

SECTION 13 34 19
METAL BUILDING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pre-engineered metal building.

1.2 RELATED WORK

- A. Section 03 30 00, CAST-IN-PLACE CONCRETE: Concrete Curbs and Foundations.
- B. Section 05 12 00, STRUCTURAL STEEL FRAMING: Structural Steel.
- C. Section 055000 METAL FABRICATIONS: Structural steel shapes and other materials.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. ASTM International (ASTM):
- A36/A36M-19.....Carbon Structural Steel
 - A242/A242M-13(2018).....High-Strength Low-Alloy Structural Steel.
 - A653/A653M-20.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron-alloy-Coated (Galvannealed) by the Hot-Dip Process
 - A992/A992M-11(2015).....Structural Steel Shapes
 - A1008/A1008M-18.....Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy
 - A1011/A1011M-18a.....Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
 - B117-19.....Operating Salt Spray (Fog) Apparatus
 - B209-14.....Aluminum and Aluminum-Alloy Sheet and Plate
 - B209M-14.....Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
 - B221-14Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Shapes and Tubes

- C553-13(2019).....Mineral Fiber Blanket Thermal Insulation for
Commercial and Insulation for Commercial and
Industrial Applications
- C1036-16.....Flat glass
- C1104/C1104M-19.....Determining the Water Vapor Sorption of Unfaced
Mineral Fiber Insulation
- D522/D522M-17.....Mandrel Bend Test of Attached Organic Coatings
- D2244-16.....Calculation of Color Tolerances and Color
Differences from Instrumentally Measured Color
Coordinates
- D2794-93(2019).....Resistance of Organic Coatings to the Effects
of Rapid Deformation (Impact)
- D3359-17.....Measuring Adhesion by Tape Test
- D4214-07(2015).....Evaluating the Degree of Chalking of Exterior
Paint Films
- G153-13.....Operating Enclosed Carbon Arc Light Apparatus
for Exposure of Nonmetallic Materials
- C. Metal Building Manufacturers Association (MBMA):
Recommended Guide Specifications for Pre-Engineered Metal Buildings
Recommended Design Practices Manual
- D. American Institute of Steel Construction (AISC):
360-16.....Specifications for Structural Steel Buildings
- E. National Fire Protection Association (NFPA):
220-18.....Standard Types of Building Construction.
- F. American Welding Society (AWS):
D1.1/D1.1M-20.....Structural Welding Code-Steel
- G. American Iron and Steel Institute (AISI): Cold Formed Steel Design
Manual Latest Edition.
- H. UL LLC (UL):
752-16.....Bullet-Resisting Equipment
- I. Department of Veterans Affairs
VA Physical Security Design Manual for Life Safety Protected Facilities
January 2015
VA Physical Security Design Manual for Mission Critical Protected
Facilities January 2015
- J. Protective Design Center

PDC-TR-08.....Single Degree of Freedom Structural Response
Limits for Antiterrorism Design

1.4 PREINSTALLATION MEETINGS

- A. Conduct preinstallation meeting at project site minimum 30 days before beginning Work of this section.
 - 1. Required Participants:
 - a. Contracting Officer's Representative.
 - b. Architect/Engineer.
 - c. Inspection and Testing Agency.
 - d. Contractor.
 - e. Installer.
 - f. Manufacturer's field representative.
 - g. Other installers responsible for adjacent and intersecting work, including foundation installers.
 - 2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
 - a. Installation schedule.
 - b. Installation sequence.
 - c. Preparatory work.
 - d. Protection before, during, and after installation.
 - e. Installation.
 - f. Terminations.
 - g. Transitions and connections to other work.
 - h. Inspecting and testing.
 - i. Other items affecting successful completion.
 - 3. Document and distribute meeting minutes to participants to record decisions affecting installation.

1.5 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
 - 1. Show size, configuration, and fabrication and installation details.
 - 2. Include erection drawings and erection manuals showing complete erection layouts.

3. Show steel and aluminum framing location, panel lengths and markings, and other component parts corresponding with erection sequence and procedures.
 4. Show connections with adjoining work.
- C. Manufacturer's Literature and Data:
1. Description of each product.
 - a. Metal panels.
 - b. Sealing materials.
 2. Installation instructions.
 3. Warranty.
- D. Samples:
1. Roof panels, 300 mm (12 inch) wide by 70 mm (2.75 inch) high sections, with factory finish in specified colors.
 2. Fasteners for roof panels.
- E. Sustainable Construction Submittals:
1. Solar Reflectance Index (SRI) for roofing.
 2. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.
 3. Low Pollutant-Emitting Materials:
 - a. Show volatile organic compound types and quantities.
- F. Certificates: Certify products comply with specifications.
1. Zinc coating on steel panels is the specified thickness.
 2. Indicating manufacturers and installers meet qualifications specified.
- G. Qualifications: Substantiate qualifications comply with specifications.
1. Manufacturer with project experience list.
 2. Installer with project experience list.
 - a. Welders and welding procedures.
- H. Delegated Design Drawings and Calculations: Signed and sealed by delegated professional structural engineer registered in the state of the project.
1. Include complete structural design analysis for structural components including but not limited computer model input and output and applicable load tables.
 2. Include manufacturer load tables indicating selected panel material, configuration and thickness meets design requirements for spans shown.

I. Operation and Maintenance Data:

1. Care instructions for each exposed finish product.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Regularly manufactures specified products.
2. Manufactured specified products with satisfactory service on five similar installations for minimum five years.

B. Installer Qualifications:

1. Regularly installs specified products.
2. Installed specified products with satisfactory service on five similar installations for minimum five years.

C. Welders and Welding Procedures Qualifications: AWS D1.1/D1.1M. and/or AWS D1.3/D1.3M.

1.7 DELIVERY

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, color, production run number, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.8 STORAGE AND PROTECTION

- A. Stack materials stored on site before erection, covered with suitable weather tight covering. Store metal panels so that any accumulated water will drain off. Do not store panels in contact with materials that might cause staining. Materials having defects or damages that effect appearance, serviceability or use will be rejected.

1.9 FIELD CONDITIONS

- A. Environment:
- B. Field Measurements: Verify field conditions affecting pre-engineered metal building fabrication and installation. Show field measurements on Submittal Drawings.
 1. Coordinate field measurement and fabrication schedule to avoid delay.

1.10 WARRANTY

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."
- B. Manufacturer's Warranty: Warrant pre-engineered metal building against material and manufacturing defects and weather intrusion.

1. Warranty Period: Two years.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Extruded aluminum walkway canopies consisting of aluminum and steel framing, metal roof, steel columns and other integrated products specified in this section, capable of meeting specified loads. Basis-of-Design: Mapes Super Lumideck (Post supported) extruded aluminum walkway canopy.

2.2 SYSTEM PERFORMANCE

- A. Delegated Design: Prepare submittal documents including design calculations and drawings signed and sealed by registered design professional, licensed in state where work is located.
- B. Design walkway canopy complying with specified performance:
 1. Load Resistance: ASCE 7; Design criteria as indicated on Structural Drawings.
 - a. Wind Uplift: UL 580; Class 90.
 - b. Maximum Deflection:
 - 1) Roof Framing: 1/180.
 - 2) Roof Panel Vertical Deflection: 1/180.
 - c. Lateral Drift: Maximum 1/200 of building height.
 2. P.E. stamped calculations are required and must be signed and sealed by an engineer licensed in NY State.
 3. Fire Resistance: ASTM E119; as component of 1 hour rated roof assembly.
 4. Water Resistance Roof Panels: ASTM E1646; No uncontrolled penetration at 137 Pa (2.86 psf), minimum, pressure differential.
 5. Seismic Loading: As determined by ASCE/SEI 7.

2.3 MATERIALS

- A. Steel Framing and Structural Steel Members: ASTM A36 or A242.
- B. Structural Steel Shapes: ASTM A992.
- C. Uncoated steel for light gage members: ASTM A1008 or ASTM A1011.
- D. Aluminum Framing Members: ASTM B221-14.
- E. Panels:
 1. Aluminum: ASTM B209M (ASTM B209), alloy 3004.
- F. Joint Sealant: Sealant type as recommend by manufacturer appropriate for each type of application.

- G. Sealing Tape: Manufacturer's standard in color to match metal building panels.
- H. Weather strips: Door manufacturer's standard approved products; closed cell neoprene or extruded vinyl.
- I. Thresholds: Aluminum, interlocking type.

2.4 PRODUCTS - GENERAL

- A. Sustainable Construction Requirements:
 - 1. Aluminum Recycled Content: 80 percent total recycled content, minimum.

2.5 FABRICATION

- A. General: Coordinate fabrication and erection of work with related work of other trades. Provide cutouts and supplemental reinforcement as required to accommodate materials and work specified in other sections of the specifications.
- B. Protection of Dissimilar Metals: Separate dissimilar materials not compatible with adjoining materials when exposed to moisture by means of coatings, gaskets, or other effective means.
- C. Framework Fabrication:
 - 1. Coordinate aluminum and steel framing required for pre-engineered metal building with structural steel shown on Drawings and specified in Section 05 12 00, STRUCTURAL STEEL FRAMING. Shop fabricate columns and related components complete with connection holes for attachment of primary and secondary framing members and bracing.
 - 2. Framing, purlins, girts, struts and miscellaneous steel members required for attachment of pre-engineered metal building panels to building structure to be roll formed members complying with ASTM A1008/A1008M. Design, size, space and install members to meet job and loading conditions. Factory-punch members with holes and furnished complete with angle clips and fastenings required for attaching to structure.
 - 3. Bolted Connections: Ribbed or high-tensile steel bolts as appropriate for each connection.
- D. Roof Panels: 2 mm (.078" inch) thick.
- E. Design roof panels with grade of steel or aluminum and configuration of cross section capable of withstanding design load conditions without exceeding specified stress and deflection limitations, with same support configuration as that in proposed building. Apply sheets with

minimum side lap of minimum one full configuration. Exposed insulation for installation on inside face of roof panels shall be semi rigid insulation.

- F. Flashing, Trim and Closures: Same material, gage and finish as adjacent wall and roof panels. Fastenings as specified for wall and roof panels. Form or mold closure strips to match configuration of the roofing or siding. Install closures wherever necessary to insure weather tight construction.

2.6 FACTORY FINISH AND PAINTING

- A. Factory finish roof panels, including related components, accessories and fastenings, as follows:

1. Prime coat weather faces of roof panels, and related components with epoxy primer, and a finish coat of Polyvinylidene Fluoride baked on coating thickness of (0.8-1.3 mils) with the following performance characteristics.

- a. Salt Spray Test: ASTM B 117, minimum (500) hours. Undercutting of paint film from score line not to exceed 2 mm (1/16 inch).
- b. Accelerated Weathering Test: ASTM G 153, Method 2, Type D apparatus minimum 2000 hours or Type EH apparatus minimum 500 hours, no checking, blistering or loss of adhesion; color change less than 5 NBS units by ASTM D 2244 and chalking less than No. 8 rating by ASTM D 4214.
- c. Flexibility: ASTM D 522, Method A, 3 mm 1/8-inch diameter, 180 degree bend, no evidence of fracturing to the naked eye.
- d. Adhesion: ASTM D 3359, Method B, for laboratory test and film thickness less than 0.01 mm 5 mil and Method A for site tests.
Impact: ASTM D 2794, no loss of adhesion after direct and reverse impact equal to 1.5 times metal thickness in mm mils, expressed in m-kg inch-pounds.

2. Finish on exposed face of liner panel, off white baked enamel suitable as finished surface or as base for field painting.

- B. Steel Framing Members: One coat of shop paint.
C. Field paint all exterior exposed fastenings to match adjacent panels.
D. Wire brush abraded surfaces and touch up with same materials as shop prime or finish coat of paint.
E. For color of finish coat, to match roof panels.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Apply barrier coating to aluminum surfaces in contact with dissimilar metals and cementitious materials to minimum 0.7 mm (30 mils) dry film thickness.

3.2 INSTALLATION - GENERAL

- A. Install products according to manufacturer's instructions and approved submittal drawings.
 - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

3.3 ERECTION

- A. Bolt settings and other dimensions to be held to a tolerance of plus or minus 3 mm (1/8 inch). Use templates or other gaging devices to assure accurate spacing of anchor bolts. Bolt field connections unless otherwise shown or specified.
 - 1. Accurately set bases and sill members to obtain uniform bearing and maintain established floor line elevation. Anchors and anchor bolts for securing members to concrete curb or structural steel sub-frame to be of black steel, set accurately to templates and of proper size to adequately resist applicable design loads at base.
- B. Roof Panels: Install roof panels with configurations running in direction of roof slope. Provide panels with no transverse joints except at juncti and at roof ridge. Lay side laps away from prevailing winds, and seal side laps and end-laps of roof with roof joint sealant. Provide flashing or and sealant at eaves and rakes at projections through roof, and elsewhere as necessary to make roof weather tight. Accomplish flashing and/or caulking in a manner that will assure complete weather-tightness and method to be used, subject to approval by Contracting Officer's Representative. Minimum end-laps for roofing and ridge caps for pre-engineered and factory-punched laps shall be 150 mm (6 inches); other minimum end-laps shall be minimum 300 mm (12 inches).
 - 1. Install insulation on interior face of roof sheets or panels as shown on approved shop drawings. Secure materials permanently in place and free of inordinate deflection. Finish work neat, clean,

uniform in appearance, and free of noticeable variations in color and texture.

- C. Fasteners for Securing Roof Panels: Fastening method, size and spacing as recommended by metal building manufacturer and as approved by Contracting Officer's Representative. Provide non-corrosive fasteners of design that will produce a weathertight connection. Clearly show fasteners and fastening method on shop and erection drawings. Field paint exterior exposed fastenings to match adjacent panels as specified in paragraph, FACTORY FINISH AND PAINTING.
- D. Weatherproofing: Joints between exterior pre-engineered metal building components and other adjacent components and materials, except flashing of metal designed to receive sealing tapes, gaskets, sealant materials, metal flashing and other methods of sealing as required to provide weathertight joints. Workmanship for installing sealants to comply with Section 07 92 00, JOINT SEALANTS. Install joint sealing and guarantee as specified. Color of sealing materials to match adjacent metal building components.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections and Tests:
- B. Field Inspections:
- C. Field Tests: Performed by testing laboratory specified in Section 01 45 29, TESTING LABORATORY SERVICES.
- D. Manufacturer Services:

3.5 CLEANING

- A. Remove excess adhesive before adhesive sets.
- B. Clean exposed surfaces. Remove contaminants and stains.
- C. Touchup Painting:
 - 1. Prepare and clean substrates according to SSPC-SP 2 or SSPC-SP 3.
 - 2. Touch up damaged factory finishes.
 - 3. Repair galvanized surfaces with galvanized repair paint.
 - 4. Repair painted surfaces with touch up primer.

3.6 ADJUSTING - NOT USED

- - - E N D - - -