

SECTION 11 41 21
WALK-IN COOLERS AND FREEZERS

PART 1 - GENERAL**1.1 DESCRIPTION:**

- A. This section specifies walk-in site assembled, refrigerators and freezers.

1.2 RELATED WORK:

- A. Section 11 05 12, GENERAL MOTOR REQUIREMENTS FOR EQUIPMENT.
- B. Section 23 05 11, COMMON WORK RESULTS FOR HVAC.
- C. Section 23 23 00, REFRIGERANT PIPING: Piping, pipe insulation and refrigerant.
- D. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.
- E. Refer to the construction documents for the refrigeration equipment schedules and installation details.
- F. Refer to Division 26, ELECTRICAL for lighting and power requirements.

1.3 WARRANTY:

- A. Construction Warranty: Comply with FAR clause 52.246-21, "Warranty of Construction".
- B. Refrigeration Compressor Warranty: Manufacturer agrees to repair or replace compressors that fail in materials or workmanship within one year from the date of final acceptance by the Government. Failure includes but is not limited to inability to maintain set temperature. Submit compressor warranty.

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. Operational test reports.
- D. Final field test reports.
- E. Maintenance and operating manuals in accordance with Section 01 00 00, GENERAL REQUIREMENTS.
- F. Manufacturer's compressor warranty.

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):
 - 420-08.....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. ASTM International (ASTM):
 - A240/A240M-14.....Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and For General Applications
 - E84-11.....Surface Burning Characteristics of Building Materials
- E. National Sanitation Foundation/American National Standard (NSF/ANSI):
 - 7-09.....Commercial Refrigerators and Storage Freezers
- F. National Fire Protection Association (NFPA):
 - 70-14.....National Electric Code
- G. Underwriters Laboratories, Inc. (UL):
 - 207-08 (R2014).....Refrigerant-Containing Components and Accessories, Nonelectrical
 - 471-10 (R2014).....Commercial Refrigerators and Freezers
 - 1598-03 (R2012).....Luminaires

PART 2 - PRODUCTS**2.1 PERFORMANCE REQUIREMENTS:**

- A. UL Certification: Provide electric and fuel-burning equipment and components that are evaluated by UL for fire, electric shock, and casualty hazards according to applicable safety standards, and that are UL certified for compliance and labeled for intended use.
- B. Regulatory Requirements: Install equipment to comply with the following:

1. ASHRAE 15, "Safety Code for Mechanical Refrigeration."
2. NFPA 70, "National Electric Code."

2.2 WALK-IN REFRIGERATOR/FREEZER CONSTRUCTION:

- A. General: Prefabricated, sectional, all-metal clad, modular, designed for easy accurate field assembly.
- B. Provide walk-in units conforming to UL 471. Floor panel walk-in refrigerators and freezers with appropriate insulated floor assembly and stainless steel finish floor.
- C. Panel Construction:
 1. General: Interchangeable, 1219 mm (48 inch) maximum width, 101 mm (4 inch) thick, filled with insulation. Double seal serrated neoprene rubber gaskets to assure air and vapor tight joints.
 2. Corner panels: 90 degree angle, radiuses 15 mm (0.5 inch) inside and outside, with 305 mm (12-inch) dimensions each side.
 3. Panel edges: Foam-in-place, tongue-and-grooved urethane to assure tight joints. Provide double seal serrated neoprene rubber gaskets to assure air and vapor tight joints on the interior and exterior of each panel along every tongue.
 4. Insulation: 101 mm (4 inch) minimum foamed-in-place polyurethane with manufacturer's rated "K" factor of not more than 0.15, free rise design of not less than 27 kg per cubic meter (1.7 pounds per cubic foot), or in-place density of not less than 32 kg per cubic meter (2 pounds per cubic foot). Provide floor screeds with minimum of 63 mm (2-1/2 inches) of foamed insulation.
5. Door Panel and Door:
 - a. Provide channel thermal breaker type reinforcing steel frame around the entire perimeter of the door opening.
 - b. Door to 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.
 - c. Provide heated, double glass view windows in refrigerator doors.
 - d. Door to be equipped with a minimum of three (3) hinges, for rough usage including stainless steel diamond plate on

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- inside of door panel and frame to a height of 915 mm (36 inches).
- e. Provide hydraulic exterior door closer to prevent slamming and assure secure closing.
 - f. Door hinges and latch and strike assembly: Manufacturer's standard, self-closing cam-lift type hinges, for 1219 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.
 - g. 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.
 - h. Thermometer: Manufacturer's standard, 50 mm (2-inch) minimum diameter, dial type, flush mounted in door panel.
6. Pressure relief port: Provide for all freezers operating at 18 degree C (0 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 to carry UL 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 Panels:
- a. Floor Panel Strength: Capable of withstanding 28.7 kPa (600 pounds per square foot) uniform load.
 - b. Provide prefabricated floor panels of the same construction as wall/ceiling except with 16 gauge stainless steel skin, sealed watertight. Provide nonskid floor strips at top 24" of the ramp. Provide prefabricated floor panels with sloping interior floor ramps at exterior entrance doors, panels flush with surrounding building floor. Furnish two (2) sets of erection tools, compatible with fasteners, with each unit.
- 8. Panel Construction and Finishes:**
- a. **22 Gauge - Interior wall, Exposed Wall, Interior Ceiling, Exterior door frame, Exterior Door.**

- b. 26 Gauge - Corrosion Resistant stucco Embossed Coated Steel - exterior wall.**
 - c. 26 Gauge Smooth Galvanized - Ceiling topside, floor bottom side.**
 - d. 16 Gauge - Stainless Steel - Interior Floor**
- D. 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.
- E. Rub rail wall protectors: Manufacturer's standard, at floor line of walls exposed to traffic.
- F. Lights: Provide high-efficiency rated two-tube fluorescent lamps in vapor-proof fixtures with safety shields. Lighting must conform with UL 1598. Provide diffuser and ballast capable of operating in minus 23 degrees C (10 degrees F) temperature. Lights must run full length of walk-in starting 610 mm (24 inches) from front panel and extending within 610 mm (24 inches) of back panel. Run between shelf rows to obtain 323 lux (30 foot-candles) at floor level regardless of any interior furnishings.

2.3 CONDENSING UNITS:

- A. Comply with ARI Standard 520. Air cooled type as shown in construction documents.
- B. Provide motor driven integral compressor, motor starter, condenser, receiver, common base, and safety/operational controls.
- C. Receiver capacity not to be less than 125 percent of system refrigerant charge.
- D. For units racked above each other and for units installed in a closet, provide a factory fabricated steel rack extending approximately 1143 mm (45 inches) above the floor.
- E. Provide two (2) condensing units and unit coolers with independent refrigeration systems for freezer when shown on construction documents or recommended by manufacturer due to size or freezer.
- F. Do not locate compressors on top of refrigerators or freezers.

- G. Provide positive oil lubrication and oil level indicating device for each compressor. Provide water regulating valve for water cooled unit.
- H. Compressor Motor: Squirrel cage induction type of ample size for continuous operating at maximum compressor performance. Provide inherent protection, in compressor terminal box, for each phase of motor.
- I. Pressure Switches: Automatic reset low pressure switch, and automatic or manual reset high pressure cutout.
- J. 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 -4.9 degrees C (23.2 degrees F), and be provided with crankcase and receiver heaters.
 - 2. The condenser fans are to be driven by permanent split capacitor motors.

2.4 UNIT COOLERS:

- A. Comply with ARI Standard 420. Units to be UL listed, forced-ventilation type. Provide 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 to 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 and 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 to occur during compressor off cycle with evaporator fan running continuously.
 - 2. Freezer defrost: Defrost by heating elements incorporated into coil and drain pan. Operation of evaporator fan to be delayed

after defrost cycle until evaporator is cold enough to freeze any water droplets that are on evaporator coil. Defrosting unit to 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.

2.5 MONITORING ALARM SYSTEM:

A. Provide an electronic monitoring and alarm system for each section of each unit. The system should report status to the Building Automation System via BAS Interface. The unit should include factory-installed hardware and software to enable the BAS to monitor and display unit status and alarms via an open protocol BACnet MSTP data interface.

1. System Components: Detecting thermostat, master control panel, interconnecting wiring, remote audible alarm, and defrost compensator. Provide dials showing temperatures and pilot lights, warning lights, switches, transformer, and buzzer, all as a part of the master control panel. Locate master control panel and remote audible alarm as indicated on construction documents. Provide power fuse to protect system components.
2. System Operation: Set alarms at 5 degrees C (10 degrees F) above and below specified operating temperatures.

B. Personnel Alarm: For each unit, provide separate audible alarm system operable from inside unit, for use of personnel unable to exit unit. Locate remote audible alarm where indicated on construction documents.

2.6 EQUIPMENT IDENTIFICATION REQUIREMENTS:

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

2.7 SPECIAL REQUIREMENTS FOR FREEZERS:

- A. Provide a separate entrance to freezers

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.

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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. 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. Initial Start-up and Operational Test:
1. Provide all lubricants and accessories before initial start-up. Start and operate all equipment.
 2. Follow the manufacturer's procedures and place the systems under all modes of operation.
 3. Supplement initial charges of lubricating oil to assure maximum operating capacity.
 4. Adjust all safety and automatic control instruments. Record manufacturer's recommended readings hourly.
 5. Operational tests must cover a period of not less than three (3) days. Submit operational test report.
- B. Test Reports: Submit the final field test reports for each system tested, describing test apparatus, instrumentation calculations, and equipment data based on industry standard forms. Include in data:
1. Compressor and air moving device ampere readings.
 2. Power supply characteristics, including phase imbalance, with 1/2 percent accuracy.
 3. Thermostatic expansion valve superheat-value as determined by field test.
 4. Sub-cooling.
 5. High and low refrigerant temperature switch set-points.
 6. Monitoring alarm system.
 7. Low oil pressure switch set-point.
 8. Defrost system timer and thermostat set-points.
 9. Moisture content.

10. Ambient, condensing and coolant temperatures.
 11. Capacity control set-points.
 12. Field data and adjustments which affect unit performance and energy consumption.
 13. Where final adjustments and settings cannot be permanently marked or drilled and pinned as an integral part of device, include adjustment and setting data in test report.
- C. By arrangement with the Contracting Officer Representative (COR), 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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