

# **Lakeland Water Utilities**

## **Water Materials Specifications**

**October 15, 2007**  
(Rev. June 24, 2014)

## WATER MATERIAL SPECIFICATIONS

This information is provided as part of the Engineering Standards Manual referenced by Ordinance 3175, Passed and Certified February 5, 1990.

Water Operations has updated this information for the use of engineers and developers, and customers of the City of Lakeland’s Water Utility. As Director, it is my goal that this information will assist each user to formalize their request and facilitate faster service from Water Operations.

Future revisions may be required and will be available. I would encourage the user to maintain the following revision log so that Water Engineering will be able to adequately address any concerns.

Please use this information and call Water Engineering if you need additional information or clarification.

Approved:

Robert J. Conner, P.E.  
Interim Director of Water Utilities  
Effective Date: 01/16/2014

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## Section I

### Reference Water Policies, Standards and Specifications for Subdivisions and Commercial Developments.

#### 1.0 Definitions

1.1 The following definitions are given for use in these specifications.

Approved—Approved, acceptable, considered necessary, satisfactory or words of similar meaning shall mean approved, acceptable, considered necessary, satisfactory to or by the City unless another meaning is plainly intended.

City—The City of Lakeland Water Utilities Department. When applicable, specific divisions within the Water Utilities Department will be referenced; e.g. Engineering, Wastewater, etc.

Division Representative—The individual designated by the Water Engineering Division to make approval of materials, products, and equipment on the Water Department's behalf.

Equal—The words “or equal” used in conjunction with materials, products, or equipment designated by manufacturer's names, trade names or catalog numbers are intended to establish a standard. Other materials, products or equipment meeting or exceeding the established standard may be used provided that their equivalence has been demonstrated to the satisfaction of the Division Representative and that written approval of their use has been obtained.

**Lead Free or No Lead- All material that contains 0.25% or less of lead content.**

Manufacturer—An individual, firm or corporation who is furnishing material or equipment to the City.

Materials – “Materials” shall be taken to mean those goods, articles, merchandise, and equipment supplied to the City.

Shop Drawings—All manufacturers' drawings, plans, diagrams, illustrations, brochures, schedules, and other data that illustrate the details of the materials, products, and equipment to be furnished.

## 2.0 Submittals

- 2.1 Four copies of shop drawings shall be submitted to the Division Representative for review on any materials, products, and equipment that are requested by the Manufacturer as a substitute for approved materials. Reference **Water Policies, Standards and Specifications for Subdivisions and Commercial Developments.**

## 3.0 Materials—General

- 3.1 Materials shall be new, of top quality, manufactured in the United States of America, and shall conform to the appropriate ANSI/ASTM/NSF/AWWA standards. *Any later revision shall automatically supersede standards enumerated herein.* **Any variance must be approved by the Department Director based upon detailed specifications BEFORE materials are purchased.**

When possible, a list of manufacturers known to make at least some compliant items will be provided with each section. The City does not claim they are the sole providers or that all products of the company are compliant.

**The City also recognizes that there are quality materials produced both by United States companies in other nations and products of foreign firms which maybe tested or certified to some of the independent testing standards (or equivalent) referenced herein. Where a manufacturer or manufacturer’s representative feels he has such a product, he may submit it for inclusion as an “accepted alternative”. Where such inclusions have been accepted, they will be annotated in the applicable specification section.**

**The manufacturer or manufacturer’s representative shall make written application for inclusion to the Water Utility indicating the reasons the product should be considered. A sample of the product may be required. Applications received after June 1<sup>st</sup>, 2008 will be accompanied by a review fee in the amount of \$50.00. Providing the manufacturing standards do not change between sizes (or in the case of fittings – shapes), a series of sizes shall be considered on one application.**

**The review process shall start twice each year, with any items received prior to December 1<sup>st</sup> or June 1<sup>st</sup> being included in the review period initiated on those dates. The review period is 90 days. Acceptance and rejection letters shall be issued on March 1<sup>st</sup> or September 1<sup>st</sup> (respectively). Should the City not act affirmatively or negatively, the item(s) will be automatically reconsidered in the next cycle without additional charge.**

**When the applicant for an item rejected for inclusion has additional information or clarification, he may make a new application for the following or any subsequent review cycle.**

**Should the City subsequently determine the product no longer meets our needs, the City may unilaterally remove the approval from the product.**

**DUE TO RECENT CHANGES TO THE SAFE DRINKING WATER ACT, AS OF JANUARY 4, 2014, ALL BRASS AND BRASS CONTAINING MATERIALS INSTALLED WITHIN THE CITY OF LAKE LAND'S WATER UTILITIES SYSTEM SHALL BE LABELED WITH THE MANUFACTURER'S MARK INDICATING THAT THE MATERIAL IS "LEAD FREE OR NO LEAD". THE EXCEPTION TO THIS RULE SHALL ONLY BE AS FOLLOWS:**

**FIRE HYDRANTS  
FIRE LINE BACKFLOW PREVENTERS**

3.2 All fittings and materials shall be inspected and approved by the Water Utilities Engineering Inspector on site prior to installation. Unapproved materials may be required to be replaced. Replacement will be at the developer's expense.

3.3 The Water Utility has the right to designate specific pipe materials based upon soils, loading, etc.

4.0 Ductile Iron Pipe (DIP)

4.1 All pipe with an inside diameter greater than or equal to 20-in. shall be made of ductile iron.

Ductile iron pipe for underground water mains shall be manufactured in accordance with AWWA C-151. Pipe shall be designed for thickness in accordance with AWWA C-150.

Ductile Iron pipe shall comply to ANSI Standard A21.10, with a 150 psi minimum pressure rating.

Ductile Iron pipe installation shall conform to laying condition Type 2 (B) with a flat bottom trench and backfill lightly compacted to the centerline of the pipe. Minimum trench width shall be the diameter of the pipe plus 2 ft. for all pipe sizes 4-inch and larger.

Laying lengths for ductile iron pipe shall be 18 ft. - 20 ft., and shall conform to all applicable AWWA and ANSI specifications.

Pressure Class shall be Class 350 for pipe sizes 4 through 20-inch and Class 250 for pipe sizes 24 through 36-inches. The pipe manufacturer shall determine additional wall thickness required where depth of cover exceeds the minimum requirements.

Where ductile iron is threaded for a flange, the thickness shall be increased accordingly. In all cases the flanged pipe thickness shall not be less than Thickness Class 53. Ductile iron pipe and fittings shall receive an exterior bituminous coating as specified in ANSI specifications A21.4, A21.50, or A21.51 and shall be cement mortar lined and bituminous sealed in accordance with ANSI standard A21.4.

Joints for ductile iron shall be mechanical or push-on type designed in accordance with AWWA C-111. Gasket lubricant for push-on joints shall be labeled with trade name and the pipe manufacturer's name. Use of adaptable flanges may be used subject to approval by Water Utilities Engineering.

Per F.A.C. 62-555, all ductile iron pipe shall have a blue stripe applied by the manufacturer, or the contractor shall spray paint a blue strip on all joints of pipe.

#### APPROVED MANUFACTURERS:

- American Cast Iron Pipe Co. (USA)
- Griffin Pipe (USA)
- U.S. Pipe (USA)
- McWane Pipe (USA)
- Clow Pipe (USA)

#### 4.2 Ductile Iron Fittings

Fittings for ductile iron pipe shall be manufactured of ductile iron or gray cast iron, and shall conform to the standards of AWWA C-110 or AWWA C-153 (compact fittings). Fittings shall be designed so as to be compatible with the pipe and so as to provide at least equal resistance to internal and external load on the pipe. Fitting joints shall be mechanical type for underground service. The joints, bolts, and nuts shall conform to AWWA C-111. All fittings shall be rated for not less than 150 psi working pressure **(crosses are not to be used)**.

#### APPROVED MANUFACTURERS:

- Union/Tyler Class 153 Compact Fitting (USA & China)

- 4.3 Fittings, pipe bells and valves installed for underground service shall be properly restrained in accordance with industry standards, and as specified in the Water Policies, Standards and Specifications for Subdivisions and Commercial Developments. Metal joint restraints, tie rods, and other approved restraining methods may be employed. All metal joint restraints, tie rods, clamps, bolts, and nuts shall be coated after assembly with a bituminous coating or other acceptable corrosion retarding material. Reference Water Policies, Standards and Specifications for Subdivisions and Commercial Developments.

APPROVED MANUFACTURERS:

- EBAA Mega-Lug Series 1100 (USA)

5.0 PVC PIPE AND FITTINGS

- 5.1 PVC Water distribution pipe size 4" through 12" shall meet the requirements of AWWA C-900. Pipe shall match cast iron Outside Diameters and shall be class 150 or greater, and meet or exceed the requirements of DR 18 for sizes 4" through 12". All fittings 4" and larger shall be made of cast iron or ductile iron, mechanical joint and shall conform to AWWA C-110 or AWWA C-153.

Water distribution pipe sizes 16" and 18" shall meet the requirements of AWWA C-905. All fittings shall be made of cast iron or ductile iron, mechanical joint and shall conform to AWWA C-110 or AWWA C-153.

Maximum laying length for all PVC water pipe shall be 20 feet. Pipe size 2" and below shall conform to ASTM D-2241 for standard dimension ratio for SDR 21 and Class 200. Schedule 40 with glued joints is acceptable under 2" size.

Pipe shall be manufactured from clean, virgin, unplasticized polyvinyl resin, cell classification 12454-A or 12454-B as defined as ASTM D-1784. All pipes shall bear the National Sanitation Foundation seal for potable water pipe.

All PVC water pipe shall be blue in color or bear an acceptable indelible blue marking in three locations for the continuous length of each pipe joint. The required spacing for these markings is to be 120 degrees apart.

All pipe shall bear the trade name, pipe manufacturer's name, and AWWA standard number.

APPROVED MANUFACTURERS:

- JM Pipe C-900/C-905 (USA)
- National Pipe C-900/C905 (USA)
- Diamond Plastics C-900/C905 (USA)
- Domestic Mfr. Only (Schedule 40)
- **North American Pipe C-900/C-905 (USA) –added as approved manufacturer 8/4/08**

5.2 Connection method for PVC water pipe larger than 2" in diameter shall be rubber compression ring type. The bell shall consist of an integral wall section with a solid cross section elastomeric wall.

5.3 PVC pipe shall be furnished with factory lubricant, in sufficient quantities for the lengths of pipe provided, and utilized exclusively in the installation of the pipe.

6.0 High Density Polyethylene (HDPE) Pipe and Fittings (Directional Bore)

6.1 HDPE pipe shall only be used for directional bores unless approved by Water Utilities Engineering. Directional bore design must be approved by Water Utilities Engineering and comply with Water Utilities' Directional Bore Standards.

Water distribution pipe and fittings sizes 4 inches through 16 inches shall meet the requirements of AWWA C906. Pipe shall be made from materials conforming to polyethylene code designation PE 3408. All pipe shall be ductile iron pipe size.

Markings on the pipe shall include the following:

- A. Nominal size and OD base.
- B. Standard material code designation.
- C. Dimensional ratio.
- D. Pressure class.
- E. AWWA designation (AWWA C906).
- F. Material test category of pipe.
- G. Continuous blue strips 120 degrees apart, or blue extruded.

Note:

- 1. Standard dimension ratio shall be 11 and DIP outside diameter.
- 2. Pressure class shall be 160 psi.
- 3. All markings shall be blue in color and co-extruded.

There shall be no more than a 3% difference in the pipe diameter when measured at two places 90° of each other.

#### APPROVED MANUFACTURERS:

- Rinker Polypipe (USA)
- JM Pipe (USA)
- Charter Plastics (USA)
- CP Chem Performance Pipe (USA)

6.2 Joining of the pipe sections shall be performed by thermal butt-fusion. Thermal fusion shall only be performed by personnel trained and experienced in the use of the fusion equipment recommended by the pipe supplier. The technician shall also have the necessary information relating to the fusing such as fusion temperature, interface pressure and cooling time before fusing begins. Fusing shall be performed in accordance with ASTM D 2657. All pipe shall also meet the requirements of ANSI, NSF Standard 61. All pipe shall be ductile iron pipe size.

#### 7.0 Galvanized Pipe and Fittings

Galvanized pipe and fittings shall conform to the applicable provision of federal specification WW-P-521D type 2 and may only be used in size 2" and under.

#### APPROVED MANUFACTURERS:

- Domestic Mfr. only (USA)

#### 8.0 Steel Pipe Sleeves and Carrier Pipe

All construction projects requiring steel sleeves shall conform to the minimum Florida Department of Transportation (FDOT) requirements for roadway crossings. Railroad crossings shall conform to railroad requirements.

Casing pipe shall be new steel and shall meet the following wall thickness:

**Table 8.1 Steel Casing Sizes**

Steel Casing (Diameter)	FDOT/City/Rail Road (Min. Thickness)
1"	0.188"
1-1/2"	0.188"
2"	0.188"
2-1/2"	0.188"
3"	0.188"
4"	0.188"
6"	0.188"
8"	0.188"
10"	0.188"
12"	0.250"
14"	0.250"
16"	0.281"
18"	0.312"
20"	0.344"
22"	0.344"
24"	0.375"
30"	0.469"
36"	0.531"

When the engineer's plans specify carrier pipe size for installation in casing pipe, said casing pipe shall be sized as follows (sizes shown for PIPE ONLY):

Table 8.2 Carrier Pipe - Casing Sizes

Carrier Pipe (Normal O.D.)	Steel Casing (Required Dia.)
4"	10"
6"	14"
8"	16"
10"	18"
12"	24"
16"	30"
20"	36"

The City prior to construction must approve any variations to the above schedule.

The engineer is responsible for selecting the casing size to accommodate the carrier pipe restraint method used.

#### 9.0A Gate Valves

Gate valves 4" and larger shall be in accordance with AWWA C-509 or C-515 with (0 type stem seal and 2" square-operating nut for burying service). Valves shall be mechanical joint and open left (counter clockwise). The operating nut shall have an arrow cast in the nut indicating direction of opening.

Gate valves shall be of resilient seat wedge and when fully open shall have a clean waterway equal to the normal diameter of the pipe. Each valve shall have the manufacturer's distinctive marking, pressure rating, and year of manufacture cast on the body. Prior to shipment from the factory, each valve shall be tested by applying it to hydraulic pressure equal to twice the specified working pressure.

Gate valves 2" and under shall conform with federal specification MSS-SP-80. Valves shall have a malleable iron hand wheel and the manufacturer approved by the City. All gate valves shall open left.

Unless receiving prior approval, valves shall be from an American manufacturer.

## APPROVED MANUFACTURERS:

### MJ – Resilient Wedge - 4” to 12”

- Mueller (A-2360 or A-2361) (USA)
- American Flow Control (Series 2500) (USA)
- US Pipe (A-USP0/A-USP1) (USA)
- Clow (F-6100) (USA)

### Bronze Gate Valve – ¾” to 2”

- **Hammond UP640 or Milwaukee UP148 (USA)**
- **NIBCO T-111 LF**

## 9.0B Ball Valves

Ball Valves 2” and smaller shall be in accordance with AWWA C507 and shall be “Lead Free” or “No Lead” to be used at the end of water meter service lines less than 2 ft in depth and prior to meter box or on Backflow Preventer units only.

### **Ball Valves – ¾”– 2”**

- **Ford B11-333-WLN (USA)**
- **Ford B11-444-WLN (USA)**
- **Ford B11-666-WLN (USA)**
- **Ford B11-777-WLN (USA)**

## 10.0 Butterfly Valves - 16" and Above

Butterfly valves shall be of tight closing, rubber body or disc mount seat type with stainless steel sealing surface, one piece stainless steel shaft; long body type, with the valve class, shaft size, and other specified requirements selected in accordance with the specific design. No metal to metal seating surfaces will be permitted.

Valves shall be leak tight at rated pressures with flow in either direction and shall be satisfactory for application involving throttling service and/or frequent operation and for applications involving valve operation after long periods of inactivity. Valve operations shall be by approved gear actuators, and sealed enclosures for burial or submerged service. Valve discs shall rotate 90 degrees from full open to the tight shut position. Position indicators shall be furnished as required. Valves shall meet the full requirements of AWWA Standards C-504-87 for class 150B.

Manufacturers furnishing valves under this specification shall be prepared to show proof that the proposed valves meet the design requirements of AWWA C-504-87.

All butterfly valves shall open left. All butterfly valves shall have square operating nuts.

Unless receiving prior approval, valves shall be from an American manufacturer.

## APPROVED MANUFACTURERS:

### MJ Butterfly Valves

- Dezurik (USA)
- Pratt (USA)
- M&H (USA)
- Mueller (USA)

## 11.0 Valve Boxes

Valve boxes shall be cast iron of standard design with adjustable drop section to fit or cover over valve. Interior diameter shall be not less than 5" with cast iron cover marked "water". Any deviations from this; i.e., PVC valve boxes, shall be approved by the City prior to installation.

Valve box extensions shall be of class 50 ductile iron pipe or C900 PVC and shall be installed on any valve five- (5) ft. or more below finished grade. Valve box lids shall be of cast iron. A 2 ft-square by 4" thick concrete slab shall be neatly poured around all valve box lids not installed in a paved area. After complete construction, valve boxes shall be in a vertical position above the valve and provide clear access and free operation with a valve key.

## 12.0 Hydrant Assemblies

Hydrants shall be in accordance with AWWA Standard C-502-85 and the following requirements:

- A. Dry barrel compression type
- B. "O" ring seal at operating nut stem and means for lubrication
- C. Traffic model with breakable safety clips, or flange and stem with safety coupling located below barrel break line to preclude valve opening
- D. Open left (counter clockwise)
- E. Two 2-1/2" hose nozzles and one 4-1/2" pump nozzle with National Standard threads
- F. Main valve openings shall be not less than 5-1/4"
- G. Paint shall be one coat primer and two coats finish of yellow equal to Rust-O-Leum #7446 (Gallon) or Rust-O-Leum #2148 (Spray)
- H. Pipe outlet shall be 6" mechanical joint
- I. Operating nut shall be pentagonal measuring 1-1/2" point to flat
- J. All hydrant leads shall be valved and the hydrant installed with a minimum of 18" hose nozzle to ground clearance
- K. All hydrants shall be installed plumb and in true alignment with the connection pipe to the water main
- L. Gravel or crushed stone shall be used for the drain sump and shall be carefully placed and compacted

APPROVED MANUFACTURERS:

- Mueller Super Centurion 250 (USA)
- Kennedy Model K-81D (USA)
- Waterous Pacer WB-67 (USA)

Hydrants shall be installed with six (6) inch lead valves using mechanical restraints.

**Until authorized by the city, new hydrants must remain out of service and this shall be indicated by a plastic “out of service” ring placed on the pumper connection.**

13.0 Flush Valves

No distribution lines shall be terminated in a dead-end without a hydrant or a blow-off (flush) valve. The required size of flush valves is outlined in the table below:

Table 13 Required Flush Valves Sizes

Size of Dead-End Lines <i>(inches)</i>	Required Size of Flush Valve <i>(inches)</i>
1	0.75
2	1
4	2
6 and larger	fire hydrant

All blow-offs, 2" and below, shall be constructed with galvanized pipe and fittings, shall be at ground level, and enclosed in a meter box.

14.0 Meter Boxes

The City shall determine type and size of meter boxes. Meter boxes 3/4" through 2" shall be supplied by the City.

Meter boxes through 2" shall be made of plastic or fiberglass for grassed areas; concrete for light loading in residential areas; cast iron for medium to heavy loading in commercial areas.

Boxes for meters 3" and larger shall be constructed of reinforced concrete, conforming to approved City standards, in locations and configurations as shown on approved drawings. Boxes shall be installed by the developer/contractor at their expense.

All drawings shall be reviewed and approved by Water Utilities Engineering prior to installation.

## **15.0 Air Release Valve Boxes/Vaults**

See detail drawings WS404.

## **16.0 Pipe Fittings/Bells – Restraints**

- 16.1 The following restraints are acceptable for restraining ductile iron and PVC pipe to mechanical joint valves and fittings provided for underground service:
- a. Ductile iron pipe, sizes 4 inches through 12 inches – EBAA Iron Series 1200 mechanical joint retainer gland. (USA)
  - b. Ductile iron pipe sizes larger than 12 inches – EBAA Iron Series 100 mechanical joint retainer gland. (USA)
  - c. PVC pipe sizes 4 inches through 12 inches – EBAA Iron Megalug Series 2000PV mechanical joint retainer gland. (USA)
  - d. PVC pipe sizes larger than 12 inches – EBAA Iron Megalug Series 1100PV mechanical joint retainer gland. (USA)
  - e. Uni-Flange (Series 1300) (USA & China)
- 16.2 The following adapters are acceptable for mating ductile iron and PVC pipe to flanged valves and fittings provided for aboveground service and/or in wells and valve vaults:
- a. Ductile iron pipe, sizes 4 inches through 12 inches – EBAA Iron Megaflange flange adapter Series 2100, or Uni-Flange Series 200 flange adapter. (USA)
  - b. Ductile iron pipe, sizes larger than 12 inches – Uni-Flange Series 400 flange adapter. (USA)
  - c. PVC pipe, sizes 4 inches through 12 inches – EBAA Iron Series 3500 flange adapter, or Uni-Flange Series 900-C flange adapter. (USA)
- 16.3 The following restraints are acceptable for restraining ductile iron and PVC pipe bells as indicated on the design drawings:
- a. Ductile iron pipe, mechanical joint, sizes 4 inches through 12 inches – EBAA Iron Series 1200 mechanical joint retainer gland. (USA)
  - b. Ductile iron pipe, mechanical joint, sizes larger than 12 inches – EBAA Iron Series 100 mechanical joint retainer gland. (USA)
  - c. Ductile iron pipe, push-on, sizes 4 inches and larger – EBAA Iron Series 800 bell retainer. (USA)
  - d. PVC pipe bells, sizes 4 inches and larger – Uni- Flange Series 1350-C bell retainer. (USA/China)

## 17.0 Dresser/Flexible Couplings

- 17.1 Dresser couplings for ductile iron pipe sizes of the same nominal diameter with the same outside diameter dimension through 16 inches shall be Model 210, having ductile iron flanges and sleeve, meeting the requirements of ASTM A536, with rubber gaskets and corrosion resistant high strength, low alloy bolts and nuts.
- 17.2 Dresser couplings for ductile iron pipe sizes of the same nominal diameter with different outside diameter dimension through 16 inches shall be Model 212 Transition Coupling, having ductile iron flanges and sleeve, meeting the requirements of ASTM A536, with rubber gaskets and corrosion resistant high strength, low alloy bolts and nuts.
- 17.3 Dresser and Flexible couplings shall not be used in new construction.

### APPROVED MANUFACTURERS:

- JCM.

## 18.0 Paint

- 18.1 Fire Hydrants – See Section 12.0 Hydrant Assemblies.
- 18.2 Reference **Water** Policies, Standards and Specifications for Subdivisions and Commercial Developments, **for further requirements.**

## 19.0 Tracer Wire

- 19.1 **Tracer wire provided for detection of buried watermain pipe shall be as specified in the COL Water Standards and Specification Section 2.7.17.**

## 20.0 Detection Tape

- 20.1 Detection tape provided for early warning of buried pipe shall be plastic and foil laminate, 3 inches wide, **blue** in color, with lettered message “CAUTION, BURIED WATER MAIN” repeating every 20-36 inches **and buried 2-feet above pipe.**
- 20.2 Reference Water Policies, Standards and Specifications for Subdivisions and Commercial Developments.

## 21.0 Miscellaneous Items

### 21.1 Backflow Preventers

**See Table 6.1 Approved Backflow Prevention Devices in COL Water Standards and Specification**

### 21.2 Freeze Protection Device

- DOLE Model FP 45

### 21.3 Corporation Stops

- FORD F-500
- MUELLER H10013
- JONES J41

### 21.4 Service Saddles

- FORD F202
- POWERSEAL 3413
- JCM 402
- SMITH BLAIR 313

### 21.5 Poly Tubing

- CHARTER PLASTICS
- ENDOT
- DRISCOPE
- VANGUARD PROGUARD

### 21.6 Stainless Steel Poly Tubing Inserts

- FORD
- MUELLER

### 21.7 Casing Spacers

- CASCADE

### 21.8 Brass Ball Valves & Adapters

- FORD
- MUELLER
- JONES

## Section II

### 1.0 Reference Standards

1.1 The following is a listing of standards referenced throughout this materials specification.

- ASTM A123 – Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.
- ASTM A126 – Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
- ASTM A276 – Stainless Steel Bars and Shapes.
- ASTM A428 – Weight (Mass) of Coatings on Aluminum-Coated Iron or Steel Articles.
- ASTM A491 – Aluminum-Coated Steel Chain Link Fence Fabric
- ASTM A536 – Ductile Iron Castings.
- ASTM A568 – Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
- ASTM D1248 – Polyethylene Plastics Molding and Extrusion Materials.
- ASTM D1653 – Water Vapor Transmission of Organic Coating Films.
- ASTM D1784 – Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (CPVC) Compounds.
- ASTM D2000 – Rubber Products in Automotive Applications.
- ASTM D2241 -- Polyvinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series).
- ASTM D3034 – Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings.
- ASTM D3212 – Joints for Drain and Sewer Plastic Pipes using Flexible Elastomeric Seals.
- ASTM D3753 – Glass Reinforced Polyester Manholes.
- ASTM F477 – Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- ASTM F679 – Polyvinyl Chloride (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
- ASTM F1216 – Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.
- AWWA C111 – Rubber Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.
- AWWA C115 – Flanged Ductile-Iron and Gray-Iron Pipe with Threaded Flanges.
- AWWA C150 – Thickness Design of Ductile-Iron Pipe.
- AWWA C151 – Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water and Other Liquids.
- AWWA C153 -- Ductile-Iron Compact Fittings, 3 inches through 16 inches, for Water and Other Liquids.
- AWWA C213 – Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines.

AWWA C500 – Gate Valves, for Water and Sewerage Systems.  
AWWA C508 – Swing-Check Valves for Waterworks Service, 2 In. through 24 In. NPS.  
AWWA C509 – Resilient-Seated Gate Valves, for Water and Sewerage Systems.  
AWWA C550 – Protective Interior Coatings for Valves and Hydrants.  
AWWA C900 – Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. through 12 In., for Water.  
AWWA C905 – Polyvinyl Chloride (PVC) Water Transmission Pipe, Nominal Diameters 14 In. through 36 In.  
Uni-B-13 – Joint Restraint Devices for use with Polyvinyl Chloride (PVC) Pipe.  
**Water Policies, Standards and Specifications for Subdivisions and Commercial Developments.**  
**Water Utilities Directional Bore Standard**  
**Water Utilities Jack & Bore Standard**

## 2.0 Abbreviations

AASHO – American Association of State Highway Officials  
ANSI – American National Standards Institute  
ASTM – American Society for Testing and Materials  
AWWA – American Water Works Association