SECTION 232300

REFRIGERANT PIPING

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**NOTE TO SPECIFIER**

*Use this Specification Section for Mail Processing Facilities.*

***This is a Type 2 Specification with primarily editable text; therefore, most of the text can be edited, but there is some required text which is noted within the Section with a “Note to Specifier.” Do not revise these paragraphs without an approved Deviation from USPS Headquarters, Facilities Program Management, through the USPS Project Manager.***

*For Design/Build projects, do not delete the Notes to Specifier in this Section so that they may be available to Design/Build entity when preparing the Construction Documents.*

*For the Design/Build entity, this specification is intended as a guide for the Architect/Engineer preparing the Construction Documents.*

*The MPF specifications may also be used for Design/Bid/Build projects. In either case, it is the responsibility of the design professional to edit the Specifications Sections as appropriate for the project.*

*Text shown in brackets must be modified as needed for project specific requirements.* *See the “Using the USPS Guide Specifications” document in Folder C for more information.*

*The last date that USPS revised this standard specification section occurs in two places, at the end of this section and in the Table of Contents. If the date in this section matches the date in the Table of Contents, then you are using the latest version. Do not delete or revise the “last revised” date at the end of the section during the development of the Project Manual.*

*The footer in this section should be edited to replace the text, “USPS MPF SPECIFICATION” with the project name, and the blank date in the center should be replaced with the submission date, for interim design reviews, or the issue date of the completed Project Manual.*

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1. GENERAL
	1. Submittals:
		1. Product Data: Include pressure drop, based on manufacturer's test data, for thermostatic expansion valves, solenoid valves, and pressure-regulating valves.
		2. Shop Drawings: Show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationship between piping and equipment.
			1. Size piping and design the actual piping layout, including oil traps, double risers, specialties, and pipe and tube sizes, to ensure proper operation and compliance with warranties of connected equipment.
	2. QUALITY ASSURANCE:
		1. ASHRAE Standard: Comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."
		2. ASME Standard: Comply with ASME B31.5, "Refrigeration Piping."
		3. UL Standard: Provide products complying with UL 207, "Refrigerant-Containing Components and Accessories, Nonelectrical"; or UL 429, "Electrically Operated Valves."
2. PRODUCTS

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**NOTE TO SPECIFIER**

\*\*Required: Piping and fittings materials must comply with the chart in Section 220000 - Plumbing

Do not revise the materials below without an approved deviation; however, items may be removed to comply with local code requirements or for building requirements for MPF Repair & Alteration or Expansion projects; verify with the facility.

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* 1. Copper Tube and Fittings:
		1. Drawn-Temper Copper Tube: ASTM B 280, Type ACR.
		2. Wrought-Copper Fittings: ASME B16.22.
		3. Wrought-Copper Unions: ASME B16.22.
		4. Bronze Filler Metals: AWS A5.8, Classification BAg-1 (silver)
	2. Refrigerant Piping Specialities:
		1. Replaceable-Core Filter-Dryers: 500-psig maximum working pressure; heavy gage protected with corrosion-resistant-painted steel shell, flanged ring and spring, ductile-iron cover plate with steel cap screws; wrought-copper fittings for solder-end connections; with replaceable-core kit, including gaskets and the following:
			1. Filter-Dryer Cartridge: Pleated media with solid-core sieve with activated alumina, ARI 730 rated for capacity.
			2. Service Valves: 500-psig pressure rating; forged-brass body with copper stubs, brass caps, removable valve core, integral ball check valve, and with solder-end connections.
			3. Pressure-Regulating Valves: Comply with ARI 770; direct acting, brass; with pilot operator, stainless-steel diaphragm, standard coil, and solder-end connection; suitable for refrigerant specified.
			4. Pressure Relief Valves: Straight-through or angle pattern, brass body and disc, neoprene seat, and factory sealed and ASME labeled for standard pressure setting.
			5. Thermostatic Expansion Valves: Comply with ARI 750; brass body with stainless-steel parts; thermostatic-adjustable, modulating type; size and operating characteristics as recommended by manufacturer of evaporator, and factory set for superheat requirements; solder-end connections; with sensing bulb, distributor having side connection for hot-gas bypass line, and external equalizer line.
			6. Hot-Gas Bypass Valve: Pulsating-dampening design, stainless-steel bellows and polytetrafluoroethylene valve seat; adjustable; sized for capacity equal to last step of compressor unloading; with solder-end connections.
			7. Moisture/Liquid Indicators: 500-psig maximum working pressure and 200 deg F operating temperature; all-brass body with replaceable, polished, optical viewing window with color-coded moisture indicator; with solder-end connections.
1. EXECUTION
	1. Piping Applications:
		1. Aboveground, within Building: Type ACR drawn-copper tubing or Type L (Type B) drawn-copper tubing.
		2. Belowground for NPS 2 (DN 50) and Smaller: Type K (Type A) annealed-copper tubing.
	2. Piping Installation:
		1. Install refrigerant piping according to ASHRAE 15. Equipment manufacturer shall size refrigerant lines for Contractor.
		2. Basic piping installation requirements are specified in Division 23 Section "Common Work for HVAC."
		3. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.
		4. Arrange piping to allow inspection and service of compressor and other equipment. Install valves and specialties in accessible locations to allow for service and inspection.
		5. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation. Use sleeves through floors, walls, or ceilings, sized to permit installation of full-thickness insulation.
		6. Install copper tubing in rigid or flexible conduit in locations where copper tubing will be exposed to mechanical injury.
		7. Slope refrigerant piping as follows:
			1. Install horizontal suction lines with a uniform slope downward to compressor.
			2. Install traps and double risers to entrain oil in vertical runs.
			3. Liquid lines may be installed level.
		8. Hanger, support, and anchor products are specified in Division 23 Section "Hangers and Supports."
		9. Install the following pipe attachments:
			1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet long.
		10. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:
			1. NPS 1/2: Maximum span, 60 inches; minimum rod size, 1/4 inch.
			2. NPS 5/8: Maximum span, 60 inches; minimum rod size, 1/4 inch.
			3. NPS 1: Maximum span, 72 inches; minimum rod size, 1/4 inch.
			4. NPS 1-1/4: Maximum span, 96 inches; minimum rod size, 3/8 inch.
			5. NPS 1-1/2: Maximum span, 96 inches; minimum rod size, 3/8 inch.
		11. Support vertical runs at each floor.
		12. Pipe Joint Construction:
			1. Braze joints according to Division 23 Section "Common Work for HVAC."
			2. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide) during brazing to prevent scale formation.
		13. Refrigerant Pipe Insulation:
			1. Insulate refrigerant piping according to Division 23 Section "Pipe Insulation."
		14. Test and inspect refrigerant piping according to ASME B31.5, Chapter VI.
			1. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure.
			2. Test high- and low-pressure side piping of each system at not less than the lower of the design pressure or the setting of pressure relief device protecting high and low side of system.
				1. System shall maintain test pressure at the manifold gage throughout duration of test.
				2. Test joints and fittings by brushing a small amount of soap and glycerine solution over joint.
				3. Fill system with nitrogen to raise a test pressure of 150 psig or higher as required by authorities having jurisdiction.
				4. Remake leaking joints using new materials, and retest until satisfactory results are achieved.
		15. Adjust set-point temperature of the conditioned air controllers to the system design temperature.
		16. Before installing copper tubing other than Type ACR, clean tubing and fittings with trichloroethylene.
		17. Replace core of filter-dryer after system has been adjusted and design flow rates and pressures are established.
		18. Charge system using the following procedures:
			1. Install core in filter-dryer after leak test but before evacuation.
			2. Evacuate entire refrigerant system with a vacuum pump to a vacuum of 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
			3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
			4. Charge system with a new filter-dryer core in charging line. Provide full-operating charge.

END OF SECTION

USPS MPF Specification Last Revised: 10/1/2022