SECTION 23 20 00

HVAC PIPING AND PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Work Included:

1. Pipe and Pipe Fittings
2. Miscellaneous Piping Specialties

C. Related Sections:

1. Division 01 -- Commissioning
2. Section 23 00 10 – HVAC General Requirements
3. Section 23 05 00 – Common Work Results for HVAC
4. Section 23 05 48 – Vibration and Seismic Controls for HVAC Equipment and Piping
5. Section 23 05 53 – Identification for HVAC Piping and Equipment
6. Section 23 05 93 – Testing, Adjusting, and Balancing for HVAC
7. Section 23 70 00 – Central HVAC Equipment
8. Section 23 80 00 – Decentralized HVAC Equipment

1.2 REFERENCES:

A. General: The following standards or codes form a part of this specification to the extent indicated by the reference thereto.

B. American Society for Testing and Materials (ASTM):

A53-88a Pipe, Steel, Black and Hot-dipped, Zinc-coated, Welded and Seamless

A106-88a Seamless Carbon Steel Pipe for High Temperature Service

A120-88a Pipe, Steel Black and Hot-dipped, Zinc-coated, Welded and Seamless for Ordinary Uses

A126-84 Gray Iron Castings for Valves, Flanges and Pipe Fittings

A254-88 Copper Brazed Steel Tubing

A420-88 Piping Fittings of Wrought Iron Carbon Steel and Alloy Steel for Low Temperature Service

A539-88 Electric-Resistance-Welded Coiled Steel Tubing for Gas and Fuel Oil Lines

B32-89 Solder Metal

B42-88 Seamless Copper Pipe, Standard Sizes

B75-86 Seamless Copper Tube

B88-95a Seamless Copper Water Tube

C. American Society of Mechanical Engineers (ASME):

ASME 95 Boiler and Pressure Vessel Code

B16.3 Malleable Iron Threaded Fittings

B16.4 Cast Iron Threaded Fittings

B31.9 Building Services Piping

D. International Ground Source Heat Pump Association (IGSHPA) Installation Manuals.

E. National Electrical Manufacturers Association (NEMA)

F. Underwriters Laboratories, Inc. (UL)

1.3 COMMISSIONING OF HVAC SYSTEMS:

A. The Contractor shall provide contact information to the Commissioning Agent indicated in Division 1 for all major items of Equipment.

B. Provide additional submittal copy of major equipment for Commissioning Agent specified in Division 1.

1.4 SUBMITTALS:

A. Submit shop drawings, product data and samples in accordance with Division 1 and Section 23 00 10.

B. Shop drawings, diagrams, catalog data and such other data necessary to fully describe and substantiate compliance with these specifications shall be submitted for all equipment and materials marked with notation set forth in Section 23 00 10.

C. Operation and maintenance data shall be submitted in accordance with Division 1, for all items of equipment and materials marked with notation set forth in Section 23 00 10.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS:

A. Material Standards:
   1. Copper pipe shall be manufactured in accordance with ASTM B88 and shall be so labeled.

B. Refrigerant piping shall larger than ¾" shall be type "ACR" hard drawn copper tubing, pipe ¾" and smaller shall be soft copper refrigerant tube. Pipes shall be factory cleaned, dehydrated and capped with wrought copper fittings. Provide all accessories including, but not limited to, refrigerant duty ball type shutoff valves, solenoid valves, expansion valves, moisture indicating sight glass, replaceable core filter dryers, access ports with gasketed screw-on covers for charging and measuring subcooling, hot gas bypass valve where indicated and other accessories recommended by the refrigeration equipment manufacturer. Expansion valves shall be balanced port, externally equalized type. Provide heat exchangers for subcooling and suction line accumulator as recommended by the manufacturer. All components shall be selected and sized for the lowest pressure drop at the capacities indicated. Prior to offering the system for final acceptance, the Contractor shall submit a written certification from an authorized official of the equipment manufacturer stating the complete system, to include refrigerant piping, has been installed in accordance with the manufacturer's recommendations.

2.2 MISCELLANEOUS PIPING SPECIALTIES:

A. Escutcheons shall be the split pattern chromium plated bronze or steel. Special height escutcheons shall be provided where extended sleeves are used. Escutcheons shall be sized to cover the entire opening.

B. Pipe sleeves shall be installed as outlined in SECTION 23 00 10 HVAC GENERAL REQUIREMENTS.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION:

A. General: Sleeves and sealant shall be provided where pipes pass through floors, partitions or walls as outlined in Section 23 00 10, HVAC GENERAL REQUIREMENTS. Pipe shall be cut accurately to measurements established at the job site and worked into place without springing or forcing, properly clearing all windows, doors and other openings. Pipe in finished areas shall be concealed. Excessive cutting or other weakening of the building structure to facilitate piping installation will not be permitted. Each end of each piece of pipe shall be reamed. Pipe shall be installed to permit free expansion and contraction without damage to joints or hangers. Changes in direction shall be made with fittings, except that bending of pipe will be permitted provided a hydraulic or mechanical bender is used and wide sweep bends are formed.

Bent pipe showing kinks, wrinkles, or other malformations will not be acceptable. Bushings and all thread nipples will not be allowed.

B. Open ends of pipe lines or equipment shall be properly capped or plugged during installation to keep dirt or foreign material out of the system.

C. Escutcheons shall be provided where exposed pipes pass through finished walls or floors.

D. Joints:

1. Copper tubing shall be cut square, ends reamed and all filings and dust wiped from interior of pipe. Joints shall be soldered with solder drawn through the full fitting length. Excess solder shall be wiped from joint before solder hardens. Solder shall be 95/5 composition – 50/50 will not be allowed. All solder joints shall have piping surfaces sanded or brushed. Self-cleaning solder flux as a substitute for sanding or brushing is not acceptable.

3.2 REFRIGERANT PIPING:

A. All refrigerant piping shall be sized, installed, and routed in accordance with the refrigeration equipment manufacturer's recommendations.

B. All piping joints and the inside of all piping shall be clean. Burnish all mating surfaces until all dirt, oxide, or other debris is removed. Using no flux, braze all joints using hard solder equal to Stay-Bright for pipe 2 inches and below or Stay-Silver for pipe larger than 2 inches. Remove all internal components from refrigerant accessories which may be subject to heat damage prior to brazing. Joints for copper tubing for ductless split systems smaller than ¾" may be flared fittings.

C. Before charging, refrigerant lines shall be thoroughly cleaned and purged. Refrigerant lines shall be pulled down to a vacuum of 500 microns and then pressure tested according to the manufacturer's instructions before charging with refrigerant.

D. All filters from filter dryers shall be replaced after 48 hours of system operation and prior to final acceptance.

E. Refrigerant circuit access ports located outdoors shall be fitted with locking-type tamper resistant caps or shall be otherwise secured to prevent unauthorized access.

END OF SECTION 23 20 00

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