



Anvil International, Inc.
110 Corporate Drive
Suite 10
Portsmouth, NH 03802-3180
Phone: (603) 422-8000
Fax: (603) 422-8033
www.anvilintl.com

This MANU-SPEC™ utilizes the Construction Specifications Institute (CSI) *Manual of Practice*, including *MasterFormat™*, *SectionFormat™* and *PageFormat™*. A MANU-SPEC is a manufacturer-specific proprietary product specification using the proprietary method of specifying applicable to project specifications and master guide specifications. Optional text is indicated by brackets []; delete optional text in final copy of specification. Specifier Notes typically precede specification text; delete notes in final copy of specification. Trade/brand names with appropriate symbols typically are used in Specifier Notes; symbols are not used in specification text. Metric conversion, where used, is soft metric conversion.

This MANU-SPEC specifies pipe hangers and supports. These products are manufactured by Anvil International, Inc. Revise MANU-SPEC section number and title below to suit project requirements, specification practices and section content. Refer to CSI *MasterFormat* for other section numbers and titles.

SECTION 15060 HANGERS & SUPPORTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Hangers and supports for mechanical piping, ducting and equipment.

Specifier Note: Revise paragraph below to suit project requirements. Add section numbers and titles per CSI *MasterFormat* and specifier's practice.

- B. Related Sections:
1. Division 3 Section: Cast-in-Place Concrete.
 2. Division 5 Section: Structural Steel.
 3. Division 5 Section: Metal Fabrications.

Specifier Note: Article below may be omitted when specifying manufacturer's proprietary products and recommended installation. Retain Reference Article when specifying products and installation by an industry reference standard. If retained, list standard(s) referenced in this section. Indicate issuing authority name, acronym, standard designation and title. Establish policy for indicating edition date of standard referenced. Conditions of the Contract or Division 1 References Section may establish the edition date of standards. This article does not require compliance with standard, but is merely a listing of references used. Article below should list only those industry standards referenced in this section. Retain only those reference standards to be used within the text of this Section. Add and delete as required for specific project.

1.02 REFERENCES

- A. American National Standards Institute/American Society of Mechanical Engineers (ANSI/ASME):
1. ANSI/ASME B31.1 Power Piping (SI Edition).
 2. ANSI/ASME B31.3 Chemical Plant and Petroleum Refinery Piping.
 3. ANSI/ASME B31.9 Building Services Piping.

Specifier Note: The following material specifications are a sample of those listed in MSS SP-58. Other materials may also be used by the manufacturer.

- B. ASTM International:



1. ASTM A36 Standard Specification for Carbon Structural Steel.
 2. ASTM A47 Standard Specification for Ferritic Malleable Iron Castings.
 3. ASTM A48 Standard Specification for Gray Iron Castings.
 4. ASTM A53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 5. ASTM A123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 6. ASTM A240 (for Types 304 and 316) Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 7. ASTM A387 Standard Specification for Pressure Vessel Plates, Alloy Steel, Chromium-Molybdenum.
 8. ASTM A515 Standard Specification for Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service.
 9. ASTM A536 Standard Specification for Ductile Iron Castings.
 10. ASTM A575 Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades.
 11. ASTM A668 Standard Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use.
 12. ASTM A1011 Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 13. ASTM B633 Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
- C. Manufacturers Standardization Society of The Valve and Fittings Industry (MSS):
1. MSS SP-58 Pipe Hangers and Supports - Materials, Design and Manufacture.
 2. MSS SP-69 Pipe Hangers and Supports - Selection and Application.
 3. MSS SP-77 Guidelines for Pipe Support Contractual Relationships.
 4. MSS SP-89 Pipe Hangers and Supports - Fabrication and Installation Practices.
 5. MSS SP-90 Guidelines on Terminology for Pipe Hangers and Supports.
 6. MSS SP-127 Bracing for Piping Systems Seismic-Wind-Dynamic Design, Selection, Application.

Specifier Note: Article below should be restricted to statements describing design or performance requirements and functional (not dimensional) tolerances of a complete system. Omit descriptions to composite and operational properties to extent necessary to link multiple components of a system and to interface with other systems.

1.03 SYSTEM DESCRIPTION

A. Design Requirements:

1. Incorporate in designs pipe hangers and supports to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies as detailed in manufacturer's pipe hanger catalog.
2. Establish maximum load ratings with consideration for allowable stresses prescribed by ASME B31.1 or MSS SP-58.
3. Ensure that supports, guides and anchors do not transmit excessive quantities of heat to building structure.
4. Utilize hangers and supports to support systems under all conditions of operation, allow free expansion and contraction, and to prevent excessive stresses from being introduced into pipework or connected equipment.
5. Provide for vertical adjustments after erection and during commissioning, where feasible, to ensure pipe is at design elevation and slope.
6. Pipe supports on racks require T-supports, which are not adjustable.

Specifier Note: Article below includes submittal of relevant data to be furnished by Contractor before, during or after construction. Coordinate this article with Architect's and Contractor's duties and responsibilities in Conditions of the Contract and Division 1 Submittal Procedures Section.

1.04 SUBMITTALS

Specifier Note: Submit the following in accordance with MSS SP-77 and MSS SP-90. Consult manufacturer for complete recommendations. Submit shop drawings for items in this section only as required. Otherwise, catalog information shall be used in lieu

of drawings.

- A. General: Submit listed submittals in accordance with Conditions of Contract and Division 1 Submittal Procedures.
- B. Product Data: Submit product data, including manufacturer's SPEC-DATA™ product sheet, for specified products.
- C. Shop Drawings:
 - 1. If required, submit shop drawings for the following items:
 - a. All bases, hangers and supports.
 - b. Connections to equipment and structure.
 - c. Structural assemblies.
 - d. [].
- D. Quality Assurance:
 - 1. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements. Certificates shall be furnished only as required by specific codes, upon request.
 - 2. Manufacturer's Instructions: Manufacturer's installation instructions, only as required for engineered hangers and furnished upon request.
- E. Closeout Submittals: Submit the following:
 - 1. Warranty: Warranty documents specified or as indicated in manufacturer's product literature.
 - 2. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Utilize an installer experienced in performing work of this section who is experienced in installation of work similar to that required for this project and per the minimum requirements of MSS SP-89.

Specifier Note: Retain paragraph below if a preinstallation meeting is required. Describe requirements for meetings to coordinate materials and techniques, and to sequence related work.

- B. Conduct preinstallation meeting [One week] prior to commencing [Work of this section] [And] [Onsite installations], to verify project requirements, coordinate with other subtrades, establish condition and completeness of substrate, review manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Division 1 Project Management and Coordination (Project Meetings).

1.06 DELIVERY, STORAGE & HANDLING

- A. General: Comply with Division 1 Product Requirements.
- B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- D. Storage and Protection: Store materials protected from exposure to harmful weather conditions.

Specifier Note: Coordinate article below with Conditions of the Contract and with Division 1 Closeout Submittals (Warranty) Section.

1.07 WARRANTY

- A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
- B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

Specifier Note: Coordinate paragraph below with manufacturer's warranty requirements.

1. Warranty Period: [Specify term.] years commencing on Date of Substantial Completion.

PART 2 PRODUCTS

Specifier Note: Retain article below for proprietary method specification. Add product attributes, performance characteristics, material standards, and descriptions as applicable. Use of such phrases as “or equal” or “or approved equal” or similar phrases may cause ambiguity in specifications. Such phrases require verification (procedural, legal and regulatory) and assignment of responsibility for determining “or equal” products.

2.01 PIPE HANGERS AND SUPPORTS

- A. Manufacturer: Anvil International, Inc.

1. Contact: 110 Corporate Drive, Suite 10, Portsmouth, NH 03802-3180; Telephone: (603) 422-8000; Fax: (603) 422-8033; Web site: www.anvilintl.com.

2.02 GENERAL

- A. Fabricate hangers, supports and sway braces as applicable to [ANSI/ASME B31.1] [ANSI/ASME B31.3] [ANSI/ASME B31.9] [MSS SP-58] [MSS SP-69] [MSS SP-127].
- B. Use components for intended design purpose only. Do not use for rigging or erection purposes.

2.03 MANUFACTURED UNITS

Specifier Note: Galvanizing or zinc-rich paint is normally required only under conditions where corrosion is likely. Refer to Anvil catalog and include all dimensions, which are required to facilitate ordering.

- A. Finishes:

1. Pipe Hangers and Supports: [Galvanized] [Painted with zinc-rich paint] [Manufacturer’s standard primer that meets Fed Spec TT-P-636] after manufacture.
2. Use [Electro-plating galvanizing process per ASTM B633] [Hot dipped galvanizing process per ASTM A123].
3. Ensure steel hangers in contact with copper piping are [Copper plated] [Copper painted] [Epoxy coated]. Copper plating/painting is used for identification purposes only, indicating use on copper tube diameters.

Specifier Note: Comply with the requirements and recommendations of MSS SP-58, MSS SP-69 and MSS SP-90 as applicable for products below. Consult the Anvil International catalog for the appropriate MSS SP-58 and MSS SP-69 types and figure numbers.

- B. Proprietary Products/Systems: Anvil hangers and supports, including the following:

1. Copper Tubing Hangers:
 - a. Material: [Malleable iron per ASTM A47/ASTM A126] [Carbon steel per ASTM A36/ASTM A1011].
 - b. Size: [Specify size.].
 - c. Finish: [Copper plated] [Copper painted] [Yellow dichromate] [Plastic coated].
 - d. Figure Number: [CT65] [CT69] [CT99] [CT109] [CT121] [CT128R] [CT138R] [CT255].
2. Pipe Rings:
 - a. Material: [Malleable iron per ASTM A47/ASTM A126] [Carbon steel per ASTM A36/ASTM A1011].
 - b. Size: [Specify size.].
 - c. Finish: [Plain] [Galvanized].
 - d. Maximum Temperature:
 - 1) Galvanized Finish: 450 degrees F (232 degrees C).
 - 2) Plain Finish: 650 degrees F (343 degrees C).
 - e. Figure Number: Fig [67] [69] [97] [104] [108] [138R].
3. Clevis:
 - a. Material: Carbon steel per ASTM A36/ASTM A1011.
 - b. Size: [Specify size.].

- c. Finish: [Plain] [Galvanized] [Epoxy] [Plastic].
- d. Maximum Temperature:
 - 1) Galvanized/Epoxy Finish: 450 degrees F (232 degrees C).
 - 2) Plain Finish: 650 degrees F (343 degrees C).
 - 3) Plastic Finish: 225 degrees F (107 degrees C).
- e. Figure Number: Fig [65] [260] [300] [590].
- 4. Steel Pipe Clamps:
 - a. Material: [Carbon steel, comply with ASTM A36/ASTM A515] [Alloy steel, comply with ASTM A387, Grade 22] [Stainless steel, comply with ASTM A240, types 304 and 316].
 - b. Size: [Specify size.].
 - c. Finish: [Plain] [Galvanized] [Epoxy].
 - d. Maximum Temperature:
 - 1) Galvanized/Epoxy Finish: 450 degrees F (232 degrees C).
 - 2) Plain Finish: [650 degrees F (343 degrees C)] [750 degrees F (399 degrees C)] [1075 degrees F (579 degrees C)].
 - e. Figure Number: Fig [40] [100] [103] [212] [212FP] [216] [224] [246] [261] [295] [295A] [295H].
- 5. Socket Clamps (AWWA/Ductile/Cast Iron Pipe Sizes Only):
 - a. Material: Carbon steel per ASTM A36/ASTM A515.
 - b. Size: [Specify size.].
 - c. Finish: [Plain] [Galvanized].
 - d. Figure Number: Fig [594] [595] [599] [600].
- 6. Beam Clamps:
 - a. Material: [Malleable iron per ASTM A47/ASTM A126] [Carbon steel per ASTM A36] [Ductile iron per ASTM A536] [Forged steel per ASTM A668].
 - b. Size: [Specify size.].
 - c. Finish: [Plain] [Galvanized].
 - d. Figure Number: Fig [14] [86] [87] [88] [89] [89X] [92] [93] [94] [95] [133] [134] [217] [218] [227] [228] [292].
- 7. Structural Attachments:
 - a. Material: Carbon steel per ASTM A36/ASTM A515.
 - b. Size: [Specify size.].
 - c. Finish: [Plain] [Galvanized].
 - d. Figure Number: Fig [54] [55] [60] [66] [112].
- 8. Ceiling Plates and Ceiling Flanges:
 - a. Material: [Plastic] [Cast iron per ASTM A48] [Malleable iron per ASTM A47/ASTM A126].
 - b. Size: [Specify size.].
 - c. Finish: [Plain] [Galvanized].
 - d. Figure Number: Fig [127] [128] [128R] [153] [395].
- 9. Brackets:
 - a. Material: [Malleable iron per ASTM A47/ASTM A126] [Carbon steel per ASTM A36].
 - b. Size: [Specify size.].
 - c. Finish: [Plain] [Galvanized].
 - d. Maximum Temperature:

- 1) Galvanized Finish: 450 degrees F (232 degrees C).
 - 2) Plain Finish: 650 degrees F (343 degrees C).
 - e. Figure Number: Fig [194] [195] [199] [202] [206] [207].
10. Concrete Inserts and Attachments:
- a. Material: [Malleable iron per ASTM A47/ASTM A126] [Stainless steel] [Carbon steel per ASTM A36/ASTM A1011].
 - b. Size: [Specify size.].
 - c. Finish: [Plain] [Galvanized].
 - d. Figure Number: Fig [47] [49] [52] [152] [281] [282] [284] [285] [286].
11. Rod Attachments:
- a. Material: [Carbon steel per ASTM A36] [Malleable iron per ASTM A47/A126] [Forged steel per ASTM A668].
 - b. Size: [Specify size.].
 - c. Finish: [Plain] [Galvanized].
 - d. Maximum Temperature:
 - 1) Galvanized Finish: 450 degrees F (232 degrees C).
 - 2) Plain Finish: 650 degrees F (343 degrees C).
 - e. Figure Number: Fig [110R] [114] [135] [136] [140] [142] [146] [148] [157] [230] [248] [278] [290] [299].
12. U-Bolts and Straps:
- a. Material: [Malleable iron per ASTM A47/ASTM A126] [Carbon steel per ASTM A36/ASTM A515/ASTM A575].
 - b. Size: [Specify size.].
 - c. Finish: [Plain] [Galvanized].
 - d. Maximum Temperature:
 - 1) Galvanized Finish: 450 degrees F (232 degrees C).
 - 2) Plain Finish: 650 degrees F (343 degrees C).
 - e. Figure Number: Fig [120] [126] [137] [243] [244] [262].
13. Pipe Supports:
- a. Material: [Carbon steel per ASTM A36/ASTM A53] [Cast iron steel per ASTM A48].
 - b. Finish: [Plain] [Galvanized].
 - c. Type: [Insert type number from Anvil catalog.].
 - d. Pipe Size: [Specify pipe size.].
 - e. Stanchion Size: [Specify stanchion size.].
 - f. Height: "D" dimension [_____].
 - g. Figure Number: Fig [62] [63] [191] [192] [258] [259] [264] [265].
14. Trapeze:
- a. Material: Carbon steel per ASTM A36.
 - b. Size: [Specify size.].
 - c. Finish: [Plain] [Galvanized].
 - d. Maximum Temperature:
 - 1) Galvanized Finish: 450 degrees F (232 degrees C).
 - 2) Plain Finish: 650 degrees F (343 degrees C).
 - e. Figure Number: Fig [45] [46] [47].

15. Pipe Shields and Saddles:
 - a. Material: Carbon steel per ASTM A36/ASTM A1011.
 - b. Pipe Size: [Specify size.].
 - c. Finish: [Galvanized] [Plain].
 - d. Figure Number: Fig [160 - 166A] [167] [168].
16. Pipe Rolls:
 - a. Material: [Carbon steel per ASTM A36/ASTM A1011] [Cast iron per ASTM A48].
 - b. Pipe Size: [Specify size.].
 - 1) Dimension: [_____].
 - c. Finish: [Galvanized] [Plain].
 - d. Maximum Temperature:
 - 1) Galvanized Finish: 450 degrees F (232 degrees C).
 - 2) Plain Finish: 650 degrees F (343 degrees C).
 - e. Figure Number: Fig [171] [175] [177] [178] [181] [271] [274] [277].
17. Guides and Slides:
 - a. Material: Carbon steel per ASTM A36/ASTM A515.
 - b. Size: [Specify size.].
 - c. Pipe Size: [Specify pipe size.].
 - d. Insulation Thickness: [Specify insulation thickness.].
 - e. Finish: [Plain] [Galvanized] [Painted].
 - f. Maximum Temperature:
 - 1) Galvanized/Painted Finish: 450 degrees F (232 degrees C).
 - 2) Plain Finish: 650 degrees F (343 degrees C).
 - g. Options: [Specify options desired.].
 - h. Figure Number: Fig [212] [255] [256] [257] [432] [436] [439].
 - 1) Special High Temperature Slides: [Specify figure number.].

2.04 PRODUCT SUBSTITUTIONS

Specifier Note: Edit Article below to suit project requirements. If substitutions are permitted, edit text below. Add text to refer to Division 1 Project Requirements (Product Substitutions Procedures) Section.

- A. Substitutions: No substitutions permitted.

2.05 EQUIPMENT SUPPORTS

- A. Fabricate equipment supports not provided by equipment manufacturer from structural grade steel meeting requirements of Section 05120 Structural Steel. Submit calculations with shop drawings.

2.06 EQUIPMENT ANCHOR BOLTS AND TEMPLATES

- A. Provide templates to ensure accurate location of anchor bolts.

PART 3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

Specifier Note: Article below is an addition to the CSI *SectionFormat* and a supplement to MANU-SPEC. Revise article below to suit project requirements and specifier's practice.

- A. Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions, product carton installation instructions and Anvil International, Inc., SPEC-DATA™ sheets.

3.02 EXAMINATION

- A. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

3.03 INSTALLATION

- A. Clamps on Riser Piping:
 - 1. Support independent of connected horizontal pipework using riser clamps and riser clamp lugs welded to riser.
 - 2. Bolt tightening torques shall be to industry standards.
 - 3. Steel Pipes: Install above floor penetration or at structure, or under shear lugs welded to pipe. Shear lugs are recommended for Figure 261 but required on Figure 40.
 - 4. Cast Iron Pipes: Install below joint.
- B. Clevis Plates:
 - 1. Attach to concrete with [4] minimum concrete inserts, [One] at each corner.
 - 2. Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.
- C. Use approved constant support type hangers where:
 - 1. Vertical movement of pipework is 1/2 inch (12.7 mm) or more.
 - 2. Transfer of load to adjacent hangers or connected equipment is not permitted.
- D. Use variable support spring hangers where:
 - 1. Transfer of load to adjacent piping or to connected equipment is not critical.
 - 2. Variation in supporting effect does not exceed 25% of total load.

3.04 HANGER SPACING

- A. Plumbing Piping: Most stringent requirements of Plumbing Code, or authority having jurisdiction.
- B. Fire Protection: Comply with applicable fire code.
- C. Gas and Fuel Oil Piping: Comply with pipe manufacturer's recommendations and applicable codes.
- D. Copper Piping: Comply with pipe manufacturer's recommendations and applicable codes.
- E. Flexible Joint Roll Groove Pipe: Not less than one hanger at joints. For size and spacing of hangers and supports, refer to manufacturer's literature.
- F. Within 12 inches (305 mm) of each elbow. Recommended directly after change in direction of pipe.

3.05 HANGER INSTALLATION

- A. Install hanger so that rod is vertical under operating conditions.
- B. Adjust hangers to equalize load.
- C. Support from Structural Members: Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.
- D. Field welding of supports should be done by qualified welders using qualified welding procedures.
- E. Proper care and ventilation should be given when welding galvanized components.

3.06 HORIZONTAL MOVEMENT

- A. Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4 degrees from vertical.
- B. Where horizontal pipe movement is less than 1/2 inch (12.7 mm), offset pipe hanger and support so that rod hanger is vertical in hot position.

3.07 FINAL ADJUSTMENT

- A. Adjust Hangers and Supports:
 - 1. Ensure that rod is vertical under operating conditions.

-
2. Equalize loads.
- B. Adjustable Clevis:
1. Tighten hanger load nut securely to ensure proper hanger performance.
 2. Tighten upper nut after adjustment.
- C. C-Clamps:
1. Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.
- D. Beam Clamps:
1. Tighten all set screws and lock nuts.
 2. Hammer jaw firmly against underside of beam for Figure 127 only.

END OF SECTION