SECTION 230500

COMMON WORK RESULTS FOR HVAC

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**NOTE TO SPECIFIER**

*Use this Specification Section for Mail Processing Facilities.*

***This is a Type 1 Specification with completely editable text; therefore, any portion of the text can be modified by the A/E preparing the Solicitation Package to suit the project.***

*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. Basic mechanical methods.
			2. Supports and anchors.
			3. Motors.
			4. Mechanical identification.
			5. Vibration isolation.
			6. Sleeves and seals.
		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. 078400 - Firestopping: Materials for closure of penetrations at rated assemblies.
			2. 079200 - Joint Sealants: Sealants.
			3. 099100 - Painting: Field painting.
			4. Section 019113 – General Commissioning Requirements: Requirements related to Division 23 Commissioning
	2. REFERENCES
		1. American Society for Testing and Materials (ASTM):
			1. ASTM F708 - Design and Installation of Rigid Pipe Hangers.
		2. American Society of Mechanical Engineers (ASME):
			1. ASME A13.1 - Scheme for the Identification of Piping Systems.
			2. ASME B31.5 - Refrigeration Piping
			3. ASME B31.9 - Building Services Piping
		3. National Fire Protection Association
			1. NFPA 13 - Installation of Sprinkler Systems.
		4. Institute of Electrical and Electronic Engineers
			1. IEEE 112 - Test Procedure for Polyphase Induction Motors and Generators.
		5. National Electrical Manufacturers Association
			1. NEMA MG 1 - Motors and Generators.
	3. SUBMITTALS
		1. Section 013300 - Submittal Procedures: Procedures for submittals.
			1. Product Data:
				1. Pipe Supports and Anchors: Provide manufacturers catalog data including load capacity.
				2. Motors: Provide wiring diagrams with electrical characteristics and connection requirements.
				3. Mechanical Identification: Provide manufacturers catalog literature for each product required.
		2. Section 017704 – Closeout Procedures and Training: Procedures for closeout submittals.
			1. Project Record Documents: Accurately record the following:
				1. Record actual locations of tagged valves; include valve tag numbers.
	4. QUALITY ASSURANCE
		1. Regulatory Requirements:
			1. Conform to applicable local code for support of plumbing piping.
			2. Supports for Fire Suppression Piping: In conformance with NFPA 13.
			3. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.
	5. DELIVERY, STORAGE, AND HANDLING
		1. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
		2. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering.
	6. BASIC MECHANICAL METHODS
		1. Comply with manufacturer's published instructions for delivery, storage, protection, installation, and materials.
		2. When equipment is operable, and it is to the advantage of the Contractor to operate the equipment, he may do so provided that he properly supervises the operation, and retains full responsibility for the equipment operated. Regardless of whether or not the equipment has or has not been operated, the Contractor shall properly clean the equipment, install new filter media, make all required adjustments, and complete all punch list items before final acceptance by the Construction Manager and Contracting Officer.
		3. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.
		4. Where mounting heights are not detailed or dimensioned, install mechanical services and overhead equipment to provide the maximum headroom possible.
		5. Items exposed (in areas without ceilings) shall be installed in a neat, orderly manner. Elements shall be perpendicular and parallel to building lines.
		6. In those conditions where ductwork is exposed in finished areas, careful craftsmanship and only the highest standards of installation will be acceptable. All routing of exposed ducts, pipes, conduits, shall be approved in advance by the Contracting Officer prior to installation.
		7. Drawings and Specifications:
			1. The Drawings indicate the general arrangement of systems and are to be followed insofar as possible. If deviations from the layout are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted in writing to the Contracting Officer, for approval before proceeding with the work.
			2. This Contractor shall make all his own measurements in the field and shall be responsible for correct fitting. Contractor shall coordinate this work with all other branches in such a manner as to cause a minimum of conflict or delay.
			3. Where any work is so placed as to cause or contribute to a conflict it shall be readjusted at the expense of the Contractor causing the conflict. The decision shall be final in regard to the arrangement of ducts, piping, etc., where conflict arises.
			4. Where offsets in systems are required to complete the installation, or for the proper operation of the system, these shall be deemed to be included in the Contract.
			5. Significant deviations from the Drawings must be approved by the Contracting Officer’s Representative (COR).
		8. Locations:
			1. Mechanical layouts indicated on drawings are diagrammatic. Exact locations of ducts, pipes, and equipment may vary because of conflicts with work of other trades. Work out conflicts where relocations will not affect operation or appearance of systems.
			2. Locate equipment requiring periodic servicing so that it is readily accessible. Do not back up service sides to walls, nor place it too close to other equipment to make service impractical.
2. 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. PIPE HANGERS AND SUPPORTS
		1. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
			1. Grinnell, Exeter, NH (603) 778-9200.
			2. Other acceptable manufacturers offering equivalent products.
				1. Elcen
				2. Fee and Mason
				3. Kin-Line
				4. Michigan
				5. Unistrut
		2. Fire Protection Piping:
			1. Conform to NFPA 13.
			2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: [Malleable iron] [Carbon steel], adjustable swivel, split ring.
			3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
			4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
			5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
			6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
			7. Vertical Support: Steel riser clamp.
			8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
			9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
		3. Plumbing Piping - DWV:
			1. Conform to [ASME B31.9] [ASTM F708].
			2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron or carbon steel, adjustable swivel, split ring.
			3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
			4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
			5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
			6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
			7. Vertical Support: Steel riser clamp.
			8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
			9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
		4. Plumbing Piping - Water:
			1. Conform to [ASME B31.9] [ASTM F708].
			2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron or carbon steel, adjustable swivel, split ring.
			3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
			4. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
			5. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll, double hanger.
			6. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
			7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded spacers and hanger rods, cast iron roll.
			8. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
			9. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
			10. Wall Support for Hot Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
			11. Vertical Support: Steel riser clamp.
			12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
			13. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
			14. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
			15. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
		5. Refrigerant Piping:
			1. Conform to [ASME B31.5] [ASTM F708].
			2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron or carbon steel adjustable swivel, split ring.
			3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
			4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
			5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
			6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
			7. Vertical Support: Steel riser clamp.
			8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
			9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
		6. See Hanger and Support schedule at end of this Section.
	2. MOTORS
		1. Electric motors shall be new NEMA Standard, sized and designed to operate at full load and full speed continuously without causing noise, vibration, and temperature rise in excess of their rating.
		2. Motors on belt driven equipment shall have slide rails with adjusting screws for belt tension adjustment. Motors exposed to the weather shall be weather-protected.
		3. Premium efficiency electric motors shall be installed on air handling units, relief fans, exhaust fans, pumps, etc.
		4. High efficiency motors shall have efficiency and losses determined in accordance with the latest revisions of IEEE Standard 112. Polyphase squirrel-cage motors rated 1 through 125 horsepower shall be tested by dynamometer method B. The efficiency will be determined using segregated losses in which stray load loss is obtained from a linear regression analysis to reduce the effect of random errors in the test measurements. Guaranteed minimum load efficiency shall be as follows:

 MOTOR FULL LOAD GUARANTEED MINIMUM

 HP RPM FULL LOAD EFF.

 3 1750 86.5

 5 1750 86.5

 7-1/2 1750 88.5

 10 1745 90.2

 15 1760 90.2

 20 1760 91.0

 25 1760 91.7

 30 1760 92.4

* + 1. Motor sound power levels shall not be greater than recommended in NEMA MG 1-12.49.
		2. Provide motors with drive shafts long enough to extend completely through belt sheaves when sheaves are properly aligned or balanced.
		3. Motor Characteristics:
			1. 120V/1/60 Hz: Capacitor start, open drip-proof type, ball bearing, rated 40 C. continuous rise.
			2. 460/3/60 Hz: NEMA B, normal starting torque, single speed, squirrel-cage type, open drip-proof, rated 40 C continuous rise, with ball bearings rated for B-10 life of 100,000 hours and fitted with grease fittings and relief ports. Provide motors with aluminum end brackets with steel inserts in bearing cavities.
		4. Manufacturers: Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
			1. GE
			2. Other acceptable manufacturers offering equivalent products.
				1. Lincoln
				2. Reliance
				3. Louis Alis
		5. Motor Sentinel Switches:
			1. Manufacturers: Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
				1. Square D Class 2510
				2. Siemens SCN or SCF Series.
		6. Combination Starter/Disconnect:
			1. Manufacturers: Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
				1. Square D Class 8538 or 8539
				2. Siemens SCN or SCF Series.
		7. Motor/Circuit Disconnects:
			1. Manufacturers: Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
				1. Square D Class Type HU.
				2. Siement/I-T-E Enclosed Switch.
	1. MECHANICAL IDENTIFICATION
		1. Nameplates: Laminated three-layer plastic with engraved [black] [\_\_\_\_\_] letters on light contrasting background color.
		2. Tags
			1. Plastic Tags: Laminated three-layer plastic with engraved [black] [\_\_\_\_\_] letters on light contrasting background color. Tag size minimum 1-1/2 inches [diameter] [square] [\_\_\_\_\_\_\_\_\_].
			2. Metal Tags: Brass, Aluminum, or Stainless Steel [\_\_\_\_\_\_\_\_\_\_] with stamped letters; tag size minimum 1-1/2 inches diameter or square with smooth edges.
			3. Information Tags: Clear plastic with printed "Danger," "Caution," or "Warning" and message; size 3-1/4 x 5-5/8 inches with grommet and self-locking nylon ties.
			4. Tag Chart: Typewritten letter size list in anodized aluminum frame and plastic laminated.
		3. Pipe Markers
			1. Color and Lettering: Conform to ASME A13.1.
			2. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.
			3. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
			4. Plastic Underground Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.
	2. VIBRATION ISOLATION
		1. Type 1: Closed spring mount with top and bottom housing separated with neoprene rubber stabilizers.
		2. Type 2: Open spring mount with stiff springs (horizontal stiffness equal to vertical stiffness).
		3. Type 3: Open spring mount with stiff springs, heavy mounting frame, and limit stop.
		4. Type 4: Closed spring mount with stiff springs and limit stop.
		5. Type 5: Closed spring hanger with acoustic washer.
		6. Type 6: Closed spring hanger with one inch thick acoustic isolator.
		7. Type 7: Elastomer mount with threaded insert and hold down holes.
		8. Type 8: Neoprene jacketed pre-compressed molded glass fiber.
		9. Type 9: Rubber waffle pads, 30 durometer, minimum 1/2 inch thick, maximum loading 40 psi. Use neoprene in oily or exterior locations.
		10. Type 10: 1/2 inch thick rubber waffle pads bonded each side of 1/4 inch thick steel plate.
	3. SLEEVES AND SEALS
		1. Sleeves for Pipes Through Non-Fire Rated Floors: 18 gage galvanized steel.
		2. Sleeves for Pipes Through Non-Fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage galvanized steel.
		3. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed, refer to Section 078400.
		4. Sleeves for Round Ductwork: Galvanized steel.
		5. Sleeves for Rectangular Ductwork: Galvanized steel or wood.
		6. Firestopping Insulation: Glass fiber type, non-combustible; refer to Section 078400.
		7. Sealant: Refer to Section 079200.
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.
		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. PREPARATION - MECHANICAL IDENTIFICATION
		1. Degrease and clean surfaces to receive adhesive for identification materials.
	3. INSTALLATION - GENERAL
		1. Install in accordance with manufacturer's instructions.
		2. The use of lead-containing solder for plumbing and plumbing fixtures is prohibited in the construction of this project.
	4. INSTALLATION - PIPE HANGER AND SUPPORTS
		1. Support horizontal piping as scheduled.
		2. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
		3. Place hangers within 12 inches of each horizontal elbow.
		4. Use hangers with 1-1/2 inch minimum vertical adjustment.
		5. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.
		6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
		7. Support riser piping independently of connected horizontal piping.
		8. Provide [copper plated hangers and supports for copper piping] [sheet lead packing between hanger or support and piping].
		9. Design hangers for pipe movement without disengagement of supported pipe.
		10. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
	5. INSTALLATION - MOTORS
		1. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
		2. Line up motors on direct drive dial type gauges.
		3. Check line voltage and phase and ensure agreement with nameplate.
		4. Make electrical connections and test motor for proper rotation/ phasing under Division 26.
		5. Adjust motors together with driven equipment to ensure equipment is dynamically and statically balanced. Correct any excessive vibration or noise from the equipment.
	6. INSTALLATION - MECHANICAL IDENTIFICATION
		1. Install identifying devices after completion of coverings and painting.
		2. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.
		3. Install tags using corrosion resistant chain. Number tags consecutively by location.
		4. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
		5. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.
		6. Identify control panels and major control components outside panels with plastic nameplates.
		7. Identify valves in main and branch piping with tags.
		8. Identify air terminal units and radiator valves with numbered tags.
		9. Tag automatic controls, instruments, and relays. Key to control schematic.
		10. Identify piping, concealed or exposed, with plastic pipe markers and plastic tape pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.
		11. Identify ductwork with plastic nameplates. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.
		12. Provide ceiling tacks to locate valves or dampers above T-bar type panel ceilings. Locate in corner of panel closest to equipment.
	7. INSTALLATION - VIBRATION ISOLATION
		1. Install vibration isolators for motor driven equipment.
		2. Set steel bases for one inch clearance between housekeeping pad and base. Set concrete inertia bases for 2-inch clearance. Adjust equipment level.
		3. Provide spring isolators on piping connected to isolated equipment as follows: Up to 4 inches diameter, first three points of support; 5 to 8 inches diameter, first four points of support; 10 inch diameter and over, first six points of support. Static deflection of first point shall be twice deflection of isolated equipment.
	8. PIPE HANGER AND SUPPORT SCHEDULE

 MAX. HANGER ROD

 PIPE SIZE HANGER SPACING DIAMETER

 (Inches) (Feet) (Inches)

 1/2 to 1-1/4 6.5 3/8

 1-1/2 to 2 10 3/8

 2-1/2 to 3 10 1/2

 4 to 6 10 5/8

 8 to 12 14 7/8

 PVC (All Sizes) 6 3/8

C.I. Bell and Spigot

(or No-Hub) and at Joints 5 [\_\_\_]

END OF SECTION

USPS MPF Specification Last Revised: 10/1/2022