

**SECTION 23 23 00**  
**REFRIGERATION PIPING**

**PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Piping
- B. Refrigerant
- C. Moisture and liquid indicators
- D. Valves
- E. Filter-dryers
- F. Brazing Materials

1.2 REFERENCES

- A. ARI 710 - Liquid Line Dryers
- B. ASHRAE 15 - Safety Standard for Refrigeration Systems
- C. ASHRAE 34 - Designation and Classification of Refrigerants
- D. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
- E. ASME B16.26 - Cast Copper Alloy Fittings For Flared Copper Tubes
- F. ASME B31.5 - Refrigeration Piping and Heat Transfer Components
- G. ASME B31.9 - Building Services Piping
- H. ASTM B32 – Standard Specification for Solder Metal
- I. AWS A5.8/A5.8M Specification for Filler Metals for Brazing and Braze Welding
- J. AWS D1.1/D1.1M - Structural Welding Code, Steel
- K. UL 429 - Electrically Operated Valves
- L. ARI 760 - Solenoid Valves for Use With Volatile Refrigerants
- M. ASTM B280 – Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service
- N. MIL V 23450C - Valves, Expansion, Thermostatic, Refrigerant 12 and 22

1.3 SUBMITTALS

- A. Submit shop drawings under provisions of Division 1.
- B. Submit shop drawings indicating schematic layout of system, including equipment, critical dimensions, and sizes.
- C. Submit product data under provisions of Division 1.
- D. Submit product data indicating general assembly of specialties, including manufacturer's catalogue information.
- E. Submit manufacturer's installation instructions under provisions of Division 1.
- F. Submit design data as a submittal under provisions of Division 1.
- G. Submit data indicating pipe sizing.
- H. Submit test reports under provisions of Division 1.
- I. Submit Test reports indicating results of leak test, acid test.

1.4 PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Division 1.
- B. Accurately record the exact locations of equipment and refrigeration accessories on record drawings.

1.5 REGULATORY REQUIREMENTS

- A. Conform to ASME B31.9.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Division 1.
- B. Deliver and store piping and specialties in shipping containers with labeling in place.
- C. Store and protect products under provisions of Division 1.

- D. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.

## **PART 2 PRODUCTS**

### **2.1 PIPING**

- A. Copper Tubing:
  - 1. Per ASTM B280, type ACR dehydrated hard drawn copper for exposed/accessible lines.
  - 2. Type ACR soft drawn (annealed) dehydrated rated up to 700 psi, inaccessible piping and for piping below slabs, and grade shall be installed without joints.
  - 3. Fittings: ASME B16.22 long radius 90-degree elbow, couplings, and Tees shall be fabricated from wrought copper with manufacture stamp on each fitting.
- B. Brazing Compound shall be a minimum of 15% silver with melting point greater than 1000° F.
- C. See section 23 05 00 part 2.1 F on additional material requirements.

### **2.2 REFRIGERANT**

- A. Refrigerant R-134A Tetrafluoroethane
- B. Refrigerant R-410A Pentafluoroethane

### **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 and plastic cap; for maximum working pressure of 700 psi and maximum temperature of 200°F.
- B. Sight Glass Moisture Indicator is determined by the type of refrigerant contained within the refrigeration system.

### **2.4 VALVES**

- A. Packed Angle Valves: Forged brass or nickel plated forged steel, forged brass seal caps with copper gasket, rising stem and seat with back seating, molded stem packing, solder or flared ends; for maximum working pressure of 500 psi and maximum temperature of 300°F.
  - 1. Compatible with all CFC, HCFC, and HFC refrigerants and oils.
- B. Packed Ball Valves: Two piece 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°F.
  - 1. Compatible with all CFC, HCFC, and HFC refrigerants and oils.

### **2.5 FILTER-DRIERS**

- A. Replaceable Cartridge Type: ARI 710, UL listed, brass shell and bronze cap, brass shell and molded desiccant filter core for maximum working pressure of 500 psi.
  - 1. Size determined by tonnage of system.
  - 2. Shell & Core type drier can be used on liquid and suction lines.
  - 3. Shell & Core type drier shall be used in liquid lines of refrigeration systems 7 tons and larger.
  - 4. Shell & Core dryer shall be provided with bypass piping and valves to isolate dryer for core replacement and include a Schrader valve port for dryer evacuation.
- B. Provide a liquid line filter drier in all new units/systems 5 tons or less unless drier is provided by the Manufacturer of the unit or system.

### **2.6 EXPANSION VALVES**

- A. Provide thermostatic expansion valve on all cooling systems 7 tons and larger.

### **2.7 PRESSURE SWITCHES**

- A. Provide a high and low-pressure switch for each new refrigeration system or unit 1 ½ ton and larger.
- B. Switch to disable the compressor when activated.

## **PART 3 EXECUTION**

### 3.1 PREPARATION

- A. Ream pipe and tube ends removing burrs.
- B. Clean copper or brass fitting to original luster and remove any scale and dirt from the inside and outside of the pipe before assembly before installation.

### 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, and slope piping one percent in direction of oil return.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
  - 1. Nitrogen purge lines during brazing.
- F. Provide clearance for installation of insulation and access to valves and fittings.
- G. Provide access to concealed valves and fittings.
- H. Insulate and support piping; refer to Section 23 07 19 and 23 05 29.
- I. Locate expansion valve sensing bulb immediately downstream of evaporator on suction line as per manufacturer's instructions.
- J. Provide external equalizer piping on expansion valves with refrigerant distributor connected to evaporator.
- K. Test refrigerant system for leaks by evacuation and maintain pressures for min. of 24 hours, then pressurize system and test joints and connections with soap.
  - 1. Charge system with refrigerant per Manufacturer's instructions relative to ambient conditions.
  - 2. If system was commissioned in cooler weather, installing contractor shall return upon warmer conditions to verify proper charge.
  - 3. Insure system is labeled indicating type of refrigerant installed. Locate label at condensing unit.

### 3.3 APPLICATION

- A. Provide line size liquid indicators in main liquid line leaving condenser.
  - 1. Install moisture indicator so it is viewable from service area.
- B. Provide replaceable cartridge filter-dryers, with three-valve bypass assembly, one for each refrigeration circuit.
- C. Provide an isolation valve in the high and low refrigerant piping located next to condensing unit.
- D. Provide charging service ports in high and low refrigerant piping located next to condensing unit. (Schrader Type).

### 3.4 FIELD QUALITY CONTROL

- A. Perform field-testing under provisions of Division 1.
- B. Test refrigeration system in accordance with ASME B31.5.
- C. Pressure test the system with small amount of refrigerant and dry nitrogen at 200-psi.
  - 1. Using a halide torch or an electronic leak detector, check for leaks in the system.
  - 2. Perform final test at 30" vacuum for a 24-hour period with no deviation.
  - 3. Provide notification a minimum of 48-hours prior to test and submit written report to A/E verifying test results.

END OF SECTION