

SECTION 13 21 29
LABORATORY CONSTANT TEMPERATURE ROOMS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Walk-in, site-assembled, constant temperature rooms. Refer to architectural drawings for unit dimensions and arrangement. Work includes, but is not limited to, the following:
1. Cold Rooms: ~~2P149A~~ 4P305 and 3P149A.
 2. Filling and/or leveling the structural floor slab recess.
 3. Provide close off panels, with supports, from exposed faces of walk-in to adjacent walls and ceiling.
 4. Refrigeration Condensing and Cooling Units located remotely from constant temperature rooms; see Drawings for locations.
 - a. Piping, insulation, and related controls between remote condensing/cooling equipment and refrigerators.
- B. Refer to Structural Drawings for floor slab recesses for Laboratory Constant Temperature Rooms.
- C. Refer to Section 23 23 00, Refrigerant Piping, for piping and Section 23 07 11, HVAC Insulation, for piping insulation.
- D. Controls: See Section 25 10 00 for HVAC control system.
- E. Refer to Electrical Drawings for lighting and power.

1.2 RELATED WORK (Items not included in this Project Manual are available through Construction Manager upon request)

- A. Cast-In-Place Concrete Floor Slabs: Section 03 30 09.
- B. Cast Underlayment: Section 03 54 00.
- C. General Motor Requirements for Equipment: Section 11 05 12.
- D. Plumbing, including floor drains: DIVISION 22.
- E. Common Work Results for HVAC and Steam Generation: Section 23 05 11.
- F. Refrigerant Piping: Section 23 23 00.
- G. Direct-Digital Control System for HVAC: Section 25 10 00- Direct Digital/Automatic Temperature Controls.
- H. Electric Work not specified herein: DIVISION 26.

1.3 QUALITY ASSURANCE

- A. Safety Standard: Meet ASHRAE 15 requirements for refrigerant containing parts.
- B. Manufacturer Qualifications: Regularly and presently manufactures prefabricated constant temperature rooms.
- C. Electrical Components and Devices: UL listed and labeled for intended use.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
 - 1. Walk-in units, including assembly instructions.
 - 2. Condensing units, with mounting rack where required.
 - 3. Unit coolers.
 - 4. Temperature controls and alarms.
 - 5. Diagrams and details of piping, wiring and controls.
- C. Operating Test Data.
- D. Performance Testing Reports: Indicate dates and times of tests and certify test results.
- E. Maintenance and operating manuals in accordance with Section 01 00 00, GENERAL REQUIREMENTS.

1.5 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications may be referenced in the text by the basic designation only. Follow latest versions unless otherwise indicated.
- B. Air-Conditioning and Refrigeration Institute (ARI):
 - 1. 420 Unit Coolers for Refrigeration.
 - 2. 520 Performance Rating of Positive Displacement Condensing Units.
- C. American National Standards Institute/National Electrical Manufacturers Association (ANSI/NEMA):
 - 1. WD 6 Wiring Devices – Dimensional Requirements.
- D. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE):
 - 1. 15 Safety Standard for Refrigeration Systems
- E. American Society for Testing and Materials (ASTM):
 - 1. A167 Stainless and Heat-Resisting Chromium-Nickel Steel plate, Sheet and Strip

2. A480 Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
3. A793 Standard Specification for Rolled Floor Plate, Stainless Steel
4. E84 Surface Burning Characteristics of Building Materials

F. National Sanitation Foundation (NSF):

1. Standard No. 7 Commercial Refrigerators and Storage Freezers.

PART 2 - PRODUCTS

2.1 WALK-IN CONSTANT TEMPERATURE ROOM CONSTRUCTION

A. General: Prefabricated, sectional, all-metal clad, modular constant temperature rooms, designed for easy accurate field assembly, to establish temperature specified within two hours and maintain that temperature without further attention.

A-1. Room 3P139A

1-a. Operating Temperature: 0 to 4°C (32 to 39°F).

2-b. Control Point: 2.0°C (3.6°F), plus or minus.

c. Uniformity: 1.0°C (1.8°F).

2. Room 4P305

3-a. Operating Temperature: -18 to -20°C

B. Room Dimensions: As shown on drawings, minimum 15.8 square meters (171 square feet) net floor area and 2600 mm (8 foot 6 inches) minimum over-all height, unless shown otherwise.

C. Door Size: 915 mm (36 inches) wide by 1980 mm (78 inches) high.

D. Metal Finishes:

1. Inside facing of walls and ceiling, and outside facing of exposed walls: Stainless steel, minimum 0.85 mm thickness (22 gage), No. 3 finish, ASTM A167, Type 302B. Provide stainless steel close-off panels, with supports, from exposed faces of walk-in to adjacent walls and ceiling.
2. Concealed outside facings: Embossed aluminum sheet, 1 mm (0.040 inch) thick, or 0.55 thick (26 gauge) galvanized steel panel.
3. Interior floor: Stainless steel, rolled floor plate, ASTM A793:
 - a. Thickness at Base of Raised Figure:
 - 1) Nominal: 0.078 inches (1.98 mm).
 - 2) Minimum: 0.063 inches (1.60 mm).
 - b. Surface Finish (ASTM A480): Hot-rolled or cold-rolled, annealed or heat treated, and surface cleaned and polished; No. 4.
 - c. Type: 304.
 - d. Raised Figure Pattern: Angular; A, B, or C.

E. Panel Construction:

1. General: 100 mm (4 inches) thick, precisely formed interior and exterior metal pans, filled with foamed-in-place urethane foam, overall "U" factor not more than 0.09 (0.03), interchangeable, nominal 300, 600, 900 and 1200 mm (1, 2, 3 and 4 foot) widths, without wood or metal structural members. Sections to be mechanically locked in place from

- interior of room using quick-lock panel fasteners without special tools. Pre-wire panels where needed for service devices.
2. Corner panels: 90 degree angle, radiused 15 mm (0.5 inch) inside and out-side, with 300 mm (12-inch) dimensions each side.
 3. Panel Edges: Foam-in-place, tongue-and-grooved urethane to ensure tight joints. Provide gaskets on the interior and exterior of each panel along every tongue to provide a gasketed vapor seal at each panel joint.
 4. Insulation: "Pour-type" urethane, foamed-in-place thermal conductivity (k) not more than 0.017 (0.12), 97 percent closed cell, flame spread rating 25 or less, when tested in accordance with ASTM E84. Fiberglass, polystyrene, or similar materials not acceptable.
 5. Door panel and door: Provide channel thermal breaker type reinforcing steel frame around the entire perimeter of the door opening. In-fitting flush-mounted type door with dual flexible blade wiper gasket on the bottom, and a replaceable magnetic gasket on top edge and along both sides. Provide heated, double glass view windows in doors not less than 305 mm (12 inches) square. Door shall be super type, with three hinges, for rough use including aluminum diamond plate on inside of door panel and frame to a height of 914 mm (36 inches). Provide hydraulic exterior door closer to prevent slamming and ensure secure closing.
 - a. Door hinges and latch and strike assembly: Manufacturer's standard, self-closing cam-lift type hinges, for specified door size, chrome plated or polished aluminum finish. Door handle and latch made to provide for locking, but with an inside safety release mechanism to prevent anyone from being locked inside, when door is locked from outside. Safety release will not disturb vapor seal when operated nor require tools to reactivate.
 - b. Concealed, energy use selective, anti-sweat heater wire circuit: Provide sufficient heat to prevent condensation and frost formation at door jambs and exterior edges of door on all sides.
 - c. Door panel and inside lighting: Vapor-proof incandescent. Provide exterior toggle switch and pilot light, and top mounted junction box. This switch shall operate all lights in the walk-in unit. See electrical drawings for lights and installation.
 - d. Thermometer: Manufacturer's standard, 50 mm (2-inch) minimum diameter, dial type, flush mounted in door panel.
 6. Floor panel strength: Capable of withstanding 28.7 kPa (600 pounds per square foot) uniform load.
 7. Access Ports: Equip units with PVC or neoprene sleeves or gaskets for service entrances. Vapor seal access ports at interior and exterior of panels.
- F. Where compartment dimension exceed clear-span ability of ceiling panels, provide I-beam support on exterior of ceiling or spline-hangers. Install 13 mm (1/2 inch) diameter steel rods through beam/hangers and secure to structure above. Beams or posts within compartments not acceptable.
- G. Interior Equipment:
1. Shelves: Furnished and installed by VAMC except as otherwise indicated in the Medical Equipment Activation List.
 2. Rub rail wall protectors: Manufacturer's standard, at floor line of walls exposed to traffic.
 3. Work Counter with Integral Sink: Type 304 stainless steel countertop, 762 mm (30 inches) deep x 915 mm (36 inches) high x width of room with raised rim, back and side splashes, and integral sink bowl 457 x 457 x 406 mm (18 x 18 x 16 inches).
 - a. Support work counter on six (6) tubular legs, 50.8 x 50.8 x 914 mm (2" x 2" x 36 inches), with feet.

- b. Provide hot and cold water mixing faucet with swivel gooseneck spout and drain.
4. Lighting: Rapid start, vapor proof fluorescent lighting to produce not less than 753 lux (70 fc) at 1016 mm (40 inches) above floor. Mount externally ballasts and other heat-producing components except lamps.
5. Electrical Receptacles: Equip with ^{RFI 8684} four ANSI/NEMA WD 6 Configuration 5-20R duplex, ^{RFI 08698} ~~one Configuration 6-30R duplex, and one Configuration 6-30R watertight receptacle,~~ mounted 1143 mm (45 inches) above floor at fixed work surface on back wall.
6. Miscellaneous Supports: Install fastening and hanging devices for equipment specified in other sections of the Project Manual.

2.2 CONDENSING UNITS

- A. Comply with ARI Standard 520. Water cooled type, remote mounted in Mechanical Penthouse 5P102 as shown, motor driven integral compressor, motor starter, condenser, receiver, common base, and safety/operational controls. Receiver capacity not less than 125 percent of system refrigerant charge. For units racked one above the other and for units installed in a closet or mechanical room, provide a factory fabricated steel rack extending approximately 1150 mm (45 inches) above floor. For larger units provide two condensing units and unit coolers with independent refrigeration systems as shown. Do not locate compressors on top of refrigerators.
- B. Provide positive oil lubrication and oil level indicating device for each compressor. Provide water regulating valve for water cooled unit.
- C. Compressor Motor: Squirrel cage induction type of ample size for continuous operating at maximum compressor performance indicated. Provide inherent (Klixon) protection, in compressor terminal box, for each motor phase.
- D. Pressure Switches: Automatic reset low pressure switch, and automatic or manual reset high pressure cutout.
- E. Water Cooled Condensing Units:
1. High efficiency type piped and automatically controlled to operate at lower head pressures during low ambient temperature conditions, designed for indoor installation, to operate satisfactorily at winter ambient temperatures down to 6 degrees C (10 degrees F), and be provided with crankcase and receiver heaters.
 2. The condenser fans shall be driven by permanent split capacitor motors.

2.3 UNIT COOLERS

- A. Comply with ARI Standard 420. Units shall be UL listed, forced-ventilation type integral defrosting, internal or external refrigerant distributor, single or multiple fans and motors, drip-pan, deflectors, aluminum or baked-enamel steel housing, hangers, and all accessories. NSF approved.
- B. Motors: Permanent split capacitor type in accordance with Section 11 05 12, General Motor Requirements for Equipment. Provide motors with thermal overload protection. Provide manual starting switch.
- C. Drain Pans: Galvanized sheet steel. Provide additional drain pans under uncovered refrigerant connections, and interconnect them with main drain pan.

D. Defrost Provision:

1. Refrigerators: Defrost shall occur during compressor off cycle with evaporator fan running continuously.

2.4 CONTROLS

- A. Mount regulating and indicating devices in console or panel adjacent to and no higher than door. Calibrate controls, thermometer, and recorder in increments of 1°C (1.8° F)/
- B. Operating Temperature Control: Self-contained remote bulb, liquid filled, reverse acting, adjustable, and sealed mercury-bulb-type thermostat, with three-degree C differential.
- C. Alarm and Override Temperature Control: Equip with sensing devices and circuits that take over control initiate corrective action, and activate an audible signal device in event of temperature variation in room of more than 3°C (5°F) from set temperature. Signal automatically resets on return of room to set operating temperature.

2.5 AIR CIRCULATION SYSTEM

RFI:08678 - Paragraph 2.5-A does NOT apply to Building 8 Constant Temp. Rooms

- A. System consists of positive pressure ceiling plenum, floor-level air returns, blower, ducts, and diffusion devices, and provides means of regulating fresh air draw into room.
 1. Equip air intake and exhaust with a replaceable filter.
 2. Air recirculated continuously by lifetime-lubricated blower(s).
 3. Minimum 42 m³/s (25 cfm) supply and exhaust air volume.

2.6 REFRIGERATION SYSTEM

- A. Equip constant temperature rooms specified for operation below ambient temperature with hermetically sealed refrigeration system designed for continuous operation in ambient temperature of 35°C (95°F) that is capable of maintaining lowest temperature specified.
 1. Defrost: Cycle not more than 15 minutes' duration. Temperature of room will not rise more than 1°C (1.8°F) during defrost.
 2. Install components to enable access for servicing.
 3. Insulate refrigerant lines to prevent formation of condensate, and protect exposed lines with stainless steel cover.
 4. Equip with refrigerant vapor detectors and two monitor and alarm devices. Locate on monitor and alarm device local to the equipment and one in the electrical communication closet servicing the equipment.

2.7 DEHUMIDIFICATION SYSTEM

- A. Equip with fully automatic mechanical or regenerating chemical dehumidification system capable of attaining condition required below to ambient; maximum of 50% relative humidity.

2.8 PIPING, PIPE INSULATION, AND REFRIGERANT AND OIL CHARGES

- A. Comply with refrigerator manufacturer's recommendations and Section 23 23 00, REFRIGERANT PIPING. Include piping between refrigerators and remote condensing/cooling units.

2.9 EQUIPMENT IDENTIFICATION REQUIREMENTS

- A. Refer to Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION.
- B. Identify all walk-ins, refrigeration equipment and alarm devices.

PART 3 - EXECUTION

3.1 EXAMINATION & PREPARATION

- A. Ensure substrates are level and at proper elevation. Beginning installation constitutes refrigerator installer's acceptance of the substrates.
 - 1. Fill and/or level structural floor slab recess with suitable material as necessary to achieve proper elevation including co-planar finish floor elevation of the walk-in unit and adjacent room.

3.2 INSTALLATION

- A. Assemble walk-in units and install refrigeration equipment as described in the respective manufacturer's instructions. Make panel joints tight and seal panel penetrations to prevent air passage, condensation, and frosting.
 - 1. To extent achievable, mount pipe, conduit, and instrumentation on exterior and pass through neatly drilled penetrations to lights or other devices.
 - 2. Coordinate unit floor components with sink supply piping and drains, provided under Division 22 - PLUMBING, for proper installation.
- B. Piping, Pipe Insulation, and Refrigerant: Provide in accordance with Section 23 23 00, REFRIGERANT PIPING.
- C. Controls Installation: As specified in DIVISION 25 - INTEGRATED AUTOMATION.

3.3 REFRIGERATOR START-UP, PERFORMANCE TESTS, AND INSTRUCTIONS

- A. Start-up Temperature Reduction: On start-up, reset room thermostats daily for a maximum temperature drop of 8 degrees, on C scale (15 degrees on F scale) per day down to 2 degrees C (36 degrees F), and a maximum of 6 degrees on C scale, (10 degrees on F scale) per day between 2 degrees C (36 degrees F) and final operating temperature.
- B. Perform test in accordance with Section 01 00 00, GENERAL REQUIREMENTS. Operate each system and record conditions hourly for eight hours. Submit the following information:
 - 1. Station, Building and System Identification, Contractor, Date and Time.
 - 2. Compressor nameplate data: Make, model, horsepower, RPM, refrigerant and charge in pounds.
 - 3. Compressor operation: Approximate percentage running time, pressure gage readings, actual amps (starting and running), condenser water temperature in and out, or condenser entering air temperature.
 - 4. Room temperatures.
 - 5. Defrost and drain functions of unit coolers. Demonstrate alarm functions.

- C. By arrangement with the Resident Engineer, 24 hours in advance, use start-up and test period for required operation and maintenance instructions to VA personnel in accordance with Section 01 00 00, GENERAL REQUIREMENTS.

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