

STATEMENT OF WORK

1. **SCOPE**

1.1. Portsmouth Naval Shipyard (PNSY) is seeking to lease a 25 Ton DX HVAC unit with the capability of dehumidification operation. This system is intended to provide tempered and dehumidified air to an industrial work environment at PNSY. In addition to the DH Unit, three electric powered Fan Coil Unit Heaters are required for supplemental heat. All equipment shall come with the necessary power cables to energize the equipment, equipped with Duraline quick disconnect couplers. Cable shall be sized with the appropriate gauge wire to handle the current and cable length specified in the SOW. PNSY shall provide the 20 IN flexible ductwork.

2. **REFERENCES**

2.1. **Issues of Publications** - The following documents in effect on the date of this requested proposal is a part of this specification to the extent applicable, or as specified herein. Within the specification, they shall be referred to by their basic designation only.

2.1.1. **Government**

2.1.1.1. General Specification For Integral Lifting Attachment Design

2.1.2. **Nongovernment**

2.1.2.1. AHRI Standard 410-2001

2.2. **Order of precedence** - In the event of conflict between the text of this specification and that of the references cited above, the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws or regulations unless a specific exemption has been obtained.

3. **TECHNICAL REQUIREMENTS**

3.1. **Component List**

PIECE NO.	QTY.	NAME OF PART	PARA NO.
V-01	1	25 Ton DX HVAC Unit	3.2
V-02 thru V04	3	150 KW Electric Heater- Fan Coil Units	3.3
V-05 thru V-09	4	200 FT Power Cable, with Duraline Connectors	3.4

3.2. **25 Ton DX HVAC Unit- [with Dehumidification mode]**

Physical Attributes and Unit Features

- 3.2.1. Physical Attributes: Max Dimensions 140" x 96" x 70" [L x W x H] Max Weight: 5,500 Lbs.
- 3.2.2. All Components must be fully integrated within single housing.
- 3.2.3. Process air outlets: Quantity of two at 20" Dia. Each
- 3.2.4. Process air returns: Quantity of two at 20" Dia. Each
- 3.2.5. R410a refrigerant system
- 3.2.6. Two stage cooling control
- 3.2.7. Phase monitor indication
- 3.2.8. Insulated equipment cabinet
- 3.2.9. Electric heater safety control limits
- 3.2.10. Entering and leaving air temperature sensors
- 3.2.11. Overhead certified lift frame with fork pockets

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3.2.12. Cooling coil condensate drain pan with P-trap

Process Air Requirements

3.2.13. Process Air Flow requirements: 10,000 CFM @ 7 inches External Static Pressure

3.2.13.1. 8000 CFM @ 8.0 inches External Static Pressure

3.2.14. Process Air Fan: Direct drive plenum fan. The fan shall be capable of delivering the specified flow and pressure, installed with TEFC Premium Motors, and VFD controlled.

3.2.15. Electrical Power Requirements: 1 Circuit at [460 Volt AC / 3 Phase / Full Load Amp: 180A]

3.2.16. Integral refrigeration loop, compressor, condenser coils, with DX Cooling Coil: Total Capacity = 25 Tons. Designed per reference 2.1.2.1

3.2.17. Post Heater requirements: two stage electric heating elements, thermostatically controlled to discharge air temperature set point. 50 Amps per heater: total capacity: 100 Amps @ 460 volt

3.2.18. DX Cooling Coil & Electric heating element shall be thermostatically controlled to discharge air temperature set point to meet cooling season and heating season demands. Coils shall be able to operate simultaneously to provide dehumidification.

3.2.19. Process Air inlet Filtration: Moisture Separator / Demister type filtration for purging 98% of the moisture. Paper or fibrous filtration media is not acceptable.

3.3. Electric Heater Fan Coil Units (Quantity 4)

3.3.1. Dimensions: 48" W x 92" L x 50" H

3.3.2. 1820 LBs

3.3.3. 7020 CFM Max Air Delivery @ 5.6 IN W.G. (Total Static Pressure)

3.3.4. 2618 CFM Min Air Deliver @ 6.6 IN W.G. (Total Static Pressure)

3.3.5. 150 KW Electric heating capacity

3.3.6. 4 stage electric elements, 37.5 KW each

3.3.7. 240 Degree F Air Temperature Rise

3.3.8. Unit Voltage Requirement: 460 VAC, 3 Phase, 60 Hz

3.3.9. Full Load Amperage 194.4 Amp

3.3.10. Fan Motor: 10 Hp, 1800 RPM, TEFC

3.3.11. Duct Size: 20 IN Diameter

3.3.12. Forkpocket Slots

3.3.13. Overheat rigging lifting padeyes

3.4. Power Cable

3.4.1. 200 FT 4 conductor power cable with duraline connectors. Wire gauge must be sized to handle 250Amps of current at 460 VAC, 3 Phase power at 200 FT length.

4. **NOTES:**

4.1. **Phase Rotation:** To prevent or identify an out-of-phase electrical power situation, three-phase machines shall include either: **(a)** a reverse phase relay and/or meter that identifies an out-of-phase condition and prevents operation especially applied to complex machinery in which such a condition could cause damage or **(b)** an arrow prominently displayed at an appropriate location on the machine's housing to indicate the proper direction of shaft rotation with the ability to observe a portion of the shaft after a momentary application of power (a.k.a. jog

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or bump). A reverse phase relay is not required nor desired for VFD motors, however, the VFD shall have a jog button so as to verify correct rotation.

4.2. HVAC Capacity & Utilities

- 4.2.1. **Airflow:** An integrated blower (air-handler) is required for independent operation of the unit. With the blower operating at full speed, the airflow in cubic feet per minute (cfm) combined with either the fan's external Total Static Pressure (TSP) in inches of Water Gauge (WG) and/or the motor's power rating in horsepower shall be as stated in section 3.2.
- 4.2.2. **VFD:** The unit shall incorporate variable speed control for the process air blower so that the air-handler shall be capable of adjusting the airflow to half or less of the minimum specified airflow.
- 4.2.3. **Control:** The unit shall include a permanently mounted control board accessible without opening any panels with temperature thermometer(s) and pressure gauge(s) as necessary for monitoring and control. The unit shall be completely wired for safety, capacity, and operation such as a power / switch system with circuit breakers, manual / automatic controller, motor overload protection, high / low pressure cut-outs, energy control system, and other essential components. The unit shall be fully controllable under a wide range of loads even though the diurnal and seasonal ambient temperatures varies greatly.
- 4.2.4. **Design & Component Integration:** The unit shall be rigidly mounted within a single integrated framed structure manufactured as a complete entity to include all devices, accessories, and fittings such as energy control system, motors, filters, and other auxiliary components necessary to condition ambient air and deliver that air to ancillary mechanical equipment.
- 4.2.5. **Filtration:** HVAC Units shall feature permanent metal filters for the Process Air Inlet filtration so as to withstand exposure from wet ambient conditions. Inlet fibrous (paper) filters deteriorate exceedingly soon after the first rain storm and is not an acceptable substitute. Furthermore, air-handling coils that convey fresh outside treated air directly to the industrial space pressurized compartments should feature Moisture Separator / Demister type filtration for purging 98% of the moisture on saturated days.
- 4.3. **Termination Couplers:** Process Air outlet(s) for the various ventilation systems shall terminate in nominal twenty-inch diameter (20"Ø) opening(s) either by design or by providing the proper reducer(s). This will allow for the attachment of nominal twenty inch diameter flexible ducting as provided by either the Vendor and/or the Government. The Vendor shall ensure that the flexible ducting furnished is sized to match the Process Air Inlet(s) and Process Air Outlet
- 4.4. **Process Air Doors or Covers:** Machinery with blowers for imparting energy to a Process Air stream or in-line with an air stream shall have the quantity and size of round Process Air suction inlets and discharge outlets and shall include tightly-fitting non-detachable doors (preferred) or detachable covers (permitted) for each suction inlet and discharge outlet.
- 4.5. **Construction:** Except as noted for a particular machine type, units shall be a single integrated framed structure manufactured as a complete entity to include all devices, accessories, and fittings necessary to perform the function for which it was designed. Each unit shall be capable of continuous, year-round, outdoor, unmanned operation even at minimal loading while exposed from inclement to extremely harsh weather (e.g. deep snow, strong & gusty winds, and/or heavy rain) and varied ambient conditions (-10 to +110°F & 0 to 100% RH). Machines shall meet State and federal requirements for its type such as the National Electrical Code (NEC) for electrical devices / components and the American Society of Mechanical Engineers (ASME) for pressurized vessels / components. Machines shall be modular in design so as to act as a stand-alone unit; compact so as to fit in the tight confines of a drydock; portable so as to be transported by forklift and then lifted by crane; and ruggedly constructed so as to endure a marine industrial environment. Machines shall be newly manufactured / completely refurbished and factory tested within ten (10) years.
- 4.6. **Electrical:** Electrical components shall conform to a NEMA standard (NEMA 3 or 4) that allows for unsheltered outdoor use of the unit. Each machine shall require only one type / source of electrical power (460 VAC +5% / three-phase / 60 hertz). The type of electrical power required (voltage & amperage) must be clearly indicated on the outside of the equipment, readily detected, and collocated with all other electrical information. The Vendor

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shall provide the Project Temporary Services Zone Manager with the following details: (i) electrical power type (amperage & voltage); (ii) confirming that the type of electrical connectors for three phase shall be Duraline 4M20; (iii) breaker type/size or recommended capacity for the electrical source; and (iv) whether the machine is furnished with over-current protection. Three phase powered (i.e. 460V) machines shall have panel-mounted male connectors (single Duraline 4M20) for each phase if $\leq 285A$ (preferred, permits 2/0 cable) or $\leq 385A$ (minimum, but restricted to 4/0 cable).

4.7. Lifting & Handling:

4.7.1. See reference in section 2.1.1.1.

4.7.2. Lifting & Handling Exception:

Although considered to be machinery, individual pump units, being relatively lightweight and compact, are not required to be enclosed in a caged frame. However, the remaining Lifting and Handling requirements pertain in that the unit will be handled by forklift.

4.8. **Noise Requirement:** When operating at full speed, noise levels must not be over 85 dB[A] at six feet from the unit or frame unless a quieter noise level is specified. A hearing protection safety placard shall be posted on each machine generating more than 85 dB[A] at the unit's edge or frame.

4.9. **Machinery / Equipment Tagging and Markings:** Fluid piping inlet(s) / outlet(s) must be clearly marked. Machinery and itemized equipment require tagging to show Project Number / Technical Specification Identification (ID) Number

4.10. **Vendor Identification Of Itemized And Ancillary Equipment:** The Contractor shall uniquely tag and permanently mark all of its ancillary and itemized equipment / hardware (e.g. manifolds, hose assemblies, pipe fittings, duct adapters, ducting, etc.) so as to differentiate from that owned by either the Shipyard or other Vendors.

4.11. **Dead Front Control Panel or External Controller:** Access to basic machinery controls, such as a Dead Front Control Panel or External Controller, shall be such that there is non-exposure to energized "live" electrical circuits or other components regardless of voltage, to include control circuitry, by *"a person on the operating side of the equipment"*.

5. GOVERNMENT FURNISHED MATERIAL (GFM)

5.1. Electrical power cable to supply 460VAC, 3PH, 60 Hz

5.2. Flex duct adaptors to convert the 20 IN Dia. process air duct to triple branch 8 IN Dia. Local process air duct.

6. RESPONSIBILITIES

6.1. Government

6.1.1. Equipment Technical Evaluation: C230 Engineering

6.1.2. Receipt Inspection: Contractor Officer Representative (COR) & Temporary Service Zone Manager (TSZM)

6.1.3. Coordination of equipment delivery & returns: COR & TSZM

6.1.4. Schedule equipment service, repair, and training: COR & TSZM

6.2. Contractor

6.2.1. The equipment will be operating around-the-clock under a rigorous deployment performance schedule. Within twenty-four (24) hours of initial notification of the need for repair, the Contractor shall have a knowledgeable and equipped technician on the job-site fully prepared to repair the rental equipment. The defective unit(s) shall be repaired within forty-eight (48) hours of initial notification or, if the original

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defective unit(s) cannot be made operational, replaced within seventy-two (72) hours of initial notification. If the equipment failure is not the fault of the Government, the Contractor shall bear all costs associated with its repair and/or replacement.

6.2.2. The vendor shall provide technical support to PNSY project personnel as required.

6.3. **Machinery Quality Checklist (MQC):** The vendor shall develop and provide a Machinery Quality Checklist (MQC) unique for each machine. The MQC shall include an operational checklist and Objective Quality Evidence (OQE) of Functional Performance Testing identified in 6.3.1 and 6.3.2 of each machine prior to shipment. An MQC report shall be generated for each specific piece of rental equipment being provided to fulfill the contract that shall identify the piece of equipment, Make, Model Number, and serial number, and test date of equipment. The MQC reports shall be authored by the vendor. The vendor shall provide blank templates of each MQC report and provide these to PNSY along with the Equipment Bid/Proposal package. The MQC template reports (blank) shall be reviewed for technical acceptance during the Technical Evaluation of the Vendors Bid/Proposal. Any changes to the MQC's shall be identified at the proposal review. All equipment testing and validation to support the MQC report shall be completed within one month of ship date to PNSY, or detachment location. Copies of the completed MQC reports shall be provided to PNSY Contracting Office C400 and Temporary System Design Engineer for review one week prior to equipment ship date.

6.3.1. **MQC Report Operational Checklist:** At a minimum, MQC reports shall include 2 primary sections: first is a basic functional check list to verify all equipment components are in place, intact, and in good working order. This check sheet shall include, at a minimum include items such as gaskets, new AHU filters, valves operational, pump suction and discharge pressure gauges, air bleeder valves, pump strainers cleaned, steam traps present, flow meter installation / location, Flow meter calibration certificates from a certified test lab, piping end caps to maintain cleanliness. If components (such as a flow meter) within a packaged unit configuration (such as a chiller) are found to be non-operational, damaged, etc. the original item is to be replaced or repaired, and not substituted with an auxiliary replacement system.

6.3.2. **Example Line item format of an MQC Checklist:**

Item / Component	Inspection Date	Technician Signature	Condition: Satisfactory or Unsatisfactory
Demister Air filters installed, cleaned and new condition.			
Process air door covers installed, functional.			
Refrigerant pressure within OEM specifications			

6.3.3. **MQC Report Functional Performance Testing:** The vendors shall perform a complete functional performance test of each piece of equipment. This shall include fully testing the equipment's performance capabilities. The Vendor shall measure and record the performance of the equipment. If the vendor does not have the capability to test the equipment in house, a certified Testing & Balancing agency may be subcontracted by the vendor to complete the functional performance testing of the equipment.

6.3.3.1. **Air Handling Units:** the equipment shall be powered and all electrical circuits, fuses, contactors & relays, control panel functions, control panel indicators, VFD control verified & fan speed (RPM), filter static pressure drop, motor FLA, rotational verification, heating element performance test, amperage of each heating element stage, thermostatic set point test, cooling coil leak check and pressure test, steam coil leak check and pressure test, Steam trap functional performance test.

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6.3.3.2. Pumps: Motor speed verification, rotation verification, dead head test (measure & report total dynamic pressure), valves tested operational.

6.3.3.3. Chillers: the equipment shall be powered and all electrical circuits, fuses, contactors & relays, control panel functions, control panel indicators, flow switch safety interlock function verified, Chiller run load amps, discharge water temperature set point satisfied, system leak check and pressure test.

6.4. Maintenance

6.4.1. Except for daily surveillance checks, the Contractor is responsible for all equipment preventative maintenance and repairs for the duration of the lease. Coordinate maintenance with Shipyard Temporary Service Zone Manager.

6.4.2. The vendor shall provide Preventative Maintenance (PM) schedules which are equipment specific. The PM shall meet all requirements determined by the Original Equipment Manufacturer (OEM). The vendor shall provide the PM documentation and schedules to PNSY Temporary Services Engineering Code 230 for review and approval prior to being considered for a successful Bid. The routine PM plan for each piece of equipment shall include a comprehensive list of the components to be serviced as well as identifying the service frequency. (e.g. all consumables to be replace, bearing grease points, belt replacement / tensioning, filter changes, refrigerant charge, oil changes, other lubrication, coolant refills, liquid top-offs, etc.) All PMs conducted shall include a technical service report identifying component, maintenance conducted, date, and next scheduled PM date. Copies of all reports shall be delivered to the project COR and the Temporary Service Zone Manager.

6.4.3. In addition to providing routine preventative maintenance, the vendor shall provide a service technician on a weekly basis for the duration of the lease to perform weekly equipment inspections. Weekly equipment inspections shall consist of checking all functional operating parameters of each individual piece of equipment. This shall include but is not limited to: verifying correct equipment performance and operation, checking for diagnostic or trouble codes, measuring discharge air temps, assessing DH equipment reactivation air performance, verify amperage of all electric heating coils, verification of chilled water coils performance, verify pump operation, motor speed, and differential pressure, verify HVAC process air fan speeds, DH process air discharge air temperature and RH performance, Chiller performance operation, etc. Weekly equipment inspections shall include a technical field report identifying the status of each piece of equipment and shall include all data / measurement points verified. All reports are delivered to the project COR.

6.4.4. The vendor shall provide a knowledgeable service technician to cover the repair of all equipment deficiencies and malfunctions. The response time for the repair or replacement of deficient equipment shall meet the requirements defined in section 6.2.1.

6.5. Training

6.5.1. The Contractor is responsible for and shall provide training sessions to Shipyard Personal on the operation & setup of all equipment. Training shall be available throughout the duration of the lease to accommodate equipment swap out and seasonal equipment operation.

6.6. **Deliverables** – In addition to all required equipment, technical documentation shall also be provided electronically to the project COR and Engineering. Minimally, the documentation shall consist of:

6.6.1. Lifting & Handling the equipment with its padeye(s) Certification

6.6.2. Points of contact with telephone numbers for requesting emergency repair regardless of the time or type of day

6.6.3. Technical Instructions (TIs) such as an Operations & Maintenance Manual, Controls Manual, and/or Mechanical/Electrical Manual with Schematics.

6.6.4. Operating Instructions, if not in the TI.

6.6.5. Preventative Maintenance Schedules. (See section 6.4.2)

6.6.6. MQC's (See section 6.3)

6.6.7. Equipment Data Sheet (EDS).

7. **DELIVERY / ACCEPTANCE / RETURN**

- 7.1. **Delivery** - The machinery shall be in a fully-charged, fully-assembled, ready-to-use, and in a first-class-operating condition. Machines shall be functionally tested prior to its delivery and all leased products, including machine / equipment / ancillary component accompanying machine, must fully function as intended. The machinery with its support equipment shall be delivered to the site on or prior to the request date. It is incumbent and the responsibility of the Contractor to either confirm or coordinate the date and time of delivery prior to each shipment via the Point-of-Contact (POC) as designated on the Contract and/or the Contracting Officer's Representative (COR). The Government can provide forklift services for removing machinery from Vendor's transport during work hours. Documentation with Shipyard copies shall accompany each delivery.
- 7.2. **Acceptance**- Upon satisfactory completion of inspection and test of the equipment, the authorized Government Representative (Portsmouth Naval Shipyard, Code 990 Equipment Manager) will sign and forward the acceptance document(s) to Code 220 Production Control for completion. Unloading of equipment from Vendor's transport does not signify acceptance.
- 7.3. **Start Up**- If requested by the Project, the Vendor shall: **(i)** start and run the equipment to verify its operability; **(ii)** confirm that a set of operating instructions was previously delivered; and/or **(iii)** instruct designated Shipyard personnel on how to properly run the equipment to include its operation, control, daily checks, & service contacts. For multiple sets of comparable equipment with essentially similar operation, the orientation given to a specific Project on a particular type and/or capacity of machine can be accomplished just once regardless of delivery.
- 7.4. **Security** - To be allowed onto a government Shipyard, personnel must be US citizens and in possession of appropriate personal identification. Proof of US citizenship may be necessary and can be required for access to the drydock. Allowable documentation of US citizenship is an official government issued Certificate of Birth or Naturalization (w/ raised seal & not a photocopy) or a US passport (can be expired). Vehicular access requires a non-expired personal Driver's License and appropriate vehicle identification or registration. The transport vehicle must have the company's name / logo prominently displayed. To gain access to the drydock environs, personnel must be escorted and possess / wear their own personal safety gear.
- 7.5. **Receipt Inspection Criteria** – Equipment must meet all criteria defined in this specification.
- 7.6. **Return** - The Government will provide a temporary storage location convenient for Contractor pick-up. The Government will notify the Contractor as well as the Contracting Office as to when the rental Item has been released and is available for pick-up. The last day of the rental period shall be the next normal workday after the Contractor has been so notified. The Contractor shall be responsible for shipping. The Government can provide forklift services during work hours for placing the equipment onto the vendor's transport.

8. **GENERAL**

- 8.1. **Response to Request** - As part of the response to this request, descriptive literature shall be furnished in sufficient detail to show that the proposed design will meet these specifications. Vendor submittals shall include brochures of the model being submitted, assembly sketches with critical dimensions, sketches (with dimensions) of all tooling being provided, statements of compliance with specification, and performance statements with special instructions. Supporting information shall be organized and packaged by unit. If supporting information includes multiple models the vendor shall clearly state model number of proposed unit and redact all information not applicable to proposed unit.

9. **ATTACHMENTS**

- 9.1. N/A