferrous piping under insulation.

##### 1.12.3.1 Fire Extinguishing Sprinkler Systems

Clean, pretreat, prime, and paint new fire extinguishing sprinkler systems including valves, piping, conduit, hangers, supports, miscellaneous metalwork, and accessories. Apply coatings to clean, dry surfaces, using clean brushes. Clean the surfaces to remove dust, dirt, rust, and loose mill scale. Immediately after cleaning, provide the metal surfaces with one coat primer per schedules. Shield sprinkler heads with protective covering while painting is in progress. Upon completion of painting, remove protective covering from sprinkler heads. Remove sprinkler heads which have been painted and replace with new sprinkler heads. Provide primed surfaces with the following:

- a. Piping in Unfinished Areas: Provide primed surfaces with one coat of red alkyd gloss enamel applied to a minimum dry film thickness of 1.0 mil in attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and spaces where walls or ceiling are not painted or not constructed of a prefinished material. In lieu of red enamel finish coat, provide piping with 2 inch wide red enamel bands or self-adhering red plastic bands spaced at maximum of 20 foot intervals.
- b. Piping in Finished Areas: Provide primed surfaces with two coats of paint to match adjacent surfaces, except provide valves and operating accessories with one coat of red alkyd gloss enamel applied to a minimum dry film thickness of 1.0 mil. Provide piping with 2 inch wide red enamel bands or self-adhering red plastic bands spaced at

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

maximum of 20 foot intervals throughout the piping systems.

#### 1.12.4 Exterior Painting of Site Work Items

Field coat the following items:

##### New Surfaces

##### Existing Surfaces

##### a. Protective bollards

##### Salvaged bike rack

#### 1.12.5 Definitions and Abbreviations

##### 1.12.5.1 Qualification Testing

Qualification testing is the performance of all test requirements listed in the product specification. This testing is accomplished by MPI to qualify each product for the MPI Approved Product List, and may also be accomplished by Contractor's third party testing lab if an alternative to Batch Quality Conformance Testing by MPI is desired.

##### 1.12.5.2 Batch Quality Conformance Testing

Batch quality conformance testing determines that the product provided is the same as the product qualified to the appropriate product specification. This testing must be accomplished by an MPI testing lab.

##### 1.12.5.3 Coating

A film or thin layer applied to a base material called a substrate. A coating may be a metal, alloy, paint, or solid/liquid suspensions on various substrates (such as metals, plastics, wood, paper, leather, cloth). They may be applied by electrolysis, vapor deposition, vacuum, or mechanical means such as brushing, spraying, calendaring, and roller coating. A coating may be applied for aesthetic or protective purposes or both. The term "coating" as used herein includes emulsions, enamels, stains, varnishes, sealers, epoxies, and other coatings, whether used as primer, intermediate, or finish coat. The terms paint and coating are used interchangeably.

##### 1.12.5.4 DFT or dft

Dry film thickness, the film thickness of the fully cured, dry paint or coating.

##### 1.12.5.5 DSD

Degree of Surface Degradation, the MPI system of defining degree of surface degradation. Five (5) levels are generically defined under the Assessment sections in the MPI Maintenance Repainting Manual.

##### 1.12.5.6 EPP

Environmentally Preferred Products, a standard for determining environmental preferability in support of Executive Order 13101.

##### 1.12.5.7 EXT

MPI short term designation for an exterior coating system.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.12.5.8 INT

MPI short term designation for an interior coating system.

#### 1.12.5.9 micron / microns

The metric measurement for 0.001 mm or one/one-thousandth of a millimeter.

#### 1.12.5.10 mil / mils

The English measurement for 0.001 in or one/one-thousandth of an inch, equal to 25.4 microns or 0.0254 mm.

#### 1.12.5.11 mm

The metric measurement for millimeter, 0.001 meter or one/one-thousandth of a meter.

#### 1.12.5.12 MPI Gloss Levels

MPI system of defining gloss. Seven (7) gloss levels (G1 to G7) are generically defined under the Evaluation sections of the MPI Manuals. Traditionally, Flat refers to G1/G2, Eggshell refers to G3, Semigloss refers to G5, and Gloss refers to G6.

Gloss levels are defined by MPI as follows:

Gloss Level	Description	Units at 60 degrees	Units at 85 degrees
G1	Matte or Flat	0 to 5	10 max
G2	Velvet	0 to 10	10 to 35
G3	Eggshell	10 to 25	10 to 35
G4	Satin	20 to 35	35 min
G5	Semi-Gloss	35 to 70	
G6	Gloss	70 to 85	
G7	High Gloss		

Gloss is tested in accordance with [ASTM D523](#). Historically, the Government has used Flat (G1 / G2), Eggshell (G3), Semi-Gloss (G5), and Gloss (G6).

#### 1.12.5.13 MPI System Number

The MPI coating system number in each Division found in either the MPI Architectural Painting Specification Manual or the Maintenance Repainting Manual and defined as an exterior (EXT/REX) or interior system (INT/RIN). The Division number follows the CSI Master Format.

#### 1.12.5.14 Paint

See Coating definition.

#### 1.12.5.15 REX

MPI short term designation for an exterior coating system used in repainting projects or over existing coating systems.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.12.5.16 RIN

MPI short term designation for an interior coating system used in repainting projects or over existing coating systems.

### PART 2 PRODUCTS

#### 2.1 MATERIALS

Conform to the [coating](#) specifications and standards referenced in PART 3. Submit product data sheets for specified [coatings](#) and solvents. Provide preprinted cleaning and maintenance instructions for all coating systems.

Submit Manufacturer's Instructions on Mixing: Detailed mixing instructions, minimum and maximum application temperature and humidity, potlife, and curing and drying times between coats.

Provide certification of [Indoor Air Quality for paints and primers](#).

Provide certification of [Indoor Air Quality for consolidated latex paints](#).

### PART 3 EXECUTION

#### 3.1 PROTECTION OF AREAS AND SPACES NOT TO BE PAINTED

Prior to surface preparation and coating applications, remove, mask, or otherwise protect hardware, hardware accessories, machined surfaces, radiator covers, plates, lighting fixtures, public and private property, and other such items not to be coated that are in contact with surfaces to be coated. Following completion of painting, reinstall removed items by workmen skilled in the trades. Restore surfaces contaminated by coating materials, to original condition and repair damaged items.

#### 3.2 REPUTTYING AND REGLAZING

Remove cracked, loose, and defective putty or glazing compound on glazed sash and provide new putty or glazing compound. Where defective putty or glazing compound constitutes 30 percent or more of the putty at any one light, remove the glass and putty or glazing compound and reset the glass. Remove putty or glazing compound without damaging sash or glass. Clean rabbets to bare wood or metal and prime prior to reglazing. Provide linseed oil putty for wood sash. Patch surfaces to provide smooth transition between existing and new surfaces. Finish putty or glazing compound to a neat and true bead. Allow glazing compound time to cure, in accordance with manufacturer's recommendation, prior to coating application. Allow putty to set one week prior to coating application.

#### 3.3 SURFACE PREPARATION

Remove dirt, splinters, loose particles, grease, oil, disintegrated coatings, and other foreign matter and substances deleterious to coating performance as specified for each substrate before application of paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Schedule cleaning so that dust and other contaminants will not fall on wet, newly painted surfaces. Spot-prime exposed ferrous metals such as nail heads on or in contact with surfaces to be painted with water-thinned paints, with a suitable corrosion-inhibitive primer capable of preventing flash rusting and compatible with the coating specified for the adjacent areas.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.3.1 Additional Requirements for Preparation of Surfaces With Existing Coatings

Before application of coatings, perform the following on surfaces covered by soundly-adhered coatings, defined as those which cannot be removed with a putty knife:

- a. Test existing finishes for lead before sanding, scraping, or removing. If lead is present, refer to paragraph Toxic Materials.
- b. Wipe previously painted surfaces to receive solvent-based coatings, except stucco and similarly rough surfaces clean with a clean, dry cloth saturated with mineral spirits, [ASTM D235](#). Allow surface to dry. Wipe immediately preceding the application of the first coat of any coating, unless specified otherwise.
- c. Sand existing glossy surfaces to be painted to reduce gloss. Brush, and wipe clean with a damp cloth to remove dust.
- d. The requirements specified are minimum. Comply also with the [application instructions](#) of the paint manufacturer.
- e. Thoroughly clean previously painted surfaces that are specified to be repainted or have been damaged during construction from all grease, dirt, dust or other foreign matter.
- f. Remove blistering, cracking, flaking and peeling or otherwise deteriorated coatings.
- g. Remove chalk so that when tested in accordance with [ASTM D4214](#), the chalk resistance rating is no less than 8.
- h. Roughen slick surfaces. Repair damaged areas such as, but not limited to, nail holes, cracks, chips, and spalls with suitable material to match adjacent undamaged areas.
- i. Feather and sand smooth edges of chipped paint.
- j. Clean rusty metal surfaces as per SSPC requirements. Use solvent, mechanical, or chemical cleaning methods to provide surfaces suitable for painting.
- k. Provide new, proposed coatings that are compatible with existing coatings.

### 3.3.2 Substrate Repair

- a. Repair substrate surface damaged during coating removal;
- b. Sand edges of adjacent soundly-adhered existing coatings so they are tapered as smooth as practical to areas involved with coating removal; and
- c. Clean and prime the substrate as specified.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.4 PREPARATION OF METAL SURFACES

#### 3.4.1 Ferrous Surfaces

- a. Ferrous Surfaces including Shop-coated Surfaces and Small Areas That Contain Rust, Mill Scale and Other Foreign Substances: Solvent clean or detergent wash in accordance with SSPC SP 1 to remove oil and grease. Where shop coat is missing or damaged, clean according to SSPC SP 2, SSPC SP 3, SSPC SP 6/NACE No.3, or SSPC SP 10/NACE No. 2. Brush-off blast remaining surface in accordance with SSPC 7/NACE No.4; Water jetting to SSPC SP 12/NACE No.5 WJ-4 may be used to remove loose coating and other loose materials. Use inhibitor as recommended by coating manufacturer to prevent premature rusting. Protect shop-coated ferrous surfaces from corrosion by treating and touching up corroded areas immediately upon detection.
- b. Surfaces With More Than 20 Percent Rust, Mill Scale, and Other Foreign Substances: Clean entire surface in accordance with SSPC SP 6/NACE No.3/SSPC SP 12/NACE No.5 WJ-3, SSPC SP 10/NACE No. 2/SSPC SP 12/NACE No.5 WJ-2.

#### 3.4.2 Final Ferrous Surface Condition:

For tool cleaned surfaces, the requirements are stated in SSPC SP 2 and SSPC SP 3. Use as a visual reference, photographs in SSPC VIS 3 for the appearance of cleaned surfaces.

For abrasive blast cleaned surfaces, the requirements are stated in SSPC 7/NACE No.4, SSPC SP 6/NACE No.3, and SSPC SP 10/NACE No. 2. Use as a visual reference, photographs in SSPC VIS 1 for the appearance of cleaned surfaces.

For waterjet cleaned surfaces, the requirements are stated in SSPC SP 12/NACE No.5. Use as a visual reference, photographs in SSPC VIS 4/NACE VIS 7 for the appearance of cleaned surfaces.

#### 3.4.3 Galvanized Surfaces

- a. Galvanized Surfaces With Only Dirt and Zinc Oxidation Products: Clean with solvent, steam, or non-alkaline detergent solution in accordance with SSPC SP 1. Completely remove coating by brush-off abrasive blast if the galvanized metal has been passivated or stabilized. Do not "passivate" or "stabilize" new galvanized steel to be coated. If the absence of hexavalent stain inhibitors is not documented, test as described in ASTM D6386, Appendix X2, and remove by one of the methods described therein.
- b. Galvanized with Slight Coating Deterioration or with Little or No Rusting: Water jetting to SSPC SP 12/NACE No.5 WJ3 to remove loose coating from surfaces with less than 20 percent coating deterioration and no blistering, peeling, or cracking. Use inhibitor as recommended by the coating manufacturer to prevent rusting.
- c. Galvanized With Severe Deteriorated Coating or Severe Rusting: Water jet to SSPC SP 12/NACE No.5 WJ3 degree of cleanliness. Spot abrasive blast rusted areas as described for steel in SSPC SP 6/NACE No.3, and waterjet to SSPC SP 12/NACE No.5, WJ3 to remove existing coating.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 3.4.4 Non-Ferrous Metallic Surfaces

Aluminum and aluminum-alloy, lead, copper, and other nonferrous metal surfaces.

Surface Cleaning: Solvent clean in accordance with [SSPC SP 1](#) and wash with mild non-alkaline detergent to remove dirt and water soluble contaminants.

#### 3.4.5 Terne-Coated Metal Surfaces

Solvent clean surfaces with mineral spirits, [ASTM D235](#). Wipe dry with clean, dry cloths.

#### 3.4.6 Existing Surfaces with a Bituminous or Mastic-Type Coating

Remove chalk, mildew, and other loose material by washing with a solution of [1/2 cup](#) trisodium phosphate, [1/4 cup](#) household detergent, [one quart](#) 5 percent sodium hypochlorite solution and [3 quarts](#) of warm water.

### 3.5 PREPARATION OF CONCRETE AND CEMENTITIOUS SURFACE

#### 3.5.1 Concrete and Masonry

- a. Curing: Allow concrete, stucco and masonry surfaces to cure at least 30 days before painting, and concrete slab on grade to cure at least 90 days before painting.
- b. Surface Cleaning: Remove the following deleterious substances.
  - (1) Dirt, Chalking, Grease, and Oil: Wash uncoated surfaces with a solution composed of [1/2 cup](#) trisodium phosphate, [1/4 cup](#) household detergent, and [4 quarts](#) of warm water. Then rinse thoroughly with fresh water. For large areas, water blasting may be used.
  - (2) Fungus and Mold: Wash surfaces with a solution composed of [1/2 cup](#) trisodium phosphate, [1/4 cup](#) household detergent, [1 quart](#) 5 percent sodium hypochlorite solution and [3 quarts](#) of warm water. Rinse thoroughly with fresh water.
  - (3) Paint and Loose Particles: Remove by wire brushing.
  - (4) Efflorescence: Remove by scraping or wire brushing followed by washing with a 5 to 10 percent by weight aqueous solution of hydrochloric (muriatic) acid. Do not allow acid to remain on the surface for more than five minutes before rinsing with fresh water. Do not acid clean more than [4 square feet](#) of surface, per workman, at one time.
- c. Cosmetic Repair of Minor Defects: Repair or fill mortar joints and minor defects, including but not limited to spalls, in accordance with manufacturer's recommendations and prior to coating application.
- d. Allowable Moisture Content: Latex coatings may be applied to damp surfaces, but not to surfaces with droplets of water. Do not apply epoxies to damp vertical surfaces as determined by [ASTM D4263](#) or horizontal surfaces that exceed 3 lbs of moisture per 1000 square feet in 24 hours as determined by [ASTM F1869](#). In all cases follow

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

manufacturers recommendations. Allow surfaces to cure a minimum of 30 days before painting.

### 3.5.2 Gypsum Board, Plaster, and Stucco

- a. Surface Cleaning: Verify that plaster and stucco surfaces are free from loose matter and that gypsum board is dry. Remove loose dirt and dust by brushing with a soft brush, rubbing with a dry cloth, or vacuum-cleaning prior to application of the first coat material. A damp cloth or sponge may be used if paint will be water-based.
- b. Repair of Minor Defects: Prior to painting, repair joints, cracks, holes, surface irregularities, and other minor defects with patching plaster or spackling compound and sand smooth.
- c. Allowable Moisture Content: Latex coatings may be applied to damp surfaces, but not surfaces with droplets of water. Do not apply epoxies to damp surfaces as determined by [ASTM D4263](#). Verify that new plaster to be coated has a maximum moisture content of 8 percent, when measured in accordance with [ASTM D4444](#), Method A, unless otherwise authorized. In addition to moisture content requirements, allow new plaster to age a minimum of 30 days before preparation for painting.

## 3.6 APPLICATION

### 3.6.1 Coating Application

Comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Apply coating materials in accordance with [SSPC PA 1](#). [SSPC PA 1](#) methods are applicable to all substrates, except as modified herein.

At the time of application, paint must show no signs of deterioration. Maintain uniform suspension of pigments during application.

Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. Use trigger operated spray nozzles for water hoses. Use rollers for applying paints and enamels of a type designed for the coating to be applied and the surface to be coated. Wear protective clothing and respirators when applying oil-based paints or using spray equipment with any paints.

Only apply paints, except water-thinned types to surfaces that are completely free of moisture as determined by sight or touch.

Thoroughly work coating materials into joints, crevices, and open spaces. Pay special attention to ensure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces.

Apply each coat of paint so that dry film is of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Completely hide all blemishes.

Touch up damaged coatings before applying subsequent coats. Broom clean and clear dust from interior areas before and during the application of coating material.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Apply paint to new fire extinguishing sprinkler systems including valves, piping, conduit, hangers, supports, miscellaneous metal work, and accessories. Shield sprinkler heads with protective coverings while painting is in progress. Remove sprinkler heads which have been painted and replace with new sprinkler heads. For piping in unfinished spaces, provide primed surfaces with one coat of red alkyd gloss enamel to a minimum dry film thickness of 1.0 mil. Unfinished spaces include attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and space where walls or ceiling are not painted or not constructed of a prefinished material. For piping in finished areas, provide prime surfaces with two coats of paint to match adjacent surfaces, except provide valves and operating accessories with one coat of red alkyd gloss enamel. Upon completion of painting, remove protective covering from sprinkler heads.

- a. Drying Time: Allow time between coats, as recommended by the coating manufacturer, to permit thorough drying, but not to present topcoat adhesion problems. Provide each coat in specified condition to receive next coat.
- b. Primers, and Intermediate Coats: Do not allow primers or intermediate coats to dry more than 30 days, or longer than recommended by manufacturer, before applying subsequent coats. Follow manufacturer's recommendations for surface preparation if primers or intermediate coats are allowed to dry longer than recommended by manufacturers of subsequent coatings. Cover each preceding coat or surface completely by ensuring visually perceptible difference in shades of successive coats.
- c. Finished Surfaces: Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in colors.
- d. Thermosetting Paints: Topcoats over thermosetting paints (epoxies and urethanes) should be applied within the overcoating window recommended by the manufacturer.
- e. Floors: For nonslip surfacing on level floors, as the intermediate coat is applied, cover wet surface completely with almandite garnet, Grit No. 36, with maximum passing U.S. Standard Sieve No. 40 less than 0.5 percent. When the coating is dry, use a soft bristle broom to sweep up excess grit, which may be reused, and vacuum up remaining residue before application of the topcoat.

### 3.6.2 Mixing and Thinning of Paints

Reduce paints to proper consistency by adding fresh paint, except when thinning is mandatory to suit surface, temperature, weather conditions, application methods, or for the type of paint being used. Obtain written permission from the Contracting Officer to use thinners. Verify that the written permission includes quantities and types of thinners to use.

### 3.6.3 Two-Component Systems

Mix two-component systems in accordance with manufacturer's instructions. Follow recommendation by the manufacturer for any thinning of the first coat to ensure proper penetration and sealing for each type of substrate.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 3.6.4 Coating Systems

- a. Systems by Substrates: Apply coatings that conform to the respective specifications listed in the following Tables:

##### Table

Division 3. Exterior Concrete Paint Table  
 Division 4. Exterior Concrete Masonry Units Paint Table  
 Division 5. Exterior Metal, Ferrous and Non-Ferrous Paint Table  
 Division 6. Exterior Wood; Dressed Lumber, Paneling, Decking,  
                   Shingles Paint Table  
 Division 9: Exterior Stucco Paint Table  
 Division 10. Exterior Cloth Coverings and Bituminous Coated  
                   Surfaces Paint Table

Division 3. Interior Concrete Paint Table  
 Division 4. Interior Concrete Masonry Units Paint Table  
 Division 5. Interior Metal, Ferrous and Non-Ferrous Paint Table  
 Division 6. Interior Wood Paint Table  
 Division 9: Interior Plaster, Gypsum Board, Textured Surfaces  
                   Paint Table

- b. Minimum Dry Film Thickness (DFT): Apply paints, primers, varnishes, enamels, undercoats, and other coatings to a minimum dry film thickness of 1.5 mil each coat unless specified otherwise in the Tables. Coating thickness where specified, refers to the minimum dry film thickness.
- c. Coatings for Surfaces Not Specified Otherwise: Coat surfaces which have not been specified, the same as surfaces having similar conditions of exposure.
- d. Existing Surfaces Damaged During Performance of the Work, Including New Patches In Existing Surfaces: Coat surfaces with the following:
- (1) One coat of primer.
  - (2) One coat of undercoat or intermediate coat.
  - (3) One topcoat to match adjacent surfaces.
- e. Existing Coated Surfaces To Be Painted: Apply coatings conforming to the respective specifications listed in the Tables herein, except that pretreatments, sealers and fillers need not be provided on surfaces where existing coatings are soundly adhered and in good condition. Do not omit undercoats or primers.

#### 3.7 COATING SYSTEMS FOR METAL

Apply coatings of Tables in Division 5 for Exterior and Interior.

- a. Apply specified ferrous metal primer on the same day that surface is cleaned, to surfaces that meet all specified surface preparation requirements at time of application.
- b. Inaccessible Surfaces: Prior to erection, use one coat of specified primer on metal surfaces that will be inaccessible after erection.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- c. Shop-primed Surfaces: Touch up exposed substrates and damaged coatings to protect from rusting prior to applying field primer.
- d. Surface Previously Coated with Epoxy or Urethane: Apply MPI 101, 1.5 mils DFT immediately prior to application of epoxy or urethane coatings.
- e. Pipes and Tubing: The semitransparent film applied to some pipes and tubing at the mill is not to be considered a shop coat. Overcoat these items with the specified ferrous-metal primer prior to application of finish coats.
- f. Exposed Nails, Screws, Fasteners, and Miscellaneous Ferrous Surfaces. On surfaces to be coated with water thinned coatings, spot prime exposed nails and other ferrous metal with latex primer MPI 107.

### 3.8 COATING SYSTEMS FOR CONCRETE AND CEMENTITIOUS SUBSTRATES

Apply coatings of Tables in Division 3, 4 and 9 for Exterior and Interior.

### 3.9 PIPING IDENTIFICATION

Piping Identification, Including Surfaces In Concealed Spaces: Provide in accordance with ASME A13.1. Place stenciling in clearly visible locations. On piping not covered by ASME A13.1, stencil approved names or code letters, in letters a minimum of 1/2 inch high for piping and a minimum of 2 inches high elsewhere. Stencil arrow-shaped markings on piping to indicate direction of flow using black stencil paint.

### 3.10 INSPECTION AND ACCEPTANCE

In addition to meeting previously specified requirements, demonstrate mobility of moving components, including swinging and sliding doors, cabinets, and windows with operable sash, for inspection by the Contracting Officer. Perform this demonstration after appropriate curing and drying times of coatings have elapsed and prior to invoicing for final payment.

### 3.11 WASTE MANAGEMENT

As specified in the Waste Management Plan and as follows. Do not use kerosene or any such organic solvents to clean up water based paints. Properly dispose of paints or solvents in designated containers. Close and seal partially used containers of paint to maintain quality as necessary for reuse. Store in protected, well-ventilated, fire-safe area at moderate temperature. Place materials defined as hazardous or toxic waste in designated containers. Set aside extra paint for future color matches or reuse by the Government. Where local options exist for leftover paint recycling, collect all waste paint by type and provide for delivery to recycling or collection facility for reuse by local organizations.

### 3.12 PAINT TABLES

All DFT's are minimum values. Use only materials with a GPS green check mark having a minimum MPI "Environmentally Friendly" E1 rating based on VOC (EPA Method 24) content levels. Acceptable products are listed in the MPI Green Approved Products List, available at <http://www.specifygreen.com/APL/ProductIdxByMPInum.asp>.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.12.1 Exterior Paint Tables

#### DIVISION 5: EXTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE

##### EXTERIOR GALVANIZED SURFACES

#### A. Galvanized surfaces:

1. First Coat: "27 Typoxy" or "N69 Epoxoline II" by Tnemec; "Intergard 345" by International Protective Coatings; "Carboguard 893 SG" or "Carboguard 888" by Carboline; "Devran 203 WB Epoxy Primer" by Akzo; Epoxy Mastic Coating V 160 Series by Cortech/Moore or "Recoatable Epoxy Primer 867-45" by Sherwin Williams.

2. Second Coat: "V73 Endura Shield" or "1074/1075" by Tnemec; "Interthane 870UHS" or "990 UHS" by International Protective Coatings; "Carbothane 133 LH" by Carboline; "Devthane 379UH Aliphatic Vizethne" by Akzo; Acrylic Aliphatic Urethane V 500 (Gloss) or V 510 (Semi-Gloss) by Corotech/Moore or "Hi-Solids Urethane B65-300/350" by Sherwin Williams.

##### EXTERIOR SURFACES, OTHER METALS (NON-FERROUS)

A. Aluminum, aluminum alloy and other miscellaneous non-ferrous metal items not otherwise specified except hot metal surfaces, roof surfaces, and new prefinished equipment. Match surrounding finish:

#### 1. Alkyd

MPI EXT 5.4F-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 95	MPI 94	MPI 94
System DFT:	5 mils	

B. Surfaces adjacent to painted surfaces. Match surrounding finish:

#### 1. Alkyd

MPI EXT 5.1D-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 94	MPI 94
System DFT:	5.25 mils	

#### 2. Waterborne Light Industrial Coating

MPI EXT 5.1C-G3(Eggshell)

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 161	MPI 161
System DFT:	5 mils	

MPI EXT 5.1C-G5(Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 163	MPI 163
System DFT:	5 mils	

C. Hot metal surfaces including smokestacks subject to temperatures up to 400 degrees F:

#### 1. Heat Resistant Enamel

MPI EXT 5.2A

Primer:	Intermediate:	Topcoat:
MPI 21	Surface preparation and number of coats per manufacturer's instructions.	

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

EXTERIOR SURFACES, OTHER METALS (NON-FERROUS)  
System DFT: Per Manufacturer

D. Ferrous metal subject to high temperature, up to 750 degrees F:

1. Inorganic Zinc Rich Coating  
MPI EXT 5.2C  
Primer:                      Intermediate:                      Topcoat:  
MPI 19                      Surface preparation and number of coats per  
manufacturer's instructions.  
System DFT: Per Manufacturer
2. Heat Resistant Aluminum Enamel  
MPI EXT 5.2B (Aluminum Finish)  
Primer:                      Intermediate:                      Topcoat:  
MPI 2                      Surface preparation and number of coats per  
manufacturer's instructions.  
System DFT: Per Manufacturer

E. New surfaces made bare cleaning to SSPC SP 10/NACE No. 2  
subject to temperatures up to 593 degrees C (1100 degrees F):

1. Heat Resistant Coating  
MPI EXT 5.2D  
Primer:                      Intermediate:                      Topcoat:  
MPI 22                      Surface preparation and number of coats per  
manufacturer's instructions.  
System DFT: Per Manufacturer

### 3.12.2 Interior Paint Tables

#### DIVISION 3: INTERIOR CONCRETE PAINT TABLE

A. Exposed Concrete Floors in following areas:

1. Latex Floor Paint  
New; MPI INT 3.2A-G2 (Flat) / Existing; MPI RIN 3.2A-G2 (Flat)  
Primer:                      Intermediate:                      Topcoat:  
MPI 60                      MPI 60                      MPI 60  
System DFT: 5 mils
2. Alkyd Floor Paint  
New; MPI INT 3.2B-G2 (Flat) / Existing; MPI RIN 3.2B-G2 (Flat)  
Primer:                      Intermediate:                      Topcoat:  
MPI 59                      MPI 59                      MPI 59  
System DFT: 5 mils
3. Epoxy  
New; MPI INT 3.2C-G6 (Gloss) / Existing; MPI RIN 3.2C-G6 (Gloss)  
Primer:                      Intermediate:                      Topcoat:  
MPI 77                      MPI 77                      MPI 77  
System DFT: 5 mils

Note: Primer may be reduced for penetration per manufacturer's instructions.

#### DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE

A. New Concrete masonry:

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE

1. High Performance Architectural Latex

MPI INT 4.2D-G2 (Flat)

Filler	Primer:	Intermediate:	Topcoat:
MPI 4	N/A	MPI 138	MPI 138
System DFT: 11 mils			

MPI INT 4.2D-G3 (Eggshell)

Filler	Primer:	Intermediate:	Topcoat:
MPI 4	N/A	MPI 139	MPI 139
System DFT: 11 mils			

MPI INT 4.2D-G5 (Semigloss)

Filler	Primer:	Intermediate:	Topcoat:
MPI 4	N/A	MPI 141	MPI 141
System DFT: 11 mils			

Fill all holes in masonry surface

2. Institutional Low Odor / Low VOC Latex

New; MPI INT 4.2E-G2 (Flat)

Filler	Primer:	Intermediate:	Topcoat:
MPI 4	N/A	MPI 144	MPI 144
System DFT: 4 mils			

New; MPI INT 4.2E-G3 (Eggshell)

Filler	Primer:	Intermediate:	Topcoat:
MPI 4	N/A	MPI 145	MPI 145
System DFT: 4 mils			

New; MPI INT 4.2E-G5 (Semigloss)

Filler	Primer:	Intermediate:	Topcoat:
MPI 4	N/A	MPI 147	MPI 147
System DFT: 4 mils			

B. Concrete masonry units in high humidity areas unless otherwise specified:

1. Waterborne Light Industrial Coating

MPI INT 4.2K-G3(Eggshell)

Filler:	Primer:	Intermediate:	Topcoat:
MPI 4	N/A	MPI 151	MPI 151
System DFT: 11 mils			

MPI INT 4.2K-G5(Semigloss)

Filler:	Primer:	Intermediate:	Topcoat:
MPI 4	N/A	MPI 153	MPI 153
System DFT: 11 mils			

2. Alkyd

MPI INT 4.2N-G3 (Eggshell)

Filler:	Primer:	Intermediate:	Topcoat:
MPI 4	MPI 50	MPI 51	MPI 51
System DFT: 12 mils			

MPI INT 4.2N-G5 (Semigloss)

Filler:	Primer:	Intermediate:	Topcoat:
MPI 4	MPI 50	MPI 47	MPI 47
System DFT: 12 mils			

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE

Fill all holes in masonry surface

3. Epoxy

MPI INT 4.2G-G6 (Gloss)

Filler:	Primer:	Intermediate:	Topcoat:
MPI 116	N/A	MPI 77	MPI 77
System DFT:	10 mils		

Fill all holes in masonry surface

DIVISION 5: INTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE

INTERIOR STEEL / FERROUS SURFACES

A. Metal, Mechanical, Electrical, Fire extinguishing sprinkler systems including valves, conduit, hangers, supports, and miscellaneous metal items not otherwise specified except floors, hot metal surfaces, and new prefabricated equipment:

1. High Performance Architectural Latex

MPI INT 5.1R-G2 (Flat)

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 138	MPI 138
System DFT:	5 mils	

B. Metal in restrooms, shower areas, and other high-humidity areas not otherwise specified except floors, hot metal surfaces, and new prefabricated equipment:

1. Alkyd

MPI INT 5.1E-G3 (Eggshell)

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 51	MPI 51
System DFT:	5.25 mils	

MPI INT 5.1E-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 47	MPI 47
System DFT:	5.25 mils	

MPI INT 5.1E-G6 (Gloss)

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 48	MPI 48
System DFT:	5.25 mils	

2. Alkyd

MPI INT 5.1T-G3 (Eggshell) For hand tool cleaning

Primer:	Intermediate:	Topcoat:
MPI 23	MPI 51	MPI 51
System DFT:	5.25 mils	

MPI INT 5.1T-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 23	MPI 47	MPI 47
System DFT:	5.25 mils	

MPI INT 5.1T-G6 (Gloss)

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

# INTERIOR STEEL / FERROUS SURFACES

Primer:	Intermediate:	Topcoat:
MPI 23	MPI 48	MPI 48
System DFT:	5.25 mils	

C. Ferrous metal in concealed damp spaces or in exposed areas having unpainted adjacent surfaces as follows:

## 1. Aluminum Paint

MPI INT 5.1M		
Primer:	Intermediate:	Topcoat:
MPI 79	MPI 1	MPI 1
System DFT:	4.25 mils	

D. Miscellaneous non-ferrous metal items not otherwise specified except floors, hot metal surfaces, and new prefinished equipment. Match surrounding finish:

## 1. High Performance Architectural Latex

MPI INT 5.4F-G2 (Flat)		
Primer:	Intermediate:	Topcoat:
MPI 95	MPI 138	MPI 138
System DFT:	5 mils	

MPI INT 5.4F-G3 (Eggshell)		
Primer:	Intermediate:	Topcoat:
MPI 95	MPI 139	MPI 139
System DFT:	5 mils	

MPI INT 5.4F-G4 (Satin)		
Primer:	Intermediate:	Topcoat:
MPI 95	MPI 140	MPI 140
System DFT:	5 mils	

MPI INT 5.4F-G5 (Semigloss)		
Primer:	Intermediate:	Topcoat:
MPI 95	MPI 141	MPI 141
System DFT:	5 mils	

## 2. Alkyd

MPI INT 5.4J-G2 (Flat)		
Primer:	Intermediate:	Topcoat:
MPI 95	MPI 49	MPI 49
System DFT:	5 mils	

MPI INT 5.4J-G3 (Eggshell)		
Primer:	Intermediate:	Topcoat:
MPI 95	MPI 51	MPI 51
System DFT:	5 mils	

MPI INT 5.4J-G5 (Semigloss)		
Primer:	Intermediate:	Topcoat:
MPI 95	MPI 47	MPI 47
System DFT:	5 mils	

MPI INT 5.4J-G6 (Gloss)		
Primer:	Intermediate:	Topcoat:
MPI 95	MPI 48	MPI 48



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

INTERIOR STEEL / FERROUS SURFACES

System DFT: 5 mils

E. Hot metal surfaces subject to temperatures up to 400 degrees F:

1. Heat Resistant Enamel

MPI INT 5.2A

Primer: Intermediate: Topcoat:  
MPI 21 Surface preparation and number of coats per  
manufacturer's instructions.  
System DFT: Per Manufacturer

F. Ferrous metal subject to high temperature, up to 750 degrees F:

1. Inorganic Zinc Rich Coating

MPI INT 5.2C

Primer: Intermediate: Topcoat:  
MPI 19 Surface preparation and number of coats per  
manufacturer's instructions.  
System DFT: Per Manufacturer

2. Heat Resistant Aluminum Paint

MPI INT 5.2B (Aluminum Finish)

Primer: Intermediate: Topcoat:  
MPI 2 Surface preparation and number of coats per  
manufacturer's instructions.  
System DFT: Per Manufacturer

G. Surfaces made bare cleaning to SSPC SP 10/NACE No. 2  
subject to temperatures up to 593 degrees C (1100 degrees F):

1. High Heat Resistant Coating

MPI INT 5.2D

Primer: Intermediate: Topcoat:  
MPI 22 Surface preparation and number of coats per  
manufacturer's instructions.  
System DFT: Per Manufacturer

DIVISION 6: INTERIOR WOOD PAINT TABLE

A. Wood and plywood not otherwise specified:

1. High Performance Architectural Latex

MPI INT 6.4S-G3 (Eggshell)

Primer: Intermediate: Topcoat:  
MPI 39 MPI 139 MPI 139  
System DFT: 4.5 mils

MPI INT 6.4S-G4 (Satin)

Primer: Intermediate: Topcoat:  
MPI 39 MPI 140 MPI 140  
System DFT: 4.5 mils

MPI INT 6.4S-G5 (Semigloss)

Primer: Intermediate: Topcoat:  
MPI 39 MPI 141 MPI 141  
System DFT: 4.5 mils

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

DIVISION 6: INTERIOR WOOD PAINT TABLE

2. Alkyd

MPI INT 6.4B-G3 (Eggshell)

Primer:	Intermediate:	Topcoat:
MPI 45	MPI 51	MPI 51
System DFT: 4.5 mils		

MPI INT 6.4B-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 45	MPI 47	MPI 47
System DFT: 4.5 mils		

MPI INT 6.4B-G6 (Gloss)

Primer:	Intermediate:	Topcoat:
MPI 45	MPI 48	MPI 48
System DFT: 4.5 mils		

3. Institutional Low Odor / Low VOC Latex

New; MPI INT 6.3V-G2 (Flat)

Primer:	Intermediate:	Topcoat:
MPI 39	MPI 144	MPI 144
System DFT: 4 mils		

New; MPI INT 6.3V-G3 (Eggshell)

Primer:	Intermediate:	Topcoat:
MPI 39	MPI 145	MPI 145
System DFT: 4 mils		

New; MPI INT 6.3V-G4

Primer:	Intermediate:	Topcoat:
MPI 39	MPI 146	MPI 146
System DFT: 4 mils		

New; MPI INT 6.3V-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 39	MPI 147	MPI 147
System DFT: 4 mils		

B. Wood and Plywood, except floors; natural finish or stained:

1. Natural finish, oil-modified polyurethane

New; MPI INT 6.4J-G4 / Existing; MPI RIN 6.4L-G4

Primer:	Intermediate:	Topcoat:
MPI 57	MPI 57	MPI 57
System DFT: 4 mils		

New; MPI INT 6.4J-G6 (Gloss) / Existing; MPI RIN 6.4L-G6 (Gloss)

Primer:	Intermediate:	Topcoat:
MPI 56	MPI 56	MPI 56
System DFT: 4 mils		

2. Stained, oil-modified polyurethane

New; MPI INT 6.4E-G4 / Existing; MPI RIN 6.4G-G4

Stain:	Primer:	Intermediate:	Topcoat:
MPI 90	MPI 57	MPI 57	MPI 57
System DFT: 4 mils			

New; MPI INT 6.4E-G6 (Gloss) / Existing; MPI RIN 6.4G-G6 (Gloss)

Stain:	Primer:	Intermediate:	Topcoat:
--------	---------	---------------	----------

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

DIVISION 6: INTERIOR WOOD PAINT TABLE

MPI 90 MPI 56 MPI 56 MPI 56  
System DFT: 4 mils

3. Stained, Moisture Cured Urethane

New; MPI INT 6.4V-G2 (Flat) / Existing; MPI RIN 6.4V-G2 (Flat)

Stain: Primer: Intermediate: Topcoat:

MPI 90 MPI 71 MPI 71 MPI 71

System DFT: 4 mils

New; MPI INT 6.4V-G6 (Gloss) / Existing; MPI RIN 6.4V-G6 (Gloss)

Stain: Primer: Intermediate: Topcoat:

MPI 90 MPI 31 MPI 31 MPI 31

System DFT: 4 mils

C. Wood surfaces in high humidity areas not otherwise specified.

2. Waterborne Light Industrial

MPI INT 6.3P-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 45 MPI 153 MPI 153

System DFT: 4.5 mils

MPI INT 6.3P-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 45 MPI 154 MPI 154

System DFT: 4.5 mils

3. Alkyd

MPI INT 6.3B-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 45 MPI 47 MPI 47

System DFT: 4.5 mils

MPI INT 6.3B-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 45 MPI 48 MPI 48

System DFT: 4.5 mils

D. Wood Doors; Natural Finish or Stained:

1. Natural finish, oil-modified polyurethane

New; MPI INT 6.3K-G4 / Existing; MPI RIN 6.3K-G4

Primer: Intermediate: Topcoat:

MPI 57 MPI 57 MPI 57

System DFT: 4 mils

New; MPI INT 6.3K-G6 (Gloss) / Existing; MPI RIN 6.3K-G6 (Gloss)

Primer: Intermediate: Topcoat:

MPI 56 MPI 56 MPI 56

System DFT: 4 mils

Note: Sand between all coats per manufacturers recommendations.

DIVISION 9: INTERIOR PLASTER, GYPSUM BOARD, TEXTURED SURFACES PAINT  
TABLE

A. Wallboard not otherwise specified:

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

DIVISION 9: INTERIOR PLASTER, GYPSUM BOARD, TEXTURED SURFACES PAINT TABLE

1. Latex

New; MPI INT 9.2A-G2 (Flat) / Existing; RIN 9.2A-G2 (Flat)

Primer: Intermediate: Topcoat:

MPI 50 MPI 44 MPI 44

System DFT: 4 mils

New; MPI INT 9.2A-G3 (Eggshell) / Existing; RIN 9.2A-G3 (Eggshell)

Primer: Intermediate: Topcoat:

MPI 50 MPI 52 MPI 52

System DFT: 4 mils

New; MPI INT 9.2A-G5 (Semigloss) / Existing; RIN 9.2A-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 50 MPI 54 MPI 54

System DFT: 4 mils

2. High Performance Architectural Latex - High Traffic Areas

New; MPI INT 9.2B-G2 (Flat) / Existing; MPI RIN 9.2B-G2 (Flat)

Primer: Intermediate: Topcoat:

MPI 50 MPI 138 MPI 138

System DFT: 4 mils

New; MPI INT 9.2B-G3 (Eggshell) / Existing; MPI RIN 9.2B-G3 (Eggshell)

Primer: Intermediate: Topcoat:

MPI 50 MPI 139 MPI 139

System DFT: 4 mils

New; MPI INT 9.2B-G5 (Semigloss) / Existing; MPI RIN 9.2B-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 50 MPI 141 MPI 141

System DFT: 4 mils

3. Institutional Low Odor / Low VOC Latex

New; MPI INT 9.2M-G2 (Flat) / Existing; MPI RIN 9.2M-G2 (Flat)

Primer: Intermediate: Topcoat:

MPI 50 MPI 144 MPI 144

System DFT: 4 mils

New; MPI INT 9.2M-G3 (Eggshell) / Existing; MPI RIN 9.2M-G3 (Eggshell)

Primer: Intermediate: Topcoat:

MPI 50 MPI 145 MPI 145

System DFT: 4 mils

New; MPI INT 9.2M-G4 (Satin) / Existing; MPI RIN 9.2M-G4 (Satin)

Primer: Intermediate: Topcoat:

MPI 50 MPI 146 MPI 146

System DFT: 4 mils

New; MPI INT 9.2M-G5 (Semigloss) / Existing; MPI RIN 9.2M-G5 (Semigloss)

Primer: Intermediate: Topcoat:

MPI 50 MPI 147 MPI 147

System DFT: 4 mils

B. Wallboard in restrooms, shower areas, and other high humidity areas not otherwise specified.:

1. Waterborne Light Industrial Coating

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

DIVISION 9: INTERIOR PLASTER, GYPSUM BOARD, TEXTURED SURFACES PAINT TABLE  
New; MPI INT 9.2L-G5 (Semigloss) / Existing; MPI RIN 9.2L-G5 (Semigloss)  
Primer: Intermediate: Topcoat:  
MPI 50 MPI 153 MPI 153  
System DFT: 4 mils

2. Alkyd

New; MPI INT 9.2C-G5 (Semigloss) / Existing; MPI RIN 9.2C-G5 (Semigloss)  
Primer: Intermediate: Topcoat:  
MPI 50 MPI 47 MPI 47  
System DFT: 4 mils

3. Epoxy

New; MPI INT 9.2E-G6 (Gloss) / Existing; MPI RIN 9.2D-G6 (Gloss)  
Primer: Intermediate: Topcoat:  
MPI 50 MPI 77 MPI 77  
System DFT: 4 mils

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 10 14 00.20

INTERIOR SIGNAGE  
08/20

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z97.1 (2015) Safety Glazing Materials Used in  
Buildings - Safety Performance  
Specifications and Methods of Test

## AMERICAN WELDING SOCIETY (AWS)

AWS D1.2/D1.2M (2014; Errata 1 2014; Errata 2 2020)  
Structural Welding Code - Aluminum

## ASTM INTERNATIONAL (ASTM)

ASTM B209 (2014) Standard Specification for Aluminum  
and Aluminum-Alloy Sheet and Plate

ASTM B221 (2020) Standard Specification for Aluminum  
and Aluminum-Alloy Extruded Bars, Rods,  
Wire, Profiles, and Tubes

ASTM D635 (2018) Standard Test Method for Rate of  
Burning and/or Extent and Time of Burning  
of Plastics in a Horizontal Position

## INTERNATIONAL CODE COUNCIL (ICC)

ICC A117.1 COMM (2017) Standard And Commentary Accessible  
and Usable Buildings and Facilities

## NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 101 (2021) Life Safety Code

## NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST SP 800-82 (2015; Rev 2) Guide to Industrial Control  
Systems (ICS) Security

## U.S. DEPARTMENT OF DEFENSE (DOD)

DOD 8510.01 (2020; Change 1-2020) Risk Management  
Framework (RMF) for DoD Information  
Technology (IT)

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

DODI 8500.01 (2014) Cybersecurity

UFC 4-010-06 (2016; with Change 1, 2017) Cybersecurity  
of Facility-Related Control Systems

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

36 CFR 1191 Americans with Disabilities Act (ADA)  
Accessibility Guidelines for Buildings and  
Facilities; Architectural Barriers Act  
(ABA) Accessibility Guidelines

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

### SD-02 Shop Drawings

Detail Drawings; G, AE

### SD-03 Product Data

Room Identification

Stair Signage

Building Directories

### SD-04 Samples

Interior Signage; G, AE

### SD-10 Operation and Maintenance Data

Approved Manufacturer's Instructions

Protection and Cleaning

## 1.3 EXTRA MATERIALS

Provide extra frames and extra stock of the following: 5 percent of each color and size for all sign types included in project. Provide one paper inserts and one copy of the software for user produced signs and inserts after project completion and equipment necessary for removal of signage parts and pieces.

## 1.4 QUALITY ASSURANCE

### 1.4.1 Samples

Submit interior signage samples of each of the following sign types showing typical quality, workmanship and color: all sign types included in project. Approved samples may be installed in the work, provided each sample is identified and location recorded.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.4.2 Detail Drawings

Submit detail drawings showing elevations of each type of sign, dimensions, details and methods of mounting or anchoring, mounting height, shape and thickness of materials, and details of construction. Include a schedule showing the location, each sign type, and message.

#### 1.4.3 Sign Fabricator

Sign Fabricator to follow room number strategies created by designer. The room numbering system to be reviewed and approved by the Contracting Officer and command end users during the shop drawing phase, and prior to fabrication.

#### 1.4.4 Cybersecurity

- a. The Risk Management Framework (RMF) is the process by which information systems are accredited for operation by a designated official from the Using Military Department. It is the standard process under which all DoD information systems achieve and maintain their Authority To Operate. The cybersecurity process is documented in [DOD 8510.01](#) and [NIST SP 800-82](#). Refer to [UFC 4-010-06](#) and [DODI 8500.01](#) for additional requirements.
- b. All systems that are IP addressable or interface with the Assured Network required certification to operate. Coordinate with the Government to initiate and complete the accreditation process.
- c. Cybersecurity requires input from the system vendor or provider and support from the local IMD. The local IMD-IA office is the point of contact for all Cyber Security requirements. The local CMIO is the point of contact for all clinical and functional system requirements.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

Package materials to prevent damage and deterioration during shipment, handling, storage and installation. Deliver products to the jobsite in manufacturer's original packaging and store in a clean, dry area in accordance with manufacturer's instructions.

#### 1.6 WARRANTY

Provide manufacturer's warranty to repair or replace defective interior signage materials and workmanship for a period of 2 years from date of final acceptance of the work.

### PART 2 PRODUCTS

#### 2.1 ROOM IDENTIFICATION

Provide signs, plaques, directories, and dimensional building letters that are standard products of manufacturers regularly engaged in the manufacture of such products that essentially duplicate signs that have been in satisfactory use at least 2 years prior to bid opening.

##### 2.1.1 Standard Room Signs

Signs must consist of acrylic plastic 0.080 inch thickness minimum conforming to ANSI Z97.1 and must conform to the following:

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- a. Units must be frameless. Corners of signs must be squared.

#### 2.1.1.2 Changeable Message Strip Signs

Changeable message strip signs must be of same construction as standard room signs to include a clear sleeve that will accept a paper or plastic insert identifying changeable text. The insert must be prepared die-cut vinyl letters applied to 0.015 inch rigid vinyl film.

#### 2.1.1.3 Type of Mounting for Signs

Surface mounted signs must be mounted with 1/16 inch thick closed cell vinyl foam with adhesive backing. Adhesive must be transparent, long aging, high tech formulation on two sides of the vinyl foam.

#### 2.1.1.4 Character Proportions and Heights

Letters and numbers on signs conform to 36 CFR 1191.

#### 2.1.1.5 Graphics

Signage graphics for modular signs must conform to the following:

- a. First Surface Copy Direct Print or Silkscreened (Non-Tactile) Message may be applied to panel using the silkscreen process. Silkscreened images must be executed with photo screens prepared from original art. Handcut screens will not be accepted. Original art is defined as artwork that is a first generation reproduction of the specified art. Edges and corners must be clean.

#### 2.1.1.6 Surface Applied Photopolymer

Integral graphics and Braille achieved by photomechanical stratification processes. Photopolymer used for ADA compliant graphics must be of the type that has a minimum durometer reading of 90. Tactile graphics must be raised 1/32 inch from the first surface of plaque by photomechanical stratification process.

#### 2.1.1.7 Engraved Copy

Machine engrave letters, numbers, symbols, and other graphics into panel sign on face to produce precisely formed copy and sharp images, incised to uniform depth. Melamine plastic engraving stock used for ADA compliant graphic must be three-ply lamination contrasting color core meeting ASTM D635.

#### 2.1.1.8 Graphic Blast Raised Copy

Background is sandblasted to a uniform depth of 1/32 inch leaving raised text and Braille. Background must be painted with polyurethane paint.

#### 2.1.1.9 Embossed

Methods other than sandblasting such as vacuum formed to create ADA compliant projected graphics.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.1.10 Tactile Letters, Symbols and Braille

Raised letters and numbers on signs must conform to 36 CFR 1191.

#### 2.2 STAIR SIGNAGE

Provide signs on stairs serving three or more stories with special signage within the enclosure at each floor landing conforming to NFPA 101.

Indicate the floor level, the terminus of the top and bottom of the stair enclosure, and the identification of the stair enclosure. Also, state the floor level of, and the direction to, exit discharge. Locate the signage inside the enclosure in a position that is visible when the door is in the open or closed position and install in conformance with 36 CFR 1191.

Provide tactile for floor level designation in accordance with ICC A117.1 COMM.

#### 2.3 BUILDING DIRECTORIES

Provide building directories as lobby directories or floor directories, with a changeable directory listing consisting of the areas, which can include departments, offices, personnel and other destinations located within the facility as well as a map with "you are here" locations. Provide dimensions, details, and materials of sign and message content as indicated on the drawings.

#### 2.4 ALUMINUM ALLOY PRODUCTS

Aluminum extrusions must be at least 1/8 inch thick, and aluminum plate or sheet must be at least 0.0508 inch thick. Extrusions must conform to ASTM B221; plate and sheet must conform to ASTM B209. Where anodic coatings are specified, alloy must conform to AA PK-1 alloy designation 514.0. Exposed anodized aluminum finishes must be as shown. Welding for aluminum products must conform to AWS D1.2/D1.2M.

#### 2.5 ANODIC COATING

Anodized finish must conform to AA DAF45 as follows: Integral color anodized designation AA-M10-C22-A32, Architectural Class 0.4 to 0.7 mil.

Factory Workmanship: Holes for bolts and screws must be drilled or punched. Drilling and punching must produce clean, true lines and surfaces. Exposed surfaces of work must have a smooth finish and exposed riveting must be flush. Fastenings must be concealed where practicable.

Dissimilar Materials: Where dissimilar metals are in contact, the surfaces will be protected to prevent galvanic or corrosive action.

#### 2.6 COLOR, FINISH, AND CONTRAST

Provide color as indicated; colors listed are not intended to limit the selection of equal colors from other manufacturers. Finish of eggshell, matte, or other non-glare finish for all signs as required in handicapped-accessible buildings.

#### 2.7 TYPEFACE

ADA-ABA compliant font as indicated.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

PART 3 EXECUTION

3.1 INSTALLATION

Install signs plumb and true and in accordance with [approved manufacturer's instructions](#) at locations shown on the detail drawings. Submit operating instructions outlining the step-by-step procedures required for system operation. The instructions include simplified diagrams for the system as installed, the manufacturer's name, model number, service manual, parts list, and brief description of all equipment and their basic operating features. Provide each set permanently bound with a hard cover. The following identification must be inscribed on the covers: "OPERATING AND MAINTENANCE INSTRUCTIONS", name and location of the facility, name of the Contractor, and contract number. Submit in accordance with Section 01 78 23 OPERATING AND MAINTENANCE DATA. Mounting height and mounting location complies with [36 CFR 1191](#). Install required blocking. Do not install signs on doors or other surfaces until finishes on such surfaces have been installed. Signs installed on glass surfaces are installed with matching blank back-up plates in accordance with manufacturer's instructions.

Do not install items that show visual evidence of biological growth.

3.1.1 Anchorage

Provide anchorage in accordance with approved manufacturer's instructions. Anchorage not otherwise specified or shown includes slotted inserts, expansion shields, and powder-driven fasteners when approved for concrete; toggle bolts and through bolts for masonry; machine carriage bolts for steel; lag bolts and screws for wood. Provide exposed anchor and fastener materials compatible with metal to which applied with matching color and finish.

- a. Signs mounted to painted gypsum board surfaces must be removable for painting maintenance.
- b. Mount signs to lay-in ceiling grids with clip connections to ceiling tees.
- c. Install signs mounted on metal surfaces with magnetic tape.

3.1.2 [Protection and Cleaning](#)

Protect the work against damage during construction. Adjust hardware and electrical equipment for proper operation. Clean glass, frames, and other sign surfaces at completion of signage installation in accordance with the manufacturer's written instructions.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 10 21 13

### TOILET COMPARTMENTS 08/20

#### PART 1 GENERAL

##### 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

#### ALUMINUM ASSOCIATION (AA)

**AA DAF45** (2003; Reaffirmed 2009) Designation System  
for Aluminum Finishes

#### ASTM INTERNATIONAL (ASTM)

**ASTM A123/A123M** (2017) Standard Specification for Zinc  
(Hot-Dip Galvanized) Coatings on Iron and  
Steel Products

**ASTM A385/A385M** (2020) Standard Practice for Providing  
High-Quality Zinc Coatings (Hot-Dip)

**ASTM D7611/D7611M** (2013; E 2014) Standard Practice for  
Coding Plastic Manufactured Articles for  
Resin Identification

#### CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

**CDPH SECTION 01350** (2010; Version 1.1) Standard Method for  
the Testing and Evaluation of Volatile  
Organic Chemical Emissions from Indoor  
Sources using Environmental Chambers

#### INTERNATIONAL CODE COUNCIL (ICC)

**ICC A117.1 COMM** (2017) Standard And Commentary Accessible  
and Usable Buildings and Facilities

#### SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

**SCS** SCS Global Services (SCS) Indoor Advantage

#### U.S. GENERAL SERVICES ADMINISTRATION (GSA)

**CID A-A-60003** (Basic) Partitions, Toilet, Complete

#### UNDERWRITERS LABORATORIES (UL)

**UL 2818** (2013) GREENGUARD Certification Program  
For Chemical Emissions For Building  
Materials, Finishes And Furnishings

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

### SD-02 Shop Drawings

Fabrication Drawings; G, AE

Installation Drawings; G, AE

### SD-03 Product Data

Cleaning and Maintenance Instructions

Colors And Finishes

Anchoring Devices and Fasteners

Hardware and Fittings

Brackets

Door Hardware

Toilet Enclosures

Urinal Screens

Pilaster Shoes

Finishes; G

### SD-04 Samples

Colors and Finishes; G, AE

Hardware and Fittings; G, AE

Anchoring Devices and Fasteners

### SD-07 Certificates

Warranty

### SD-10 Operation and Maintenance Data

Plastic Identification; G

## 1.3 CERTIFICATIONS

### 1.3.1 Indoor Air Quality

#### 1.3.1.1 Laminated Plastic and Solid Phenolic Products

Provide products certified to meet indoor air quality requirements by

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification or validation by other third-party program that products meet the requirements of this Section. Provide current product certification documentation from certification body.

#### 1.4 REGULATORY REQUIREMENTS

Comply with to ICC A117.1 COMM code for access for the handicapped operation of toilet compartment door and hardware.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

Deliver materials in the manufacturer's original unopened packages with the brand, item identification, and project reference clearly marked. Store components in a dry location that is adequately ventilated; free from dust, water, other contaminants, and damage during delivery, storage, and construction.

#### 1.6 WARRANTY

Provide certification or warranties that toilet partitions will be free of defects in materials, fabrication, finish, and installation and will remain so for a period of not less than 10 years after completion.

### PART 2 PRODUCTS

#### 2.1 SYSTEM REQUIREMENTS

Provide a complete and usable toilet partition system, including toilet enclosures, room entrance screens, urinal screens, system of panels, hardware, and support components. Furnish the partition system from a single manufacturer, with a standard product as shown in the most recent catalog data. Submit Fabrication Drawings for toilet partitions and urinal screens consisting of fabrication and assembly details to be performed in the factory. Submit manufacturer's Cleaning and Maintenance Instructions in accordance with Section 01 78 23 OPERATIONS AND MAINTENANCE DATA.

##### 2.1.1 Plastic Identification

Verify that plastic products to be incorporated into the project are labeled in accordance with ASTM D7611/D7611M. Where products are not labeled, provide product data indicating polymeric information in the Operation and Maintenance Manual.

#### 2.2 MATERIALS

##### 2.2.1 Anchoring Devices and Fasteners

Provide steel anchoring devices and fasteners hot-dipped galvanized after fabrication, in conformance with ASTM A385/A385M and ASTM A123/A123M. Conceal all galvanized anchoring devices.

##### 2.2.2 Brackets

Provide two-ear panel wall brackets, T-style, 1 inch stock. Provide stirrup style panel-to-pilaster brackets.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 2.2.3 Hardware and Fittings

#### 2.2.3.1 General Requirements

Provide hardware for the toilet partition system that complies with **CID A-A-60003** for the specified type and style of partitions. Provide hardware finish highly resistant to alkalis, urine, and other common toilet room acids. Submit three samples of each item, including anchoring devices and fasteners. Approved hardware samples may be installed in the work if properly identified.

#### 2.2.3.2 Finishes

- a. **Aluminum** with clear anodic coating that complies with **AA DAF45**.
- b. **Corrosion**-resistant steel with a No. 4 finish.
- c. **Exposed** fasteners that match the hardware and fittings.

### 2.2.4 Door Hardware

#### 2.2.4.1 Hinges

Provide adjustable hinges to hold in-swinging doors open at any angle up to 90 degrees. Provide self-lubricating hinges with the indicated swing. Provide hinges that are surface-mounted type are cutout-insert type and have the following type of return movement:

- a. Gravity return movement

#### 2.2.4.2 Latch and Pull

Provide latch and pull that is a combination rubber-faced door strike and keeper equipped with emergency access.

#### 2.2.4.3 Coat Hooks

Provide coat hooks that are combination units with hooks and rubber tipped pins.

### 2.3 PARTITION PANELS AND DOORS

Fabricate partition panels, and pilasters of materials and construction listed:

Provide plastic laminate clad and solid phenolic, black core toilet partitions and urinal screens to meet the emissions requirements of **CDPH SECTION 01350** (limit requirements for either office or classroom spaces regardless of space type).

#### 2.3.1 Toilet Enclosures

Provide toilet enclosures that comply with **CID A-A-60003**, Type I, Style C, overhead braced. Furnish width, length, and height of toilet enclosures as shown. Finish surface of panels are plastic laminate clad (Finish 3); water resistant; graffiti resistant; non-absorbent radius beveled edges. Reinforce panels indicated to receive toilet paper holders or grab bars for mounting of the items required and provide cut outs for through partition toilet accessories. Provide grab bars to withstand a bending



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

stress, shear stress, shear force, and a tensile force induced by 250 lbf. Grab bars cannot rotate within their fittings.

### 2.3.2 Urinal Screens

Provide urinal screens that comply with CID A-A-60003, Type III, Style F, wall hung. Provide finish for surface of screens as plastic laminate clad (Finish 3); water resistant; graffiti resistant; non-absorbent with radius beveled edges; with manufacturer's standard post design of materials matching the thickness and construction of pilasters. Furnish width and height of urinal screens as shown. Provide thickness to match toilet compartment panel construction. Secure wall hung urinal screens with a minimum of three wall stirrup brackets 42 inches long, continuous flanges.

Fabricate screens from the same types of panels and pilasters as the toilet partitions. Use corrosion-resistant steel fittings and fasteners.

### 2.4 CEILING-HUNG PARTITIONS

Not Used.

### 2.5 FLOOR-ANCHORED PARTITIONS

Not Used.

### 2.6 OVERHEAD-BRACED PARTITIONS

Pilasters must be not less than 3/4-inch thick solid phenolic core decorative plastic laminate with multiple resin integrated kraft and surface sheets fused at high temperature and pressure. Provide anchoring device at the bottom of the pilaster consisting of a channel-shaped floor stirrup fabricated from not less than 0.0635 inch thick material and a leveling bolt. Secure the stirrup to the pilaster with not less than a 3/16 inch bolt and nut after the pilaster is leveled. Secure the stirrup to the floor with not less than two lead expansion shields and sheet metal screws. Headrail shall be made of heavy duty anodized extruded aluminum (6063-T5 Alloy). Headrail shall be anti-grip and attaches to the top of the plaster with stainless steel, tamper-resistant screws. Headrail shall be attached to the adjacent wall construction with a headrail bracket.

### 2.7 PILASTER SHOES

Provide shoes at pilasters to conceal floor-mounted anchorage. Pilaster shoes must be Type 304. Height must be manufacturer's standard.

### 2.8 HARDWARE

Provide hardware for the toilet partition system that complies with CID A-A-60003 for the specified type and style of partitions. Provide hardware pre-drilled by manufacturer. Use a hardware finish that is highly resistant to alkalis, urine, and other common toilet room acids. Hardware includes chrome plated non ferrous cast pivot hinges, gravity type, adjustable for door close positioning; door latch; door strike and keeper with rubber bumper; and cast alloy chrome plated coat hook and bumper. Use stainless steel, tamper proof type screws and bolts. Wall mounting brackets must be continuous, full height, stainless steel, in accordance with toilet compartment manufacturer's instructions.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 2.9 COLORS AND FINISHES

### 2.9.1 Colors

Provide color as indicated on drawings.

Submit three samples showing color and a finished edge on two adjacent sides and core construction, each not less than 12 inch square.

### 2.9.2 Finishes

#### 2.9.2.1 Finishes No. 4 and No. 5

Provide solid plastic fabricated of solid phenolic core with melamine facing sheets formed under high pressure rendering a single component section not less than 1/2-inch thick for panels and 3/4-inch thick for door and pilasters. Colors must extend throughout the panel thickness. Provide exposed finish surfaces: smooth, waterproof, non-absorbent, and resistant to staining and marking with pens, pencils, or other writing devices. Solid plastic partitions must not show any sign of deterioration when immersed chemicals and maintained at a temperature of 80 degrees F for a minimum of 30 days:

## PART 3 EXECUTION

### 3.1 PREPARATION

Take field measurements prior to the preparation of drawing and fabrication to ensure proper fits. Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive work. Verify correct spacing of plumbing fixtures. Verify correct location of built in framing, anchorage, and bracing. Report in writing to Contracting Officer prevailing conditions that adversely affect satisfactory execution of the work of this section. Do not proceed with work until unsatisfactory conditions have been corrected.

### 3.2 METAL PARTITION FABRICATION

Not Used.

### 3.3 INSTALLATION

Do not install items that show visual evidence of biological growth. Install partitions rigid, straight, plumb, and level, with the panels centered between the fixtures. Provide a panel clearance of not more than 1/2 inch and secure the panels to walls and pilasters with continuous full height wall brackets. Locate wall brackets so that holes for wall bolts occur in masonry or tile joints. Secure panels to pilasters with brackets matching the wall brackets. Provide for adjustment due to minor floor variations. Locate head rail joints at pilaster center lines. Install adjacent components for consistency of line and plane. Equip each door with hinges, one door latch, and one coat hook and bumper. Align hardware to uniform clearance at vertical edges of doors.

- a. Secure panels to hollow plastered walls with toggle bolts using not less than 1/4-20 screws of the length required for the wall thickness. Provide toggle bolts with a load-carrying strength of not less than 600 pounds per anchor.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

- b. Secure panels to ceramic tile on hollow plastered walls or hollow concrete-masonry walls with toggle bolts using not less than 1/4-20 screws of the length required for the wall thickness. Provide toggle bolts with a load-carrying strength of not less than 600 pounds per anchor.
- c. Secure panels to solid masonry or concrete with lead or brass expansion shields designed for use with not less than 1/4-20 screws, with a shield length of not less than 1-1/2 inches. Provide expansion shields with a load-carrying strength of not less than 600 pounds per anchor.
- d. Submit Installation Drawings for toilet partitions, room entrance screens, and urinal screens showing plans, elevations, details of construction, hardware, reinforcing and blocking, fittings, mountings and escutcheons. Indicate on drawings the type of partition, location, mounting height, cutouts, and reinforcement required for toilet-room accessories.

#### 3.4 CEILING-HUNG PARTITIONS

Not Used.

#### 3.5 FLOOR-ANCHORED PARTITIONS

Not Used.

#### 3.6 OVERHEAD-BRACED PARTITIONS

Secure pilasters to the floor with the anchorage device specified. Make all leveling devices readily accessible for leveling, plumbing, and tightening the installation. Secure overhead brace to the pilaster face with not less than two fasteners per face. Expansion shields have a minimum 2 inch penetration into the concrete slab. Make tops of doors parallel with the overhead brace when doors are in a closed position.

#### 3.7 FINAL ADJUSTMENT

After completion of the installation, make final adjustments to the pilaster-leveling devices, door hardware, and other working parts of the partition assembly. Doors have a uniform vertical edge clearance of approximately 3/16 inch and rest open at approximately 30 degrees when unlatched.

#### 3.8 CLEANING

Touch up baked enamel and powder coat finish with the same color of paint that was used for the finish. Clean all surfaces and adjacent surfaces soiled as a result of the work, in an approved manner compliant with the manufacturer's recommended cleaning and protection from damage procedures until accepted. Remove all equipment, tools, surplus materials, and work debris from the site.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 10 22 39

FOLDING PANEL PARTITIONS  
08/20

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## ASTM INTERNATIONAL (ASTM)

ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E90	(2009; R2016) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
ASTM E413	(2016) Classification for Rating Sound Insulation
ASTM E557	(2012; R 2020) Standard Guide for Architectural Design and Installation Practices for Sound Isolation between Spaces Separated by Operable Partitions

## NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 101	(2021) Life Safety Code
----------	-------------------------

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

## SD-02 Shop Drawings

Layouts; G, AE

Installation Drawings; G, AE

## SD-03 Product Data

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Folding Panel Partitions; G

SD-06 Test Reports

Acoustical Test Reports; G

Flame and Smoke Development Tests; G

SD-07 Certificates

Installer Qualifications

Manufacturer's Qualifications

SD-08 Manufacturer's Instructions

Installation Instructions

SD-10 Operation and Maintenance Data

Folding Panel Partitions; G

### 1.3 CERTIFICATIONS

Not Used.

### 1.4 QUALITY ASSURANCE

#### 1.4.1 Coordination Drawings

Provide reflected ceiling plans, applicable details and other drawings as required to suit conditions, drawn to scale, for the following coordinated items, using input from adjacent materials/systems installers, field measurements and verification of conditions:

- a. Partition track, track supports and bracing, switches and storage layout.
- b. Suspended ceiling system components and structural members used for attachment.
- c. Items penetrating finished ceiling in vicinity of folding panel partition location.
- d. Accessories located within the folding panel partitions.

#### 1.4.2 Installer Qualifications

Installer must have a minimum of 5 years of documented successful experience in the installation of folding panel partitions. When required by manufacturer, folding panel partitions must be installed by an authorized dealer with a certified crew.

#### 1.4.3 Manufacturer's Qualifications

Manufacturer must have a minimum of 10 years of documented successful experience in designing and manufacturing folding panel partitions conforming to the requirements specified in this Section.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 1.5 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the jobsite in the manufacturer's original, unopened, and undamaged packages with labels legible and intact. Provide labels to indicate the manufacturer, brand name, size, finish, and placement location. Store partitions and accessories in unopened packages in a manner to prevent damage. Handle partition materials in accordance with manufacturer's instructions. Protect materials from the weather, humidity and temperature variations, dirt and dust, or other contaminants.

## 1.6 WARRANTY

Provide manufacturer's warranty to repair or replace defective materials and workmanship for specified warranty periods from date of final acceptance of the work as follows:

### 1.6.1 Warranty Periods

- a. Structural: 10 years
- b. Plastic and Wood Materials: 3
- c. Fabric Materials: 3 years
- d. Electrical Components: 5 years

## PART 2 PRODUCTS

### 2.1 SYSTEM DESCRIPTION

Provide manual operation, acoustical folding panel partitions, factory finished, supported from overhead track with floor seal, as shown on the drawings including all hardware, seals, track and rollers as needed to close the specified opening.

Submit detail coordination drawings and installation drawings of each folding panel partition indicated. Include elevations, dimensions, clearances, details of construction and anchorage, and details of joints and connections.

Submit manufacturers' descriptive product data for the folding panel partition indicated. Include manufacturers' literature, finishes, profiles and thicknesses of materials.

Submit manufacturers' operations and maintenance data for the folding panel partition in accordance with Section 01 78 23 OPERATIONS AND MAINTENANCE DATA.

#### 2.1.1 Performance Requirements

##### 2.1.1.1 Fire Resistance Ratings

Provide covering and lining with flame spread rating of 25 or less, fuel contribution rating of 15 or less, smoke generation of 50 or less in accordance with NFPA 101 when tested in accordance with ASTM E84. Submit flame and smoke development tests reports. Provide door and partition finishes with a Class A rating when tested in accordance with ASTM E84.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.1.1.2 Laboratory Acoustical Requirements

Provide partitions tested in accordance with **ASTM E90**, by a laboratory accredited by the U.S. Bureau of Standards, that have attained a sound transmission class (STC) of not less than **55** in a fully extended position, with a Noise Reduction Coefficient (NRC) of 0.25-0.30 for napped, tufted or looped fabric. Provide documentation that the partition tested is the same construction, materials, and model number as the partition to be provided and be fully operable. Test specimen is not less than **14 feet by 9 feet**. Provide a minimum panel weight of **8.5 per square foot** for STC up to 50, and **10.0 per square foot** for STC up to 53. Design panel thickness (**4 inch** nominal) and composition to provide the required STC rating in accordance with **ASTM E90** and **ASTM E413**. Submit **acoustical test reports** in accordance with **ASTM E90** and **ASTM E413**.

#### 2.2 MATERIALS

Provide heavy-duty type hardware standard with the manufacturer. Provide pulls and latches for all partitions. Provide partitions with keyed locks. Provide clear anodized aluminum finish hardware.

#### 2.3 FOLDING PANEL PARTITIONS

Provide folding panel partitions using top hung ball bearing carriers which support modular panels. **Basis of Design product is Acousti-seal Encore by Modernfold.**

- a. Provide partitions made up of a series of rigid paired flat panels hinged together in pairs, manually operated, top supported with operable floor seal. Use the number of panels as indicated. Field verify panel dimensions.
- b. Final Closure to be horizontally expanding panel edge with removable crank.

##### 2.3.1 Panels

Provide panels of nominal 3-1/2-inch (90mm) thick panels in widths as indicated. All panel horizontal and vertical framing members fabricated from minimum 18-gauge or 16-gauge formed steel with overlapped and welded corners for rigidity. Top channel is reinforced to support suspension system components. Frame is designed so that full vertical edges of panels are of formed steel and provide concealed protection of the edges of the panel skin. Panels must lock in place to form a stable, rigid partition; low profile hinges may not project more than 1/4 inch maximum from panel edge. Panel surfacing must wrap around the vertical panel edges without vertical trim.

Panel Skin to be 1/2-inch (13 mm) tackable gypsum board, class "A" rated single material or composite layers continuously bonded to panel frame. Acoustical ratings of panels to have a minimum STC rating of 45.

Hinges for Closure Panels shall be full leaf butt hinges, attached directly to panel frame with welded hinge anchor plates within panel to further support hinge mounting to frame. Lifetime warranty on hinges. Hinges mounted into panel edge or vertical astragal are not acceptable.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 2.3.2 Finish Covering

Panel face finish shall be a fabric finish from manufacturer's standard offering and approved by Architect.

Panel Trim: Exposed panel trim to be one consistent color from manufacturer's standard offering and approved by Architect.

### 2.3.3 Track

Provide recessed track as shown. Provide steel that conforms to ASTM A653/A653M. Provide track that is the manufacturer's standard product designed for the weight of the finished partition, including door. Provide track sections in the maximum lengths practicable, and not less than 6 feet long except for narrow doors and at ends of runs where short length and "drop-out service" sections of track are required. Provide suitable joint devices such as interlocking keys at each joint to provide permanent alignment of track.

### 2.3.4 Suspension System

Suspension Tracks: Minimum 11-gauge, 0.12-inch (3 mm) roll-formed steel track, supported by adjustable steel hanger brackets, supporting the load-bearing surface of the track, connected to structural support by pairs of 3/8-inch (9.5 mm) diameter threaded rods. Aluminum track is not acceptable.

Exposed Area of Track Soffit: Steel, integral to track, and prepainted to match adjacent ceiling.

Carriers: One all-steel trolley with steel-tired ball bearing wheels per panel (except hinged panels). Nonsteel tires are not acceptable.

Warranty Period: Five (5) years minimum.

## 2.4 ACCESSORIES

Not Used.

## 2.5 SEALS AND SWEEPSTRIPS

Provide perimeter seals or sound insulation, of manufacturer's standard product, to achieve the sound transmission class specified and to pass the visual field test specified, without crack or craze when subjected to severe usage. Provide mechanical bottom seal that can be raised or lowered for positive control. Provide manufacturer's vertical seals between panels to ensure acoustical rating. Bottom seals must consist of a vinyl sweep mechanical seal which automatically drop as panels are positioned, without the need for tools or cranks. Provide vertical interlocking sound seals between panels which are roll-formed steel astragals, with reversible tongue and groove configuration in each panel edge for universal panel operation. Rigid plastic or aluminum astragals or astragals in only one panel edge are not acceptable. Sweep strips must be vinyl or other material that will not crack or craze with severe usage. Provide sweep strip STC to the specified rating.

## 2.6 ELECTRICAL OPERATORS

Not Used.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 2.7 COLOR

Submit three color samples of specified surfaces and finishes to match those specified. Finish and color requirements are not limited to manufacturer's standard selections in order to meet these requirements. Also submit certificate attesting that partitions have specified acoustical and flame retardant properties, as determined by test.

## PART 3 EXECUTION

### 3.1 INSTALLATION

Do not install building construction materials that show visual evidence of biological growth. Install in accordance with the approved installation drawings and the manufacturer's written installation instructions.

#### 3.1.1 Preparation Work

Verify dimensions and condition of openings scheduled to receive folding panel partitions. Install partitions in accordance with the approved partition layouts, manufacturer's directions, and ASTM E557. Provide structural support for the track support elements as indicated.

#### 3.1.2 Adjustment

Adjust manually operated partitions to open and close from any position with a maximum horizontal force as specified in paragraph MANUAL OPERATION applied to pendant pull, box or handle.

### 3.2 FIELD TESTS

#### 3.2.1 Operational Test

In the presence of the Contracting Officer, operate partition at least three times to demonstrate that partition is capable of being moved from the stored position to the fully extended position smoothly and quietly. Activate mechanical seals top and bottom. Adjust partitions which do not operate properly and retest.

#### 3.2.2 Visual Test

Conduct visual field tests for light leakage with all room lights turned on in the space on one side of the partition. Darken space on the other side of the partition. Light leakage from the lighted space to the darkened space is not acceptable. If light leakage does occur, adjust the partition to correct the problem and retest.

### 3.3 CLEANING

Clean any soiled parts of the partition in accordance with manufacturer's written instructions.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 10 26 00

WALL AND DOOR PROTECTION  
08/20

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## ASTM INTERNATIONAL (ASTM)

ASTM D256	(2010; R 2018) Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics
ASTM D543	(2020) Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents
ASTM D635	(2018) Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
ASTM E84	(2020) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM G21	(2015) Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

## CALIFORNIA DEPARTMENT OF PUBLIC HEALTH (CDPH)

CDPH SECTION 01350	(2010; Version 1.1) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers
--------------------	--

## GREEN SEAL (GS)

GS-36	(2013) Adhesives for Commercial Use
-------	-------------------------------------

## SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS	SCS Global Services (SCS) Indoor Advantage
-----	--

## SOCIETY OF AUTOMOTIVE ENGINEERS INTERNATIONAL (SAE)

SAE J1545	(2005; R 2014) Instrumental Color Difference Measurement for Exterior Finishes, Textiles and Colored Trim
-----------	---

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168 (2017) Adhesive and Sealant Applications

UNDERWRITERS LABORATORIES (UL)

UL 2818 (2013) GREENGUARD Certification Program  
For Chemical Emissions For Building  
Materials, Finishes And Furnishings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Corner Guards; G, AE

Wall Covering and Panels; G, AE

SD-03 Product Data

Corner Guards

Wall Covering and Panels; G

SD-07 Certificates

Indoor air quality for wall covering/panels

1.3 CERTIFICATIONS

1.3.1 Indoor Air Quality

1.3.1.1 Wall Covering and Panels

Provide sheet and high impact resistant resilient materials certified to meet indoor air quality requirements by UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification or validation by other third-party program that products meet the requirements of this section. Provide current product certification documentation from certification body.

1.3.1.2 Adhesives and Sealants

Provide products certified to meet indoor air quality requirements by UL 2818 (Greenguard) Gold, SCS Global Services Indoor Advantage Gold or provide certification or validation by other third-party program that products meet the requirements of this section. Provide current product certification documentation from certification body. When product does not have certification, provide validation that product meets the indoor air quality product requirements cited herein.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the project site in manufacturer's original unopened containers with seals unbroken and labels and trademarks intact. Keep materials dry, protected from weather and damage, and stored under cover. Store materials at approximately 70 degrees F for at least 48 hours prior to installation.

#### 1.5 WARRANTY

Provide manufacturer's warranty to repair or replace defective materials and workmanship for a 1 year period from date of final acceptance of the work.

### PART 2 PRODUCTS

#### 2.1 STANDARD PRODUCTS

To the maximum extent possible, provide wall and door protection items that are standard products of a single manufacturer and furnished as detailed. Drawings show general configuration of products required, and items differing in minor details from those shown are acceptable.

##### 2.1.1 Resilient Material

Provide resilient material consisting of high impact resistant extruded acrylic vinyl or injection molded thermal plastic conforming to the following:

###### 2.1.1.1 Minimum Impact Resistance

Minimum impact resistance must be 18 ft-lbs/sq. inch when tested in accordance with ASTM D256, (Izod impact, ft-lbs per sq inch notched).

###### 2.1.1.2 Fire Resistance Rating

Provide the following surface burning characteristics when tested and labeled in accordance with ASTM E84 by a qualified testing agency: maximum flame spread of 25 and a smoke developed rating of 450 or less. Provide material rated as self extinguishing when tested in accordance with ASTM D635.

###### 2.1.1.3 Integral Color

Provide colored components having integral color and matched in accordance with SAE J1545 to within plus or minus 1.0 on the CIE-LCH scales.

###### 2.1.1.4 Chemical and Stain Resistance

Provide materials resistant to chemicals and stains reagents in accordance with ASTM D543.

###### 2.1.1.5 Fungal and Bacterial Resistance

Provide materials resistant to fungi and bacteria in accordance with ASTM G21, as applicable.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 2.2 CORNER GUARDS

### 2.2.1 Resilient Corner Guards

Provide surface mounted corner guards, radius formed to profile shown. Provide corner guards that extend from top of wall base to ceiling. Furnish factory fabricated end closure caps for top and bottom of surface mounted corner guards.

## 2.3 WALL COVERING AND PANELS

Provide wall covering and panels consisting of high impact RFP resilient material. Submit fire rating and extinguishing test results for resilient material. Also submit statements attesting that the items comply with specified fire and safety code requirements. Provide wall covering material used on the interior of the building (defined as inside of the weatherproofing system) that meets either emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type) the VOC content requirements of SCAQMD Rule 1168, or VOC content requirements of GS-36. Provide certification of indoor air quality for wall covering/panels.

### 2.3.1 FRP Wall Covering

Provide 0.90-inch thick wall covering.

## 2.4 TRIM, FASTENERS AND ANCHORS

Provide PVC trim, fasteners and anchors for each specific installation as indicated.

## 2.5 FINISH

Submit samples indicating color and texture of materials requiring color and finish.

### 2.5.1 Resilient Material Finish

Provide resilient material finish of pebbled texture with colors in accordance with SAE J1545.

## 2.6 ADHESIVES

Provide adhesive for resilient material in accordance with manufacturers recommendations. Provide sealants and non-aerosol adhesive products used on the interior of the building (defined as inside of the weatherproofing system) that meet either emissions requirements of CDPH SECTION 01350 (limit requirements for either office or classroom spaces regardless of space type) the VOC content requirements of SCAQMD Rule 1168, or VOC content requirements of GS-36. Provide certification of indoor air quality for adhesives.

## 2.7 COLOR

Provide color as indicated; colors listed are not intended to limit the selection of equal colors from other manufacturers.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### PART 3 EXECUTION

#### 3.1 INSTALLATION

Do not install items that show visual evidence of biological growth.  
Install items on surfaces that are clean, smooth, and free of obstructions.

##### 3.1.1 Corner Guards and Wall Guards

Mount guards as indicated and in accordance with manufacturer's written installation instructions.

##### 3.1.2 Wall Coverings and Panels

Install as indicated in accordance with manufacturer's written instructions.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 10 28 13

TOILET ACCESSORIES  
08/20

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## ASTM INTERNATIONAL (ASTM)

ASTM C1036 (2021) Standard Specification for Flat Glass

## U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-STD-1691 (1994; Rev F) Construction and Material Schedule for Military Medical and Dental Facilities

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

## SD-02 Shop Drawings

## Product Schedule; G

Submit product Schedule indicating types, quantities, sizes, and installation locations by room for each toilet accessory item required. Identify locations using room designations indicated on the drawings.

## 1.3 CERTIFICATIONS

Not Used.

## 1.4 DELIVERY, STORAGE, AND HANDLING

Wrap toilet accessories for shipment and storage, then deliver to the jobsite in manufacturer's original packaging, and store in a clean, dry area protected from construction damage and vandalism.

## 1.5 WARRANTY

Provide manufacturer's warranty to repair or replace defective materials and workmanship for a period of one year from date of final acceptance of the work.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## PART 2 PRODUCTS

### 2.1 ACCESSORY ITEMS

Provide toilet accessories where indicated in accordance with Contractor-provided [product schedule](#). Conform to the requirements for accessory items specified herein which are based on [MIL-STD-1691](#) Joint Schedule Numbers (JSN). Provide each accessory item complete with the necessary mounting plates of sturdy construction with corrosion resistant surface.

Provide stainless steel products listed herein manufactured from materials containing a minimum of 50 percent recycled content. Provide data identifying percentage of recycled content for stainless steel toilet accessories.

#### 2.1.1 Anchors and Fasteners

Provide corrosion-resistant anchors and fasteners capable of developing a restraining force commensurate with the strength of the accessory to be mounted and suited for use with the supporting construction. Provide tamperproof design exposed fasteners with finish to match the accessory. Provide fasteners proposed for use for each type of wall construction and mounting.

#### 2.1.2 Finishes

Except where noted otherwise, provide the following finishes on metal:

Metal	Finish

#### 2.1.3 Mirror, Glass (M-1)

Framed mirror. Provide Type I transparent flat type, Class 1-clear glass for mirrors. Glazing Quality ql 1/4 inch thick conforming to ASTM C1036. Coat glass on one surface with silver coating, copper protective coating, and mirror backing paint. Provide highly adhesive pure silver coating of a thickness which provides reflectivity of 83 percent or more of incident light when viewed through 1/4 inch thick glass, free of pinholes or other defects. Provide copper protective coating with pure bright reflective copper, homogeneous without sludge, pinholes or other defects, of proper thickness to prevent "adhesion pull" by mirror backing paint. Provide mirror backing paint with two coats of special scratch and abrasion-resistant paint and baked in uniform thickness to provide a protection for silver and copper coatings which will permit normal cutting and edge fabrication. Sizes as indicated on drawings.

#### 2.1.4 Dispenser, Paper Towel, Recessed (PTWR-1)

Recess mounted paper towel dispenser and waste receptacle combination unit. Unit constructed of heavy gauge stainless steel with satin finish, all welded construction, have full length piano hinge and tumbler lock. Unit dispenses 300 C-fold or 400 multifold paper towels and be self-feeding

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

until supply is depleted. Towel dispensing slot is snag-free. Unit is ADA compliant.

#### 2.1.5 Dispenser, Soap, Lavatory-Mounted (SD-1)

Lavatory-mounted, liquid type consisting of a polyethylene tank with a minimum 32 fluid ounces holding capacity and a 6-inch spout length.

#### 2.1.6 Disposal, Sanitary Napkin, SS, Surface Mounted (SND-1)

Surface mounted sanitary napkin receptacle. Unit made of stainless steel with satin finish and all welded construction. Unit has piano hinge attached at the top and an integral finger depression for opening. For use with disposable paper liners, available separately. Unit may be attached to wall or toilet partition.

Approximate size: 7 inches wide by 4 inches deep by 10 inches high.

#### 2.1.7 Grab Bar, 1-1/4 Inch Diameter, SS, 2 Wall, W/C Accessible (GB-1)

Grab bar of 1-1/4 inch diameter satin finish stainless steel with peened gripping surface for use in toilet stall/room. Snap-on flange covers for concealed mounting are stainless steel and equipped with two screw holes for attachment to wall. Grab bars designed to meet and exceed ADA requirements for structural strength. Grab bars designed to withstand loads of 900 pounds when properly installed. Clearance from wall to grab bar is 1-1/2 inches to meet ADA and ANSI codes.

#### 2.1.8 Grab Bar (GB-2)

Provide an 18-gauge, 1-1/2-inch grab bar OD Type 304 stainless steel. Provide form and length for grab bar as indicated. Clearance between the grab bar and wall shall be 1-1/2 inches. Provide concealed mounting flange. Concealed mounting flanges shall be 1/8-inch-thick stainless steel plate, 2-inch by 3-1/8-inch, and equipped with two screw holes for attachment to wall. Flange covers shall be 22 gauge (3-1/4-inch diameter by 1/2-inch) deep and shall snap over mounting flange to conceal mounting screws and/or winglet fasteners. Ends of grab bars shall pass through concealed mounting flanges and be heliarc welded to form on structural unit. Grab bar shall comply with accessible design (including ADAAG in the USA) for structural strength.

#### 2.1.9 Shelf, Utility W/ Mop/Broom Holders, SS, Surf Mounted (HDS-1)

Surface mounted mop/broom holder with shelf made of 18 gauge stainless steel with all exposed surfaces in satin finish. Unit has shelf 8 inches deep with shelf support brackets of satin finish stainless steel welded to mounting base, and a minimum of 3 hooks/3 holders. Mop holders have spring-loaded rubber cams and hold mop or broom handle with a diameter between 5/8 inch and 1 inch.

Approximate size: 36 inches wide by 8 inches deep.

#### 2.1.10 Hook, Garment, Double, SS, Surface Mounted (CHB-1)

Surface mounted double garment hook made of stainless steel with satin finish. For use on door back or wall. Hook comes with concealed mounting bracket secured to concealed wall plate. Mounting hardware included. Flange size is approximately 2 inches by 2 inches.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.1.11 Surface-Mounted Door Bumper (DB-1)

Surface-mounted door bumper shall have base constructed of Type 304 stainless steel with bright polished finish. Unit shall be equipped with black neoprene bumper.

#### 2.1.12 Dispenser, Toilet Tissue, SS, 2-Roll, Surface Mounted (TTD-1)

Concealed surface mounted, double roll, toilet tissue dispenser of stainless steel. Unit holds and dispenses two standard 5-1/4 inch diameter rolls of toilet tissue. Spindles are free-spinning for non-controlled delivery, chrome-plated plastic equipped with heavy-duty internal springs.

Approximate size: 7 inches diameter by 4 inches deep.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

Do not install items that show visual evidence of biological growth. Provide the same finish for the surfaces of fastening devices exposed after installation as the attached accessory. Provide oval exposed screw heads. Install accessories at the location and height indicated. Protect exposed surfaces of accessories with strippable plastic or by other means until the installation is accepted. After acceptance of accessories, remove and dispose of strippable plastic protection. Coordinate accessory manufacturer's mounting details with other trades as their work progresses. After installation, thoroughly clean exposed surfaces and restore damaged work to its original condition or replace with new work.

##### 3.1.1 Recessed Accessories

Fasten accessories with wood screws to studs, blocking or rough frame in wood construction. Set anchors in mortar in masonry construction. Fasten to metal studs or framing with sheet metal screws in metal construction.

##### 3.1.2 Surface Mounted Accessories

Mount on concealed backplates, unless specified otherwise. Conceal fasteners on accessories without backplates. Install accessories with corrosion-resistant fasteners as required by the construction. Install backplates in the same manner, or provide with lugs or anchors set in mortar, as required by the construction. Fasten accessories mounted on gypsum board and plaster walls without solid backing into the metal or wood studs, or to backplates secured to metal studs.

#### 3.2 CLEANING

Clean material in accordance with manufacturer's recommendations. Do not use alkaline or abrasive agents. Take precautions to avoid scratching or marring exposed surfaces.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 10 44 16

### FIRE EXTINGUISHERS

**11/19**

#### PART 1 GENERAL

##### 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

#### ASTM INTERNATIONAL (ASTM)

**ASTM E814** (2013a; R 2017) Standard Test Method for  
Fire Tests of Penetration Firestop Systems

#### NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

**NFPA 1** (2021) Fire Code

**NFPA 10** (2018; ERTA 1-2 2018) Standard for  
Portable Fire Extinguishers

**NFPA 101** (2021) Life Safety Code

#### UNDERWRITERS LABORATORIES (UL)

**UL 299** (2012; May 2021) Dry Chemical Fire  
Extinguishers

##### 1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section **01 33 00 SUBMITTAL PROCEDURES**:

#### **SD-02 Shop Drawings**

**Fire Extinguishers; G**

**Cabinets; G**

**Wall Brackets; G**

**Schedule; G**

#### **SD-03 Product Data**

**Fire Extinguishers; G**

**Cabinets; G**

**Wall Brackets; G**

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SD-07 Certificates

Fire Extinguishers Certifications; G

Manufacturer's Warranty with Inspection Tag; G

### 1.3 DELIVERY, STORAGE, AND HANDLING

Protect materials from weather, soil, and damage during delivery, storage, and construction.

Deliver materials in their original packages, containers, or bundles bearing the brand name and the name and type of the material.

### 1.4 WARRANTY

Guarantee that Fire Extinguishers are free of defects in materials, fabrication, finish, and installation and that they will remain so for a period of not less than 10 years after completion.

Submit the manufacturer's warranty with inspection tag.

### 1.5 PROJECT SCHEDULE

For fire extinguishers. Coordinate final fire extinguisher schedule with fire protection cabinet schedule to ensure proper fit and function. Use same designations indicated on Drawings.

## PART 2 PRODUCTS

Submit fabrication drawings consisting of fabrication and assembly details performed in the factory and product data for the following items: Fire Extinguishers; Accessories, cabinets, Wall Brackets.

### 2.1 SYSTEM DESCRIPTION

#### 2.1.1 Types

Submit fire extinguishers certifications showing compliance with local codes and regulations.

Provide fire extinguishers conforming to NFPA 10. Provide quantity and placement in compliance with the applicable sections of NFPA 1 and NFPA 101.

Provide dry chemical type fire extinguishers compliant with UL 299.

#### 2.1.2 Material

Provide enameled steel extinguisher shell.

#### 2.1.3 Size

10 pounds extinguishers.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 2.2 EQUIPMENT

### 2.2.1 Cabinets

#### 2.2.1.1 Material

Provide enameled steel cabinets.

#### 2.2.1.2 Type

Provide semi-recessed cabinet.

Provide a fire rated cabinet, listed and labeled to comply with ASTM E814 for fire resistance wall rating.

#### 2.2.1.3 Size

Dimension cabinets to accommodate the specified fire extinguishers.

### 2.2.2 Wall Brackets

Provide wall-hook fire extinguisher wall brackets.

Provide wall bracket and accessories as approved.

#### 2.2.2.1 Identification

Provide lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by the drawings.

Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

Orientation: Vertical.

## PART 3 EXECUTION

### 3.1 INSTALLATION

Install Fire Extinguishers where indicated on the drawings. Verify exact locations prior to installation.

Provide extinguishers which are fully charged and ready for operation upon installation. Provide extinguishers complete with Manufacturer's Warranty with Inspection Tag attached.

Install fire extinguishers in locations indicated and in compliance with requirements of authorities having jurisdiction.

Comply with the manufacturer's recommendations for all installations.

### 3.2 PROTECTION

#### 3.2.1 Repairing

Remove and replace damaged and unacceptable portions of completed work with new work at no additional cost to the Government.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 3.2.2 Cleaning

Clean all surfaces of the work, and adjacent surfaces which are soiled as a result of the work. Remove from the site all construction equipment, tools, surplus materials and rubbish resulting from the work.

-- End of Section --



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 10 51 13

### METAL LOCKERS

05/11

#### PART 1 GENERAL

##### 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS AA-L-00486

(Rev J) Lockers, Clothing, Steel

##### 1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Installation; G, AE

SD-04 Samples

Color chips; G, AE

##### 1.3 DELIVERY, HANDLING, AND STORAGE

Deliver lockers and associated materials in their original packages, containers, or bundles bearing the manufacturer's name and the name of the material. Protect from weather, soil, and damage during delivery, storage, and construction.

##### 1.4 FIELD MEASUREMENTS

To ensure proper fits, make field measurements prior to the preparation of drawings and fabrication. Verify correct location.

##### 1.5 QUALITY ASSURANCE

###### 1.5.1 Color Chips

Provide a minimum of three color chips, not less than 3 inches square, of each color indicated.

Government may request performance-characteristic tests on assembled lockers. Tests and results must conform to FS AA-L-00486. Lockers not conforming will be rejected.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## PART 2 PRODUCTS

### 2.1 TYPES

Locker must have the following type and size in the location and quantities indicated. Locker finish colors will be as scheduled.

### 2.2 CELL PHONE LOCKERS

Cell phone lockers and cell phone lockers with front access panel:  
Constructed entirely of heavy duty aluminum; durable powder coated finish;  
standard A doors includes a clear plastic cardholder; can accommodate  
built-in resettable combination locks.

#### a. Standard Cell Phone Locker with Front Access Panel.

1. Surface Mounted.
  - a) 5 door high units.

#### b. Unit Width: 37 inches.

#### c. Unit Height: 31 inches.

#### d. Unit Depth:

1. Overall Depth: 9-1/4 inches (235 mm).
2. Compartment Depth: 8 inches (203 mm).

#### e. Lock Type: Resettable combination locks.

#### f. Unit Color: Aluminum.

### 2.3 INTERIOR EQUIPMENT

#### a. Standard Hardware Features:

1. 2-inch wide by 5/8-inch high clear plastic cardholder.
2. Resettable combination locks.
3. Front access panel lock.

### 2.4 OPTIONAL EQUIPMENT

#### a. Cell Phone Locker Pedestals:

1. Unit Width: 22 inches.
2. Unit Height: 30 inches.
3. Unit Depth: 10 inches.

#### b. Locks: All optional locking systems are factory installed.

1. Built-in spring latch combination locks.

#### c. Hinges:

1. Front Access Panel: Built-in continuous hinge.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## PART 3 EXECUTION

### 3.1 ASSEMBLY AND INSTALLATION

Assemble lockers according to the locker manufacturer's instructions. Align lockers horizontally and vertically. Secure lockers to wall studs through the locker back and to the floor with screws as indicated. Bolt adjacent lockers together. Adjust doors to operate freely without sticking or binding and to ensure they close tightly.

### 3.2 FIELD QUALITY CONTROL

#### 3.2.1 Testing

Government may request performance-characteristic tests on assembled lockers in accordance with FS AA-L-00486. Lockers not conforming will be rejected.

#### 3.2.2 Repairing

Remove and replace damaged and unacceptable portions of completed work with new.

#### 3.2.3 Cleaning

Clean surfaces of the work, and adjacent surfaces soiled as a result of the work, in an approved manner. Remove equipment, surplus materials, and rubbish from the site.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 12 24 13

ROLLER WINDOW SHADES  
08/20

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI/WCMA A100.1 (2018) American National Standard for  
Safety of Window Covering Products

## ASTM INTERNATIONAL (ASTM)

ASTM G21 (2015) Standard Practice for Determining  
Resistance of Synthetic Polymeric  
Materials to Fungi

## NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701 (2019) Standard Methods of Fire Tests for  
Flame Propagation of Textiles and Films

## SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS SCS Global Services (SCS) Indoor Advantage

## UNDERWRITERS LABORATORIES (UL)

UL 2818 (2013) GREENGUARD Certification Program  
For Chemical Emissions For Building  
Materials, Finishes And Furnishings

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES

## SD-02 Shop Drawings

Detailed Drawings; G, AE

Installation; G, AE

## SD-03 Product Data

Window Shades; G

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### SD-04 Samples

Window Shades; G, AE

#### SD-06 Test Reports

Flammability Requirements; G

#### SD-07 Certificates

Indoor Air Quality for roller window shades

#### SD-10 Operation and Maintenance Data

Window Shades; G

### 1.3 CERTIFICATES

#### 1.3.1 Indoor Air Quality Certifications

##### 1.3.1.1 Roller Window Shades

Provide products certified to meet indoor air quality requirements by **UL 2818** (Greenguard), **SCS** Global Services Indoor Advantage Gold or provide validation by other third-party program that products meet the requirements of this paragraph. Provide current product certification documentation from certification body.

### 1.4 QUALITY ASSURANCE

#### 1.4.1 Qualifications

##### 1.4.1.1 Installer's Qualifications

Installer trained and certified by the manufacturer with a minimum of ten years of experience in installing products comparable to those specified in this section.

##### 1.4.2 Flammability Requirements

Passes in accordance with **NFPA 701** small and large-scale vertical burn. Materials tested are identical to products proposed for use.

##### 1.4.3 Anti-Microbial Requirements

'No Growth' per **ASTM G21** results for fungi ATCC9642, ATCC 9644, ATCC9645.

### 1.5 DELIVERY, STORAGE, AND HANDLING

Deliver components to the jobsite in the manufacturer's original packaging with the brand or company name, item identification, and project reference clearly marked. Store components in a dry location that is adequately ventilated and free from dust, water, or other contaminants and has easy access for inspection and handling. Store materials flat in a clean dry area with temperature maintained above **50 degrees F**. Do not open containers until needed for **installation** unless verification inspection is required. Handle and store shades in accordance with manufacturer's recommendations.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## 1.6 WARRANTY

Provide manufacturer's warranty to repair or replace defective materials and workmanship for a period of 10 years from date of final acceptance of the work.

## PART 2 PRODUCTS

### 2.1 WINDOW SHADES WS-1

Submit drawings showing plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to work. Submit a location schedule showing location, size and quantity of shades. Include the use of same room designations as indicated on the drawings.

Provide product data composed of catalog cuts, brochures, and operating and maintenance instructions on each product to be used. Include styles, profiles and features.

Furnish samples of each type and color of roller shade fabric and roller shade channel. Provide shade material minimum 6 by 6 inches in size. Mark face of material to indicate interior faces.

Mock up: Install shade in area designated by Contracting Officer. Do not proceed with remaining work until the Contracting Officer approves workmanship and operation. Rework mock up as required to produce acceptable work. The approved shade can be used in the installation.

Submit fire resistance data, flame spread and smoke contribution data.

Provide roller tube that operates smoothly and of sufficient diameter and thickness to prevent excessive deflection. Provide brackets that are appropriate for inside mount. Provide shade cloth meeting the performance described in NFPA 701, small scale test. Treat steel features for corrosion resistance.

Provide Various Fiber Components with a minimum of 60 percent recycled content. Provide data identifying percentage of recycled content for various fiber components.

Provide certification of indoor air quality for roller window shades.

#### 2.1.1 Manufacturer's Qualifications

Furnish manual shades produced by the same manufacturer to provide matching appearance.

#### 2.1.2 Manually Operated Shades with Single Rollers

##### 2.1.2.1 Chain-and-Clutch Operating Mechanisms

Provide continuous-loop bead chain and clutch that stops shade movement when bead chain is released; shade to be permanently adjusted and lubricated.

##### 2.1.2.2 Bead Chains

Provide bead chain from #10 stainless steel rated to 90 lb. minimum

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

breaking strength with pull chain tensioning device complying with  
ANSI/WCMA A100.1

- a. Loop Length: Full length of roller shade.
- b. Limit Stops: Allows shade to stop when chain is released. Provide limit stops to prevent shade from being raised or lowered too far.
- c. Chain-Retainer Type: Chain tensioner, jamb mounted.

#### 2.1.2.3 Rollers

Provide corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shade bands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shade cloth for service.

- a. Roller Drive-End Location: Left side of interior face of shade.
- b. Direction of Shade cloth Roll: Regular, from back (exterior face) of roller.
- c. Shade cloth-to-Roller Attachment: Manufacturer's standard method. Adhesive attachment is not acceptable.

#### 2.1.2.4 Mounting Hardware

Provide corrosion resistant brackets or endcaps compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated. Provide hardware that allows for field adjustment or removal of shade roller tube and other operable hardware component without removal of brackets and end or center supports.

#### 2.1.2.5 Shade Cloth

- a. Shade Material: Light-filtering fabric: Openness 5 percent, Light-blocking fabric.
- b. Shade Cloth Bottom (Hem) Bar: Steel or extruded aluminum. Provide shade bar enclosed in sealed pocket of shade band material.

#### 2.1.2.6 Installation Accessories

- a. Front Fascia: L-shaped aluminum extrusion to conceal shade roller and hardware that snaps onto end caps without requiring exposed fasteners of any kind. Fascia can be mounted continuously across two or more shade bands. Provide manufacturers standard height fascia as required to conceal roller and shade band assembly when shade is fully open.
- b. Endcaps: Extruded aluminum with universal design suitable for mounting to window mullions. Provide size compatible with roller size. Provide end cap covers matching fascia/headbox finish.

### 2.2 COLOR

Provide color, pattern and texture for metal trim and shade fabric as indicated; colors listed are not intended to limit the selection of equal colors from other manufacturers.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## PART 3 EXECUTION

### 3.1 FIELD MEASUREMENTS

After becoming familiar with details of the work, verify all dimensions in the field, and advise the Contracting Officer of any discrepancy before performing the work.

### 3.2 ROLLER WINDOW SHADE PLACEMENT SCHEDULE

Provide window covering as indicated on drawings.

### 3.3 INSTALLATION

Do not install building construction materials that show visual evidence of biological growth.

Provide roller window shades, complete with necessary brackets, fittings, and hardware as indicated.

Perform installation in accordance with the approved detailed drawings and manufacturer's installation instructions. Install units level, plumb, secure, and at proper height and location relative to window units. Provide and install supplementary or miscellaneous items in total, including clips, brackets, or anchorages incidental to or necessary for a sound, secure, and complete installation. Do not start installation until completion of room painting and finishing operations.

### 3.4 CLEAN-UP

Upon completion of the installation, clean window treatments and exposed components as recommended by manufacturer. Adjust window treatment for form and appearance and proper operating condition. Repair or replace damaged units as directed by the Contracting Officer. Isolate metal parts from direct contact with concrete, mortar, or dissimilar metals. Ensure shades installed in recessed pockets can be removed without disturbing the pocket. The entire shade, when retracted, is contained inside the pocket. For shades installed outside the jambs and mullions, overlap each jamb and mullion 0.75 inch or more when the jamb and mullion sizes permit. Include all hardware, brackets, anchors, fasteners, and accessories necessary for a complete, finished installation.

-- End of Section --

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

THIS PAGE INTENTIONALLY LEFT BLANK

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

## SECTION 14 24 23

HYDRAULIC PASSENGER ELEVATORS  
05/16

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

- |                    |  |
|--------------------|--|
| ASME A17.1/CSA B44 | (2021) Safety Code for Elevators and Escalators  |
| ASME A17.2         | (2020) Guide for Inspection of Elevators, Escalators, and Moving Walks Includes Inspection Procedures for Electric Traction and Winding Drum Elevators, Hydraulic Elevators, and Escalators and Moving Walks |
| ASME B16.9         | (2018) Factory-Made Wrought Butt welding Fittings  |
| ASME B16.11        | (2016) Forged Fittings, Socket-Welding and Threaded  |

## AMERICAN WELDING SOCIETY (AWS)

- |                |  |
|----------------|--|
| AWS D1.1/D1.1M | (2020) Structural Welding Code - Steel |
|----------------|--|

## ASTM INTERNATIONAL (ASTM)

- |                 |  |
|-----------------|--|
| ASTM A53/A53M   | (2020) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless  |
| ASTM A106/A106M | (2019a) Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service   |
| ASTM E2074      | (2000e1) Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies |

## INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

- |             |  |
|-------------|--|
| IEEE C62.41 | (1991; R 1995) Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits |
|-------------|--|

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC (2018) International Building Code

#### NATIONAL ELEVATOR INDUSTRY, INC. (NEII)

NEII-1 (2000; R thru 2017) Building  
Transportation Standards and Guidelines,  
including the Performance Standards Matrix  
for New Elevator Installation

#### NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA  
20-1; TIA 20-2; TIA 20-3; TIA 20-4)  
National Electrical Code

NFPA 101 (2021) Life Safety Code

NFPA 80 (2022) Standard for Fire Doors and Other  
Opening Protectives

#### U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

36 CFR 1191 Americans with Disabilities Act (ADA)  
Accessibility Guidelines for Buildings and  
Facilities; Architectural Barriers Act  
(ABA) Accessibility Guidelines

### 1.2 SUBMITTALS

Government approval is required for submittals with a "G" or "G, AE" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. When used, a code following the "G, AE" classification identifies the AE of record will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-02 Shop Drawings

Elevator System; G, AE

Elevator Components; G, AE

Elevator Machine; G, AE

Elevator Controller; G, AE

Wiring Diagrams; G, AE

#### SD-03 Product Data

Elevator and Accessories; G, AE

Elevator Components; G, AE

Data Sheets; G, AE

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Elevator Microprocessor Controller; G, AE

#### SD-05 Design Data

Emergency Power Systems

Heat Loads

Reaction Loads

#### SD-07 Certificates

Elevator Parts and Components Price Lists; G

Warranty

Endorsement Letter

Welders' Qualifications

Elevator Controller Certification; G

#### SD-10 Operation and Maintenance Data

Elevator, Data Package 4; G

Maintenance Control Program (MCP); G

Software and Documentation; G

Submit in accordance with Sections 01 78 23 OPERATION AND MAINTENANCE DATA and 01 78 24.00 20 FACILITY ELECTRONIC OPERATION AND MAINTENANCE SUPPORT INFORMATION (eOMSI).

#### 1.2.1 Shop Drawing Requirements

Provide assembly and arrangement of elevators, accessories, and elevator components. Show location of elevator machine in machinery space (MS). Show location of elevator controller. Provide details for materials and equipment, including but not limited to operating and signal fixtures, doors, door and car frames, car enclosure, controllers, motors, guide rails and brackets, layout of hoistway in plan and elevation, and other layout information and clearance dimensions.

#### 1.2.2 Product Data Requirements

Provide manufacturers' product data for all elevator components, including but not limited to the following: elevator controller, hydraulic pump unit, hydraulic pump and motor, hydraulic cylinder, hydraulic piping and fittings, car and hall fixture buttons and switches, cab and machine room or control room communication devices, door operator, door protection system, car roller guides, and buffers. For data sheets, provide document identification number or bulletin number, published or copyrighted prior to the date of contract bid opening. Provide controller manufacturer's published procedures for performance of each and all testing required by ASME A17.1/CSA B44.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

### 1.2.3 Design Data

#### 1.2.3.1 Reaction Loads

Provide calculations by registered professional engineer for [reaction loads](#) imposed on building by elevator system. Demonstrate calculations complying with [ASME A17.1/CSA B44](#)

#### 1.2.3.2 Heat Loads

Provide calculations from elevator manufacturer, or by registered professional engineer, for total anticipated [heat loads](#) generated by all of the elevator equipment.

#### 1.2.3.3 Emergency Power Systems

Where the facility does have an emergency power system, confirm the elevators that will be connected to the emergency power system. Confirm the complete emergency power system and sequence of operation for all elevators, including operation of the elevator lobby manual selection switch. Provide wiring diagrams for building emergency power interface with elevator controls. For elevators not supplied by an emergency power system, provide manufacturers' product data for auxiliary power systems.

#### 1.2.4 Welders' Requirements

Comply with [AWS D1.1/D1.1M](#), Section 5. Include certified copies of field [welders' qualifications](#). List welders' names with corresponding code marks to identify each welder's welding work

#### 1.2.5 Maintenance Control Program (MCP)

For each elevator, prepare and provide a written Maintenance Control Program (MCP) that complies with [ASME A17.1/CSA B44](#) Section 8.6, including written documentation that details the test procedures for each and every test that is required to be performed by [ASME A17.1/CSA B44](#). Assemble all MCP documentation, and supporting technical attachments, in a single MCP package and provide in both electronic and hard copy. Assemble entire hard copy MCP in 3-ring binders. For each elevator provided, the MCP must include only documentation and instruction that apply to the elevator specified.

For each elevator, provide an additional, separate binder that includes all maintenance, repair, replacement, call back, and other records required by [ASME A17.1/CSA B44](#). The records binder must be kept in the elevator mechanical room, maintained by elevator maintenance and service personnel, and be available at all times to authorized personnel.

Provide detailed information regarding emergency service procedures and elevator installation company personnel contact information. Provide a listing of all tools to be provided to the Contracting Officer as components of the elevator system.

### 1.3 QUALITY ASSURANCE

#### 1.3.1 Qualification

Provide a designed and engineered elevator system by an [approved manufacturer with minimum 15 years of experience in manufacturing](#),

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

installing, and servicing elevators of the type required for the project. Utilize only licensed and certified elevator personnel for the installation, adjusting, testing, and servicing of the elevators.

#### 1.3.1.1 Elevator Contractor's Elevator Technicians

For elevator installations in the United States, including United States territories, perform all elevator related work under the direct guidance of a state certified elevator technician with a minimum of 15 years of experience in the installation of elevator systems of the type and complexity specified in the contract documents. Provide an endorsement letter from the elevator manufacturer, certifying that the elevator specialist is qualified. All elevator technicians must carry a current certification issued by one of the following organizations:

- a. National Association of Elevator Contractors (NAEC)
- b. National Elevator Industry Education Program (NEIEP)

#### 1.3.2 Manufacturers' Technical Support

Provide elevator components from manufacturers that provide factory training and online and live telephone elevator technical support to any elevator installation, service, and maintenance contractor. Provide elevator components from manufacturers that guarantee accessibility to all replacement and repair parts and components to any elevator installation, service, and maintenance contractor. Use only elevator component manufacturers that provide current published price lists for all elevator parts and components.

#### 1.3.3 Operation and Maintenance Data

Assemble all shop drawing and product data material into O&M Data Packages in accordance with Article SUBMITTALS. Provide two complete O&M Data Packages in hard copy and two complete electronic O&M data packages on separate CDs, in PDF format. Provide all O&M Data Packages to Contracting Officer. Include controller diagnostic documentation and software as required under Article CONTROL EQUIPMENT.

#### 1.3.4 Wiring Diagrams

Provide complete wiring diagrams and sequence of operations, which show electrical connections and functions of elevator systems. Provide one set (11 inch by 17 inch minimum size) of wiring diagrams, with individual sheets laminated in plastic and assembled in binder, to be stored in the machine room or control room cabinet. Provide one additional hard copy set and two complete electronic sets on separate CDs, in PDF format. Provide all wiring diagram sets to the Contracting Officer. Coded diagrams are not acceptable unless fully identified.

#### 1.4 NEW INSTALLATION SERVICE

Provide elevator warranty service in accordance with the manufacturer's maintenance plan, warranty requirements and applicable safety codes, for a period of 12 months after the date of acceptance by Contracting Officer. Perform this work during regular working hours. Provide supplies and parts to keep elevator system in operation. Perform service only by factory trained personnel. Provide services to include repairs, adjustments, greasing, oiling, and cleaning. Provide service log in

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

elevator machine room or control room and update throughout the one-year warranty period.

Provide 24-hour emergency service, with two hour on-site response time, during this period without additional cost to the Government.

#### 1.4.1 Periodic Elevator Certification Inspection and Testing

Provide elevator mechanic to support QEI Certified Elevator Inspector in the periodic six-month and the annual Category 1 elevator certification inspection and testing. Perform Category 1 inspection and testing no greater than 30 days prior to the end of the warranty period. Perform all elevator certification testing in the presence of QEI Certified Elevator Inspector.

In conjunction with the testing noted above, test systems for Emergency Power Operation and Earthquake Emergency Operation, as applicable. Schedule so that testing does not interfere with building operations.

### 1.5 FIRE PROTECTION SYSTEM

Coordinate interface between building fire protection system and elevator controls.

Opening protective assemblies including frames, hardware, and operation shall comply with ASTM E2074, CAN4-S104 (ULC-S104), UL10(b), and NFPA 80. Provide entrance assembly units bearing Class B or 1 1/2 hour label by a Nationally Recognized Testing Laboratory (2 hour label in Canada).

#### 1.5.1 Fire Sprinklers

Provide fire sprinklers in accordance with all applicable safety codes and with Section 21 13 13 WET PIPE SPRINKLER SYSTEMS, FIRE PROTECTION.

Pipe sprinkler piping serving these spaces in a series manner with no laterals. Locate inspectors' test connection at the end of pipe runs such that operation of the test connection will purge air from system piping.

## PART 2 PRODUCTS

### 2.1 ELEVATOR DESCRIPTION

Provide elevator system that complies with ASME A17.1/CSA B44 in its entirety, ASME A17.2 in its entirety, and additional requirements specified herein. Provide elevator system that meets or exceeds the NEII-1 Ride Quality Performance Standards Matrix (RQPSM). Comply with the RQPSM "Intermediate Performance" criteria.

Provide and install elevators in accordance with 36 CFR 1191 - ABAAS, ICC IBC, IEEE C62.41, NFPA 70 and NFPA 101 requirements.

#### 2.1.1 Elevator Design Parameters

##### 2.1.1.1 Elevator No. 1 - Emergency Medical Service Accessibility (EMSA)

Provide elevator(s) with minimum size and arrangement to accommodate an ambulance stretcher 24-inch by 84-inch with not less than 5-inch radius corners, in the open, horizontal position.



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Basis of Design: Thyssenkrupp enduraMRL 3500 elevator.

- a. Type: Holeless
- b. Rated load: 3500 lb.
- c. Rated Speed: 150 fpm
- d. Car Door Type: Single-speed side slide.
- e. Car Door Opening Width: 3 ft.-6 in. minimum.

#### 2.1.2 Cab Enclosure and Hoistway Entrance Assemblies

Provide finishes as listed below:

- a. Floor; as scheduled.
- b. Walls; stainless steel. Provide each cab wall with equally spaced and equally sized wall panels. All wall panel fasteners must be concealed.

Accessories; Provide 2-inch flat metal bar on side and rear walls on front opening cars and side walls only. Handrails shall have a stainless steel, No. 4 brushed finish.

- c. Car doors, car door returns, and wall reveals; horizontal sliding car doors reinforced with steel for panel rigidity. Hang doors on sheave type hangers with polyurethane tires that roll on a polished steel track and are guided at the bottom by non-metallic sliding guides.
- d. Door Finish: Stainless steel panels. No. 4 brushed finish.
- e. Cab Sills: Extruded aluminum, mill finish.
- f. Ceilings; Downlight type, metal pans with suspended LED downlights and dimmer switch. Number of downlights shall be dependent on platform size with a minimum of six. The metal pans shall be finished with a stainless steel, No. 4 brushed finish.
- g. Cab fronts, Return, Transom, Soffit, and Strike Material and Finishes; brushed stainless steel.

#### 2.2 ELEVATOR OPERATION

ASME A17.1/CSA B44, Introduction, Section 3, Definitions.

##### 2.2.1 Single, Two-Stop, Automatic Operation

Provide Single-phase Two-Stop Automatic Operation.

#### 2.3 SPECIAL OPERATION AND CONTROL

Provide the following special operations and control systems.

##### 2.3.1 Keys for Elevator Key Switches

Provide a minimum of twelve keys per unique cylinder used on all key switches for a single elevator. Provide keys with brass or fiberglass tags marked "PROPERTY OF THE U.S. GOVERNMENT" on one side with function of

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

key or approved code number on the other side.

### 2.3.2 Firefighters' Emergency Operation (FEO)

Provide FEO equipment and signaling devices. The designated level for the FEO Phase I key operated switch is the ground floor. In the FEO Phase I fixture, provide FEO Operating Instructions.

#### 2.3.2.1 Firefighters' Emergency Operation (FEO) Key Box

Provide flush mounted, locking, FEO Key Box of a minimum size of 5 inch W by 9 inch H by 1.5 inch D. Install at a height of 6 feet above floor level and directly above the FEO Phase I key switch. Provide box equipped with lock that uses the FEO K1 key.

### 2.3.3 Hoistway Access Operation

Provide hoistway access operation with switches at top and bottom terminal landings. Locate switch 6 feet above floor level, within 12 inches of elevator hoistway entrance frame or with the ferrule exposed when located in the elevator entrance frame.

### 2.3.4 In-Car Inspection Operation

Provide a car top inspection station with an "Auto-Inspection" switch, an "emergency stop" switch, and constant pressure "up and down" direction and safety buttons to make the normal operating devices inoperative. The station shall give the inspector complete control of the elevator. The car top inspection station shall be mounted in the door operator assembly.

### 2.3.5 Door Operation

Provide a direct or alternating current motor driven heavy duty operator designed to operate the car and hoistway doors simultaneously. The door control system shall be digital closed loop and the closed loop circuit shall give constant feedback on the position and velocity of the elevator door. The motor torque shall be constantly adjusted to maintain the correct door speed based on its position and load. All adjustments and setup shall be through the computer-based service tool. Door movements shall follow a field programmable speed pattern with smooth acceleration and deceleration at the ends of travel. The mechanical door operating mechanism shall be arranged for manual operation in event of power failure. Doors shall automatically open when the car arrives at the landing and automatically close after an adjustable time interval or when the car is dispatched to another landing. AC controlled units with oil checks, or other deviations are not acceptable.

#### 2.3.5.1 No Un-Necessary Door Operation

The car door shall open only if the car is stopping for a car or hall call, answering a car or hall call at the present position or selected as a dispatch car.

#### 2.3.5.2 Door Open Time Saver

If a car is stopping in response to a car call assignment only (no coincident hall call), the current door hold open time is changed to a shorter field programmable time when the electronic door protection device is activated.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.3.5.3 Nudging Operation

The doors shall remain open as long as the electronic detector senses the presence of a passenger or object in the door opening. If door closing is prevented for a field programmable time, a buzzer shall sound. When the obstruction is removed, the door shall begin to close at reduced speed. If the infra-red door protection system detects a person or object while closing on nudging, the doors shall stop and resume closing only after the obstruction has been removed.

#### 2.3.5.4 Door Reversal

If the doors are closing and the infra-red beam(s) is interrupted, the doors shall reverse and reopen. After the obstruction is cleared, the doors shall begin to close.

#### 2.3.5.5 Door Open Watchdog

If the doors are opening, but do not fully open after a field adjustable time, the doors shall recycle closed then attempt to open six times to try and correct the fault.

#### 2.3.5.6 Door Close Watchdog

If the doors are closing, but do not fully close after a field adjustable time, the doors shall recycle open then attempt to close six times to try and correct the fault.

#### 2.3.5.7 Door Close Assist

When the doors have failed to fully close and are in the recycle mode, the door drive motor shall have increased torque applied to possibly overcome mechanical resistance or differential air pressure and allow the door to close.

#### 2.3.5.8 Door Protection Device

Provide a door protection system using microprocessor controlled infra-red light beams. The beams shall project across the car opening detecting the presence of a passenger or object. If door movement is obstructed, the doors shall immediately reopen.

#### 2.3.6 Elevator Emergency Power Operation

Battery Lowering 10-DOC) When the loss of normal power is detected, a battery lowering feature is to be activated. The elevator will lower to a predetermined level and open the doors. After passengers have exited the car, the doors will close and the car will shutdown. When normal power becomes available, the elevator will automatically resume operation. The battery lowering feature is included in the elevator contract and does not utilize a building-supplied standby power source.

#### 2.4 ELEVATOR DRIVE SYSTEM

Provide hydraulic elevator drive system, including pump unit, piping, cylinder/plunger assembly, and associated equipment, which will operate at a maximum working pressure of 500 psi or less. Provide complete elevator system that meets or exceeds the NEII-1 Ride Quality Standard, including

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

elevator ride quality and noise levels in car and in elevator machine room and machinery space.

#### 2.4.1 Hydraulic Pump Unit

Provide self-contained pump unit, including oil-hydraulic elevator pump, electric motor, suction-line oil strainer, and structural steel outer base with tank supports and isolation pads. Provide oil tank capacity for full plunger displacement plus at least 10 gallons. Provide means to maintain oil temperature between 100 and 130 degrees F regardless of ambient temperature. Limit acoustic output in elevator machine room and machinery space to 80 dbA.

##### 2.4.1.1 Pump Motor

Provide intermittent-duty pump motor rated at 120 starts/hour. Provide motor that is sized so that the motor amperage does not exceed the motor data tag amperage in any operating condition, exclusive of acceleration and deceleration. Provide minimum of one mega ohm insulation resistance between conductors and motor frame. Provide motor and pump nameplate and data tags permanently mounted on the outside of the pump unit frame, with all data viewable without the use of mirrors or other tools.

#### 2.4.2 Hydraulic Controls and Equipment

Provide control valve, overspeed safety valve, blowout-proof muffler, and hydraulic pump discharge strainer in the hydraulic oil supply line. Provide two 1/4 turn, ball valve type manual shutoff valves. Provide one in the elevator hoistway pit and one in the machinery space.

##### 2.4.2.1 Hydraulic Control Valve

Provide constant-velocity, down-speed regulated, control valve. Down-speed regulated control valve allows the car to travel at the same speed in the down direction, regardless of the load on the elevator. In addition, the hydraulic control valve must have built-in adjustment capability to operate the elevator at 140 percent of rated speed to facilitate periodic testing of the overspeed safety valve.

##### 2.4.2.2 Hydraulic Overspeed Safety Valve

Provide overspeed safety valve in hydraulic oil supply line, directly adjacent to the hydraulic cylinder. Provide threaded pipe connections between the hydraulic cylinder and the overspeed valve. Provide valve equipped with manufacturer's manual shutoff feature. Overspeed valve must not be equipped with a manual or automatic lowering feature. Provide adjustable valve with means to seal adjustment after inspection and testing by certified elevator inspector.

#### 2.4.3 Hydraulic Piping and Accessories

Provide ASTM A53/A53M or ASTM A106/A106M, Schedule 80, black steel piping with ASME B16.9 or ASME B16.11 fittings for supply piping. Extend schedule 80 piping from the pump control valve body, inside the pump unit, to the hydraulic cylinder in the hoistway. Provide welded or threaded forged pipe fittings for all fittings and components of the hydraulic oil supply line. Provide hangers or supports for all piping and components.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.4.3.1 Containment of Hydraulic Oil Supply Line

Protect all portions of hydraulic oil supply line that are installed below ground, including portions encapsulated in concrete or covered by construction, with continuous, Schedule 80, PVC. Inside diameter of PVC must be 3 inches larger than the outside diameter of the hydraulic oil supply line pipe and couplings.

#### 2.4.4 Hydraulic Elevator Type

Provide a machine roomless, holeless type hydraulic passenger elevator. Elevators with telescopic or inverted cylinder-plungers are not acceptable and may not be used. Rope hydraulic elevator design is not acceptable and may not be used.

##### 2.4.4.1 Cylinder-Plunger (Jack) Unit

Provide a single-stage plunger of seamless steel construction. Provide cylinder with self-stabilizing mount that will support and hold cylinder plumb without the need for stabilization means at the bottom of the cylinder. Provide a threaded, 1/4 inch bleeder valve at the top of the cylinder, just below packing gland.

#### 2.5 CONTROL EQUIPMENT

##### 2.5.1 Controller

Shall be integrated in a hoistway entrance jamb. Should be microprocessor based, software oriented and protected from environmental extremes and excessive vibrations in a NEMA 1 enclosure. Control of the elevator shall be automatic in operation by means of push buttons in the car numbered to correspond to floors served, for registering car stops, and by "up-down" push buttons at each intermediate landing and "call" push buttons at terminal landings.

##### 2.5.2 Elevator Microprocessor Controller

For each individual elevator controller, and for each group controller, provide a microprocessor controller that complies with the following paragraphs. Provide controller(s) package that includes all hardware and software required for the installation, maintenance, and service of the elevator, in its' entirety. Provide verification of technical support service that the controller manufacturer provides to any licensed elevator installation, service, and maintenance company.

Provide an elevator controller from a manufacturer that provides comprehensive factory training to include controller installation, adjustment, service, and maintenance. The training must be identified as available to any licensed elevator contractor. Provide verification of an established and documented training schedule, with pricing, for factory training classes that manufacturer has provided for a minimum period of one year prior to contract award date.

The elevator controller must be identified as available for purchase and installation by any licensed elevator contractor. All components, parts, diagnostic tools, and software must be available for purchase and installation and use by any licensed elevator contractor; "exchange-only" provisions for the purchase of spare parts are not acceptable. The elevator controller manufacturer must publish an industry competitive

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

price listing for all controller parts, diagnostic tools, and software.

Provide verification of telephone and internet based technical support service that the elevator controller manufacturer provides to any licensed elevator installation, service, and maintenance company at an industry competitive price. The service must include live telephone based technical support for installation, adjustment, maintenance, and troubleshooting of the elevator controller and related elevator components. The service must be available during standard working hours.

Provide an elevator controller that is designed to automatically reestablish normal elevator operation following any temporary loss of power, regardless of duration.

#### 2.5.2.1 Elevator Controller Service Panel

To be located outside the hoistway in the controller entrance jamb and shall provide the following functionality/features:

1. Access to main control board and CPU.
2. Main controller diagnostics.
3. Main controller fuses.
4. Universal Interface Tool (UIT).
5. Remote valve adjustment.
6. Electronic motor starter adjustment and diagnostics.
7. Operation of pit motorized shut-off valve with LED feedback to the state of the valve in the pit.
8. Operation of auxiliary pump/motor (secondary hydraulic power source).
9. Operation of electrical assisted manual lowering.
10. Provide male plug to supply 110VAC into the controller.
11. Run/Stop button.

#### 2.5.2.2 Software and Documentation

Provide three copies of the manufacturer's maintenance and service diagnostic software, with complete software documentation, that will enable the same level of unrestricted access to all controllers of the same make and model, regardless of the installation date or location. Provide signed certification, from the manufacturer's corporate headquarters, that guarantees that the microprocessor software and access system will not terminate the unlimited and unrestricted access at any future date.

#### 2.5.2.3 Elevator Controller Certification

For elevator installations in the United States, including United States territories, provide an elevator microprocessor controller that has a current certificate of safety code compliance issued by the Technical Standards and Safety Authority (TSSA), Toronto, Canada.

#### 2.5.2.4 Automatic Light and Fan Shut Down

Control system shall evaluate the system activity and automatically turn off the cab lighting and ventilation fan during periods of inactivity. The settings shall be field programmable.

### 2.6 OPERATING PANELS, SIGNAL FIXTURES, AND COMMUNICATIONS CABINETS

For all panels and fixtures, provide identical and uniform panel and

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

fixture design, material, finish, and components for all elevators. For all panels and fixtures, legibly and indelibly identify all buttons, devices, and all operating positions for each device. Use engraving and backfilling, or photo etching, for button and device designations. Do not use attached signs. Provide elevator manufacturers' standard grade for all key switches unless otherwise specified. All illuminating panels and fixture components must utilize LED lighting for energy efficiency.

#### 2.6.1 Car and Hall Buttons

For all cab and landing fixture buttons, provide industry-standard, vandal resistant push buttons with positive-stop assembly design. Buttons must be minimum 3/4 inch diameter, satin-finish stainless steel, with illuminating LED halo.

#### 2.6.2 Passenger Car-Operating Panel

Provide each car with one car operating panel that contains operation controls and communication devices. Provide exposed, flush mounted buttons for the controls identified in subparagraph PASSENGER CONTROLS. Provide a lockable service cabinet for the controls listed in subparagraph SERVICE CONTROLS. Use engraving and backfilling or photo etching for button and switch designations. Do not use attached signs.

##### 2.6.2.1 Passenger Controls

In addition to ASME A17.1/CSA B44 requirements, provide the following operating controls, identified as indicated:

- a. Illuminating car-call buttons identified to correspond to landings served by the elevator.
- b. "DOOR OPEN" and "DOOR CLOSE" buttons.
- c. Red, illuminating "ALARM" button.
- d. Key-operated "Independent Service" switch.
- e. "Help" communication device to include communication between elevator cab and elevator machine room or control room.

##### 2.6.2.2 Service Controls

In addition to ASME A17.1/CSA B44 requirements, provide the following operating controls, identified as indicated:

- a. Provide a key-operated, three-position switch for "In car Inspection Operation" and "Hoistway Access". The center switch position will provide normal, automatic operation.
- b. "Car Light" switch.
- c. "Car Fan" switch with two speed settings identified.
- d. 120-volt ac 60 Hz single-phase duplex electrical outlet of ground-fault-circuit-interrupt (GFCI) design.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.6.2.3 Certificate Window

Provide a minimum 4 inch wide by 6 inch high certificate window for elevator inspection certificate. Locate window in the Service Controls door of the Car Operating Panel.

#### 2.6.2.4 Emergency Signaling Devices

Provide an audible signaling device, operable from the Car Operating Panel button marked "ALARM". The audible signaling device must have a sound pressure rating between 80 and 90 dBA at 10 ft. Provide battery backup power capable of operating the audible signaling device for at least one hour.

#### 2.6.3 Elevator In-Car Position Indicators

Provide illuminating position indicator in the Car Operating Panel.

#### 2.6.4 Elevator In-Car Direction Indicators

Provide visual direction indicators and audible car arrival signal in the elevator car door jamb, in accordance with ABA Standards. Visual indicators must be visible from the hall call fixture.

#### 2.6.5 Hall Call Landing Fixtures

Provide a hall call fixture adjacent to each elevator. Provide a single push-button for terminal landings.

##### 2.6.5.1 Designated Landing Hall Call Fixture

###### 2.6.5.1.1 Location of COMMUNICATION MEANS FAILURE (CMF) Visual Signal

When required by ASME A17.1/CSA B44, provide an elevator CMF audible and illuminating signal, and reset switch, in the FEO Designated Landing hall call fixture. Mount the signal and reset switch at a minimum of 7 inches above the "UP" hall call button.

###### 2.6.5.1.2 COMMUNICATION MEANS FAILURE (CMF) Visual and Audible Signal Operation

Provide a CMF visual and audible signal system that conforms to ASME A17.1/CSA B44. Provide continuous verification of operability of the telephone line and immediate activation of audible and visual signals when verification means determines that the telephone line is not functioning. Provide illumination of visual signal at one second intervals. Provide a minimum of 65 dBA audible signal at 30 second intervals.

###### 2.6.5.1.3 Firefighters' Emergency Operation Phase I Switch and Visual Signal

When required by ASME A17.1/CSA B44, provide an elevator Firefighters' Emergency Operation Phase I switch and illuminating visual signal in the FEO Designated Landing hall call fixture. Provide FEO Phase I visual signal that is designed with intermittent, flashing, illumination when actuated by the machine room, control room, or hoistway fire alarm initiating device. Locate FEO Phase I key switch above the CMF visual signal with a minimum of 6 inches vertical between the centerlines of the CMF signal and the FEO Phase I key switch. Locate FEO Phase I visual



Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

signal directly above the Phase I switch. In addition, locate Elevator Corridor Call Station Pictograph at top of hall call fixture.

#### 2.6.6 Emergency or Standby Power

When emergency or standby power is provided for elevator operation, provide an elevator emergency power visual indicator that conforms to ASME A17.1/CSA B44. Locate the visual signal in the Firefighters Emergency Operation fixture for each simplex elevator and for each elevator group. When an emergency power selector switch is required, provide switch in a separate, flush mounted fixture located at the designated level, in view of all elevator entrances.

### 2.7 PASSENGER ELEVATOR GUIDES, PLATFORM, AND ENCLOSURE

#### 2.7.1 Roller Guides

Provide coil-spring loaded roller guide assemblies in adjustable mountings on each side of car and counterweight frames in accurate alignment at top and bottom of frames.

#### 2.7.2 Car Enclosure Wall Panels, Return Panels, Doors, Entrance Columns, and Transom

Provide 14 Gauge minimum stainless steel cab wall panels and entrance components. Use same material and finish for all hoistway and car entrance assemblies. Apply sound-deadening material on exterior of all cab wall panels.

#### 2.7.3 Car Enclosure Top

Provide reinforced, 12 gauge minimum steel car enclosure top. Provide hinged emergency exit with lock that complies with the seismic risk zone 2 or greater design requirements of ASME A17.1/CSA B44. Locate emergency exit hinge towards the rear of the elevator cab. Design and configure the elevator cab interior ceiling to provide convenient and unobstructed access to, and use of, emergency exit from inside the elevator cab.

#### 2.7.4 Car Door

Provide 16 gauge minimum stainless steel car doors of sandwich construction with flush surfaces on car and landing sides. Provide a minimum of 2 door guide assemblies per door panel, one guide at leading and one at trailing door edge with guides in the sill groove their entire length of travel.

#### 2.7.5 Car Entrance Sill

Provide one piece brushed stainless steel. Set sills level and flush with floor finish. Use same material for hoistway and car entrance sills.

#### 2.7.6 Cab Finish Floor

Provide cab finish floor with top of finish floor flush with the cab sill.

#### 2.7.7 Car Fan

Provide 2-speed fan for car enclosure forced ventilation. Fan must be mounted in the car enclosure top.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

#### 2.7.8 Car Lighting

Utilize LED lighting for elevator car interior illumination. Provide a minimum of 10 foot-candles, measured at all areas of the car enclosure floor. Provide automatic car lighting operation that will turn off car lights after 3 minutes of inactivity. Car lights must automatically turn on upon actuation of an elevator car or hall call.

#### 2.7.9 Car Protection Pads and Hooks

Provide fire retardant, hanging car protection pads that provide protection for all car interior wall panels. Provide permanently installed studs in car that are designed for hanging the car protection pads in the car.

### 2.8 PASSENGER ELEVATOR HOISTWAY DOORS AND ENTRANCES

Provide hoistway entrance assemblies with a minimum 1-1/2 hour fire rating. Use same material and finish for all hoistway and car entrance assemblies.

#### 2.8.1 Hoistway Entrance Frames

Provide 14 gage minimum brushed stainless steel hoistway entrance frames. Solidly grout uprights of entrance ways to height of 5 feet.

#### 2.8.2 Hoistway Entrance Sills

Provide one-piece cast brushed stainless steel entrance sills. Set top of landing sill flush with top of finish floor. Solidly grout under full length of sill. Use same material for all hoistway and car entrance sills.

#### 2.8.3 Hoistway Entrance Doors

Provide stainless steel non-vision construction hoistway entrance doors with flush surfaces on car and landing sides. Provide a minimum of 2 door guide assemblies per door panel, one guide at leading edge and one at trailing edge with guides in the sill groove the entire length of door travel. Use same material and finish for all hoistway and car entrance assemblies.

#### 2.8.4 Hoistway Entrance Door Track Dust Covers

Provide sheet metal hoistway door track dust covers at each landing. Dust covers must cover top and hoistway side of door locks and door roller tracks and extend the full width of the door track and associated hardware. Dust cover sections will not exceed 3 feet in length.

### 2.9 HOISTWAY EQUIPMENT

#### 2.9.1 Car Guide Rails and Fastenings

Provide T-section type guide rails for car. Paint rail shanks with one coat of black enamel.

#### 2.9.2 Pit Equipment and Support Channels

Provide rail-to-rail pit channels to serve as mounting surface for main

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

guide rails and car buffers. Method of installation of channels, brackets and buffer mounts must be such that pit waterproofing is not punctured.

#### 2.9.3 Pit "STOP" Switch

Provide push-to-stop/pull-to-run type pit "STOP" switch.

#### 2.9.4 Traveling Cables

Suspend traveling cables by means of self-tightening webbed devices or internal suspension members.

#### 2.9.5 Hoistway Pit Ladder

Provide continuous horizontal rungs for the full height of the pit ladder.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

Install in accordance with DOD design criteria, contract specifications, manufacturer's instructions, **NEII-1** Building Transportation Standards and Guidelines, and all applicable building and safety code requirements.

##### 3.1.1 Structural Members and Finish Materials

Do not cut or alter structural members. Do not alter finish materials from manufacturer's original design. Restore any damaged or defaced work to original condition.

##### 3.1.2 Miscellaneous Requirements

Provide recesses, cutouts, slots, holes, patching, grouting, and refinishing to accommodate elevator installation. Use core drilling to drill all new holes in concrete. Finish work to be straight, level, and plumb. During installation, protect machinery and equipment from dirt, water, or mechanical damage. At completion, clean all work and spot paint.

#### 3.2 FIELD QUALITY CONTROL

The Contractor will provide and utilize a third-party licensed and certified Qualified Elevator Inspector (QEI) to conduct elevator pre-acceptance inspection and testing. The QEI must perform inspections and witness tests to ensure that the installation conforms to all applicable safety codes and contract requirements. The QEI will be directly employed by the Contractor and independent of the elevator contractor.

Upon completion, the QEI must provide written test data for all **ASME A17.1/CSA B44** Acceptance Tests and written certification that the elevator is complete and ready for final Acceptance Inspection, Testing, and Commissioning.

#### 3.3 ACCEPTANCE INSPECTION, TESTING AND COMMISSIONING

When elevator system installation is complete and ready for final inspection, notify Contracting Officer that elevator system is ready for Acceptance Inspection, Testing, and Commissioning. Provide QEI certification specified in Article FIELD QUALITY CONTROL.

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

Contracting Officer will obtain services of Naval Facilities Engineering Command (NAVFAC) QEI Certified Elevator Inspector. NAVFAC QEI will utilize the applicable NAVFAC Elevator Acceptance Inspection Form to record the results of inspection and testing and to identify safety code and contract deficiencies. Specific values must be provided for all tests required by ASME A17.1/CSA B44, ASME A17.2, and contract documents. Upon completion of inspection and testing, the NAVFAC QEI will sign a copy of the completed forms and provide the signed copy to the Contracting Officer or representative. Within 2 weeks of the inspection, the QEI will also prepare a formal inspection report, including all test results and deficiencies. Upon successful completion of inspection and testing, NAVFAC Certified Elevator Inspector will complete, sign and post form NAVFACENGCOM 9-11014/23(Rev.9-2009), Elevator Inspection Certificate.

Contracting Officer will obtain the services of a third-party QEI Certified Elevator Inspector. The QEI must utilize an Elevator Acceptance Inspection Form to record the results of inspection and all testing and to identify safety code and contract deficiencies. Specific values must be provided for all tests required by ASME A17.1/CSA B44, ASME A17.2, and contract documents. Upon completion of inspection and testing, the QEI must sign a copy of the completed forms and provide to the Contracting Officer. Within 2 weeks of the inspection, the QEI must also prepare a formal inspection report, including all test results and deficiencies. Upon successful completion of inspection and testing, the QEI will complete, sign, and provide a certificate of compliance with ASME A17.1/CSA B44.

### 3.3.1 Acceptance Inspection Support

Prime and Elevator Contractors must provide inspection support and perform all required tests, in order to demonstrate proper operation of each elevator system and to prove that each system complies with contract requirements and all applicable building and safety codes. Inspection procedures in ASME A17.2 form a part of this inspection and acceptance testing. All inspection and testing must be conducted in the presence of the Qualified Elevator Inspector (QEI).

If the elevator does not comply with all contract and safety code requirements on the initial Acceptance Inspection and Test, the Contractor is responsible for all costs involved with re-inspection and re-testing required as a result of contractor delays and discrepancies discovered during inspection and testing.

### 3.3.2 Testing Materials and Instruments

Furnish all testing materials and instruments necessary for Acceptance Inspection, Testing and Commissioning. At a minimum, include calibrated test weights, tachometer, accelerometer, hydraulic pressure gauge, 600-volt mega ohm meter, volt meter and ammeter, infrared temperature gauge, door pressure gage, dynamometer, and 20 foot tape measure.

### 3.3.3 Field Tests

#### 3.3.3.1 Endurance Tests

Test each elevator for a period of one hour continuous, automatic operation, with specified rated load in the elevator cab. During the one hour test, stop car at each floor, in both directions of travel, and allow

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

automatic door open and close operation. The requirements for Automatic Operation, Rated Speed, Leveling, Temperature Rise and Motor Amperes must be met throughout the duration of the Endurance Test. Restart the one hour test period from the beginning, following any shutdown or failure.

#### 3.3.3.2 Speed Tests

Determine actual speed of each elevator, in both directions of travel, with rated load and with no load in elevator car. Make Speed tests at the beginning and at the end of the Endurance test. Determine speed by tachometer reading or accelerometer, excluding accelerating and slow-down zones. Under all conditions, minimum acceptable elevator speed is the Rated speed specified. Maximum acceptable elevator speed is 110 percent of Rated speed.

#### 3.3.3.3 Leveling Tests

Test elevator car leveling operation and provide a leveling accuracy equal to or less than  $\frac{1}{8}$  inch at each floor with no load in car, and with rated load in car, in both directions of travel. Determine leveling accuracy at the beginning and at the end of the endurance tests.

#### 3.3.3.4 Temperature Rise Tests

Determine temperature rise of elevator pump motor and hydraulic fluid during one-hour full-load test run. Under these conditions, maximum temperature rise must not exceed acceptable temperature rise indicated on manufacturer's data plate. Start test only when equipment is within 5 degrees C of ambient temperature.

#### 3.3.3.5 Motor Ampere Tests

At beginning and end of Endurance test, measure and record motor amperage in both directions of travel and in both no-load and rated load conditions.

#### 3.3.3.6 Elevator Performance and Ride Quality Testing

Evaluate elevator performance to ensure compliance with specification requirements related to the NEII-1 Performance Standards Matrix for New Elevator Installations.

#### 3.3.3.7 Hydraulic Safety Valve (Automatic Shutoff Valve) Tests

In order to ensure consistent performance, regardless of hydraulic oil temperature, test the Hydraulic Safety Valve twice. Test once before the one-hour endurance test and once immediately after the one-hour test. For elevator certification, safety valve must perform to code in both tests.

#### 3.3.3.8 Hydraulic Pressure Tests

Check the hydraulic static pressure and rated-speed operating pressure at the hydraulic control valve, under both no load and rated load conditions.

#### 3.3.3.9 Pressure Test of Liner/Cylinder Assembly

Perform 20 psig pressure test of the completed and installed liner/cylinder assembly. Test liner/cylinder assembly as a sealed unit. Provide safety relief valve set to relieve at 20 psig; 4.5 inch diameter dial pressure gage scaled for 0 to 50 psig and calibrated to 0.5 percent

Repair Aircraft Maintenance B1455 for MH-139  
Maxwell AFB, AL

accuracy; and an air pressure admission throttle and shutoff valve. For safety, pressure test must only be performed when liner and cylinder are fully inserted and assembled in the well casing. Perform the test from remote location outside of the elevator pit. Perform test in the presence of, and witnessed by, a Certified Elevator Inspector.

-- End of Section --