

SECTION 232313 - REFRIGERANT PIPE, VALVES AND SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specification sections, apply to work of this section.

1.2 SCOPE

- A. Provide refrigerant piping systems, complete in all respects, between the system components and connected equipment.

1.3 RELATION TO OTHER WORK

- A. Refer to the section, "General Mechanical Provisions", for related requirements. Refer to other sections of Division-23 and to all other applicable portions of the Drawings and Specifications.

1.4 SHOP DRAWINGS

- A. Refer to the Section entitled "General Mechanical Provisions".

PART 2 - PRODUCTS

2.1 COPPER PIPE

- A. Refrigerant system piping shall be refrigerant grade, dehydrated and sealed, seamless, uniformly dead soft temper.

2.2 FITTINGS

- A. Refrigerant grade, wrought copper, long radius, solder joint type.

2.3 SOLDER

- A. Silver brazing alloy (Sil Fos) Fed. Spec. AA-S-56Id.

2.4 FLUX

- A. Non-corrosive, specifically designed for silver brazing.

2.5 ACCESS VALVES

- A. Schrader type designed for use with quick coupler hose fittings and provided with individual cap.

PART 3 - EXECUTION

3.1 PIPE SIZES

- A. Refrigerant pipe sizes which may be shown on drawings are nominal. Provide sizes not less than sizes indicated and in compliance with size recommended by the manufacturer(s) at the connected equipment. Provide change in sizes if such change is in accord with manufacturer's recommendation and with Architect/Engineer's approval. Size piping to maintain minimum velocity of 500-fpm in horizontal lines and 1000 fpm in vertical risers for proper oil return; provide double suction risers and hot gas risers as may be necessary to accomplish this.

3.2 REFRIGERANT SPECIALTIES

- A. Refrigerant valves, driers, expansion valves, and similar items shall be provided with each system. Where refrigerant access valves are not furnished by the manufacturer, they shall be field installed to enable charging and checking the system.

3.3 JOINTS AND CONNECTIONS

- A. General: All joints and connections shall be made permanently refrigerant tight.
- B. Solder Joints: Cut tubing square using tubing cutters, with sharp cutting wheels, so as not to crimp the tubing ends. Remove all burrs using a pipe reamer and taking care not to flare the ends of the tube. Thoroughly clean the outside of the pipe and the inside of the fitting using a fine sand cloth. Apply non-corrosive paste flux to the cleaned surfaces immediately and apply silver solder and heat in accordance with manufacturer's instructions. Use care not to damage equipment or refrigerant specialty items when making up joints (protect from excessive heat).
- C. Scale Prevention: During brazing, keep pipe system full of inert gas to prevent scale formation.
- D. Mechanical Joints: Where the Contractor uses refrigerant tubing sets, follow the manufacturer's installation instructions explicitly, including the use of special tools, when making up the joints. Where precharged tubing and equipment is provided, do not cut into the system to install access valves.

3.4 HANGERS AND SUPPORTS

- A. Refer to other sections describing hangers and supports. Isolate copper tubing from contact with any dissimilar metals.

3.5 EVACUATION AND CHARGING

- A. When other than completely factory charged equipment and piping systems are used, they shall be evacuated and charged as follows: Charge the system with dry nitrogen and refrigerant and leak test all joints including factory piping within the units. Repair all leaks by disassembling and remaking the joint. After all leaks are corrected, evacuate the system to an absolute pressure of 0.2" mercury. System shall hold this vacuum for two hours with no noticeable rise in pressure. After passing vacuum test, break vacuum twice using refrigerant and re-evacuate for a minimum of two hours each time. Charge the system in the manner and with the type and amount of refrigerant recommended by the manufacturer and in accordance with accepted refrigeration practice.

3.6 REFRIGERANT PIPING CONDUIT

- A. Install any refrigerant piping which is below slab or grade in Schedule 40 PVC piping. Size conduit as necessary to properly install piping. Provide long bend sweeps. Install so that conduit will drain and not trap water. Protect ends of conduit from entry by vermin, insects and water.

3.7 OTHER REQUIREMENTS

- A. Arrange piping generally as shown and such that service access is facilitated. Keep refrigerant lines as short and direct as possible with a minimum number of joints. Provide sleeves through floors, walls or ceilings, sized to permit installation of full-thickness insulation; seal air tight after installation of piping and insulation.
- B. Provide flexible piping arrangement in hot gas discharge line of compressor. Such arrangement shall consist of a piping loop or similar measure to prevent transmission of objectional vibration.
- C. Provide a removable core filter-drier in liquid line. In-line filter-driers are acceptable in individual circuits of less than 10-ton nominal capacity. Provide a full size valved bypass around this filter-drier. Provide shut-off valves to isolate the filter drier while flow is through the bypass and also a shutoff valve in the bypass so that filter-drier can be put into use.
- D. Provide a refrigerant charging connection in the liquid line upstream from the filter-drier.
- E. Provide a moisture indicating sight glass in the liquid line downstream from the filter-drier. Install in vertical line if possible and a sufficient distance downstream from any valve such that the resulting disturbance does not appear in the glass.
- F. Provide a filter-drier with isolating shut-off valves and with valved bypass only if compressor is not equipped with a suction line filter or screen.
- G. Keep piping free from traps unless otherwise indicated. Install vertical pipe plumb. Pitch horizontal piping only where slope is desirable.
- H. Provide shut-off valves at inlet and outlet to all condensers, receivers and evaporators to permit isolation for service. If possible, use angle valves to minimize pressure drop. Use angle valves in all cases at receivers. Use globe valves only when angle valves are impractical.
- I. Provide solenoid valves upright in horizontal lines only, unless their design allows installation in vertical pipe.

- J. Where compressor(s) do not have pump down control and the compressor(s) associated evaporator coil(s) do not have bottom suction header connections and the evaporator coil(s) are located above the compressor(s), then loop suction lines(s) to top level of coil to prevent liquid slugging.
- K. To prevent erratic operation of thermal expansion valve, provide a suction line trap next to evaporator coil suction outlet with expansion valve bulb located between coil and trap. Provide only in suction lines which are level leaving coil outlet or which rise on leaving coil outlet. Trap not required when evaporator coil outlet suction line drops to compressor or suction header immediately after expansion valve bulb.

END OF SECTION 232313