SECTION 230719

HVAC PIPING INSULATION

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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. SUMMARY
		1. Section Includes:
			1. Piping insulation.
			2. Insulation jackets.
		2. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
	2. REFERENCES
		1. American Society for Testing and Materials (ASTM):
			1. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
			2. ASTM C177 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
			3. ASTM C335 - Steady-State Heat Transfer Properties of Horizontal Pipe Insulation.
			4. ASTM C518 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
			5. ASTM C534 - Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
			6. ASTM C547 - Mineral Fiber Pipe Insulation.
			7. ASTM C553 - Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
			8. ASTM C921 - Properties of Jacketing Materials for Thermal Insulation.
			9. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.
			10. ASTM E84 - Surface Burning Characteristics of Building Materials.
			11. ASTM E96 - Water Vapor Transmission of Materials.
		2. National Fire Protection Association (NFPA):
			1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
		3. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
			1. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
		4. Underwriters Laboratories, Inc. (UL):
			1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
	3. SUBMITTALS
		1. Section 013300 - Submittal Procedures: Procedures for submittals.
		2. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
	4. QUALITY ASSURANCE
		1. Qualifications:
			1. Manufacturer: Company specializing in manufacturing Products specified with minimum 3 years documented experience.
			2. Installer: Company specializing in performing the Work of this Section with minimum 3 years documented experience.
		2. Materials:
			1. Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM E84, NFPA 255 and UL 723.
			2. Insulation for pipe and equipment for above grade exposed to weather outside building shall be certified as being self-extinguishing for 1 inch thickness less than 53 seconds when tested in accordance with ASTM D1692.
	5. DELIVERY, STORAGE, AND HANDLING
		1. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
		2. Deliver materials to site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
		3. Store insulation in original wrapping and protect from weather and construction traffic.
		4. Protect insulation against dirt, water, chemical, and mechanical damage.
	6. PROJECT CONDITIONS OR SITE CONDITIONS
		1. Jobsite Requirements:
			1. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
			2. Maintain temperature during and after installation for minimum period of 24 hours.

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**NOTE TO SPECIFIER**

**REQUIRED**: Do not revise ENVIRONMENTAL REQUIREMENTS without an approved Deviation from USPS Headquarters, Facilities Program Management, through the USPS Project Manager.

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* 1. ENVIRONMENTAL REQUIREMENTS
		1. Energy efficiency:
			1. Insulation: Minimum thickness in accordance with ASHRAE 90.1. Provide additional thickness to ensure surface temperatures are below 100 degrees and to prevent condensation on cold surfaces.
1. PRODUCTS

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**NOTE TO SPECIFIER**

Verify manufacturer information, products, and availability at time of Project Manual preparation for Project.

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* 1. PIPING INSULATION
		1. Glass Fiber: Rigid molded, noncombustible with vapor barrier jacket.
			1. Manufacturers:
				1. CertainTeed Insulation, Valley Forge, PA (800) 233-8990.
				2. Other acceptable manufacturers offering equivalent products.

Knauf Fiber Glass.

Manville Insulation, Inc.

Owens-Corning Fiberglass

* + - 1. Insulation: ASTM C547; rigid molded, noncombustible.
				1. 'K' ('ksi') value: ASTM C335, 0.24 at 75 degrees F.
				2. Minimum Service Temperature: -20 degrees F.
				3. Maximum Service Temperature: 300 degrees F.
				4. Maximum Moisture Absorption: 0.2 percent by volume.
			2. Vapor Barrier Jacket
				1. ASTM C921, White kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
				2. Moisture Vapor Transmission: ASTM E96; 0.02 perm inches.
				3. Secure with self-sealing longitudinal laps and butt strips.
				4. Secure with vapor barrier mastic.
			3. Tie Wire: 18 gage stainless steel with twisted ends on maximum 12 inch centers.
			4. For insulation outdoors, provide stainless steel jacket, bonded, overlapped, screwed with pop rivets or screws, and sealant placed on joints as per manufacturers recommendation for a water-tight joint.
		1. Cellular Foam: Flexible, cellular elastomeric, molded.
			1. Manufacturers:
				1. Armstrong World Industries, Inc, Lancaster, PA (800) 448-1405.
				2. Other acceptable manufacturers offering equivalent products.

Halstead Industries, Inc.

Rubatex Corporation, Armaflex II.

* + - 1. Insulation: ASTM C534; flexible, cellular elastomeric, molded or sheet.
				1. 'K' ('ksi') Value: ASTM C177 or C518; 0.27 at 75 degrees F,
				2. Minimum Service Temperature: -40 degrees F.
				3. Maximum Service Temperature: 220 degrees F.
				4. Maximum Moisture Absorption: ASTM D1056; 1.0 percent (pipe) by volume, 1.0 percent (sheet) by volume.
				5. Moisture Vapor Transmission: ASTM E96; 0.20 perm inches.
				6. Maximum Flame Spread: ASTM E84; 25.
				7. Maximum Smoke Developed: ASTM E84; 50.
				8. Connection: Waterproof vapor barrier adhesive.
			2. Elastomeric Foam Adhesive
				1. Manufacturers:

Dow U.S.A.

H. B. Fuller Co.

Rubatex Corporation.

* + 1. Cellular Glass: Rigid shaped cellular glass.
			1. Manufacturers:
				1. Pittsburgh Corning LLC, Toledo, OH +1 724 327 6100, +1 800 327 6126
				2. Other acceptable manufacturers offering equivalent products can be submitted to EOR.
			2. Insulation: ASTM C552; rigid, noncombustible.
				1. Minimum Service Temperature: -450 degrees F.
				2. Maximum Service Temperature: 800 degrees F.
				3. Maximum Moisture Absorption: 0.5 percent by volume.
			3. Insulation joint and protrusion sealant
				1. PITTSEAL® 444Ns sealant supplied by Pittsburgh Corning LLC for below ambient applications.
				2. PITTSEAL® CW sealant supplied by Pittsburgh Corning LLC for chilled water systems.
				3. PITTSEAL® HI-TEMP LV RTV sealant supplied by Pittsburgh Corning LLC for insulation systems at operating temperatures up to 204°C (400°F).
			4. Vapor Barrier Jacket
				1. PITTWRAP® IW30 jacket, Self-sealing, non-metallic, bituminous sheet, supplied by Pittsburgh Corning LLC. PITTWRAP IW30 jacket must be covered with a metal or other UV resistant jacket. PITTWRAP IW30 jacket is for outdoor use only.
				2. Moisture Vapor Transmission: ASTM E96; 0.002 perm inches.
				3. Secure per manufacturer’s recommendations.
			5. Tie Wire: Not recommended for use with cellular glass insulation.
			6. Temporary Securement: Glass fiber reinforced tape. Tape shall be 1 inch wide, high tensile strength fiber reinforced strapping tape. Tape is appropriate for providing temporary insulation securement for piping with insulation outside diameters 18 inches or smaller as long as it is covered with metal jacket afterwards. Tape is not acceptable as primary means of securement.
			7. Permanent Securement: Metal bands - Metal bands shall be AISI type 304 (BSI 304 S16) stainless steel, 0.5 inches wide x 0.016 inches thick, with matching seals or aluminum bands with matching seals, 10.5 inches x 0.020 inches for piping and equipment with an outside diameter up to 48 inches, 0.75 inches x 0.020 inches for larger outside diameter.
			8. For insulation outdoors, provide aluminum jacket, bonded, overlapped, screwed with pop rivets or screws, and sealant placed on joints as per manufacturer’s recommendation for a water-tight joint.
1. EXECUTION
	1. EXAMINATION
		1. Section 017300 - Execution: Verification of existing conditions before starting work.
		2. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
			1. Verify that piping has been tested before applying insulation materials.
			2. Verify that surfaces are clean, foreign material removed, and dry.
		3. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
		4. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.
	2. INSTALLATION - PIPING INSULATION
		1. Install materials in accordance with manufacturer's instructions and ASHRAE 90.1.
		2. On exposed piping, locate insulation and cover seams in least visible locations.
		3. Insulated dual temperature pipes or cold pipes conveying fluids below ambient temperature:
			1. Provide vapor barrier jackets, factory applied or field applied.
			2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe.
			3. PVC fitting covers may be used.
			4. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations.
			5. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
		4. For insulated pipes conveying fluids above ambient temperature:
			1. Provide standard jackets, with or without vapor barrier, factory applied or field applied.
			2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe.
			3. Finish with glass cloth and adhesive.
			4. PVC fitting covers may be used.
			5. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
			6. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
		5. Inserts and Shields:
			1. Application: Piping 3 inches diameter or larger.
			2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
			3. Insert Location: Between support shield and piping and under the finish jacket.
			4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
			5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
		6. Finish insulation at supports, protrusions, and interruptions.
		7. For pipe exposed in mechanical equipment rooms or in finished spaces finish with manufacturer's standard all-service jacket for fiberglass pipe. No jacket required for elastomeric foam insulation.
		8. For exterior applications, provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.
		9. For buried piping, use elastomeric foam insulation only.
		10. For heat traced piping, insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located on bottom side of horizontal piping.
	3. CONSTRUCTION
		1. Substituted insulation materials shall provide thermal resistance within 10 percent at normal conditions, as materials indicated.
	4. PIPING INSULATION SCHEDULE
		1. Glass Fiber Insulation Schedule:

PIPING SYSTEM PIPE SIZE THICKNESS

Plumbing Systems:

Domestic Hot Water Supply All 1 inch

Domestic Hot Water Recirc All 1 inch

Tempered Domestic Water Supply All 1/2 inch

Tempered Domestic Water Recirc All 1/2 inch

Domestic Cold Water All 1/2 inch

Humidifier Piping All 1 inch

Horizontal Rain Leaders - Above Grade All 1 inch

HVAC Systems:

Heating Hot Water All 2 inches

Chilled Water All 2 inches

Piping Exposed to Freezing with Heat Tracing All 2 inches

* + 1. Cellular Foam Insulation Schedule

PIPING SYSTEM PIPE SIZE THICKNESS

Plumbing Systems:

Domestic hot water supply All 1/2 inch

Domestic hot water recirc All 1/2 inch

Tempered Domestic Water Supply All 3/8 inch

Tempered Domestic Water Recirc All 3/8 inch

Domestic Cold Water All 3/8 inch

Moisture Condensate Drains - Above Grade All 3/4 inch

Horizontal Waste Lines from AC Equipment All 3/4 inch

HVAC Refrigerant Lines (suction only) All 3/4 inch

Other Systems:

Piping exposed to freezing with heat tracing All 1 inch

* + 1. Cellular Glass Insulation Schedule

PIPING SYSTEM PIPE SIZE THICKNESS

Domestic water outdoors All 2 inches

Piping with heat tracing All 2 inches

Chilled water piping All 2 inches

END OF SECTION

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