SECTION 233100

HVAC DUCTS AND CASINGS

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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. Metal ductwork.
			2. Nonmetal ductwork.
			3. Air turning devices.
			4. Duct access doors.
			5. Duct test holes.
			6. Fire dampers.
			7. Flexible duct connections.
			8. Volume control dampers.
			9. Duct cleaning.
		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.
		3. Related Sections:
			1. Section 230500 - Common Work Results for HVAC:
			2. Section 230713 - Duct Insulation.
			3. Section 233713 - Diffusers Registers and Grilles:
			4. Section 230593 - Testing, Adjusting, and Balancing for HVAC:
	2. REFERENCES
		1. American Society for Testing and Materials (ASTM):
			1. ASTM A 36 - Structural Steel.
			2. ASTM A 90 - Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
			3. ASTM A 167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
			4. ASTM A 480 - General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
			5. ASTM A 653 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process.
			6. ASTM A 568 Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled.
		2. American Welding Society (AWS):
			1. AWS D9.1 - Welding of Sheet Metal.
		3. National Fire Protection Association (NFPA):
			1. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
			2. NFPA 90B - Installation of Warm Air Heating and Air Conditioning Systems.
			3. NFPA 91 - Installation of Blower and Exhaust Systems for Dust, Stock and Vapor Removal or Conveying.
			4. NFPA 96 - Installing of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment.
		4. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
			1. SMACNA - HVAC Air Duct Leakage Test Manual.
			2. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
		5. Underwriters Laboratories, Inc. (UL):
			1. UL 181 - Factory-Made Air Ducts and Connectors.
	3. SYSTEM DESCRIPTION
		1. Performance Requirements: No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.
	4. SUBMITTALS
		1. Section 013300 - Submittal Procedures: Procedures for submittals.
			1. Product Data:
				1. Duct materials, duct liner, duct connectors, and flexible duct.
				2. Factory or shop manufactured assemblies including volume control dampers, duct access doors, duct test holes, and hardware used. Include electrical characteristics and connection requirements.
		2. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
			1. Project Record Documents: Accurately record the following:
				1. Actual locations of ducts and duct fittings.
				2. Record changes in fitting location and type.
				3. Show additional fittings used.
				4. Actual locations of access doors, test holes, and fire dampers.
	5. QUALITY ASSURANCE
		1. Perform Work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
		2. Qualifications:
			1. Manufacturer: Company specializing in manufacturing Products specified with minimum 5 years documented experience.
			2. Installer: Company specializing in performing the Work of this Section with minimum 5 years documented experience.
		3. Regulatory Requirements: Construct ductwork to NFPA 90A. NFPA 90B, and NFPA 96 standards.
	6. DELIVERY, STORAGE, AND HANDLING
		1. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
		2. Protect dampers from damage to operating linkages and blades.
	7. PROJECT CONDITIONS OR SITE CONDITIONS
		1. Jobsite Requirements:
			1. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
			2. Maintain temperatures during and after installation of duct sealants.

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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. Environmental Impact:
			1. Indoor Air Quality: Install insulation so that unfaced fiberglass and mineral fiber insulation are not in the interior of the ductwork.
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. Galvanized Steel Ducts: ASTM A653 having zinc coating in conformance with ASTM A90.
		2. Steel Ducts: ASTM A569 and A568.
		3. Flexible Ducts:
			1. Manufacturers:
				1. Anco Products Inc.
				2. Hart & Cooley.
				3. Tuttle & Bailey.
			2. UL Labeled, black polymer film supported by helically wound spring steel wire.
			3. Pressure Rating: 4 inches WG positive and 0.5 inches WG negative.
			4. Maximum Velocity: 4000 fpm.
			5. Temperature Range: -20 degrees F to 175 degrees.
		4. Insulated Flexible Ducts:
			1. Manufacturers:
				1. Anco Products Inc.
				2. Hart & Cooley.
				3. Tuttle & Bailey
			2. Black polymer film supported by helically wound spring steel wire; fiberglass insulation; aluminized vapor barrier film.
			3. Pressure Rating: 4 inches WG positive and 0.5 inches WG negative.
			4. Maximum Velocity: 4000 fpm.
			5. Temperature Range: -20 degrees F to 175 degrees F.
		5. Stainless Steel Ducts: ASTM A 167, Type 304.
		6. Fasteners: Rivets, bolts, or sheet metal screws.
		7. Sealant:
			1. Manufacturers:
				1. Duro Dyne Corporation, Farmingdale, NY (800) 899-3876.
				2. H.B. Fuller Co, St. Paul, MN (888) 423-8553.
				3. Hardcast, Inc, Wylie, TX (800) 527-7092.
			2. Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape, or heavy mastic.
		8. Hanger Rod: ASTM A36; steel threaded both ends, threaded one end, or continuously threaded.
	1. AIR TURNING DEVICES/EXTRACTORS
		1. Manufacturers:
			1. Semco, Inc, Columbia, MO (888) 473-6264.
			2. Metal-Fab, Inc, Wichita, KS (800) 835-2830.
			3. United McGill Corp, Groveport, OH (614) 836-9981.
		2. Multi-blade device with blades aligned in short dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.
	2. DUCT ACCESS DOORS
		1. Manufacturers:
			1. Ductmate Industries, Inc, East Monongahela, PA (800) 245-3188.
			2. Ruskin Manufacturing, Kansas City, MO (816) 761-7476.
			3. Semco Inc, Columbia, MO (888) 473-6264.
		2. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
		3. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, install minimum one inch thick insulation with sheet metal cover.
			1. Less Than 12 Inches Square: Secure with sash locks.
			2. Up to 18 Inches Square: Provide two hinges and two sash locks.
			3. Up to 24 x 48 Inches: Three hinges and two compression latches with outside and inside handles.
			4. Larger Sizes: Provide an additional hinge.
		4. Access doors with sheet metal screw fasteners are not acceptable.
	3. DUCT TEST HOLES
		1. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
		2. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.
	4. FIRE DAMPERS
		1. Manufacturers:
			1. Prefco Products, Inc, Buckingham, PA (800) 437-6653.
			2. Ruskin Manufacturing, Kansas City, MO (816) 761-7476.
			3. Vent Products Co., Inc.
		2. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.
		3. Ceiling Dampers: Galvanized steel, 22 gage frame and 16 gage flap, two layers 0.125 inch ceramic fiber on top side, and one layer on bottom side for round flaps, with locking clip.
		4. Horizontal Dampers: Galvanized steel, 22 gage frame, stainless steel closure spring, and lightweight, heat retardant non-asbestos fabric blanket.
		5. Curtain Type Dampers: Galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations Configure with blades out of air stream except for 1.0 inch pressure class ducts up to 12 inches in height.
		6. Multiple Blade Dampers: 16 gage galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.
		7. Fusible Links: UL 33, separate at 160 degrees F with adjustable link straps for combination fire/balancing dampers.
	5. FLEXIBLE DUCT CONNECTIONS
		1. Manufacturers:
			1. Ductmate Industries, Inc, East Monongahela, PA (800) 245-3188.
			2. Ruskin Manufacturing, Kansas City, MO (816) 761-7476.
			3. Semco Inc, Columbia, MO (888) 473-6264.
		2. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
		3. Connector: Fabric crimped into metal edging strip.
			1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30oz per sq yd.
			2. Net Fabric Width: Approximately 3 inches wide.
			3. Metal: 3 inches wide, 24 gage thick galvanized steel.
	6. VOLUME CONTROL DAMPERS.
		1. Manufacturers:
			1. Louvers and Dampers, Inc, Florence, KY (606) 647-2299.
			2. Prefco Products, Inc, Buckingham, PA (800) 437-6653.
			3. Ruskin Manufacturing, Kansas City, MO (816) 761-7476.
		2. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
		3. Splitter Dampers:
			1. Material: Same gage as duct to 24 inches size in either direction, or two gages heavier for sizes over 24 inches.
			2. Blade: Fabricate of double thickness sheet metal to streamline shape, secured with continuous hinge or rod.
			3. Operator: Minimum 1/4 inch diameter rod in self aligning, universal joint action, flanged bushing with set screw.
		4. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.
		5. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
		6. End Bearings: Except in round ductwork 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.
		7. Quadrants:
			1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
			2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
			3. Where rod lengths exceed 30 inches provide regulator at both ends.
	7. DUCTWORK FABRICATION
		1. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
		2. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows are used, provide turning vanes.

* + 1. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
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 electric power is available and of the correct characteristics.
		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 - DUCTWORK
		1. Install in accordance with manufacturer's instructions.
		2. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
		3. Duct Sizes are inside clear dimensions. For lined ducts, maintain sizes inside lining.
		4. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
		5. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
		6. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
		7. Use double nuts and lock washers on threaded rod supports.
		8. Connect diffusers or light troffer boots to low pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp and tape.
		9. Connect flexible ducts to metal ducts with draw bands plus tape.
		10. Provide residue traps in kitchen hood exhaust ducts at base of vertical risers with provisions for clean out. Use stainless steel for ductwork exposed to view and stainless steel or carbon steel for ducts where concealed.
		11. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
		12. Install so that unfaced fiberglass and mineral fiber insulation are not in the interior of the ductwork.
	3. INSTALLATION - DUCTWORK ACCESSORIES
		1. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible.
		2. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
		3. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated. Provide for cleaning kitchen exhaust ductwork in accordance with NFPA 96. Provide minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, and as indicated. Review locations prior to fabrication.
		4. Provide duct test holes where indicated and required for testing and balancing purposes.
		5. Provide fire dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by authorities having jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
		6. Demonstrate re-setting of fire dampers to Owner.
		7. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment.
		8. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
		9. Use splitter dampers only where indicated.
		10. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.
	4. CLEANING
		1. Clean work under provisions of 017300.
		2. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment which may be harmed by excessive dirt with temporary filters, or bypass during cleaning.

END OF SECTION

USPS MPF Specification Last Revised: 10/1/2022