SECTION 210529-HANGERS AND SUPPORTS FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

Revise this Section by deleting and inserting text to meet Project-specific requirements.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
	* + 1. SUMMARY
				1. Section Includes:

Metal pipe hangers and supports.

Trapeze pipe hangers.

Metal framing systems.

Fastener systems.

Pipe stands.

Equipment supports.

Retain Sections in subparagraphs below that contain requirements Contractor might expect to find in this Section but are specified in other Sections.

Section 210548.13 “Vibration Controls for Fire-Suppression Piping and Equipment”.

* + - 1. DEFINITIONS
				1. MSS: Manufacturers Standardization Society of the Valve and Fittings Industry Inc.
			2. PERFORMANCE REQUIREMENTS

 Retain subparagraphs below “Certified NICET Level III or IV Technician for “Water-Based Fire Protection System Layout” with seal and signature of a NYS Registered Professional Fire Protection Engineer, or a NYS Registered Professional Fire Protection Engineer. Paragraphs below where Contractor provides layout on the bases of the contract drawings & specs.

* + - * 1. NICET Level III or IV Technician: Provide Water-Based Fire Protection Layout with seal and signature of a NYS Registered Professional Fire Protection Engineer using performance requirements, design criteria, FC, and NFPA standards that are indicated in this specification and design documentation.
				2. NYS Registered Professional Fire Protection Engineer. Provide Water-Based Fire Protection Layout using performance requirements, design criteria, FC, and NFPA standards that are indicated in this specification and design documentation.

It is essential for the design of the framing structural system for steel joist and or wood trusses to carry the additional dead loads and required live loads imposed by the fire sprinkler system and other related mechanicals. Apply to related requirements as per Steel Joist Institute Code of Standard Practice, Section 2.3- Specifying Design Loads, Structural Building Components Association, and as per NFPA 13-Chapter 9. Support structures shall be certified by a NYS Licensed Designer of Record/Register Design Professional as per IBC. Using performance requirements, design criteria, and related codes and NFPA 13 standards indicated in this specification and design documentation. The design of a support structure shall be based on either NFPA 13/9.1.1.3.1.1 or 9.1.1.3.2

* + - * 1. Structural Performance: Hangers and supports for fire-suppression piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to [**ASCE/SEI 7**] <**Insert requirement**>.

Design supports for multiple pipes, including pipe hangers & stands, capable of supporting combined weight of supported systems, system contents, and test water.

Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

* + - 1. SUBMITTALS
				1. Product data for each type of product: catalog sheets, specifications, and installation instruction. indicating UL or FM approved for each product.
				2. Shop Drawings:

 Show fabricated piping support structures, pipe racks, trapeze pipe hangers and anchors. Include installation details and include calculations for the following; include Product Data for components:

Support Frames, Piping, Tank, and Equipment Supports, and Anchorage: Indicate point loads and support locations, along with calculations and details keyed to the layouts pertaining to supports, support frames, and anchorage from the contract specification and design documentation.

Supplementary Steel: Show details of fabrication and installation. Indicate materials, thicknesses, gauges, sizes, dimensions, methods of joining and fastening, welds, finishes, details of reinforcement and embedment, attachments, anchorage, miscellaneous metal items incidental to basic fabrication shown, provisions for work of other trades, and other pertinent information from the contract specification and design documentation.

Revise list below to suit Project as per NFPA 13/9 Hanging, Bracing, and Restraint of System Piping.

Trapeze pipe hangers:

Metal framing systems.

Pipe stands.

Equipment supports.

Retain "Welding Qualifications" Paragraph below if shop or field welding is required. If retaining, also retain "Welding certificates" Paragraph in " Submittals" Article.

* + - * 1. Welding Qualifications & Welding Certification: Qualify procedures and operators according to 2010 ASME Boiler and Pressure Vessel Code.
			1. QUALITY ASSURANCE
				1. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
				2. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
1. PRODUCTS

edit to Make project specific

* + - 1. METAL PIPE HANGERS AND SUPPORTS
				1. Acceptable Manufacturers: EATON TOLCO Fire protection solution, ITT Grinnell Pipe Hangers and supports, National Pipe Hanger Corporation, nVent Caddy products, Anvil International pipe hangers-ASC, or equal.
				2. Carbon-Steel Pipe Hangers and Supports:

Description: MSS SP-58, Types 1 through 58, factory-fabricated components.

Adjustable Clevis Hanger Zinc Plated with cross bolt and nut.

Hanger Rods: Continuous-thread rod, nuts, and washer made of [**low carbon steel/clear zinc plated**] [**stainless steel**] <**Insert material**>.

* + - * 1. Stainless-Steel Pipe Hangers and Supports:

Description: MSS SP-58, Types 1 through 58, factory-fabricated components.

Adjustable Clevis Hanger stainless steel with cross bolt and nut.

Hanger Rods: Continuous-thread rod, nuts, and washer made of [**stainless steel**] <**Insert material**>.

* + - * 1. Adjustable Swivel Rings and Supports:

Listed UL and FM & complies with Federal Specification A-A-1192A (Type 10), Manufactures’ Standardization Society SP-69 (Type 10) and NFPA standards.

Adjustable Swivel Ring Carbon Steel Mil. Pre-Galvanized.

Hanger Rods: Continuous-threaded rod [**low carbon steel/clear zinc plated**] [**stainless** **steel**]

* + - * 1. Hinged Extension Split Ring Hanger:

Conforms to Federal Specification WW-H-171E & A-A-1192A, Type and Manufacturers Standardization Society ANSI/MSS SP-69 & SP-58, Type 12.

Malleable Iron/Electro-Galvanized

Hanger Rods: Continuous threaded rod [**low carbon steel/clear zinc plated**] [**stainless** **steel**]

* + - * 1. Standard Riser Clamp:

Listed UL and FM and conforms to Federal Specification WW-H-171 E & A-A-1192A, Type 8, and Manufacturers Standardization Society ANSI/MSS SP-69 & SP-58, Type 8.

Steel-Zinc Plated.

* + - * 1. Sprinkler CPVC Piping:/Hangers and Restraints:

UL listed and met the requirements of NFPA 13, 13R and 13D.

Pre-Galvanized Steel

Type: One Hole Strap.

Type: Two Hole Strap.

Type: Double Fastener Strap-Side Mount.

Type: “Stand-Off” Hanger & Restrainer.

Type: Offset Hanger and Restrainer.

Surge Restrainer.

¼” x 1” inch Tek screws

* + - * 1. Copper Pipe Hangers:

Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.

Hanger Rods: Continuous-thread rod, nuts, and washer made of [**copper-coated steel**] [**stainless steel**] <**Insert material**>.

* + - 1. TRAPEZE PIPE HANGERS

Trapeze pipe hanger in paragraph below requires calculating and detailing at each use.

* + - * 1. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.
			1. METAL FRAMING SYSTEMS

Metal framing systems in this article require calculating and detailing at each use.

Framing systems in first paragraph below are made by MFMA members.

* + - * 1. MFMA Manufacturer Metal Framing Systems:

 Retain one of first two subparagraphs for editing.

Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.

Standard: MFMA-4.

Channels: Continuous slotted steel channel with interned lips.

Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.

Hanger Rods: Continuous-thread rod, nuts, and washer made of [**carbon steel**] [**stainless steel**] <**Insert material**>.

Framing systems in paragraph below should be equal to or able to exceed MFMA-4 requirements.

* + - * 1. Non-MFMA Manufacturer Metal Framing Systems:

 Retain one of first two subparagraphs for editing.

Description: Shop- or field-fabricated pipe-support assembly made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.

Standard: Comply with MFMA-4.

Channels: Continuous slotted steel channel within turned lips.

Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.

Hanger Rods: Continuous-thread rod, nuts, and washer made of [**carbon steel**] [**stainless steel**] <**Insert material**>.

Coating: [**Zinc**] [**Paint**] <**Insert coating**>.

* + - 1. FASTENER SYSTEMS for CONCRETE, STEEL, and WOOD

retain or delete to Make project specific

Verify suitability of fasteners in this article for use in lightweight concrete or concrete slabs less than 4 inches (100 mm) thick.

* + - * 1. Acceptable Manufactures: Red Head, Powers, Sammys threaded Rod Anchors, Hangermate, EATON TOLCO, Grinnell, Michigan Hanger, Newman, ANVIL, nVent Caddy, or equal.
				2. Mechanical-Expansion Anchors: Insert-wedge-type or drop-ins. Male or Female ends [**zinc-coated**] [**stainless-**] steel anchors, for use in hardened Portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
				3. Drilling Fasteners Screw Type: For [**concrete**], [**steel**], and [**wood**]Type of installation: [**vertical**] [**horizontal-side mounted**], [**swive**l].
				4. Beam Clamps/ Beam Hangers: Zinc Plated adjustable malleable iron beam clamp, or adjustable forged steel beam clamp, and forged steel beam clamp with weldless eye nut (right hand thread) steel tie rod, nuts and washers.
				5. Beam Clamp Retaining Strap
				6. Truss-T Hangers
				7. Rod Couplings: Zinc Plated.
			1. PIPE STANDS

Pipe stands in this article require calculating and detailing at each use.

* + - * 1. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support mechanical room piping.
				2. Compact Pipe Stand: One-piece steel unit with pipe clamps, or V-shaped cradle to support pipe, for mechanical room installation.
				3. Low-Type Pipe Stand: One-piece or two pieces with vertical members with base plate. Cadmium plated steel or stainless steel, continuous threaded rod or pipe with pipe clamps, or V-shaped cradle to support pipe.
				4. High-Type Pipe Stand: One-piece or two pieces with vertical members with base plate Cadmium plated steel or stainless steel, continuous threaded rod or pipe with pipe clamps, or V-shaped cradle to support pipe.
			1. EQUIPMENT SUPPORTS

Equipment support in paragraph below requires calculating and detailing at each use.

* + - * 1. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.
			1. MISCELLANEOUS MATERIALS
				1. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
				2. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, no shrink and nonmetallic grout; suitable for interior and exterior applications.

Properties: Non-staining, noncorrosive, and nongaseous.

Design Mix: 5000 psi, 28-day compressive strength.

1. EXECUTION

retain or delete if applicable

* + - 1. HANGER AND SUPPORT INSTALLATION
				1. Metal Pipe-Hanger Installation: Comply with MSS SP-69, MSS SP-89 and NFPA 13 Chapter 9 Hanging, Bracing, and Restraint of System Piping. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

Trapeze pipe hanger in first paragraph below requires calculating and detailing at each use.

* + - * 1. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69, MSS SP-89 and NFPA 13 Chapter 9 Hanging, Bracing, and Restraint of System Piping. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.

Field fabricates from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

Metal framing system in first paragraph below requires calculating and detailing at each use.

* + - * 1. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.
				2. Fastener System Installation:

Verify suitability of fasteners in two subparagraphs below for use in lightweight concrete or concrete slabs less than 4 inches (100 mm) thick

Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

Install concrete screws in concrete after concrete is placed and completely cured. Using vertical mount, or horizontal mount. Install fasteners according to the manufacture’s written instructions.

Pipe stand in first paragraph below requires calculating and detailing at each use.

* + - * 1. Pipe Stand Installation:

Pipe Stand Types for pipe supports in mechanical room. Assemble components and mount on concrete floors or steel structure.

* + - * 1. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

Equipment support in first paragraph below requires calculating and detailing at each use.

* + - * 1. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
				2. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
				3. Install lateral bracing with pipe hangers and supports to prevent swaying.
				4. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, 2/-1/2” inch and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
				5. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
				6. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
				7. Hanger Spacing for Steel, Cooper, CPVC, and Ductile Iron as per NFPA 13/ Table 9.2.2.1 (a):
			1. EQUIPMENT SUPPORTS

Retain or delete if applicable

* + - * 1. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
				2. Grouting: Place grout under supports for equipment and make bearing surface smooth.
				3. Provide lateral bracing, to prevent swaying, for equipment supports.
			1. METAL FABRICATIONS

Retain or delete if applicable

* + - * 1. Cut, drill, and fit miscellaneous metal fabrications for [**trapeze pipe hangers**] [**and**] [**equipment supports**].
				2. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
				3. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

Obtain fusion without undercut or overlap.

Remove welding flux immediately.

Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

* + - 1. ADJUSTING
				1. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
				2. Where a sprinkler system exceeds 100psi for branch lines above a ceiling supplying sprinkler in a pendent position below a ceiling, the hanger assembly supporting the pipe supplying an end sprinkler in a pendent position shall be of a type that prevents upward movement of the pipe. Use a surge restrainer to prevent movement at each end of the line hanger assembly.
				3. Trim excess length of continuous-thread hanger and support rods to 1-1/2.
			2. PAINTING

Retain or delete if applicable

Retain first paragraph below if Section 099123 for "Interior Painting" is not in Project Manual.

* + - * 1. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mil.

Retain first paragraph below if Section 099123 for Interior Painting" is in Project Manual. Revise reference if Section 099600 "High-Performance Coatings" applies instead.

* + - * 1. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in **[Section 099123 "Interior Painting."] [Section 099600 "High-Performance Coatings."]**
				2. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.
			1. HANGER AND SUPPORT SCHEDULE

Retain or delate if applicable

* + - * 1. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
				2. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
				3. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
				4. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
				5. Use carbon-steel [**pipe hangers and supports**] [**metal trapeze pipe hangers**] [**and**] [**metal framing systems**] and attachments for general service applications.
				6. Use [**stainless-steel pipe hangers**] and supports [**stainless-steel**] [**or**] [**corrosion-resistant**] attachments for hostile environment applications.
				7. Use copper-plated pipe hangers and [**copper**] [**or**] [**stainless-steel**] attachments for copper piping and tubing.
				8. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

Adjustable, Steel Clevis Hangers-Zinc plated (MSS Type 1): For suspension of non-insulated or insulated, stationary pipes NPS ½” inch to 30” inch.

Riser Clamps/Steel-Zinc Plated (MSS Type 8): For support of stationary steel pipe risers NPS 3/8” inch to 4” inch.

Malleable/Electro-Galvanized Split-Ring Hangers (MSS Type 12): For suspension pipes to allow piping to run close to ceilings or walls NPS3/8” inch to 4” inch.

Adjustable Swivel Ring/Pre-Galvanized Zinc (MSS Type 10): For suspension of stationary pipes NPS ½” inch to 8” inch.

Adjustable Swivel Trapeze Pipe Hanger/Pre-Galvanized (ASTM A653): For suspension of stationary pipes to allow for hanging of piping systems between structural attachments. NPS 1½” inch to 4” inch.

Adjustable Swivel Ring/Copper Plated (Type 10) Recommended for suspension of stationary copper tube. ½” inch to 4”.

U-Bolts (MSS Type 24): For support of heavy pipes NPS ½” inch to 30” inch.

Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4” inch to 36” inch with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.

Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4” inch to 36” inch, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.

Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2” inch to 36” inch if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.

Sprinkler CPVC Piping/ Hangers and Restraints:

Surge Restraints if sprinkler system exceeds 100psi.

* + - * 1. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS ¾” inch to 24” inch.

Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS ¾” inch to 24” inch if longer ends are required for riser clamps.

* + - * 1. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

Steel Rod Couplings 3/8” through 7/8”.

Steel Clevises (MSS Type 14): For piping installations.

Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.

* + - * 1. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.

Drilling fasteners steel screw for concrete, wood, or steel.

Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.

Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.

Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.

Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.

C-Clamps (MSS Type 23): For structural shapes.

Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.

Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.

Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.

Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

Light (MSS Type 31): 750 lb.

Medium (MSS Type 32): 1500 lb.

Heavy (MSS Type 33): 3000 lb.

Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.

Truss T-Hangers

* + - * 1. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.

Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4” inches.

Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.

Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.

Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.

Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.

Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.

Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:

Horizontal (MSS Type 54): Mounted horizontally.

Vertical (MSS Type 55): Mounted vertically.

Trapeze (MSS Type 56): Two vertical type supports and one trapeze member.

* + - * 1. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
				2. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.
				3. Use [**mechanical-expansion anchors**] [**or**] [ **drilled fasteners screw type**] instead of building attachments where required in concrete construction.

OGS Design and Construction requirements for State Agencies:

Note: For all projects Adjustable Swivel Rings are accepted up to 2”.

Sprinkler Piping: Adjustable Swivel Rings Carbon Steel Mil. Galvanized. Please Remove Adjustable swivel rings for agency specific such as DOCCS, OC & FS, OMH, OMR & DD and DASNY funded projects. (Not accepted)

END OF SECTION 210529