

SECTION 235350 - REFRIGERATION PIPING AND SPECIALTIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Refrigerant piping
- B. Refrigerant
- C. Refrigerant pipe specialties

1.2 SUBMITTALS

- A. Submit product data indicating general assembly of specialties, including manufacturer's catalogue information.
- B. Submit data indicating pipe sizing.
- C. Submit test reports under provisions of Section 15000.

1.3 REGULATORY REQUIREMENTS

- A. Conform to ANSI/ASME B31.9.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store piping and specialties in shipping containers with labeling in place.
- B. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.

PART 2 - PRODUCTS

2.1 REFRIGERANT PIPING

- A. Copper Tubing: ASTM B280, Type ACR.
 - 1. Fittings: ANSI/ASME B16.22 wrought copper.
 - 2. Joints: ANSI/ASTM B32, solder Grade 95TA.

2.2 REFRIGERANT

- A. Refrigerant: Coordinate with equipment supplier.

2.3 MOISTURE AND LIQUID INDICATORS

- A. Indicators: Single port type, UL listed, with copper or brass body, flared or solder ends, sight glass, color coded paper moisture indicator with removable element cartridge and plastic cap; for maximum working pressure of 500 psi, and maximum temperature of 200 deg F.

2.4 VALVES

- A. Diaphragm Packless Valves: UL listed, globe or angle pattern, forged brass body and bonnet, phosphor bronze and stainless steel diaphragms, rising stem and handwheel, stainless steel spring, nylon seat disc, solder or flared ends, with positive backseating; for maximum working pressure of 500 psi and maximum temperature of 275 deg F.
- B. Packed Angle Valves: Forged brass, forged brass seal caps with copper gasket, rising stem and seat with backseating, molded stem packing, solder or flared ends; for maximum working pressure of 500 psi and maximum temperature of 275 deg F.
- C. Packed Ball Valves: Two piece bolted forged brass Body with Teflon ball seals and copper tube extensions, brass bonnet and seal cap, chrome plated ball, stem with neoprene ring stem seals; for maximum working pressure of 500 psi and maximum temperature of 300 deg F.

2.5 STRAINERS

- A. Straight Line or Angle Line Type: Brass or steel shell, steel cap and flange, and replaceable cartridge, with screen of stainless steel wire or Monel reinforced with brass; for maximum working pressure of 430 psi.

2.6 CHECK VALVES

- A. Globe Type: Cast bronze or forged brass body, forged brass cap with neoprene seal, brass guide and disc holder, phosphor-bronze or stainless steel spring, Teflon seat disc; for maximum working pressure of 425 psi and maximum temperature of 300 deg F.
- B. Straight Thru Type: Brass body and disc, phosphor-bronze or stainless steel spring, neoprene seat; for maximum working pressure of 500 psi and maximum temperature of 200 deg F.

2.7 PRESSURE RELIEF VALVES

- A. Straight Thru or Angle Type: Brass body and disc, neoprene seat, factory sealed and stamped with ASME UV and National Board Certification NB; for standard 400 psi setting; selected to ANSI/ASHRAE 15.

2.8 FILTER-DRIERS

- A. Replaceable Cartridge Angle Type: ANSI/ARI 710, UL listed, brass shell and bronze cap, perforated brass shell and molded desiccant filter core; for maximum working pressure of 350 psi.
- B. Permanent Straight Thru Type: ANSI/ARI 710, UL listed, steel shell with molded desiccant filter core, for maximum working pressure of 400 psi.

2.9 SOLENOID VALVES

- A. Valve: ARI 760, pilot operated, copper or brass body and internal parts, synthetic seat, stainless steel stem and plunger assembly, with flared, solder, or threaded ends; for maximum working pressure of 500 psi. Stem shall permit manual operation in case of coil failure.
- B. Coil Assembly: UL listed, replaceable with molded electromagnetic coil, moisture and fungus proof, with surge protector and color coded lead wires, integral junction box.

2.10 EXPANSION VALVES

- A. Angle or Straight Thru Type: ARI 750; design suitable for refrigerant, brass body, internal or external equalizer, bleed hole, adjustable superheat setting, replaceable inlet strainer, with replaceable capillary tube and remote sensing bulb and remote bulb well.
- B. Selection: Evaluate refrigerant pressure drop through system to determine available pressure drop across valve. Select valve for maximum load at design operating pressure and minimum 10 deg F superheat. Select to avoid being undersized at full load and excessively oversized at part load.

2.11 RECEIVERS

- A. Internal Diameter 6 inch and Smaller: ANSI/ARI 495, UL listed, steel, brazed; 400 psi maximum pressure rating, with tappings for inlet, outlet, and pressure relief valve.
- B. Internal Diameter Over 6 inch: ANSI/ARI 495, welded steel, tested and stamped in accordance with Section 8D of the ANSI/ASME Boiler and Pressure Vessels Code; 400 psi with tappings for inlet, outlet and pressure relief valve.

2.12 FLEXIBLE CONNECTORS

- A. Corrugated stainless steel hose with single layer of stainless steel exterior braiding, minimum 9 inches long with copper tube ends; for maximum working pressure 400 psi.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

- A. Install refrigeration specialties in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and not interfere with use of space.
- D. Group piping whenever practical at common elevations and locations. Slope piping one percent in direction of oil return.
- E. Provide non-conducting dielectric connections when joining dissimilar metals.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Provide clearance for installation of insulation and access to valves and fittings.
- H. Provide access to concealed valves and fittings.
- I. Insulate piping.
- J. Locate expansion valve sensing bulb immediately downstream of evaporator on suction line.
- K. Provide external equalizer piping on expansion valves with refrigerant distributor connected to evaporator.
- L. Install flexible connectors at right angles to axial movement of compressor.
- M. Fully charge completed system with refrigerant after testing.
- N. Provide electrical connection to solenoid valves.
- O. Do not cut structural members for refrigerant routing without approval from structural engineer.
- P. Seal all penetrations in rated assemblies as required to maintain the rating.

3.3 APPLICATION

- A. Provide line size liquid indicators in main liquid line leaving condenser, or if receiver is provided, in liquid line leaving receiver.
- B. Provide line size strainer upstream of each automatic valve. Where multiple expansion valves with integral strainers are used install single main liquid line strainer.
- C. Provide shut-off valve on each side of strainer.
- D. Provide permanent filter-driers in low temperature systems and systems utilizing hermetic compressors.
- E. Provide replaceable cartridge filter-driers vertically in liquid line adjacent to receivers with three valve bypass assembly to permit isolation of driers for servicing.
- F. Provide replaceable cartridge filter-driers, with three-valve bypass assembly. Provide filter-driers for each solenoid valve.
- G. Provide solenoid valves in liquid line of systems operating with single pump-out or pump-down compressor control, in liquid line of single or multiple evaporator systems, and in oil bleeder lines from flooded evaporators to stop flow of oil and refrigerant into the suction line when system shuts down.
- H. Provide refrigerant charging (packed angle) valve connections in liquid line between receiver shut-off valve and expansion valve.
- I. Utilize flexible connectors at or near compressors where within piping configuration does not absorb vibration.

3.4 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 15000.
- B. Test refrigeration system in accordance with ANSI/ASME B31.5.
- C. Pressure test system with dry nitrogen to 200 psig. Perform final tests at 27 inches vacuum and 200 psig using electronic leak detector. Test to no leakage.

3.5 PIPING DESIGN

- A. It shall be the responsibility of the Contractor to coordinate with the Equipment Manufacturer for the design and sizing all refrigerant piping for the air conditioning equipment. The Contractor shall consider length of run and fitting loss when sizing refrigerant piping. Provide all accessories recommended by the Equipment Manufacturer for systems that meet the Equipment Manufacturer's definition of a long-line application.

- B. The installing Contractor is required to field-route the refrigerant piping to the units concealed in the walls and above ceilings. All penetrations in rated assemblies shall be sealed in an approved manner to maintain the rating.

END OF SECTION 235350