

SECTION 15530

REFRIGERANT PIPING & SPECIALTIES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Refrigerant piping and specialties for HVAC systems.
- B. Related Sections:
 - 1. Section 00700 "General Conditions."
 - 2. Section 00800 "Supplementary Conditions."
 - 3. Section 02200 "Earthwork."
 - 4. Section 07800 "Roof Penetrations"
 - 5. Section 07900 "Caulking & Sealants."
 - 6. Section 15100 "Mechanical Materials & Methods."
 - 7. Section 15250 "Mechanical Insulation."
 - 8. Section 15510 "Air Handling Units with Coils."
 - 9. Section 15520 "Split System Condensing Units."

1.02 REFERENCES

- A. Comply with the following standards:
 - 1. ANSI B31.5 "ASME Code for Pressure Piping - Refrigerant Piping."
 - 2. ANSI/ASHRAE Standard 15 "Safety Code for Mechanical Refrigeration."

1.03 SUBMITTALS

- A. Product Data:
 - 1. Refrigerant Pipe.
 - 2. Refrigerant Pipe Valves.
 - 3. Strainers.
 - 4. Flexible Connectors.
- B. Quality Control Submittals:
 - 1. Test Reports:
 - a) Pressure Test Report/certification.

1.04 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Qualify brazing operators and processes in accordance with ASME "Boiler & Pressure Vessel Code," Section IX, "Welding & Brazing Qualifications."

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Protection:
 - 1. Maintain protective seal on all refrigerant piping. Clean pipe as specified in this section if protective seal is compromised.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Refrigerant Valves & Specialties:
 - 1. Parker-Hannifin Corp., Refrigeration & Air Conditioning Division.
 - 2. Henry Valve Company.
 - 3. Alco Controls Division, Emerson Electric.
 - 4. Sporlan Valve Company.

2.02 MATERIALS

- A. Copper Pipe/Tubing:
 - 1. Above Grade: above ground applications shall conform to ASTM B280, Type "ACR", hard-drawn straight lengths, soft annealed coils, seamless copper tubing. Tubing shall be factory cleaned and sealed, ready for installation.
 - 2. Below Grade: below ground applications shall be Type "K," annealed temper copper tubing.
- B. Fittings: wrought copper fittings meeting ANSI B16.22.
- C. Brazing Filler Metals: AWS A5.8, classification BAG-1, silver.

2.03 EQUIPMENT

- A. Valves:
 - 1. Valve assemblies: shall be U.L. listed and conform to ARI 760.
 - 2. Globe Valves: shall be constructed of a cast bronze body with cast bronze or forged brass wing cap and bolted bonnet, replaceable seat disc and plated steel stem. Valve shall be capable of being repacked under pressure. Valve shall be straight-through or angle pattern, with solder connections. Valve shall be rated for 450 psig operating pressure at 275°F operating temperature.
 - 3. Solenoid Valves: shall be forged brass with Teflon valve seat, two way straight through pattern and solder connections. Valves shall have a manual operator to open the valve.

Furnish complete with NEMA I solenoid enclosure with 1/2 inch conduit adapter and 24 volt, 60 Hz. normally closed holding coil.
 - 4. Thermostatic Expansion Valves: shall be thermostatically adjustable, modulating type, sized as required for specific evaporator requirements. Valves shall have

copper fittings for solder connections, sensing bulb, distributor with side connection for hot-gas bypass line and external equalizer line.

5. Check Valves - Smaller than 7/8 inch: shall have a cast brass body, removable piston, Teflon seat and stainless steel spring. Valves shall be straight through pattern with solder connections. Valves shall be rated for 500 psig operating pressure at 300°F operating temperature.
6. Check Valves - 7/8 inch and larger: shall have a cast bronze body, cast bronze or forged brass bolted bonnet, floating piston with mechanically retained Teflon seat disc. Valve shall be straight-through or angle pattern with solder connections. Valves shall be rated for 450 psig operating pressure at 300°F operating temperature.
- B. Strainers: shall have forged brass body with monel 80 mesh screen, screwed cleanout plug, Y-pattern and solder connections. Strainers shall be rated for 500 psig operating pressure.
- C. Moisture/Liquid Indicators: shall have a forged brass body, replaceable, polished optical view window and solder connections. Indicators shall be rated for 500 psig operating pressure at 200°F operating temperature.
- D. Filter/Driers: shall have steel shell, flange ring and spring, ductile iron cover plate with steel capscrews and wrought copper fittings for solder connections. Filter/driers shall be rated for 500 psig operating pressure at 225°F operating temperature.
- E. Flexible Connectors: shall have seamless tin-bronze or stainless steel core, high tensile bronze braid covering and solder connections. Connectors shall be rated for 500 psig at 300°F operating temperature.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Refrigerant Piping:
 1. Install in the most direct arrangement possible with the fewest number of fittings possible.
 2. Install to permit inspection and servicing of all equipment normally requiring service.
 3. Insulate all suction piping. Do not insulate until pressure test has been performed and all leaks repaired.
 4. Slope as follows:

- a. Horizontal Suction Lines: 1/2 inch per 10 feet slope towards the compressor. Take special care to avoid dead ends and long traps which may separate oil from the refrigerant.
 - b. Horizontal Hot-Gas Lines: 1/2 inch per 10 feet slope away from the compressor.
 - c. Horizontal Liquid Lines: no slope.
5. Install traps and double risers where required to entrain oil in vertical runs.
 6. Install all exposed piping parallel or at right angles to building walls.
 7. Conceal all piping in walls, pipe chases, utility spaces, above ceilings, below grade or floors unless otherwise indicated.
 8. For below grade installations install copper tubing inside 3" schedule 40 PVC pipe.
- B. Pipe Joints:
1. Brazed: install brazed joints as recommended in the AWS "Brazing Manual."
 2. Specialties:
 - a. Solenoid Valves: remove coil prior to brazing. Replace coil when valve body has sufficiently cooled to prevent damage to coil.
 - b. Sight Glass: remove glass prior to brazing. Replace glass when the glass body has sufficiently cooled to prevent damage to the glass.
 - c. Valves: remove stems, seats and packing prior to brazing. Replace when valve body has sufficiently cooled to prevent damage to valve components.
 3. Fill pipe and fittings with an inert gas during brazing to prevent scale formation.
- C. Valve Installations:
1. Globe Valves: install globe valves on each side of strainers and driers, liquid and suction lines at evaporators and elsewhere as indicated.
 2. Solenoid Valves: install solenoid valves upstream of each expansion valve and hot-gas bypass valve. Install solenoid valves in horizontal runs with the coils facing upward.
 3. Thermostatic Expansion Valves: install as close as possible to the evaporator. Where refrigerant distributors are used, mount the distributor directly on the expansion valve outlet. Secure the expansion valve sensing bulb to a clean, straight horizontal section of the suction line using two bulb straps. Do not mount the sensing bulb in a trap or at the bottom of the line. Where external equalizer lines are required, make the connection where it will clearly reflect the pressure in the

suction line at the bulb location.

4. Pressure Regulating & Relief Valves: shall be installed in accordance with the manufacturers instructions. Valves shall be located in accordance with ASHRAE Standard 15.

D. Specialties:

1. Strainers: install immediately upstream of each expansion valve, solenoid valve, hot-gas bypass valve, compressor suction valve and as required to protect refrigerant piping system components.
2. Moisture/Liquid Indicators: install in liquid lines between filter/driers and thermostatic expansion valve and in liquid line to receiver.
3. Unions: install to allow removal of solenoid valves, pressure regulating valves, expansion valves and at compressor and evaporator connections.
4. Flexible Connectors: install at the inlet and discharge connections to compressors and condensing units.
5. Eccentric Reducer Fittings: install with the straight side down.
6. Filter/Driers: install core in filter/driers after pressure test but before evacuation.

E. Penetrations:

1. Exterior Wall: seal using mechanical-sleeve seals.
2. Fire Barrier: maintain fire rating with approved sealant or mechanical seals.
3. Smoke Barrier: maintain smoke barrier rating with approved sealant or mechanical seals.

3.02 FIELD QUALITY CONTROL

A. Charge the system as follows:

1. After all piping modifications, pressure test for leaks at 125 percent of the maximum operating pressure using dry carbon dioxide or suitable refrigerant.

After repairing all leaks, maintain test pressure for 24 hours minimum. System shall not be considered leak free until no discernible drop in pressure is detected after test duration.

2. Evacuate system to 29.82 inches of mercury column vacuum. Close system and check vacuum after 24 hours. If no loss of vacuum is detected, system shall be considered leak-free.
3. Charge system with new, dehydrated refrigerant to the proper amount as recommended by the equipment manufacturer including additional refrigerant

required by piping installation.

4. Start entire system and check for proper operation. Check all safeties by simulating conditions to activate safety device.

3.03 ADJUSTING

- A. Thermostatic Expansion Valve:
 1. Adjust as required to maintain 10°F subcooling.

3.04 CLEANING

- A. Copper Tubing & Pipe other than type “ACR” or contaminated type “ACR”:
 1. Draw a clean, lint-free cloth through pipe.
 2. Draw a clean, lint-free cloth saturated with trichloroethylene through pipe. Repeat until cloth is removed clean.
 3. Draw a clean, lint-free cloth dampened with compressor oil and squeezed dry through the pipe.
 4. Draw a clean, lint-free cloth through the pipe.

3.05 DEMONSTRATION

- A. Train Owner’s representatives on procedures and schedules related to start-up, shutdown, troubleshooting, servicing, and preventative maintenance of the system. Schedule training with Owner’s representative through the Architect.

END OF SECTION