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The Description of the Project
P00000000 0000

SPECIFICATION DIVISION 23

NUMBER SECTION DESCRIPTION

DIVISION 23 HEATING, VENTILATING AND AIR CONDITIONING (HVAC)
SECTION 232300 - REFRIGERANT PIPING

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DIVISION 23 HEATING, VENTILATING AND AIR CONDITIONING (HVAC)
SECTION 232300 - REFRIGERANT PIPING

REVISIONS:

APRIL 2018: REVISED TO LIST MFR.S FROM PML. R BENEDEK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

INCLUDE PARAGRAPH 1.1.A AND B IN EVERY SPECIFICATION SECTION. EDIT RELATED SECTIONS 1.1.B TO MAKE IT PROJECT SPECIFIC.

A. Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 1 Specification Sections, and other applicable Specification Sections including the Related Sections listed below, apply to this Section.

1.2 SCOPE OF WORK

A. Provide refrigerant piping and accessories used for air conditioning applications.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with provisions of the following codes:

1. ANSI B31.5: ASME Code for Pressure Piping - Refrigerant Piping.
2. ANSI/ASHRAE Standard 15: Safety Code for Mechanical Refrigeration.
3. ASHRAE Standard 34: Number Designation and Safety Classification of Refrigerants.
4. EPA requirements in Section 608: Prohibition of Venting and Regulation of CFC Requirements

1.4 ACCEPTABLE MANUFACTURES

A. Refrigerant Valves and Specialties: Alco Controls Div., Emerson Electric., ASCO, Danfoss Electronics, Inc., EATON Corporation, Control Div., Henry Valve Company, Parker-Hannifin Corporation, Refrigeration and Air Conditioning Division, Sporlan Valve Company, Hansen.

PART 2 - PRODUCTS:

2.1 REFRIGERANT PIPING

A. Refer to Section 221113 for piping, fittings, and joints.

2.2 REFRIGERANT VALVES

A. General: Complete valve assembly shall be and designed to conform to ARI 760.

B. Globe: 450 psig maximum operating pressure, 275 deg. F maximum operating temperature; cast bronze body, with cast bronze or forged brass wing cap and bolted bonnet; replaceable resilient seat disc; plated steel stem. Valve shall be capable of being repacked under pressure. Valve shall be straight through or angle pattern, with solder-end connections.

C. Check Valves - Smaller Than 7/8 Inch: 500 psig maximum operating pressure, 300 deg. F maximum operating temperature; cast brass body, with removable piston, Teflon seat, and stainless steel spring; straight through globe design. Valve shall be straight through pattern, with solder-end connections.

D. Check Valves - 7/8 inch and Larger: 450 psig maximum operating pressure, 300 deg. F maximum operating temperature; cast bronze body, with 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-end connections.

SPEC EDITOR: REVIEW SOLENOID VALVES CAREFULLY, SELECT VOLTAGE AND NORMAL POSITION

E. Solenoid Valves: UL-listed, 250 deg. F temperature rating, 400 psig working pressure; forged brass, with Teflon valve seat, two-way straight through pattern, and solder end connections. Provide manual operator to open valve. Furnish complete with NEMA 1 solenoid enclosure with 1/2 inch conduit adapter, holding coil, voltage to meet controls requirements.

F. Thermal Expansion Valves: thermostatic adjustable, modulating type; size as required for specific evaporator requirements, and factory set for proper evaporator superheat requirements. Valves shall have copper fittings for solder end connections; complete with sensing bulb, a distributor having a side connection for hot gas bypass line, and an external equalizer line.

G. Hot Gas Bypass Valve: adjustable type, sized to provide capacity reduction beyond the last step of compressor unloading; and wrought copper fittings for solder end connections.

H. Charging and Purging Valves:
Manufacturer: Henry Series.

I. Refrigeration Ball Valve:
Manufacturer: Henry Series 900,000

2.3 REFRIGERANT PIPING SPECIALTIES

A. General: Complete refrigerant piping specialty assembly shall be UL-listed and designed to conform to ARI 760.

B. Strainers: 500 psig maximum working pressure; forged brass body with monel 80-mesh screen, and screwed cleanout plug; Y-pattern, with solder end connections.

C. Moisture/liquid Indicators: 500 psig maximum operation pressure, 200 deg. F maximum operating temperature; forged brass body, with replaceable polished optical viewing window, and solder end connections.

SPEC EDITOR: CAREFULLY REVIEW AND EDIT PARAGRAPHS D, E AND F.

D. Filter-driers: 500 psig maximum operation pressure; steel shell, flange ring, and spring, ductile iron cover plate with steel capscrews, and wrought copper fittings for solder end connections. Furnish complete with replaceable filter-drier core kit, including gaskets, as follows:

SPEC EDITOR: SELECT FROM THE FOLLOWING TWO OPTIONS.

1. Standard capacity desiccant sieves to provide micronic filtration.
2. High capacity desiccant sieves to provide micronic filtration and extra drying capacity.

E. Suction Line Filter-Drier: 350 psig maximum operation pressure, 225 deg. F maximum operating temperature; steel shell, and wrought copper fittings for solder end connections. Permanent filter element shall be molded felt core surrounded by a desiccant for removal of acids and moisture for refrigerant vapor.

F. Suction Line Filters: 500 psig maximum operation pressure; steel shell, flange ring, and spring, ductile iron cover plate with steel capscrews, and wrought copper fittings for solder end connections. Furnish complete with replaceable filter core kit, including gaskets, as follows:

G. Flexible Connectors: 500 psig maximum operating pressure; seamless tin bronze or stainless steel core, high tensile bronze braid covering, solder connections, and synthetic covering; dehydrated, pressure tested, minimum 7 inch in length.

PART 3 - EXECUTION

3.1 REFRIGERANT PIPING INSTALLATION

A. General: Install refrigerant piping per Section 221113, and in accordance with ASHRAE Standard 15.

B. Arrange piping to allow normal inspection and servicing of compressor and other equipment. Install valves and specialties in accessible locations to allow for servicing and inspection.

C. Install branch tie-in lines to parallel compressors equal length, and pipe identically and symmetrically.

D. Slope refrigerant piping as follows:

1. Install horizontal hot gas discharge piping with 1/2" per 10 feet downward slope away from the compressor.
2. Install horizontal suction lines with 1/2 inch per 10 feet downward slope to the compressor, with no long traps or dead ends which may cause oil to separate from the suction gas and return to the compressor in damaging slugs.

3. Install traps and double risers where indicated, and where required to entrain oil in vertical runs.
4. Liquid lines may be installed level.

E. Install strainers immediately ahead of each expansion valve, solenoid valve, hot gas bypass valve, compressor suction valve, and as required to protect refrigerant piping system components.

F. Install moisture/liquid indicators in liquid lines between filter/driers and thermostatic expansion valves and in liquid line to receiver.

1. Install moisture/liquid indicators in lines larger than 2-1/8 inch OD, using a bypass line.

G. Install unions to allow removal of solenoid valves, pressure regulating valves, expansion valves, and at connections to compressors and evaporators.

H. Install flexible connectors at the inlet and discharge connection of compressors.

3.2 VALVE INSTALLATION

A. General: Install refrigerant valves where indicated, and in accordance with manufacturer's instructions.

B. Install globe valves on each side of strainers and driers, in liquid and suction lines at evaporators, and elsewhere as indicated.

C. Install a full sized, 3-valve bypass around each drier.

D. Install solenoid valves ahead of each expansion valve and hot-gas bypass valve. Install solenoid valves in horizontal lines with coil at the top.

1. Electrical wiring for solenoid valves is specified in Division 26 and 230900. Coordinate electrical requirements and connections.

E. Thermostatic expansion valves may be mounted in any position, as close as possible to the evaporator.

1. Where refrigerant distributors are used, mount the distributor directly on the expansion valve outlet.
2. Install the valve in such a location so that the diaphragm case is warmer than the bulb.

SPEC EDITOR: VERIFY PROPER LOCATION FOR BULB WITH VALVE MANUFACTURER.

3. Secure the bulb to a clean, straight, horizontal section of the suction line using two bulb straps. Do not mount bulb in a trap or at the bottom of the line.
4. Where external equalizer lines are required make the connection where it will clearly reflect the pressure existing in the suction line at the bulb location.

F. Install pressure regulating and relieving valves as required by ASHRAE Standard 15.

3.3 FIELD QUALITY CONTROL

A. Inspect, test, and perform corrective action of refrigerant piping in accordance with ASME Code B31.5, Chapter VI.

B. Repair leaking joints using new materials, and retest for leaks.

3.4 CLEANING

SPEC EDITOR: THIS ARTICLE IS REQUIRED WHERE OTHER THAN TYPE ACR TUBING IS ALLOWED.

A. Before installation of copper tubing other than Type ACR tubing, clean the tubing and fitting using following cleaning procedure:

1. Remove coarse particles of dirt and dust by drawing a clean, lint free cloth through the tubing by means of a wire or an electrician's tape.
2. Draw a clean, lint free cloth saturated with trichloro-ethylene through the tube or pipe. Continue this procedure until cloth is not discolored by dirt.
3. Draw a clean, lint free cloth, saturated with compressor oil, squeezed dry, through the tube or pipe to remove remaining lint. Inspect tube or pipe visually for remaining dirt and lint.
4. Finally, draw a clean, dry, lint free cloth through the tube or pipe.

3.5 ADJUSTING

A. Verify actual evaporator applications and operating conditions, and adjust thermostatic expansion valve to obtain proper evaporator superheat requirements.

B. Adjust controls and safeties. Replace damaged or malfunctioning controls and equipment with new materials and products.

3.6 CHECK, TEST AND START-UP

A. Charge system using the following procedure:

1. Install core in filter dryer after leak test but before evacuation.
2. Evacuate refrigerant system with vacuum pump; until temperature of 35 deg F is indicated on vacuum dehydration indicator.
3. During evacuation, apply heat to pockets, elbows, and low spots in piping.
4. Maintain vacuum on system for minimum of 5 hours after closing valve between vacuum pump and system.
5. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psi.
6. Complete charging of system, using new filter dryer core in charging line. Provide full operating charge.

B. Train Owner's maintenance personnel on procedures and schedules related to start-up and shut-down, troubleshooting, servicing, and preventative maintenance of refrigerant piping valves and refrigerant piping specialties.

END OF SECTION 232300