

Anvil CSI 3 Part MasterFormat Specifications

BASIC MECHANICAL METHODS AND MATERIALS

SECTION 23 05 00

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Piping, couplings, fittings and valves for piped building systems.

1.2 RELATED SECTIONS

- A. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.
- B. Section 21 11 00 - Facility Fire-Suppression Water-Service Piping.
- C. Section 22 30 00 - Plumbing Equipment.
- D. Section 23 50 00 - Central Heating Equipment.
- E. Section 23 60 00 - Central Cooling Equipment.

1.3 REFERENCES

- A. American Society of Mechanical Engineers (ASME) B31.1 - Power Piping (SI Edition).
- B. American Society of Mechanical Engineers (ASME) B31.3 - Chemical Plant and Petroleum Refinery Piping.
- C. American Society of Mechanical Engineers (ASME) B31.9 - Building Services Piping.
- D. ASTM International (ASTM) A36 - Standard Specification for Carbon Structural Steel.
- E. ASTM International (ASTM) A47 - Standard Specification for Ferritic Malleable Iron Castings.
- F. ASTM International (ASTM) A48 - Standard Specification for Gray Iron Castings.
- G. ASTM International (ASTM) A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- H. ASTM International (ASTM) A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- I. ASTM International (ASTM) A153 - Specification for Zinc Coating (Hot Dip) on Iron & Steel Hardware.
- J. ASTM International (ASTM) A240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- K. ASTM International (ASTM) A387 - Standard Specification for Pressure Vessel Plates, Alloy Steel, Chromium-Molybdenum.
- L. ASTM International (ASTM) A515 - Standard Specification for Pressure Vessel Plates, Carbon Steel, for Intermediate-and Higher-Temperature Service.
- M. ASTM International (ASTM) A536 - Standard Specification for Ductile Iron Castings.
- N. ASTM International (ASTM) A575 - Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades.
- O. ASTM International (ASTM) A668 - Standard Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use.
- P. ASTM International (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.
- Q. ASTM International (ASTM) B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
- R. Manufacturers Standardization Society of The Valve and Fittings Industry (MSS) SP-58 Pipe Hangers and Supports - Materials, Design and Manufacture.
- S. Manufacturers Standardization Society of The Valve and Fittings Industry (MSS) SP-69 Pipe Hangers and Supports - Selection and Application.
- T. Manufacturers Standardization Society of The Valve and Fittings Industry (MSS) SP-77 Guidelines for Pipe Support Contractual Relationships.
- U. Manufacturers Standardization Society of The Valve and Fittings Industry (MSS) SP-89 Pipe Hangers and Supports - Fabrication and Installation Practices.
- V. Manufacturers Standardization Society of The Valve and Fittings Industry (MSS) SP-90 Guidelines on Terminology for Pipe Hangers and Supports.
- W. Manufacturers Standardization Society of The Valve and Fittings Industry (MSS) SP-127 Bracing for Piping Systems Seismic-Wind-Dynamic Design, Selection, Application.

1.4 SYSTEM DESCRIPTION

- A. Grooved Mechanical Products: Couplings, fittings, valves and grooved components shall be used as the piping method.

1. Product: Gruvlok as manufactured by Anvil International.

B. System Design Requirements:

1. Grooved products shall meet National and Local Piping and/or Building Codes. Mechanical commercial and industrial piping products shall have a minimum 300-psi (2.4 MPa) working pressure with 3 to 1 or greater safety working pressure with the exception of plain-end fittings, which shall have a minimum of 175-psi (1.2MPa) working pressure.
2. Fire Protection UL/ULC listed and FM approved products shall conform to NFPA working pressures.
3. Incorporate in construction pipe hangers and supports to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies. Grooved piping installation shall meet ANSI B-31.1 - ANSI B-31.9 standards for horizontal and vertical pipe support design criteria.

1.5 SUBMITTALS

A. Submit under provisions of Section 01 30 00.

B. [Product Data]: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Installation methods.

C. Certifications:

1. 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.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches square, representing actual product, color, and patterns.

F. Closeout Submittals:

1. Warranty: Warranty documents.
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.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Manufacturing facilities shall be registered to ISO 9001:2000 and assessed to ISO 9000:2000 standard. A copy of the current certificate shall be available upon request.

B. Conduct pre-installation meeting to verify project requirements, coordinate with other trades, and establish condition and completeness of substrate. Review manufacturer's installation instructions and manufacturer's warranty requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

A. 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.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Anvil International, which is located at: 2 Holland Way; Exeter, NH 03833; Tel: 603-418-2800; Email: bgunnell@anvilintl.com; Web: www.anvilintl.com

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.

2.2 PIPING

A. Steel Piping: Black Steel and/or galvanized pipe conforming to ASTM A-53, Grade A or B. Grooving shall conform to

Gruvlok published grooving specifications.

- B. Steel Piping: Black Steel and/or galvanized pipe conforming to ASTM A-135 or A-795. Grooving shall conform to Gruvlok published grooving specifications.
- C. Steel Piping: Black Steel and/or galvanized pipe conforming to ASTM A-53, Grade A or B. Standard schedule 40 pipe shall be roll or cut grooved. Grooving shall conform to Gruvlok published grooving specifications.
- D. Steel Piping: Black Steel and/or galvanized pipe conforming to ASTM A-53, Grade A or B. Schedule 10 pipe and below shall be roll grooved. Grooving shall conform to Gruvlok published grooving specifications.
- E. Copper Tubing: Copper tube to comply with ASTM B-88.
 - 1. Types K, L, M, and DWV shall be used in conjunction with the Gruvlok Copper Tube sizes grooving specifications.

2.3 FITTINGS

- A. Material:
 - 1. Couplings and Grooved Flange Adapters shall conform to ASTM A-536 Ductile Grade 65-45-12
 - 2. Coupling Track Head Bolts shall conform to ASTM A-183 Grade 2.
 - 3. Hex nuts shall conform to ASTM A-563 Grade A. Bolts and nuts shall be zinc electroplated to ASTM B-633.
 - 4. Fittings shall conform to Cast Ductile ASTM A-536.
 - 5. Forged steel fittings shall conform to ASTM A-234 or A-105.
 - 6. Segmental welded fittings shall conform to ASTM A-53.
 - 7. Coatings shall be (Orange) rust inhibiting lead free coating.
 - 8. Coating shall be hot dipped galvanized fittings shall conform to ASTM A-153.
 - 9. Standard coupling gaskets for building services shall be Grade "EP" EPDM conforming to ASTM D-2000 with operating temperature range from -40 degrees F to +250 degrees F (-40 degrees C to 121 degrees C). or "E" EPDM conforming to ASTM D-2000 with operating temperature range from -40 degrees F to +230 degrees F (-40 degrees C to 110 degrees C). Or "E" type A Pre-Lubed EPDM for Fire Protection conforming to ASTM D-2000 with operating temperatures range from -40 degrees F to 150 degrees F (-40 degrees C to 66 degrees C).
- B. Gasket Lubricant: Coupling gaskets except where noted shall be lubricated with approved lubricant.
 - 1. Copper Systems: Gruvlok Xtreme Lubricant.
 - 2. Environments below -20 degrees F (-28 degrees C), and above 150 degrees F (66 degrees C) and systems subject to continuous cycle temperature changes: Gruvlok Xtreme Lubricant.
 - 3. Systems Subject to Thermal Cycling: Gruvlok Xtreme Lubricant.
 - 4. "E" type A Pre-lubed Fire Protection Gaskets: No Lube required. Gruvlok Xtreme Lubricant required for dry pipe applications.
- C. Grooved Couplings for Steel Pipe Systems and other Approved Piping:
 - 1. Sizes 1 inch to 30 inches; Gruvlok Style 7401 Rigidlok couplings shall be used including style 7788 flange adapters fittings or 7012 Flange adaptor.
 - 2. Gruvlok Style 7402 SlideLOK ready to install coupling sizes 2 inch to 8 inch shall be used for rigid connections.
 - 3. Gruvlok Style 7001 (Flexible) couplings shall be used for vibration attenuation and noise suppression at equipment locations.
 - 4. Combination rigid, flexible, and outlet couplings shall be used for vibration, noise suppression and seismic tremor.
 - 5. Mechanical Clamp Tees style 7045, 7046 shall be used for branch outlets, cross configuration can be made with style 7047, 7048, & 7049.
 - 6. Standard coupling gaskets for building services shall be Grade "EP" EPDM conforming to ASTM D-2000 with operating temperature range from -40 degrees F to +250 degrees F (-40 degrees C to 121 degrees C). or "E" EPDM conforming to ASTM D-2000 with operating temperature range from -40 degrees F to +230 degrees F (-40 degrees C to 110 degrees C). Or "E" type A Pre-Lubed EPDM for Fire Protection conforming to ASTM D-2000 with operating temperatures range from -40 degrees F to 150 degrees F (-40 degrees C to 66 degrees C).
 - 7. Use other gasket materials as recommended for petroleum service and other applications, contact and Anvil Representative for gasket compatibility questions.
 - 8. Flexible or other style couplings designed for axial motion or other movements shall be supported in strict accordance with industry standards.
- D. Grooved Couplings for Copper Tube Systems: Coupling working pressure not to exceed 300 psig (2.0 MPa).
 - 1. Gruvlok style 6400 Rigidlite and style 6084 coupling flange adapters fittings.
 - 2. Grade "EP" EPDM Flush Gap Gasket.
 - 3. Gruvlok Xtreme Lubricant.
- E. Grooved Flange Adapters:
 - 1. Style 7788 Flange adaptor fittings shall be used to transition from grooved to flange connection.

- a. Sizes 2 inches through 12 inches are rated at 300 psig (2.0 MPa).
 - b. Conforms to ANSI class 125 or 150.
 - 1. Style 7012 & 7013 shall be used when space is at a premium .
 - a. Figures 7012 and 7013 flange adapters require sealing rings when used with certain flanged products.
 - b. Figure 7012: Conforms to ANSI class 125 or 150.
 - c. Sizes 2 inches through 20 inches are rated at 300 psig (2.0 MPa).
 - d. Size 24 inches is rated at 250 psig (1.72 MPa).
 - 4. Figure 7013: 2 inches through 12 inches available for ANSI class 250 or 300 lb bolt pattern and is rated at 750 psig (5 MPa).
- F. Grooved Fittings for Steel Piping Systems - Shall be Gruvlok cast ductile, malleable, forged steel, and/or segmental welded steel fittings.
- 1. Sizes 1 inches to 30 inches diameter:
 - a. Cast ductile conforms to ASTM A-536 or ASTM A-47.
 - b. Forged steel conforms to ASTM A-234.
 - c. Segmental welded conforms to ASTM A-53.
 - 2. Fittings shall be coated with an rust inhibiting lead free coating.
 - 3. Zinc electroplated fittings conform to ASTM B-633.
 - 4. Hot Dip Galvanized fittings conform to ASTM A-153.
 - 5. Standard Fittings shall be schedule 40 or standard wall. Other fittings are schedule 80 or light wall as dsigned.
- G. Grooved Copper Fittings: Gruvlok Wrot Copper fittings per ASTM B-75 and ANSI B-16.22, alloy C12200.
- 1. Wrought Copper fittings size 2 inches to 8 type K, L, M, or DWV. Copper fittings shall be 99.9 percent lead free.
 - 2. Couplings and Wrought Copper Fittings shall be NSF-61, UPC Plumbing Code, & low lead approved.
- H. DI-LOK Gruvlok CTS Groove to IPS Groove Dielectric Fitting.
- 1. Carbon steel conforming to ASTM A106, Nylon coated
 - 2. Operating Temperature -40 degrees F to +230 degrees F (-40 degrees C to 100 degrees C).
 - 3. Size range 2 inch to 6 inch.
 - 4. NSF-61, low lead approved.
- I. Di-Electric Insulated Pipe Connections: Di-LOK Figure 7088 or 7089 grooved by grooved or grooved by thread insulating nipples.
- 1. Shall inhibit the formation of a galvanic cell between dissimilar metals.
 - 2. Housing: Steel tube to comply with ASTM A513; zinc plated.
 - 3. Liner: Polypropylene rated at 300 psig (2 MPa).
 - 4. Operating Temperature -40 degrees F to +230 degrees F (-40 degrees C to 100 degrees C).
 - 5. Size range is 1 inch to 6 inches diameter.
- J. Branch Outlets: Shall be Gruvlok Clamp-T Styles 7045 and 7046, and Clamp-T Cross Figure 7047, 7048 and 7049 with grooved or threaded outlets.
- 1. Designated as a bolted-on positive pipe engagement branch outlet. Working pressure on schedule 40 pipe rated to 500 psi (3.5 KPa).
 - 2. Run Sizes 2 inches to 8 inches.
 - 3. Branch outlets from 1/2 inch to 3 inches diameter.
- K. Outlet Couplings: Shall be Gruvlok Figure 7042 with grooved or threaded outlets. Working pressure shall be 500-psig minimum.
- 1. Run sizes 1-1/2 inches to 6 inches.
 - 2. Branch outlets from 1/2 inch to 2 inches diameter.
- L. Plain End Couplings and Fittings: Gruvlok Roughneck coupling Style 7005 and plain-end fittings to match.
- 1. Size range is 2 inches to 16 inches diameter.
 - 2. Materials conform to ASTM A-536.
 - 3. Intended for working pressures 300 to 750 psig (2.0 KPa to 5.2 KPa) with bolts fully torque to factory recommend torque requirements on plain-end or beveled standard wall steel pipe and Gruvlok Plain-End fittings.
- M. Plain End "Sock-it" Method: Gruvlok Sock-it fitting series 7100 through 7107.
- 1. Size range is 1 inch to 2-1/2 inches diameter.
 - 2. Material conforms to ASTM A-126 Class A Cast Iron.
 - 3. Working pressures from 175 - 300 psi (1.2 KPa to 2.0 KPa) UL/ULC listed and FM approved.
- N. Gaskets for Industrial and Other Piping Systems: Systems with different media products shall be provided with industrial grade gaskets as scheduled. Contact and Anvil Representative Gruvlok for application questions.
- O. Track Head Bolts and Hex Nuts: Couplings shall be furnished with heat-treated; oval neck track head bolts conforming to

ASTM A-183 Grade 2. Bolts shall meet minimum tensile strength of 110,000 psi (758 KPa). Hex nuts shall be carbon steel conforming to ASTM A-563 Grade A. Bolts and nuts shall be zinc electroplated per ASTM B-633.

2.4 GROOVED CONNECTION FLOW CONTROL VALVES

- A. Gruvlok Tri-Service Valves - Model FTV-S.
- B. Gruvlok Tri-Service Valves - Model FTV-A.
 - 1. Size: As indicated on drawings.
 - 2. Body and Yoke: Ductile iron; comply with ASTM A395 or ASTM A536.
 - 3. Disc: Cast iron, comply with ASTM A126.
 - 4. Stem: Bronze, comply with ASTM B21.
 - 5. Seat-Guide: Bronze, comply with ATM B584.
 - 6. Disc Guide: Cast iron, comply with ASTM A126.
 - 7. Seat: Bronze.
 - 8. Flanged Gland: Cast iron, comply with ASTM A126.
 - 9. Packing: Graphited, non-asbestos packing.
 - 10. Spring: 302 stainless steel.
 - 11. Stem Guide: Ductile iron; comply with ASTM A395 or ASTM A536.
- C. Gruvlok Balancing Valves - Model GBV-S (Soldered).
- D. Gruvlok Balancing Valves - Model GBV-T (Threaded).
 - 1. Size: As indicated on drawings.
 - 2. Material: Cast bronze.
 - 3. Type and Description: Y-style globe valve with 4 full-turn adjustment, pressure differential ports on both sides of the valve, with positive shutoff and micrometer type handwheel adjustment. Provide tamperproof memory stop.
- E. Gruvlok Balancing Valves - Model GBV-G (Grooved-End Straight).
- F. Gruvlok Balancing Valves - Model GBV-A (Grooved-End Angle).
 - 1. Size: As indicated on drawings.
 - 2. Body: Ductile iron, comply with ASTM A536.
 - 3. Disc: Bronze, comply with ASTM B584.
 - 4. Seat: Ultra-high strength engineered resin.
 - 5. Trim: Brass C-37700.
 - 6. O-ring: Nitrile.
- G. Gruvlok Butterfly Valves - Series 7700:
 - 1. Size: As indicated on drawings.
 - 2. Body: Ductile iron; comply with ASTM A536, Grade 65-42-12.
 - 3. Body Coating: Nylon.
 - 4. Disc: Ductile iron; comply with ASTM A536, Grade 65-42-12.
 - 5. Grade: Grade E - EPDM.
 - 6. Grade: Grade T - Nitrile.
 - 7. Upper and Lower Shaft: Type 416 stainless steel.

2.5 EQUIPMENT ANCHOR BOLTS AND TEMPLATES

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

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. General: Grooved piping installation shall meet ANSI B-31.1 - ANSI B-31.9 Codes for Pressure Piping.
- B. Install in accordance with manufacturer's instructions.
- C. Pipe ends shall be clean and free from indentations, burrs, rust or damage.
- D. Field grooving or pipe cutting of galvanized pipe may require repair of possible damaged galvanized pipe ends. Two coats

of spray-on "liquid-galvanize" are recommended.

- E. Install rigid couplings with tongue-and-groove housing for precise coupling alignment and engagement. Install tines in the housing key section to provide a rigid-like pipe connection.
- F. Companion or mating flanges shall have a flat hard surface and shall be free from gouges, undulations or deformities. Use flange gasket sealing rings if mating surfaces are not uniform.
- G. Plain-end coupling and fitting installation shall comply with specific torque and installation requirements. Consult current manufacturer's product installation data.
- H. Gasket lubricant shall be used to assure proper coupling gasket seating, and conformance with gasket service usage.

3.4 VALVE INSTALLATION

A. Tri-Service Valves - Models FTV-S, FTV-A:

1. Mount valve to a spool piece on the discharge side of the pump. Spool piece required is based on a minimum recommended space of 12 inches for pump sizes 2 inches by 2 inches to 6 inches by 6 inches and 24 inches for pump sizes 8 inches by 8 inches to 12 inches by 12 inches.
2. Do not mount valve directly to pump to avoid causing undesirable noise in the system.
3. Leave sufficient clearance around valve for valve removal or repair.
4. Install valve in the direction of flow arrows on valve body.
5. Mount valve to flanged equipment using Gruvlok Flange Adapter or industry standard grooved coupling, suitable for system pressure and temperatures encountered.
6. Valve body has been designed to handle the weight of the pump on vertical in-line installations. The valve body is not designed to support the piping weight. Support piping by hangers. Provide pipe supports under valve and strainer bodies.

B. Globe Valves - Model GBV-S (Soldered), GBV-T (Threaded), Balancing Valves - Model GBV-G (Grooved-End Straight), GBV-A (Grooved-End Angle):

1. To ensure accuracy of measurement of GBV-S, GBV-T, GBV-G and GBV-A valves, locate valves at least 5 pipe diameters downstream from any fitting and at least 10 pipe diameters downstream from a pump.
2. Install no fittings within 2 pipe diameters downstream of valve.
3. Install valves with flow in the direction of the arrow on the valve body.
4. Provide easy access to probe metering ports (PMPs), drain ports and handwheel.
5. For solder applications, solder valve body in line using 95/5 solder.
6. Install valve-bonnet assembly into body, making sure non-asbestos gasket is in place.
7. Install valves in horizontal or vertical piping as indicated.
8. Do not install metering ports below the pipe (pointing down), as this will allow system sediment to accumulate in the ports.
9. Metering ports and body/drain plugs may be interchanged for improved accessibility.

END OF SECTION