

SECTION 15010

GENERAL PROCESS AND ONSITE UTILITY PIPING PROVISIONS

PART 1: GENERAL

1.01 SCOPE

This section contains general provisions applicable to all process and onsite utility piping. Specific requirements for each type of pipe to be used are provided in other sections of Division 15. Where specific requirements for a particular type of pipe are different than those in this section, the specific requirements shall govern.

1.02 RELATED WORK IN OTHER SECTIONS

- A. Section 01300: Submittals
- C. Section 01667: Testing of Pipelines
- D. Section 02223: Trenching, Backfilling, and Compacting
- E. Section 10400: Identifying Devices
- F. Section 15080: Piping Accessories and Appurtenances
- G. Section 15094: Hangers and Supports
- H. Section 15097: Seismic Restraint for Piping
- I. Section 15100: Valves

1.03 DRAWINGS

Drawings are diagrammatic and show the general design, arrangement and extent of the systems. Do not scale drawings for roughing in measurements, nor use as shop drawings. Make field measurements and prepare shop drawings as required. Coordinate work with shop drawings of other specification divisions.

1.04 SUBMITTALS: IN ACCORDANCE WITH SECTION 01300.

- A. Submittals shall be provided for the following items plus any additional items required in the specifications for the particular types of pipe:
 - 1. Piping and jointing materials
 - 2. Fittings
 - 3. Specialties

4. Fabrication drawings of all major runs of pipe and all pipe which cannot be fabricated in the field.
 5. The arrangement of piping and appurtenances proposed to serve equipment of other than the first named manufacturer.
- B. Contractor shall investigate the space requirements of the proposed piping before submitting shop drawings.

PART 2: MATERIALS

2.01 GENERAL

Pipe sizes are minimum nominal inside diameter unless otherwise noted. All sizes of pipe shall be as called out on the drawings and specified herein. All pipe and fittings delivered to the job site shall be clearly marked to identify the material, class, thickness, and manufacturer. All material shall be new and free of blemishes.

2.02 PIPING MATERIALS

- A. The Piping Materials Schedule lists the pipe materials that can be selected at the Contractor's option for each service, except where the drawings call for a specific pipe material. For any service not listed in the schedule, the pipe material shall be as allowed for a similar or connecting service of the same size.
- B. The Piping Materials Legend lists the pipe types and specification sections for the piping referred to by symbols in the Piping Materials Schedule.

PIPING MATERIALS SCHEDULE

Symbol	Service	Material		Pipe ID Code (a)	Test Pressure PSI (b)
		Underground or Encased	Exposed		
WN	Non-Potable Water	<u>J ($\leq$ 3-inches), A, K ($>$ 3-inches)</u>	F ($<$ 3-inches), A ($\geq$ 3-inches)	3	125
WP	Potable Water	<u>J ($\leq$ 3-inches), A, K ($>$ 3-inches)</u>	F ($<$ 3-inches), A ($\geq$ 3-inches)	3	125
<u>RW</u>	<u>Recycled Water (f)</u>	<u>J ($\leq$ 3-inches), A, K ($>$ 3-inches)</u>	<u>A</u>	<u>4</u>	<u>100</u>
<u>CD</u>	<u>Culvert Drain</u>	<u>A, BV</u>	<u>A, B</u>	<u>22</u>	<u>4010</u>
SD	Storm Drain	V	<u>BV</u>	2	<u>5010</u>

SS	Sewer (Gravity) (e)	V, A, G	A	3	10
RS	Raw Sewage (Pumped) (d, e)	A, KI	A	2	100
V	Vent	J	J	2	10

(a) See Section 10400.

(b) See Section 01667.

(c) Piping schedule lists all piping materials used unless otherwise shown on the drawings.

(d) All Pumped Piping system shall be restrained.

(e) Special lining- Ductile Iron pipe and fittings shall be lined with 'Perma Shield 431', 'Protecto 401', or approved equal. See Section 15062.

(f) PVC pipe conveying recycled water shall be color purple Pantone 522C. Ductile iron pipe conveying recycled water shall be wrapped with purple Pantone 522C polyethylene vinyl.

PIPING MATERIALS LEGEND

Symbol	Description	Specification Section
A	Ductile Iron	15062
B	Corrugated Metal Pipe	---
C	Copper	15031
F	Schedule 40 Steel, Galvanized	15051
G	HDPE	15075
J	Schedule 80 PVC	15071
K	<u>DR 18</u> C900 PVC	15071
Q	304L Stainless Steel Pipe Schedule 10s	15052
V	PVC Sewer Pipe, S SDR 26, or Schedule 40 ABS	15071

2.03 POLYETHYLENE ENCASEMENT

All buried metallic piping, valves, specials, and fittings shall be polyethylene encased, double wrapped – 8 mils thickness, sized to pipe diameter, ANSI/AWWA-C105/A21.5.

PART 3: EXECUTION

3.01 HAULING, UNLOADING AND DISTRIBUTING PIPE

- A. During loading, transportation and unloading, every precaution shall be taken to prevent injury to the pipe, coating, and lining. No pipe shall be dropped from cars or

trucks, or allowed to roll down slides without proper retaining ropes. Each pipe shall rest on suitable pads, strips, skids or blocks securely wedged or tied in place. Padding shall be used on car or truck stakes, skids, etc., to prevent damage to the pipe during transportation and handling. Any pipe damaged shall be replaced or repaired as approved by the Engineer at no additional cost to the Owner.

- B. Each section of pipe shall be delivered in the field as near as practicable to the place where it is to be installed. Pipes shall be distributed along the side of trench opposite to the spoil bank within easy reach of the installing crew.

Where it is necessary to move the pipe longitudinally along the trench, it shall be done in such a manner as not to injure the pipe. Pipe shall not be rolled or dragged on the ground. Where pipe is placed on stockpiles, it shall be neatly piled and blocked with strips between tiers.

3.02 INSTALLATION OF PIPELINES AND FITTINGS

A. Trenching and Backfill:

1. Except as otherwise noted on the plans or specified herein, all excavation and backfilling for piping shall be as specified in Section 02223, "Trenching, Backfilling, and Compacting".
2. Pipelines located in or under fill areas shall not be placed until the fill has been constructed and compacted to an elevation at least one (1) foot above the elevation of the top of the pipe.
3. All backfill other than where concrete encasement is required, for pipelines installed under structures, slabs, footings, and paving shall be made with sand and fine gravel, thoroughly compacted in place to not less than 95% of maximum density.

B. Grades and Elevations:

1. All piping and appurtenances shall be installed in the position and to accurate lines, elevations, and grades as shown on the plans or specified herein. Where possible, piping shall be sloped to permit complete drainage. All pipelines shall be rigidly supported and braced by approved hangers, brackets, or other devices. When temporary supports are used, they shall be sufficiently rigid to prevent any shifting or distortion of the piping or related work.
2. Furnish all fittings necessary for the satisfactory alignment and arrangement of piping and all necessary unions and cleanouts.
3. An invert grade rod shall be used in laying all lines below ground.

C. Flexible Couplings:

1. Flexible couplings shall be installed where shown on the drawings and at such other points as may be required for ease of installation or removal of the pipe, subject to approval of the Engineer. Where necessary to prevent separation of pipe due to internal pressures, flexible couplings shall be of the type with set screws in the retainer gland or shall be provided with tie rods as approved by the Engineer. Where permanent flexibility is required, however, such as at connections to pumps or other equipment, and elsewhere as called for on the drawings, tie rods shall be the only acceptable restraining devices and shall be installed through separate mounting plates or lugs and not through flange bolt holes, in order to retain flexibility.
 2. Where rubber or similar flexible couplings are called for on the Drawings, tie rods shall be provided if recommended by the manufacturer to prevent excessive elongation.
- D. Flexible Joints: For pipelines extending from a concrete structure into earth, at least two flexible joints shall be provided in the earth within 3 feet of the structure face, one of which may be cast in structure with end flush with structure face. Piping beyond structure shall adequately supported by proper compaction under pipe or by supporting on firm undisturbed soil if necessary.
- E. Union and Flanges:
1. In erecting the pipe, a sufficient number of screwed unions or flanged joints shall be used to allow any sections or runs of pipe to be disconnected without taking down adjacent runs. Screwed unions shall be used on pipelines two and one-half (2-1/2) inches in diameter and smaller. Flanged joints shall be employed in pipelines three (3) inches in diameter and larger.
 2. All exposed piping shall be provided with rigid joints as necessary to prevent shifting or separation due to internal pressures, seismic forces, or the weight of the pipe and its contents. Rigid joints shall include flanges, grooved couplings, screwed joints, welded joints, soldered joints, etc., unless otherwise noted on the drawings.
- F. Concrete Thrust Blocks: Unless noted otherwise, concrete thrust blocks shall not be allowed except at specific locations shown on the drawings. Thrust blocks shall be poured between the pipe or fitting and undisturbed earth.
1. In the absence of concrete thrust blocks, all pressure piping (for ductile iron, HDPE, and PVC) joints shall be restrained.
- G. Concrete Wall and Slab Penetrations:
1. Hydraulic Conditions - Piping passing through concrete walls normally below liquid level shall be installed with one of the following:
 - a. Cut-off collar cast on ductile iron fittings or pipe, 1/4-inch thick, 3-inches wide.

- b. Cut-off collar welded to steel fittings or pipe, 1/4-inch thick, 3-inches wide.
 - d. Cored, canned, or sleeved hole of suitable size to be sealed with a modular mechanical interlocking EPDM synthetic rubber links shaped to continuously fill the annular space between pipe and opening, equal to "Link-Seal" by Thunderline Corp., Wayne, MI, along with grout as shown on the detail Drawings.
2. Non-Hydraulic Conditions -
- a. Piping passing through concrete walls, slabs, or footings from earth to earth shall have provision for reasonable relative movement by wrapping pipe with one-inch fiberglass entire thickness of concrete.
 - b. Horizontal or vertical piping passing through concrete walls, sidewalks, slabs, or footings from earth to air shall be wrapped with 3/8-inch thick, 60 durometer, rubber sheeting, secured with banding.
 - c. Cored, canned, or sleeved hole 3 inches to 7 inches larger diameter than the pipe; pack with non-shrink grout.

H. Connections to Equipment:

- 1. The pipework of all pumps and equipment shall be adequately supported throughout and the weight thereof shall be carried independently of the pump casings or the equipment. All pipework shall be mounted parallel with vertical and horizontal axes of reference. All sections of pipe shall be rigidly bolted or joined together after being cut accurately to length in such a manner as to relieve any and all parts of equipment of undue strain resulting from closure of flanged or other joints or connections.
- 2. Equipment shall be so positioned and aligned that no strain shall be induced within the equipment during or subsequent to the installation of pipework.

I. Pipe Joints:

- 1. Pipe shall be cleaned of dirt and scale prior to installation and all joints swabbed clean before jointing. Ends of all pipe shall be closed or plugged at the end of each day's work or otherwise as necessary to prevent the entrance of foreign materials.
- 2. The Contractor shall perform all work of cutting pipe and special castings necessary to the assembly, erection and completion of the work. All pipe shall be cut and reamed to fit accurately with smooth edges.

J. Coatings for Buried Valves and Piping Accessories: All buried valves, flange assemblies, flexible connections, flange coupling adapters and similar fittings shall be coated with petrolatum wax tape. All buried nuts, bolts, washers, tie rods, and other threaded fasteners shall be Xylan/flouropolymer coated "Blue Bolts" or Type 316 stainless steel.

- K. Coatings for submerged valves and piping accessories: All submerged items shall be coated as per Section 9900. All submerged nuts, bolts, washers, tie-rods, and other threaded fasteners shall be Type 316 stainless steel.

3.03 IDENTIFICATION: SEE SECTION 10400.

3.04 TESTING: SEE SECTION 01667.

3.05 CLEANING AND FLUSHING

- A. All pipelines shall be cleaned of all soil, dirt, rocks, and other debris and objectionable material.
- B. Pipelines 24-inches in diameter and smaller shall be cleaned first by pulling a tightly fitting cleaning ball or swab through the pipe. Pipelines larger than 24-inches in diameter may be cleaned manually or with a cleaning ball or swab.
- C. After initial cleaning, flush the interior of all piping. Upon completion of flushing, completely drain systems at all low points; remove, clean, and replace all strainer baskets and refill systems.

END OF SECTION