SECTION 21 05 00

COMMON WORK RESULTS FOR FIRE SUPPRESSION

**PART 1 GENERAL**

1. **SECTION INCLUDES**
2. Fittings, sleeves, escutcheons, seals, and connections for sprinkler and standpipe and fire hose systems.
3. **RELATED REQUIREMENTS**
4. Section 07 8400 - Fire stopping from csi.
5. Section 09 9113 - Exterior Painting: Preparation and painting of exterior fire protection piping systems from csi.
6. Section 09 9123 - Interior Painting: Preparation and painting of interior fire protection piping systems from csi.
7. Section 21 0523 - General-Duty Valves for Water-Based Fire-Suppression Piping.
8. Section 21 0553 - Identification for Fire Suppression Piping and Equipment: Piping identification.
9. Section 21 1300 - Fire Suppression Sprinklers: Sprinkler systems design.
10. Section 22 0553 - Mechanical Identification: Piping identification.
11. **REFERENCE STANDARDS**
12. ASME A112.18.1 - Plumbing Supply Fittings; The American Society of Mechanical Engineers; 2012.
13. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications; The American Society of Mechanical Engineers; 2015.
14. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; The American Society of Mechanical Engineers; 2010.
15. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; The American Society of Mechanical Engineers; 2011.
16. ASME B16.4 - Gray Iron Threaded Fittings; The American Society of Mechanical Engineers; 2011.
17. ASME B16.5 - Pipe Flanges and Flanged Fittings; The American Society of Mechanical Engineers; 2013 (ANSI/ASME B16.5).
18. ASME B16.9 - Factory-made Wrought Steel Butt welding Fittings; The American Society of Mechanical Engineers; 2012.
19. ASME B16.11 - Forged Steel Fittings, Socket-welding and Threaded; The American Society of Mechanical Engineers; 2011.
20. ASME B16.25 - Butt welding Ends; The American Society of Mechanical Engineers; 2012.
21. ASME B36.10M - Welded and Seamless Wrought Steel Pipe; The American Society of Mechanical Engineers; 2004.
22. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999 (Reapproved 2014).
23. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
24. ASTM A135/A135M - Standard Specification for Electric-Resistance-Welded Steel Pipe; 2009 (Reapproved 2014).
25. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2015.
26. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984 (Reapproved 2009).
27. ASTM A795/A795M - Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use; 2013.
28. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
29. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type); 2013.
30. ASTM E814 - Standard Test Method for Fire Tests of Penetration Fire stop Systems; 2013a.
31. AWWA C606 - Grooved and Shouldered Joints; American Water Works Association; 2011 (ANSI/AWWA C606).
32. FM (AG) - FM Approval Guide; current edition.
33. NFPA 13 - Standard for the Installation of Sprinkler Systems; National Fire Protection Association; 2016.
34. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems; National Fire Protection Association; 2013.
35. UL (DIR) - Online Certifications Directory; Underwriters Laboratories Inc.; current listings at database.ul.com.

1. **SUBMITTALS**
2. Product Data: Provide manufacturers catalogue information. Indicate valve data and ratings.
3. Shop Drawings:
4. Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.
5. All shop drawings shall be approved by the Civil Defense
6. Project Record Documents: Record actual locations of components and tag numbering.
7. Operation and Maintenance Data: Include installation instructions and spare parts lists.
8. Maintenance Materials: Furnish the following for Employer/Owner's use in maintenance of project.
9. Extra Valve Stem Packing: Two for each type and size of valve.
10. **QUALITY ASSURANCE**
11. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum Ten years documented experience.
12. Installer Qualifications: Company specializing in performing work of the type specified this section.
13. Minimum five experience.
14. Approved by Civil Defense
15. Conform to FM (AG) or UL (DIR) requirements.
16. Conform to Local regulations, codes and civil defense requirement.
17. All equipment and materials used for firefighting systems covered by division 21 shall be approved by the Civil Defense.
18. Valves: Bear FM (AG) or UL (DIR) product listing label or marking. Provide manufacturer's name and pressure rating marked on valve body.
19. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.
20. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.
21. **DELIVERY, STORAGE, AND HANDLING**
22. Deliver and store valves in shipping containers, with labeling in place.
23. Provide temporary protective coating on cast iron and steel valves.
24. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
25. **WARRANTY**
26. Unless otherwise specified in other Sections, provide a manufacturer's full warranty covering all products of this Division (division 21), valid for 2 years from the date of issue of the Taking-Over Certificate, irrespective of delivery date and trial usage.
27. Provide warranty certificates for all equipment supplied to this project.
28. Include copies of warranties in the appropriate sections of the Operation and Maintenance (O&M) Manuals. Original certificates shall be submitted separately to the Employer.
29. **GUARANTEE**
30. Guarantee the system for 2 years free maintenance, 5 years for availability of spare parts and technical assistance. All other works for this section shall be in writing for 2 years, unless specifically stated in the Specification. All guarantees shall commence after completion of the testing and commissioning and final acceptance of the complete systems. Promptly repair or replace defective materials or equipment, workmanship and installation that develop within this period to the Engineer satisfaction at no cost to the Employer. Damage caused in making necessary repairs and replacements shall be remedied and corrected at no cost to the Employer.
31. Operation and Maintenance (O&M) Manuals: Include component list with manufacturer's reference numbers, descriptions of materials and procedures for repairing and cleaning of finishes and cleaning frequency.

**PART 2 PRODUCTS**

1. **FIRE PROTECTION SYSTEMS**
2. Sprinkler Systems: Conform to Local codes and NFPA 13.
3. Standpipe and Hose Systems: Conform to Local codes and NFPA 14.
4. Welding Materials and Procedures: Conform to ASME BPVC-IX.
5. Fire Pumps: Conform to Local codes and NFPA 20
6. Water Tanks: Conform to Local codes and NFPA 22
7. All Systems, Equipment and Materials shall comply with Local Civil Defense Regulations and shall be approved by the Local Civil Defiance.

1. **PIPE SLEEVES**
2. Vertical Piping:
3. Sleeve Length: 25 mm (1 inch) above finished floor.
4. Provide sealant for watertight joint.
5. Blocked Out Floor Openings: Provide 40 mm (1-1/2 inch) angle set in silicon adhesive around opening.
6. Drilled Penetrations: Provide 40 mm (1-1/2 inch) angle ring or square set in silicone adhesive around penetration.
7. Plastic, Sheet Metal, or Moisture-Resistant Fiber: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.
8. Pipe Passing Through Below Grade Exterior Walls:
9. Zinc coated or cast-iron pipe.
10. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.
11. Pipe Passing Through Concrete Beam Flanges, except where Brass Pipe Sleeves are Specified:
12. Galvanized steel pipe or black iron pipe with asphalt coating.
13. Connect sleeve with floor plate except in mechanical rooms.
14. Pipe Passing Through Mechanical, Laundry, and Animal Room Floors above Basement:
15. Galvanized steel pipe or black iron pipe with asphalt coating.
16. Connect sleeve with floor plate except in mechanical rooms.
17. **PIPE HANGERS AND SUPPORTS**
18. Hangers for Pipe Sizes 15 to 40 mm (1/2 to 1-1/2 inch): Carbon steel, adjustable swivel, split ring.
19. Hangers for Pipe Sizes 50 mm (2 inches) and Over: Carbon steel, adjustable, clevis.
20. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
21. Wall Support for Pipe Sizes to 80 mm (3 inches): Cast iron hook.
22. Wall Support for Pipe Sizes 100 mm (4 inches) and Over: Welded steel bracket and wrought steel clamp.
23. Vertical Support: Steel riser clamp.
24. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
25. Spacing shall be in accordance with NFPA 13 table 9.2.2.1(b) steel pipe except threaded light wall.

1. **MECHANICAL COUPLINGS**
2. Rigid Mechanical Couplings for Grooved Joints:
3. Dimensions and Testing: Comply with AWWA C606.
4. Minimum Working Pressure: 2065 kPa (300 psig).
5. Housing Material: Fabricate of ductile iron conforming to ASTM A536.
6. Housing Coating: Factory applied orange enamel or Galvanized.
7. Gasket Material: EPDM suitable for operating temperature range from minus 34 degrees C (minus 30 degrees F) to 110 degrees C (230 degrees F).
8. Bolts and Nuts: Hot dipped galvanized or zinc electroplated steel

**PART 3 EXECUTION**

1. **PREPARATION**
2. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
3. Remove scale and foreign material, from inside and outside, before assembly.
4. Prepare piping connections to equipment with flanges or unions.
5. **INSTALLATION**
6. Install sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.
7. Install standpipe piping, hangers, and supports in accordance with NFPA 14.
8. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
9. Install piping to conserve building space, to not interfere with use of space and other work.
10. Group piping whenever practical at common elevations.
11. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected [equipment.](http://global.ihs.com/doc_detail.cfm?rid=BSD&document_name=NFPA%2013)
12. Inserts:

1. Provide inserts for placement in concrete formwork.

1. Provide inserts for suspending hangers from reinforced concrete slabs and sides of [reinforced concrete beams.](http://global.ihs.com/doc_detail.cfm?rid=BSD&document_name=NFPA%2013)
2. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 100 [m (4 inches).](http://global.ihs.com/doc_detail.cfm?rid=BSD&document_name=NFPA%2013)
3. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
4. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
5. Pipe Hangers and Supports:
6. Install hangers to provide minimum 15 mm (1/2 inch) space between finished covering and adjacent work.
7. Place hangers within 300 mm (12 inches) of each horizontal elbow.
8. Use hangers with 40 mm (1-1/2 inch) minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
9. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
10. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
11. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
12. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
13. Painting of interior fire suppression systems is specified in Section 09 9123.
14. Painting of exterior fire suppression systems is specified in Section 09 9113.
15. Structural Considerations:

1. Do not penetrate building structural members unless indicated or coordinated with the design and supervision consultant.

1. Provide sleeves when penetrating footings, floors, walls, partitions, and any Seal pipe

including sleeve penetrations to achieve fire resistance equivalent to fire separation required.

1. Underground Piping: Caulk pipe sleeve watertight with lead and oakum or mechanically expandable chloroprene inserts with bitumen sealed metal components.
2. Aboveground Piping:
3. Pack solid using mineral fiber conforming to ASTM C592.
4. Fill space with an elastomeric caulk to a depth of 15 mm (0.50 inch) where penetrations occur between conditioned and unconditioned spaces.
5. All Rated Openings: Caulk tight with fire stopping material conforming to ASTM E814 in accordance with Section 07 8400 to prevent the spread of fire, smoke, and gases.
6. [Caulk exterior wall sleeves watertight with lead and oakum or mechanically expandable](http://global.ihs.com/doc_detail.cfm?rid=BSD&document_name=NFPA%2013) chloroprene inserts with mastic-sealed components.
7. Escutcheons:
8. Install and firmly attach escutcheons at piping penetrations into finished spaces.
9. Provide escutcheons on both sides of partitions separating finished areas through which piping passes.
10. Attach plates at the underside only of suspended ceilings.
11. Use chrome plated escutcheons in occupied spaces and to conceal openings in construction.
12. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
13. **CLEANING**
14. Upon completion of work, clean all parts of the installation.
15. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

**END OF SECTION**