PART 1 - GENERAL

1.1 DESCRIPTION
   A. Walk-in site assembled, refrigerators and freezers for Dietetics. Refer to architectural drawings for dimensions and arrangement of units.
   B. Refer to the architectural drawings for refrigeration equipment schedules and installation details.
   C. Refer to Section 23 23 00, REFRIGERANT PIPING, for piping and insulation.
   D. Refer to electrical drawings for lighting.

1.2 RELATED WORK
   A. Quarry tile floor: Section 09 30 13, CERAMIC TILING.
   B. Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION.
   C. Section 23 23 00, REFRIGERANT PIPING.
   D. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

1.3 QUALITY ASSURANCE
   A. Sanitary Standard: Walk-in units in food service shall comply with NSF Standard No. 7 and bear the NSF label.
   B. Safety Standard: ASHRAE 15 describes requirements for refrigerant containing parts.

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. 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 are referenced in the text by the basic designation only.

B. Air-Conditioning and Refrigeration Institute (ARI):
   420-00 .................. Unit Coolers for Refrigeration.
   520-04 .................. Performance Rating of Positive Displacement Condensing Units.

C. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE):
   15-10 .................. Safety Standard for Refrigeration Systems

D. American Society for Testing and Materials (ASTM):
   A167-99 (R2009) ........ Stainless and Heat-Resisting Chromium-Nickel Steel plate, Sheet and Strip
   E84-11 ................. Surface Burning Characteristics of Building Materials

E. National Sanitation Foundation (NSF):
   7-09 .................. Commercial Refrigerators and Storage Freezers.

PART 2--PRODUCTS

2.1 WALK-IN REFRIGERATOR/FREEZER CONSTRUCTION

A. General: Prefabricated, sectional, all-metal clad, modular, designed for easy accurate field assembly.

B. Room Dimensions: As shown on drawings, minimum 4.5 square meters (48 square feet) net floor area and 2600 mm (8 foot 6 inches) minimum overall height, unless shown otherwise.

C. Door Sizes: 1220 mm (48 inches) wide by 1980 mm (78 inches) high, except doors for freezers with floor area less than 14 square meter (150 square feet) may be 914 mm (36 inches) (nominal) wide.

   SPEC WRITER NOTE: Use quarry tile floor in new construction where adjacent areas will have quarry tile floors.

D. Floor Finish: Non-slip Quarry tile with cove base, on grout, flush with adjoining floor. Refer to Section 09 30 13, CERAMIC TILING for quarry tile work. //

E. 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 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: 1.9 mm thick (14 gauge) galvanized steel // except NSF units without quarry tile floor shall be 1.6 mm thick (16 gage) //.

F. 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 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, quick-lock panel fasteners. Provide special locking wrench and press-fit caps to close wrench holes.

2. Corner panels: 90 degree angle, radiuses 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 assure tight joints. Provide gaskets on the interior and exterior of each panel along every tongue to provide a gasketed 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 are not acceptable. For freezer spaces on grade or above grade with fill, provide floor heating system beneath floor insulation to prevent frost formation and subsequent floor heaving.

5. Door panel and door: Provide channel thermal breaker type reinforcing steel frame around the entire perimeter of the door opening. Door shall be an infitting flush-mounted type with dual flexible blade wiper gasket on the bottom, and a replaceable magnetic gasket on the top edge and along both sides. Provide heated, double glass view windows in refrigerator doors. Door shall be super type, with three hinges, for rough usage 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 assure secure closing.

a. Door hinges and latch and strike assembly: Manufacturer's standard, self-closing cam-lift type hinges, for 1220 mm (48 inch) door, chrome plated or polished aluminum finish, 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.

b. Concealed, energy use selective, anti-sweat heater wire circuit: Provide sufficient heat to prevent condensation and frost formation at the door jambs and exterior edges of the 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 refrigerator/freezer. See electrical drawings for lights and installation.

d. Thermometer: Manufacturer's standard, 50 mm (2-inch) minimum diameter, flush mounted in door panel.

6. Pressure relief port: Provide for all freezers operating at -18 degree C (zero degree F), or lower, two-way type ports, to allow for an increase or decrease of air pressure on the interior of the freezer to equalize with air pressure on the exterior. Provide ports with automatically controlled, UL approved anti-sweat heaters. Complete device shall carry Underwriters Label and be assembled ready for connection. Install port in a wall panel away from the direct air stream flowing from the coils.

7. Floor panel strength: Capable of withstanding 28.7 kPa (600 pounds per square foot) uniform load.

G. Wherever 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 are not acceptable.

H. Shelves //, other than for canteen walk-ins //: Furnished and installed by VAMC.

//I. Shelves for canteen refrigerators and freezers: Modular, mobile with 127 mm (5 inch) heavy duty casters, stainless steel, meeting NSF standards. Provide 4 tier units, 356 mm (14 inches) wide by 1524 mm (60 inches) high on two long sides and one short side of walk-in unit. //

J. Rub rail wall protectors: Manufacturers standard, at floor line of walls exposed to traffic.

K. Entrance Ramps: Provide built-in ramps where walk-in floor panels are installed on existing floors.
2.2 CONDENSING UNITS

A. Comply with ARI Standard 520. Air cooled, water cooled or combination air/water cooled type as shown, motor driven integral compressor, motor starter, condenser, receiver, common base, and safety/operational controls. Receiver capacity shall be not less than 125 percent of system refrigerant charge. For units racked one above the other and for units installed in a closet, provide a factory fabricated steel rack extending approximately 1150 mm (45 inches) above the floor. For larger freezers provide two condensing units and unit coolers with independent refrigeration systems as shown. Do not locate compressors on top of refrigerator or freezers.

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 phase of motor.

D. Pressure Switches: Automatic reset low pressure switch, and automatic or manual reset high pressure cutout.

E. Air Cooled Condensing Units:
   1. High efficiency type piped and automatically controlled to operate at lower head pressures during low ambient temperature conditions, designed and weather-proofed for outdoor installation, to operate satisfactorily at winter ambient temperatures down to ____ degrees C (F), and be provided with crankcase and receiver heaters.
      SPEC WRITER NOTE: Insert temperature of 6 degrees C (10 degrees) below the 99% column in ASHRAE Handbook weather data.
   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. Unit coolers for kitchen walk-in units shall be 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. For freezer units provide electrically heated drain pan.

D. Defrost Provision:
   1. Refrigerators: Defrost shall occur during compressor off cycle with evaporator fan running continuously.
   2. Freezer defrost: As shown on drawings. Defrost by heating elements incorporated into coil and drain pan. Operation of evaporator fan shall be delayed after defrost cycle until evaporator is cold enough to freeze any water droplets that are on evaporator coil. Defrosting unit shall be automatically controlled by an electric clock, refrigerant suction gas pressure sensing device, or by means of sensing increased air resistance due to ice accumulation.

2.4 ROOM TEMPERATURE CONTROL
   A. As shown on the drawings.
   B. Thermostat: Self-contained remote bulb, liquid filled, reverse acting, adjustable, sealed mercury bulb type, with three degree differential. Thermostat may be mounted on the unit cooler wall with remote bulb positioned in inlet air to the evaporator.

2.5 ROOM TEMPERATURE ALARMS
   A. Provide a local audible and visual over-temperature alarm with silencer switch, for each refrigerator/freezer. Provide contacts for a remote alarm at Engineering Control Center. Locate devices in a stainless steel enclosure by the door. Where shown on the drawings provide an additional remote alarm located in an adjacent corridor.
   B. Thermostat: Same as for temperature control, with bulb located near the ceiling of the room.

2.6 PIPING, PIPE INSULATION, AND REFRIGERANT AND OIL CHARGES
   Refer to Section 23 23 00, REFRIGERANT PIPING.

2.7 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.

   SPEC WRITER NOTE: Where both, a freezer and a refrigerator is required, then the preferred configuration is as specified. The designer may modify to have separate entry to refrigerator and freezer, if so required by the user.
2.8 SPECIAL REQUIREMENTS FOR FROZEN FOOD FREEZERS

A. Provide entrance to frozen food freezers through a refrigerator of a higher temperature. Locate thermometer serving frozen freezer outside of higher temperature refrigerator used as entrance vestibule.

SPEC WRITER NOTE: Verify that floor heating system if electrical, for freezer and meat refrigerators is shown on the electrical drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Assemble walk-in units and install refrigeration equipment as described in the respective manufacturer's instructions. Make panel joints tight and seal all panel penetrations to prevent condensation or frosting.

1. Unit cooler: NSF approval requires that the unit be suspended at 90 mm (3-1/2 inches) minimum distance below the ceiling to allow cleaning the top of the unit cooler.

2. To the extent feasible, mount pipe, conduit, and instrumentation on the exterior and pass thru neatly drilled penetrations to the lights or other devices.

B. Piping, Pipe Insulation and Refrigerant: Provide in accordance with Section 23 23 00, REFRIGERANT PIPING.

C. Controls Installation: As specified in Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.

3.2 REFRIGERATOR/FREEZER START-UP, AND PERFORMANCE TESTS AND INSTRUCTIONS

A. Start-up Temperature Reduction: On start-up, reset the 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 the 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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