

SECTION 15650

REFRIGERATION EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Refrigeration equipment for insulated cold storage rooms including necessary accessories.
- B. Related Section:
 - 1. 11400 - Insulated Cold Storage Rooms.
- C. Removal of Existing Refrigerants by M-DCPS: Before starting work on refrigeration equipment or related components containing refrigerants other than R-22, provide at least 2 working days (48 hours) notice to M-DCPS Project Manager and M-DCPS Office of Facilities Operations - Central Maintenance.

1.02 SUBMITTALS

- A. Submit properly identified manufacturer's literature including technical data and catalog cuts before starting work.
- B. Submit complete detailed Shop Drawings including installation details.
 - 1. Moisture indicating sight glass, liquid line solenoid at the evaporator, vibration eliminators, suction line accumulator, head pressure control, suction to liquid heat exchanger, refrigeration suction line [P] traps, and other refrigerant line accessories shall be shown on drawings.
- C. Submit, before starting work, a current, legible and clear copy of the following required documentation from the Environmental Protection Agency (EPA):

NOTE TO SPECIFIER: The following EPA Technician Certification requirement is mandatory. EPA Refrigerant Recycling/Recovery Equipment requirements have been in effect since August 12, 1993.

Project Name
Project No.

**M-DCPS MASTER
SPECIFICATION GUIDELINES**

March 03
15650 - 1

1. EPA Technician Certification.
2. EPA Refrigerant Recycling/Recovery Equipment affidavit.

D. Provide manufacturer's completed "Start-up Check List" before starting unit.

E. Provide manufacturer's completed "System Operational Check List" after completion.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements (EPA):

1. EPA Technician Certification: According to EPA Section 608, Clean Air Act Amendments of 1990, individuals who service, repair, or dispose of air conditioning and refrigeration equipment (including installers, contractor employees, in-house service personnel, and anyone else who performs installation, maintenance, or repair of HVAC/ refrigeration equipment) shall be certified by EPA by November 14, 1994.
2. Refrigerant Recycling/Recovery Equipment: According to EPA Section 608, Clean Air Act Amendments of 1990, owners of refrigerant recycling or recovery equipment (including contractors and others responsible for HVAC equipment servicing) shall submit a signed statement from the appropriate EPA Regional office, stating they have sufficient certified equipment to perform on-site recycling or recovery.

1.04 MAINTENANCE

A. Contractor shall assure the entire system is dry and properly charged with oil and refrigerant at all times for 1 year from date of substantial completion.

B. Provide 24 hour service for this period and perform necessary work only by qualified refrigeration mechanics.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Evaporator Units:

Project Name

M-DCPS MASTER

March 03

Project No.

SPECIFICATION GUIDELINES

15650 - 2

1. Walk-in Cooler: Bohn Model _____ or accepted equivalent.
2. Walk-in Freezer: Bohn Model _____ or accepted equivalent.

B. Air Cooled Condensing Units:

1. Walk-in Cooler: Copeland Model _____ or accepted equivalent.
2. Walk-in Freezer: Copeland Model _____ or accepted equivalent.

2.02 EQUIPMENT

A. Evaporator Units:

1. Factory assembled complete with propeller fans, direct driven extended surface coil with copper tubes and copper or aluminum fins, and thermostatic expansion valve.
 - a. Casing: Encase components in a suitable apparatus casing constructed of minimum 0.051 aluminum with access panels properly located for inspection and maintenance.
 - b. Fan Bearings: Accessible.
 - c. Drain Pan: Minimum 0.064 aluminum equipped with metal sheathed electric heating elements.
 - d. Electric Defrost System: Automatic controlled, time initiated, temperature terminated defrost cycle including required contactors, switches, and timers.
2. Suspension: Design suspension from ceiling construction of insulated cold storage rooms to not allow migration of moisture to the insulation within the ceiling panel above.
3. Evaporators shall not blow towards doors.
4. Temperature Requirements:
 - a. Walk-In Cooler: 35 degrees F.
 - b. Walk-In Freezer: Minus 10 degrees F.
5. Refrigerants:
 - a. HFC 134a.

b. HCFC 22.

B. Air-Cooled Condensing Units:

1. Factory assembled air-cooled, horizontal air flow, extended surface fin-and-tube type, with copper tubes and copper or aluminum fins, installed in a reinforced casing, complete with mounting stands.
 - a. Fins: Securely, mechanically bonded to the tubes.
 - b. Condenser Fans: Propeller type, direct driven.
 - c. Condenser Balance: Balance each condenser with its compressor for the operating conditions specified and equip with modulating controls for maintaining compressor head pressure when the ambient is low.
 - d. Coils: Design for 225 psig operating pressure and test at 300 psig.
 - e. Compressors: Accessible hermetic type of necessary capacity to maintain the specified temperatures under maximum outside conditions with the refrigerated space fully loaded.
 - f. Refrigeration Capacity: According to ASHRAE 23.
2. Liquid Receivers:
 - a. Steel with electric-welded seams, adequately supported and equipped with inlet, outlet, drain, charging valve, safety valve with connection, and liquid-level indicator.
 - b. Sand blast inside surfaces to remove excess scale.
 - c. Inside Diameter more than 6 Inches: Construct according to ASME Boiler and Pressure Vessel Code, Section VIII for Unfired Pressure Vessels.
 - d. Capacity: Minimum of 25 percent more than the capacity of the fully charged system.
3. Weatherhoods and Bases: When condenser unit is shown on Construction Documents for rooftop or other outdoor application exposed to the weather, provide galvanized heavy-duty base and aluminum weatherhood as recommended by the condenser unit manufacturer.
4. Temperature Requirements:
 - a. Walk-In Cooler: 35 degrees F.
 - b. Walk-In Freezer: Minus 10 degrees F.
5. Refrigerants:

- a. HFC 134a.
- b. HCFC 22.

C. Freezer Condensate Drain Line:

- 1. Wrap with heater cable or band to prevent condensate line freeze-up.
 - a. Heater: Moisture-proof vinyl enclosure holding properly spaced heater cable in separate channel.
 - b. Heater Cable: UL listed, with a density of minimum 8 watts and a maximum of 12 watts per lineal foot.
- 2. Install condensate drain trap immediately outside the box.

PART 3 EXECUTION

3.01 INSPECTION

- A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.02 INSTALLATION

- A. Install refrigeration equipment according to manufacturer's recommendations and accepted Shop Drawings.
- B. Evacuating, Drying, and Charging System:
 - 1. Evacuate the system with a vacuum pump specifically manufactured for this purpose.
 - a. A refrigeration compressor will not be accepted as an auxiliary vacuum pump.
 - b. Use a mercury manometer, electronic vacuum indicator, or a wet bulb indicator with the vacuum pump indicating efficiency of the pump and to determine pressure in the system.
 - 1) When using a monometer or electronic vacuum indicator, it must register 0.10 millimeters of mercury, or lower.
 - 2) When using a wet bulb indicator, it must

register 35 degrees F. or lower.

c. Maintain 1500 microns or lower for 5 hours.

2. Connect a line to the discharge side of the vacuum pump of sufficient length to be immersed in a small bottle of oil.

a. When using a pump, bubbles in the oil show whether air is removed from the system.

b. Leaks:

1) If bubbles continue after a reasonable time, recheck for leaks in the system.

2) Final leak check should be made by pulling a maximum of 0.10 millimeters of mercury, stopping vacuum pump and allowing to stand for a minimum of 1/2 hour.

3) If the pressure builds up more than 0.10 millimeters of mercury, repeat the pressure leak test to find and repair leaks.

3. The line connecting the vacuum pump to the system being evacuated shall not be less than 1/2" soft copper tubing nor more than 10 feet long.

a. Break vacuum on system by charging a small amount of the refrigerant into the system until pressure is brought to 0 psig.

1) Repeat steps above.

2) Install a high pressure gage at the compressor discharge service port during charging operations.

b. Each refrigeration system shall be completely dry and maintained dry as indicated by the approved moisture indicator.

C. Lubrication:

1. Refrigerant oil added to the condensing unit shall have been delivered to the location in sealed containers.

2. Check the oil level in the compressor between 24 hours and 48 hours after the refrigeration equipment has been placed in operation.

3. Unit shall not be run unless a mechanic is present.

Project Name

M-DCPS MASTER

March 03

Project No.

SPECIFICATION GUIDELINES

15650 - 6

- a. Mechanic shall be present until fixture has reached operating temperature.
 - b. Temperature pull-downs shall be according to manufacturer's recommendations.
 - c. Mechanic shall shut off equipment.
- 4. Before operating any motor, or other moving parts, lubricate with the proper oil or grease where necessary and check refrigerant charge.
 - 5. Perform dehydration procedures for refrigerant lines not drawing vacuum down to 100 microns.
 - 6. Start-Up:
 - a. After 1 month from start-up, remove a sample of oil from each refrigeration system and submit this sample marked and placed in a suitable container to the A/E for inspection and approval.
 - 1) If the sample is determined to be contaminated, perform test pressure described above again with a complete new charge of refrigerant and oil at no cost to the Board.
 - a) At the time of the oil check, replace the dehydrators and check the suction line filters for excessive pressure drop.
 - b) If any suction line filter is found with an excessive pressure drop, replace filter until the system is acceptable to the A/E.

3.03 FIELD QUALITY ASSURANCE

A. Testing:

- 1. Where refrigerant lines are over 50 feet long, blow out lines with dry nitrogen before making final connection at the condensing unit to insure against dirt, scale, or rags being in lines. Keep pressure below 150 pounds.
 - a. When refrigerant connections have been completed compressor section valve shall be front seated and the receiver outlet valves shall be closed and the balance of system tested to 150 pounds pressure or higher pressure if required by code with all other valves wide open.
 - b. Accomplish pressure test by charging enough

refrigerant into the low side to raise the pressure in the system to a minimum of 20 psig and then introducing dry nitrogen to raise the pressure to the required test pressure.

c. Attach a suitable pressure regulating valve to the nitrogen cylinder to reduce the pressure of the testing gas to the required test pressure.

d. Leaks:

1) Test joints for leaks with a Halide Torch or an approved electronic leak detector.

2) If the system is free of leaks, release pressure.

END OF SECTION