

SECTION 11 41 21
WALK-IN COOLERS AND FREEZERS

SPEC WRITER NOTES:

1. Delete between // // if not applicable to project. Also delete any other item or paragraph not applicable in the section and renumber the paragraphs.
2. VA Standard equipment schedules and installation details may be shown on architectural or mechanical drawings.
3. Show dimensions and arrangement of units on architectural drawings.

PART 1 - GENERAL

1.1 DESCRIPTION

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

1.2 RELATED WORK

- A. Section 09 30 13, CERAMIC TILING: Quarry tile floor.
- B. Section 11 05 12, GENERAL MOTOR REQUIREMENTS FOR EQUIPMENT.
- C. Section 23 05 11, COMMON WORK RESULTS FOR HVAC.
- D. Section 23 23 00, REFRIGERANT PIPING: Piping, pipe insulation and refrigerant.
- E. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.
- F. Refer to the construction documents for the refrigeration equipment schedules and installation details.
- G. // Refer to the construction documents for the fire suppression system. //
- H. 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 // five (5) // // // years from the date of final acceptance by the Government. Failure includes but is not limited to inability to maintain set temperature. Submit compressor

warranty. Walk-in Panels to be warranted for // five (5) // ten (10) // years.

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):
 - 15-10-16.....Safety Standard for Refrigeration Systems
- D. ASTM International (ASTM):
 - A240/A240M-20.....Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and For General Applications
 - E84-20.....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):

70-20.....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

SPEC WRITERS NOTES:

1. Provide floor panel walk-in refrigerators and freezers, or floorless walk-in refrigerators and freezers installed over insulated floors.
2. For floorless units provide insulated floor under each walk-in refrigerator and freezer as if the unit were a freezer.
3. Use floorless design where possible. When refrigerators are provided in existing buildings or over crawl spaces, floors must be prefabricated insulated floor panels.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NSF Standards: Provide equipment that bears NSF Certification Mark certifying compliance with applicable standards.
- B. 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.
- C. 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 manufactured for food service use conforming to NSF/ANSI 7, UL 207, and UL 471. // Floorless, with insulated floor screeds, installed over insulated floors. // // Floor panel walk-in refrigerators and freezers with appropriate

insulated floor assembly // and // // polished aluminum // // galvanized skin // 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 aluminum diamond plate on 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 1.9 mm (0.78 inch; 14 gauge) // galvanized skin // stainless steel // aluminum diamond treadplate //, sealed watertight. // Provide nonskid floor strips 101 x 915 mm (4 x 36 inch) and field apply at 305 mm (12 inch) spacing in all aisles. // Provide prefabricated floor panels which are // laid on // // recessed // 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. // Floorless Refrigeration Floors:
- a. Make floorless refrigerator floors flush with the surrounding building floor. Provide the built-in floor with // two (2) // // three (3) // // four (4) // // // layers of // 50 mm (2 inch) // // mm (inch) // thick polyurethane board insulation with staggered joints set in mastic. //

SPEC WRITER NOTE: Use quarry tile floor in floorless units.

9. //Floor Finish: Non-slip quarry tile with cove base on grout flush with adjoining floor. Refer to Section 09 30 13, CERAMIC PORCELAIN TILING for quarry tile work. //
- 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 LED light fixtures with safety shields. Lighting must conform with UL IP-65. Provide with diffuser and be capable of operating in minus 23 degrees C (-40 degrees Fahrenheit) temperature. Lights must run 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, water cooled or combination air/water 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 // // degrees C (// // degrees F), and be provided with crankcase and receiver heaters.

SPEC WRITER NOTE: Insert
temperature of 6 degrees C
(10 degrees F) below the 99% column
in ASHRAE Handbook weather data.
 - 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 demand defrost controllers for 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 with heated tape over condensate drain line.
- D. Defrost Provision:

1. Refrigerators: Defrost to be as needed with Demand defrost controllers and occur during compressor off cycle with evaporator fan running continuously.
2. Freezer defrost: Defrost to be by demand defrost with Evaporator Efficiency Controller.

2.5 MONITORING ALARM SYSTEM

- A. Provide an electronic monitoring and alarm system for each section of each unit.
 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.

SPEC WRITER NOTE: Where both a freezer and a refrigerator are required, configuration specified below is preferred. The designer may modify to have separate entry to refrigerator and freezer, if required by the user.

2.7 SPECIAL REQUIREMENTS FOR FREEZERS

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

2.8 REFRIGERATION RACK SYSTEM

- A. Digital Rack System
- B. The RDT UL-Listed, air-cooled rack system designed for outdoor installation. The unit shall be pre-wired for a single point electrical connection with a main fused disconnect. The

- refrigeration unit shall be housed in a weather-protected compact structural galvanized steel frame. The unit shall include individual dedicated air-cooled condensers. Condensers shall be aluminum fin/copper tube designed to operate at 15 degrees T.D. The exterior housing shall be brushed 304 stainless steel with one-piece stainless-steel lift out louver panels for easy access to service. Entire galvanized metal frame shall be pre-assembled, welded and cleaned. Lifting points shall be integrated in the feet at each corner to facilitate installation. Condenser fan motors shall be mounted within the enclosure.
- C. All Primary multiplex compressors shall be digital semi-hermetic or scroll type and factory assembled to operate with the refrigerant specified.
 - D. All Conventional, stand-by, and/or parallel compressors shall be semi-hermetic or scroll type and factory assembled to operate with specified refrigerant blend.
 - E. Systems to have a back-up compressor for 100% compressor redundancy and all parallel systems to have a minimum of 60% compressor redundancy built in.
 - F. Compressors and refrigeration piping will be installed in such a manner as to eliminate noise with vibration eliminators in refrigeration lines, as needed. Each compressor unit shall be equipped with; oversized receiver, dual pressure control for cut-in cut-out, a ball-bearing fan motor, fixed head pressure control, suction filter, liquid line sight glass, liquid line drier, crankcase heaters, headmaster controls and/or fan cycling, liquid line inlet and outlet valves, defrost cycle and armored super hose connections (in lieu of capillary tubes).
 - G. All digital systems to include digital rack sequencer controller, oil separators. Low temp compressors supplying refrigeration wrapped rail cold pans or blast chillers shall be equipped with suction accumulator. If stand-by compressor system is manual change over, isolation valves to be supplied on suction and discharge line at the compressor inlet and outlet.
 - H. All systems utilizing semi-hermetic compressors providing refrigeration for blast-chillers and any parallel or automatic change over compressor system shall be equipped with oil

- separator, oil reservoir, oil filter, and compressor oil management system.
- I. All refrigerant lines shall be extended to one side of the package in a neat and orderly manner. All tubing shall be securely supported and anchored with non-corrosive coated clamps. All joints must be brazed, not soldered. All piping and controls shall be factory pressure-tested with nitrogen at 175 PSI.
 - J. Evaporator coils shall be a direct expansion type. Evaporators used will be all "Underwriters Laboratory Listed" supplied from factory with an electric expansion valve, solenoid valve, suction transducer, and Eco-Smart on-demand defrost controller, pre-wired and pre-piped under nitrogen pressure and designed for use with the refrigerant specified. Isolation ball valves are to be installed on the liquid and suction lines at each evaporator coil.
 - K. All field piping installed as per factory standards and the sizing of the piping shall meet proper velocities as per factory standards. Insulation will be foam type 25/50 smoke and fire type. Medium temperature will use 3/4" thick wall, low temperature will use 1" thick wall and sub-cooled liquid lines will use 1/2" thick wall insulation. All insulation shall be jacketed with Aluminum (complying with division 15000,) 1-1/2" overlap and secured with bundling ties. All jacket elbows to be roll formed. All field piping installed with plastic bushing wherever steel to copper tubing comes together. Include all labor, material, equipment, tools, refrigerant, oil, and other required accessories for the complete installation of the systems as shown and specified. Interconnection of all accessories accomplished for ease of servicing.
 - L. After installation and before charging, evacuate all piping systems to a 500-micron evacuation. After evacuation, charge system with nitrogen and maintain pressure of 150% working pressure for 6 hours. Cap off, install pressure gauge and hold for 24 hours minimum. Re-evacuate, hold for 6 hours, charge and make electronic detector test all joints.
 - M. Final wiring of connections, conduit and/or pull boxes, provided under applicable electrical and plumbing contracts. See R-1 drawing for wiring schematic for field wiring.

- N. Included shall be a full one (1) year warranty for all parts by factory, full one (1) year compressor warranty by compressor manufacture and a 90-day warranty on labor on the entire refrigeration package only from the day of final acceptance of the installation as previously specified. Factory labor warranty does not cover installation.

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. 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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