This master should be used by designers working on Port of Portland construction projects and by designers working for PDX tenants (“Tenants”). Usage notes highlight a few specific editing choices, however the entire section should be evaluated and edited to fit specific project needs.

SECTION 211100 - FIRE SUPPRESSION PIPING

1. GENERAL
	* + 1. DESCRIPTION
				1. This section describes piping, pipe fittings, and incidental related items as required for complete piping systems.
			2. RELATED WORK SPECIFIED ELSEWHERE
				1. Section 015713, Temporary Erosion, Sediment, and Pollution Control
				2. Section 210500, Common Work Results for Fire Suppression
				3. Section 210529, Hangers and Supports for Fire Suppression Piping and Equipment
				4. Section 210548, Vibration and Seismic Control of Fire Suppression Piping and Equipment
				5. Section 210553, Identification for Fire Suppression Piping and Equipment
				6. Section 212000, Fire Suppression Systems
				7. Section 312000, Site Clearing and Earthwork
				8. Section 312300, Trenching, Backfilling, and Compacting
				9. Section 312319, Dewatering
			3. REFERENCES
				1. ANSI: American National Standards Institute

ANSI B16.1: Gray Iron Pipe Fittings and Flanged Fittings: Classes 25, 125, and 250

* + - * 1. ASTM: American Society for Testing and Materials

ASTM A53 or A120: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

ASTM A135: Standard Specification for Electric-Resistance-Welded Steel Pipe

ASTM A183: Standard Specification for Carbon Steel Track Bolts and Nuts

ASTM A234: Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service

ASTM A307: Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength

ASTM A47: Standard Specification for Ferritic Malleable Iron Castings

* + - * 1. AWWA: American Water Works Association

AWWA C151: Ductile Iron Pipe, Centrifugally Cast, for Water

AWWA C209: Cold-Applied Tape Coatings for Steel Water Pipe and Fittings

AWWA C214: Tape Coating Systems for the Exterior of Steel Water Pipelines

* + - * 1. NFPA: National Fire Protection Association

NFPA 13: Standard for the Installation of Sprinkler Systems

* + - 1. SUBMITTALS
				1. Product Data: For all products specified herein.
				2. Shop Drawings: For systems layout. Coordinate with the work of other divisions and existing facilities, systems, equipment, and components.
				3. Test Reports and Certificates: Inspections and pipe tests.
				4. Other: Certified welders’ certificates.
			2. QUALITY ASSURANCE
				1. Regulatory Requirements: Piping material and installation shall meet requirements of the local fire and building codes and serving utility requirements.
				2. Pipe Cleaning: Should any pipe be plugged or should foaming of water systems occur, disconnect piping, re-clean, and reconnect with no additional cost to the Port.
				3. Correct any damage to the building or systems resulting from failure to properly clean the system with no additional cost to the Port.
1. PRODUCTS
	* + 1. DUCTILE IRON WATER PIPE
				1. Pipe: Cement-lined ductile iron pipe, in accordance with AWWA C151.
				2. Fittings:

Below Grade: Class 150 Megalug or equal, mechanical joint type complete with gaskets, bolts, and nuts; Tyton or equal for joints employing a single gasket for the joint seal with bell-and-spigot pipe.

Above Grade: Mechanical couplings and fittings as specified herein.

* + - * 1. Service:

Below grade, incoming fire protection main.

Below grade, dry stand pipe.

* + - 1. LIGHT WALL BLACK STEEL PIPE
				1. Pipe: ASTM A135 or A53.

For Fire Protection:

Schedule 10 in sizes 2 1/2-inches and above.

* + - * 1. Fittings: Roll grooved ends with mechanical couplings.
				2. Service: Fire protection system only for sizes listed, as approved by NFPA 13. All dry pipe sprinkler systems shall be hot dip galvanized.
			1. BLACK STEEL PIPE, SCHEDULE 40
				1. Pipe: Schedule 40, in accordance with ASTM A120 or A53.
				2. Fittings: 150-pound screwed malleable iron on 2 inches and below, Schedule 40 welded fittings in accordance with ASTM A234 for 2 1/2 inches and above or mechanical couplings on select piping as herein specified. Fittings below grade shall be welding fittings. All elbows on pumped systems shall be long radius type. Short radius elbows are not acceptable for use except as approved by the Port on a case-by-case basis.
				3. Service:

Fire protection system, except fire protection fittings shall be 175-pound cast iron. All dry pipe sprinkler systems shall be hot dip galvanized.

Miscellaneous drains and overflows.

* + - 1. GALVANIZED STEEL PIPE
				1. Pipe: Schedule 40 in accordance with ASTM A120.
				2. Fittings: 150-pound screwed galvanized malleable iron on 2 inches and below. Mechanical couplings as herein specified on 2 1/2 inches and above.
				3. Service: Miscellaneous indirect waste piping.
			2. FLANGED JOINTS
				1. Flanges shall be cast iron or steel for screwed piping and forged steel welding neck for welded line sizes. Pressure rating and drilling shall match the apparatus, valve or fitting to which they are attached. Flanges shall be in accordance with ANSI B16.1; 150‑pound for system pressures to 150 psig; 300-pound for system pressures 150 psig to 400 psig. Gaskets shall be 1/16-inch thick, non-asbestos ring type, coated with graphite and oil to facilitate making a tight joint. Make joint using American Standard hexagon head bolts, lock washers and nuts (in accordance with ASTM A307 GR.B) for service pressures to 150 psig; alloy steel stud bolts, lock washer and American Standard hexagon head nuts (in accordance with ASTM A307 GR.B) for service pressures 150 psig to 400 psig. Use length of bolt required for full nut engagement. Provide electro-cad plated bolts and nuts on cold and chilled water lines.
			3. UNIONS
				1. Unions shall be 150 psi malleable iron or brass, brass to iron seat or viton O-ring, ground joint, black or galvanized to match pipe. 200 psi WOG bronze, ground joint, solder type for copper tubing. Where dissimilar metals join, dielectric unions, couplings or flanges shall be installed.
			4. MECHANICAL PIPE COUPLINGS AND FITTINGS
				1. Acceptable Manufacturers: Victaulic, Anvil, or equal.
				2. Flexible Couplings and Fittings:

Coupling housing shall be zero flex rigid type coupling with angled bolt pad design. Similar to Victaulic Type 07. Use flexible couplings only when expansion contraction, deflection, or noise and vibration is to be dampened. Flexible coupling shall be similar to Victaulic Type 77. Coupling gasket shall be similar to Victaulic’s Grade E molded synthetic rubber, Grade No. R615BZ. Flushseal gasket configuration on all applications. Coupling bolts shall be oval neck track head type with hexagonal heavy nuts in accordance with ASTM A183.

Fittings used with pipe couplings shall be fabricated of malleable iron castings in accordance with ASTM A47. Where malleable fitting pattern is not available, fittings fabricated from Schedule 40 steel pipe or standard wall seamless welding fittings with grooved ends may be used. Elbows on pumped systems shall be long radius type.

* + - * 1. Service: Fire protection systems.
			1. MECHANICAL JOINT RESTRAINTS
				1. Acceptable Manufacturers: EBAA Iron Inc., Megalug Series 1100, or pre-bid approved equal.
				2. Incorporate mechanical restraint into the joint follower gland, consisting of individually actuated wedges that increase their resistance to pullout as pressure increases. Use twist-off nuts, 350 psi working pressure. Restraints shall be UL listed and FM Global approved.
				3. Service:

Dry standpipe, below grade.

Fire protection main, below grade.

* + - 1. UTILITY MARKERS
				1. Provide plastic utility warning tape and locate wire over all buried piping in accordance with Section 312300.
			2. PIPE WRAPPING
				1. For all below ground steel piping and fittings, provide complete covering of Scotchrap No. 51 or equal, 20 mil thickness, protective tape applied over Scotchrap pipe primer applied at 1 gallon per 800 square feet of pipe surface.
				2. At the Contractor’s option, pipe may be furnished with factory applied jacket of “X‑tru-coat” with Scotchrap.
			3. PIPING, HANGERS, SUPPORTS, ANCHORAGE, AND SEISMIC RESTRAINTS
				1. Conform to the requirements of Section 210529, Section 210548, and Section 212000.
1. EXECUTION
	* + 1. PREPARATION
				1. Measurements, Lines, and Levels:

Check dimensions at the building site and establish lines and levels for the work specified in this section.

Establish all slopes and elevations by instrument, working from an established datum point. Provide elevation markers for use in determining slopes and elevations in accordance with the drawings and specifications.

Use established grid and area lines for locating trenches in relation to buildings and boundaries.

* + - 1. EXCAVATION AND BACKFILL
				1. Perform all necessary excavation and backfill required for the installation of mechanical work in accordance with Section 312000 and Section 312300. Repair pipelines or other work damaged during excavation and backfilling. Provide dewatering and temporary erosion, sediment, and pollution control in accordance with Section 312319 and Section 015713.
				2. All piping shall be full bedded on sand. Place a minimum 4‑inch‑deep layer on the leveled trench bottom for this purpose. Remove the sand to the necessary depth for piping bells and couplings to maintain contact of the pipe on the sand for its entire length. Lay all other piping on a smooth level trench bottom, so that contact is made for its entire length.
			2. PIPING INSTALLATION
				1. Install unions in all non-flanged piping connections to apparatus and adjacent to all screwed valves and appurtenances requiring removal for servicing, located so that piping may be disconnected without disturbing the general system.
				2. Mechanical Couplings:

On systems using galvanized pipe and fittings, fittings shall be galvanized at factory.

Before assembly of couplings, lightly coat pipe ends and outside of gaskets with Port-approved lubricant.

Pipe grooving shall be in accordance with manufacturer’s specifications contained in latest published literature.

* + - * 1. Install all piping to drain.
				2. Support all piping independently so that its weight is not carried by the equipment.
				3. Install utility warning tape and locate wire over the entire length of the underground piping utilities in accordance with Section 312300.
				4. Underground Water Systems: Provide mechanical joint restraints or concrete thrust blocks, prior to testing pipe, at changes in direction. Block size as required for types of fittings involved.
				5. Flexible Joints/Seismic Connectors: Install where piping crosses building expansion joints and where indicated on drawings. Install in accordance with the manufacturer’s instructions.
			1. PIPING JOINTS
				1. Join pipe and fittings using methods and materials recommended by the manufacturer, in accordance with standard practice and applicable codes. Cleaning, cutting, reaming, grooving, etc., shall be done with proper tools and equipment. Hacksaw pipe cutting is prohibited. Peening of welds to stop leaks is not permitted.
				2. Do not install couplings in floor, wall, or grade beam sleeves.
				3. Steel Piping:

Screwed Joints: Cut pipes evenly with pipe cutter, and ream to full inside diameter, with all burrs and cuttings removed. Joints shall be made up with suitable lubricant or Teflon tape, applied to male threads only, leaving two threads bare. Tighten joints so not more than two threads are left showing. Make junctions between galvanized steel waste pipe and bell of cast iron pipe with tapped spigot or half coupling on steel pipe to form spigot end, and caulk.

Flanged Joints: Pressure rating of flanges shall match valve or fitting joined. Coat joint gaskets with graphite and oil.

* + - * 1. Welded Joints:

Preparation for Welding: Bevel piping on both ends before welding.

Use following weld spacing on all buttwelds:

|  |  |  |
| --- | --- | --- |
| Nominal Pipe Wall Thickness | Spacing | Bevel |
| 1/4" or less | 1/8" | 37 1/2° |
| Over 1/4", less than 3/4" | 3/16" | 27 1/2° |

Before welding, remove all corrosion products and foreign material from surfaces.

Joints shall be made by the arc-welding process using ASME certified welders. Port openings of fittings shall match the inside diameter of the pipe to which they are welded. Use full radius welding elbows for all turns; use welding tees for all tees. Use reducing fittings for size reduction. Weldolets or threadolets may be used for branches up through one-half the pipe size of the main to which they are attached. Nipples will not be allowed.

Welding Operation:

After deposition, clean each layer of weld metal to remove slag and scale by wire brushing or grinding. Chip where necessary to prepare for proper deposition of next layer.

Weld reinforcement no less than 1/16 inch nor more than 1/8 inch above normal surface of jointed sections. Reinforcement shall be crowned at center and tapered on each side to surfaces being joined. Exposed surface of weld shall be free of depressions below surface of jointed members.

No welding shall be done when temperature of base metal is lower than 0ºF. Material to be welded during freezing temperatures shall be made warm and dry before welding is started. Metal shall be warm to the hand or approximately 60ºF.

* + - * 1. Screwed Joints: Use Teflon tape or Teflon liquid dope applied to male threads only.
			1. INSTALLATION, PIPE WRAP
				1. Install in accordance with AWWA C209 and C214.
				2. Apply in accordance with the manufacturer’s instructions.
				3. Apply wrapping to fittings in field after installation.
			2. ADJUSTING AND CLEANING
				1. Clean interior of all piping before installation.
				2. Flush sediment out of all piping systems with a minimum velocity of 5 to 6 FPS.
				3. Prepare system for adjusting and balancing. If any system components, including control valves, balancing valves, automatic flow control valves, strainers, or other valves and specialties have sediment present, remove, clean and replace damaged or worn components.

END OF SECTION 211100