SECTION 331413 - PUBLIC WATER UTILITY DISTRIBUTION PIPING

This Section specifies pipe materials, fittings, valves, and meters normally encountered with public water distribution systems, including potable water and fire water systems within public rights-of-way.

1. GENERAL
	* + 1. SUMMARY
				1. Section Includes:

Pipe and fittings for public line, including [**potable water line**] [**, fire water line**] **[combined potable water line and fire water line]** [**, and**] .

Tapping sleeves and valves.

Pipe support systems.

* + - * 1. Related Requirements:

List other Sections directly related to or affecting Work of this Section. Include Sections specifying information expected to be found in this Section as well as Sections required to describe complete system or assembly requirements.

Section 032000 - Concrete Reinforcing: Reinforcing steel and required supports for cradles and encasements.

Section 033000 - Cast-in-Place Concrete: Concrete for cradles and encasements.

Section 310001 - Earthwork Materials: Soils for backfill in trenches.

Section 310000 - Earthwork: Excavation and backfill as required by this Section.

Section 316219 - Timber Piles: Pile support systems in areas of low bearing capacity.

Section 330110.58 - Disinfection of Water Utility Piping Systems: Disinfection of water mains and appurtenances.

Section 330507 - Trenchless Installation of Utility Piping: Waterline installation under roadways and other obstructions.

Section 330509.33 - Thrust Restraint for Utility Piping: Tied joint restraint system to anchor and resist forces developed in underground closed pipeline systems.

Section 330563 - Concrete Vaults and Chambers: Cast-in-place, precast-concrete, or masonry structures for access to subsurface drainage piping or utilities.

Section 330577 - Fiberglass Metering Manholes: Fiberglass-reinforced plastic (FRP) valve vaults and meter boxes for valve and meter installations.

Section 330597 - Identification and Signage for Utilities: Pipe markers.

Section 331417 - Site Water Service Utility Laterals: Water main service connections.

Section 331419 - Valves and Hydrants for Water Utility Service: Fire hydrants, valves, and valve boxes for fire hydrant and water main installations.

Section 331900 - Water Utility Metering Equipment: Positive displacement meters as required by this Section.

Section 400578.11 - Air Release Valves for Water Service: Air-release valves at pipeline high points.

* + - 1. REFERENCE STANDARDS

List reference standards included within text of this Section, with designations, numbers, and complete document titles.

LEED requires compliance with specific editions of referenced standards. Consider including publication dates for referenced standards in this Section to ensure that correct standard is used for LEED compliance.

* + - * 1. American Association of State Highway and Transportation Officials:

AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 10-lb Rammer and a 18-in. Drop.

* + - * 1. American Society of Mechanical Engineers:

ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.

* + - * 1. ASTM International:

ASTM A36 - Standard Specification for Carbon Structural Steel.

ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

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

ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3).

ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3).

ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).

ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.

ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.

ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

* + - * 1. American Water Works Association:

AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.

AWWA C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.

AWWA C110 - Ductile-Iron and Gray-Iron Fittings.

AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

AWWA C115 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.

AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast.

AWWA C153 - Ductile-Iron Compact Fittings.

AWWA C200 - Steel Water Pipe, 6 In. and Larger.

AWWA C203 - Coal-Tar Protective Coatings and Linings for Steel Water Pipe.

AWWA C205 - Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 In. and Larger - Shop Applied.

AWWA C206 - Field Welding of Steel Water Pipe.

AWWA C207 - Steel Pipe Flanges for Waterworks Service, Sizes 4 In. Through 144 In. .

AWWA C208 - Dimensions for Fabricated Steel Water Pipe Fittings.

AWWA C213 - Fusion-Bonded Epoxy Coatings and Linings for Steel Water Pipe and Fittings.

AWWA C300 - Reinforced Concrete Pressure Pipe, Steel-Cylinder Type.

AWWA C301 - Prestressed Concrete Pressure Pipe, Steel-Cylinder Type.

AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.

AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances.

AWWA C605 - Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings.

AWWA C606 - Grooved and Shouldered Joints.

AWWA C700 - Cold-Water Meters - Displacement Type, Metal Alloy Main Case.

AWWA C701 - Cold-Water Meters - Turbine Type, for Customer Service.

AWWA C702 - Cold-Water Meters - Compound Type.

AWWA C707 - Encoder-Type Remote-Registration Systems for Cold-Water Meters.

AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In., for Water Transmission and Distribution.

AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. Through 3 In. , for Water Service.

AWWA C905 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. Through 48 In. , for Water Transmission and Distribution.

AWWA M6 - Water Meters - Selection, Installation, Testing, and Maintenance.

* + - * 1. Manufacturers Standardization Society of the Valve and Fittings Industry:

MSS SP-60 - Connecting Flange Joints between Tapping Sleeves and Tapping Valves.

* + - * 1. National Fire Protection Association:

NFPA 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances.

* + - * 1. NSF International:

NSF 61 - Drinking Water System Components - Health Effects.

NSF 372 - Drinking Water System Components - Lead Content.

* + - 1. COORDINATION
				1. Coordinate Work of this Section with termination of water main connection at Site boundary, connection to [**municipal water utility service**] <**\_\_\_\_\_\_\_\_**>, and trenching.
			2. SUBMITTALS
				1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer’s installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).

Only request submittals needed to verify compliance with Project requirements.

* + - * 1. Product Data: Submit manufacturer information regarding pipe materials, pipe fittings, valves, hydrants [**, and**] <**\_\_\_\_\_\_\_\_**>.
				2. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

Include separate paragraphs for additional certifications.

* + - * 1. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
				2. Preconstruction Photographs: Submit digital files of [**color**] photographs of Work areas and material storage areas.
				3. Qualifications Statements:

Coordinate following subparagraph with requirements specified in QUALIFICATIONS Article.

Submit qualifications for manufacturer and installer.

Remove paragraph if not LEED project.

* + - 1. SUSTAINABLE DESIGN SUBMITTALS
				1. Section 018113 - LEED Documentation Requirements: Requirements for sustainable design submittals.
				2. Manufacturer's Certificate:

Certify that products meet or exceed specified sustainable design requirements.

Insert material certifications list below to suit products specified in this Section and Project sustainable design requirements. Specific certificate submittal and supporting data requirements are specified in Section 018113.

Materials Resources Certificates:

Certify source and origin for [**salvaged**] [**and**] [**reused**] products.

Certify recycled material content for recycled content products.

Certify source for regional materials and distance from Project Site.

* + - * 1. Product Cost Data:

Submit cost of products to verify compliance with Project sustainable design requirements.

Exclude cost of labor and equipment to install products.

Provide cost data for following products:

Edit list of material cost data below to suit products specified in this Section and Project sustainable design requirements. Specific cost data requirements are specified in Section 018113.

Salvaged, refurbished, and reused products.

Products with recycled material content.

Regional products.

<**\_\_\_\_\_\_\_\_**>.

* + - 1. CLOSEOUT SUBMITTALS
				1. Section 017716 - Contract Closeout: Requirements for submittals.
				2. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and [**invert**] [**centerline**] elevations.
				3. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
			2. QUALITY ASSURANCE

Include this Article to specify compliance with overall reference standards affecting products and installation included in this Section.

* + - * 1. Valves: Mark valve body with manufacturer's name and pressure rating.
				2. Materials in Contact with Potable Water: Certified according to NSF 61 and NSF 372.

In following paragraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," or other agency as appropriate.

* + - * 1. Perform Work according to [**New York State Department of Health**] <**\_\_\_\_\_\_\_\_**> standards.

Include following paragraph only when cost of acquiring specified standards is justified.

* + - * 1. Maintain <**\_\_\_\_\_\_\_\_**> [**copy**] [**copies**] of each standard affecting Work of this Section on Site.
			1. QUALIFICATIONS

Coordinate following paragraphs with requirements specified in SUBMITTALS Article.

* + - * 1. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience.
				2. Installer: Company specializing in performing Work of this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience in installation of liner materials.
			1. DELIVERY, STORAGE, AND HANDLING
				1. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
				2. Storage:

Store materials according to manufacturer instructions.

Block individual and stockpiled pipe lengths to prevent moving.

Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.

Store PE and PVC materials out of sunlight.

* + - * 1. Protection:

Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.

Provide additional protection according to manufacturer instructions.

* + - 1. EXISTING CONDITIONS
				1. Field Measurements:

Verify field measurements prior to fabrication.

Indicate field measurements on Shop Drawings.

* + - 1. EXTENDED WARRANTY

This Article extends warranty period beyond one year. Extended warranties may increase construction costs and State enforcement responsibilities. Specify warranties with caution. Note that this is rarely used and needs to be approved by the OGS Project Manager.

* + - * 1. Furnish [**five**] <**\_\_\_\_\_\_\_\_**>-year manufacturer's warranty for valves and <**\_\_\_\_\_\_\_\_**>.
1. PRODUCTS
	* + 1. WATER PIPING

Select one or more of following paragraphs based on Project requirements.

* + - * 1. Ductile-Iron Pipe:

Comply with AWWA C151.

Bituminous Outside Coating: Comply with AWWA C151.

Pipe Mortar Lining:

Comply with AWWA C104.

Thickness: Double.

PE Encasement: Comply with AWWA C105.

Pipe Class:

Comply with AWWA C151.

In following subparagraph, select pipe class based on nominal thickness, rated water working pressure, and maximum depth of cover.

Class [**52**] <**\_\_\_\_\_\_\_\_**>.

Fittings:

Material: [**Ductile**] [**Gray**] iron; comply with AWWA C110.

[**Compact Fittings: Comply with AWWA C153.**]

Coating and Lining:

Bituminous Coating: Comply with AWWA C110.

Cement-Mortar Lining: Comply with AWWA C104; double thickness.

Joints:

Mechanical and Push-on Joints: Comply with AWWA C111.

Flanged Joints: Comply with [**AWWA C115**] [**ASME B16.1**].

[**Restrained Joints: Boltless, push-on type, joint restraint independent of joint seal.**]

Design Consultant to verify the need of PE pipe jackets based on existing soil conditions.

Jackets: [**PE; comply with AWWA C105**] [**Double layer, half lapped, 10-mil PE tape**] [**Double layer, half lapped, <\_\_\_\_\_\_\_\_>-mil PE tape**].

* + - * 1. PVC:

Comply with AWWA [**C900**] [**and**] [**C905**], Class [**165**] [**235**] [**305**].

Fittings: Comply with AWWA [**C900**] [**C905**] [**C111**].

Joints:

Comply with [**ASTM D3139**] [**F477**].

Seals: PVC flexible elastomeric.

Solvent-cement couplings are not permitted.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

* + - * 1. PVC with Internal Restrained Joints:

Comply with AWWA C900, Class 235.

Fittings: Comply with AWWA [**C900**] [**C905**] [**C111**].

Joints:

Comply with ASTM [**D3139**] [**F477**].

Seals: PVC flexible elastomeric.

Solvent-cement couplings are not permitted.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

* + - * 1. PVC:

Comply with ASTM D1785.

Schedule: [**40**] [**80**].

Fittings: Comply with AWWA [**C900**] [**C905**] [**C111**].

Joints:

Comply with ASTM [**D3139**] [**F477**].

Seals: PVC flexible elastomeric.

Solvent-cement couplings are not permitted.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

* + - * 1. PVC:

Comply with ASTM D2241.

Pressure Class: [**SDR-41 for 100-psig rating**] [**SDR-26 for 160-psig pressure rating**] [**SDR-21 for 200-psig rating**].

Fittings: Comply with AWWA [**C900**] [**C905**] [**C111**].

Joints:

Comply with ASTM [**D3139**] [**F477**].

Seals: PVC flexible elastomeric.

Solvent-cement couplings are not permitted.

ASTM D3035 piping is available in 10 different wall thicknesses ranging from DR 32.5, thinnest, to DR 7, thickest, with pressure ratings from 160 psig to 840 psig. Coordinate wall thickness and pressure rating with intended service conditions.

* + - * 1. PE Pipe:

Comply with [**AWWA C901**] [**ASTM D3035, DR <\_\_\_\_\_\_\_\_> for <\_\_\_\_\_\_\_\_>-psig pressure rating**].

Fittings:

Comply with AWWA C901.

Type: [**Molded**] [**or**] [**fabricated**].

Joints: [**Compression**] [**Butt fusion**].

* + - 1. TAPPING SLEEVES AND VALVES
				1. Tapping Sleeves:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=8759&mf=04&src=wd):

Kennedy Valve Company, (607) 734-2211, 1021 E. Water St., Elmira, NY 14901.

Mueller Co., (800) 876-0036, 1401 Mueller Ave., Chattanooga, TN 37406.

Smith-Blair Inc., (870) 774-3561, 30 Globe Ave., Texarkana, TX 75505.

Approved equivalent.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

Description:

Material: [**Stainless Steel**].

Type: Dual compression.

Outlet Flange Dimensions and Drilling: Comply with ASME B16.1, Class [**125**] <**\_\_\_\_\_\_\_\_**>, and MSS SP-60.

* + - * 1. Tapping Valves:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=8760&mf=04&src=wd):

Kennedy Valve Company, (607) 734-2211, 1021 E. Water St., Elmira, NY 14901.

Mueller Co., (800) 876-0036, 1401 Mueller Ave., Chattanooga, TN 37406.

Smith-Blair Inc., (870) 774-3561, 30 Globe Ave., Texarkana, TX 75505.

Approved equivalent.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

Description:

Comply with AWWA C500.

Type: Double disc with non-rising stem.

Inlet Flanges: Comply with ASME B16.1, Class [**125**] <**\_\_\_\_\_\_\_\_**>, and MSS SP-60.

Mechanical Joint Outlets: Comply with AWWA C111.

* + - 1. PIPE SUPPORTS AND ANCHORING
				1. Metal for Pipe Support Brackets:

Material: Structural steel.

Finish: [**Galvanized**] [**Unfinished**].

Coating: Bituminous paint.

* + - * 1. Metal Tie Rods and Clamps or Lugs:

Material: Galvanized steel.

Size: Comply with NFPA 24.

Coating: Bituminous paint.

Concrete encasement and/or cradles are not typical. Designer of Record should verify these are applicable to the project. Remove paragraph below if it does not apply.

* + - 1. CONCRETE ENCASEMENT AND CRADLES
				1. Concrete:

As specified in Section 033000 - Cast-in-Place Concrete.

[**Type: Reinforced, air entrained.**]

Compressive Strength: [**4,000**] <**\_\_\_\_\_\_\_\_**> psi at [**28**] <**\_\_\_\_\_\_\_\_**> days.

Finish: Rough troweled.

* + - * 1. Concrete Reinforcement: As specified in Section 032000 - Concrete Reinforcing.

Remove paragraph below if not LEED project.

* + - 1. SUSTAINABILITY CHARACTERISTICS

Insert sustainable design characteristics in this Article to suit content of this Section and Project sustainable design requirements specified in Section 018113.

* + - * 1. Section 018113 – LEED Documentation Requirements: Requirements for sustainable design compliance.
				2. Material and Resource Characteristics:

Recycled Content Materials: Furnish materials with maximum available recycled content [**including:**] [**.**]

Insert list of materials specified in this Section required to have recycled content.

<**\_\_\_\_\_\_\_\_**>.

Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project Site [**including:**] [**.**]

Insert list of materials specified in this Section required to be regional materials.

<**\_\_\_\_\_\_\_\_**>.

* + - 1. FINISHES

ASTM A123 includes minimum coating thickness grade based on type of material and steel thickness of component.

* + - * 1. Steel: Hot-dip galvanized after fabrication, according to ASTM A123.
				2. Protective Coating: [**Coal-tar epoxy**] [**Bituminous paint**].
			1. ACCESSORIES
				1. Steel Rods, Bolt, Lugs, and Brackets:

Comply with ASTM [**A36**] [**or**] [**A307**].

Grade A carbon steel.

1. EXECUTION
	* + 1. EXAMINATION
				1. Verify that existing utility water main size, location, and invert are as indicated on Drawings.
			2. PREPARATION
				1. Preconstruction Site Photos:

Take photographs along centerline of proposed pipe trench; minimum one photograph for each [**50**] <**\_\_\_\_\_\_\_\_**> feet of pipe trench.

Show mailboxes, curbing, lawns, driveways, signs, culverts, and other existing Site features.

Include Project description, date taken, and sequential number on back of each photograph.

* + - * 1. Pipe Cutting:

Cut pipe ends square, ream pipe and tube ends to full pipe diameter, and remove burrs.

Use only equipment specifically designed for pipe cutting; use of chisels or hand saws is not permitted.

Grind edges smooth with beveled end for push-on connections.

* + - * 1. Remove scale and dirt on inside and outside before assembly.
				2. Prepare pipe connections to equipment with flanges or unions.
			1. INSTALLATION
				1. Bedding:

Excavation:

As specified in Section [**310000 - Earthwork**].

Dewater excavations to maintain dry conditions and to preserve final grades at bottom of excavation.

Include following subparagraph for pile-supported installations.

Install pile support systems as specified in Section [**316219 - Timber Piles**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>.

Install utilities on pile support systems [**where indicated on Drawings**].

Install piles [**6**] <**\_\_\_\_\_\_\_\_**> feet o.c. for utility support.

* + - * 1. Piping:

Comply with AWWA [**C600**] [**C605**] <**\_\_\_\_\_\_\_\_**>.

Handle and assemble pipe according to manufacturer instructions [**and as indicated on Drawings**].

Steel Rods, Bolts, Lugs, and Brackets: Coat buried steel before backfilling.

Maintain [**10**] <**\_\_\_\_\_\_\_\_**> feet of horizontal separation between water main and [**sewer**] <**\_\_\_\_\_\_\_\_**> piping [**according to NYSDOH requirements**].

Ductile-Iron Piping and Fittings: Comply with AWWA C600.

Field Welding Materials: Comply with AWWA C206.

Flanged Joints: Do not use in underground installations except within structures.

Route pipe in straight line, and re-lay pipe that is out of alignment or grade.

High Points:

Install pipe with no high points.

If unforeseen field conditions arise that necessitate high points, install air-release valves [**as specified in Section 400578.11 - Air Release Valves for Water Service,**] [**as indicated on Drawings,**] as directed by [**Director’s Representative**] <**\_\_\_\_\_\_\_\_**>.

Bearing:

Maintain bearing along entire length of pipe.

[**Excavate bell holes to permit proper joint installation.**]

Do not lay pipe in wet or frozen trench.

Prevent foreign material from entering pipe during placement.

Allow for expansion and contraction without stressing pipe or joints.

Close pipe openings with watertight plugs during Work stoppages.

Install access fittings to permit disinfection of water system performed under Section [**330110.58 - Disinfection of Water Utility Piping Systems**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>.

Cover:

Establish elevations of buried piping with not less than [**5**]<**\_\_\_\_\_\_\_\_**> feet of cover.

Measure depth of cover from final surface grade to top of pipe barrel.

* + - * 1. PE Encasement:

Encase piping in PE [**as indicated on Drawings**] to prevent contact with surrounding backfill material.

Comply with AWWA C105.

Terminate encasement 3 to 6 inches above ground where pipe is exposed.

* + - * 1. Backfilling: Backfill around sides and to top of pipe as specified in Section [**310000 - Earthwork**].
				2. Disinfection of Potable Water Piping Systems: As specified in Section 330110.58 - Disinfection of Water Utility Piping Systems.
			1. TOLERANCES
				1. Install pipe to indicated elevation within tolerance of [**5/8**] <**\_\_\_\_\_\_\_\_**> inch.
				2. Testing:

Pressure test piping system according to AWWA C600 <**\_\_\_\_\_\_\_\_**>.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Pressure test piping system as indicated on pipe schedule.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Pressure test piping system according to AWWA C600 and following:

Test Pressure: Not less than 200 psig or 50 psi in excess of maximum static pressure, whichever is greater.

Conduct hydrostatic test for a minimum of [**two**] <**\_\_\_\_\_\_\_\_**> hours.

Slowly fill section to be tested with water; expel air from piping at high points.

Install corporation cocks at high points.

Close air vents and corporation cocks after air is expelled.

Raise pressure to specified test pressure.

Observe joints, fittings, and valves under test.

Remove and renew cracked pipes, joints, fittings, and valves showing visible leakage, and retest.

Correct visible deficiencies and continue testing at same test pressure for additional two hours to determine leakage rate.

Maintain pressure within plus or minus 5 psi of test pressure.

Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of test.

Compute maximum allowable leakage using following formula:

L = SD x sqrt(P)/C.

L = testing allowance, gph.

S = length of pipe tested, feet.

D = nominal diameter of pipe, inches.

P = average test pressure during hydrostatic test, psig.

C = 148,000.

If pipe under test contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each size.

Leakage:

If test of pipe indicates leakage greater than allowed, locate source of leakage, make corrections, and retest until leakage is within allowable limits.

Correct visible leaks regardless of quantity of leakage.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Perform pressure test on piping according to [**NYSDOH**] **[, AWWA] [,and] [NFPA 24].**

Provide all testing results to the Director’s Representative.

END OF SECTION 331413