08001 Construction Materials – Water Mains

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Tables

08001-1 Scope

This Section describes materials which have been approved for use in the construction of 150 mm to 300 mm diameter water mains in the City of Saskatoon. The material shall be suitable for use in a potable water system.

08001-2 Pipe

2.1 Polyvinyl Chloride (PVC)

PVC pipe shall be designed for a working pressure of 1035 kPa and may be used for all sizes from 150 mm to 300 mm diameter. The joint shall be bell and spigot type. The pipe shall be supplied with factory installed elastomeric gasket in the bell end. The pipe shall conform to AWWA C900-81.

2.2 Polyethylene

Polyethylene pipe may be used in special cases when approved by the Director of Construction & Design. Polyethylene pipe shall conform to the most current Canadian Government Specification No. 41-GP-25m. Joints shall be butt fused in accordance with the manufacturer's recommendations. Mechanical joints will only be allowed at valves and other locations approved by the Engineer.

08001-3 Valves

3.1 Gate Valves

Gate valves shall be designed for a minimum working pressure of 1724 kPa and shall be suitable for buried service on horizontal mains.

The valve body shall be either grey cast iron according to ASTM A126-04 class B or ductile iron according to ASTM A536-84. The valve shall have a non rising stem and "O"-ring stem seals. Ductile valve sizes less than twelve (12) inch shall be according to AWWA C509 and valve sizes fourteen (14) inch and up shall be according to AWWA C515 with reduced wall thickness.

Valves shall be supplied with all rubber gaskets required for installation in compliance with ANSI/AWWA C111/A21.11.

External bolts shall be Type 304 stainless steel.

The valve shall be operated by a 50 mm square operating nut which shall turn counter clockwise to open.

3.1.1 Double Disc Valves

In addition to the above specifications, double disk valves shall conform to AWWA C500-80 and all current revisions. The valves shall be bronze mounted with a bronze gate. The manufacturer shall supply information in compliance with Section 1.4 of AWWA C500-80. At the time of delivery, the manufacturer shall supply information in compliance with Section 2.2 and 5.2 of AWWA C509-87.

3.1.2 Resilient-seated Valves

In addition to the above specifications, resilient-seated valves shall conform to AWWA C509-87. The manufacturer shall supply information in compliance with Section 1.4, 1.5 and 6.2 of AWWA C509-87. At the time of delivery, the manufacturer shall supply information in compliance with Section 6.3 of AWWA C509-87.

3.2 Butterfly Valves

Butterfly valves which are suitable for buried installation and operation on horizontal mains may be used for 300 mm water mains and shall conform to AWWA C504-80 for Class 150 B valves.

Valves shall be supplied with all gaskets and bolts required for installation.

The valves shall be iron body with stainless steel shaft and "O"-ring stem seals. The disk shall be cast iron with rubber or stainless steel seating edge. External bolts shall be Type 304 stainless steel.

The valve shall have a manual operator with non rising stem and 50 mm square operating nut which shall turn counter clockwise to open.

3.3 Valve Boxes

3.3.1 Valve Boxes – Steel and Cast Iron

Valve boxes shall be the sliding type with cast iron top section and boot. The middle section may be either cast iron or steel. The minimum wall thickness shall be 4.6 mm and the box shall extend from 2440 mm to 3280 mm. The boot shall have a minimum inside diameter of 190.5 mm for 150 mm to 200 mm valves and 215.0 mm for 250 mm to 300 mm valves. The valve box shall be supplied with a cast iron cover.

The operating rod shall be solid steel, 32 mm square, with a 50 mm square operating nut and socket. The operating nut shall be connected to the top of the rod with a brass cotter key. The socket at the bottom shall be connected with a 9 mm stainless steel bolt and nut. For water mains and connections at 3 metre depth, the total length of the rod including nut and socket shall be 2130 mm. For water mains and connections at depths more than 3 metres, the top of the extension rod shall not be more than 600 mm or less than 300 mm below the top of the valve box. The rod shall be supplied with a stone and centring disk. A guide plate shall be supplied and installed below the valve operating nut.

All castings shall be clean and sound. A 15 mil (minimum) fusion bonded epoxy coating shall be applied to the top, bottom and mid-sections as follows:

The fusion bonded epoxy coating and its application shall conform to AWWA Standard C213-96 and all current revisions. The coating shall be a 100% solid, thermosetting, fusion bonded, dry powder epoxy resin, approved for contact with potable water by the National Sanitation Foundation (NSF). Powders shall be one of the following products or an approved equal:

- Valspar, D 1003 LD
- Valspar, G 1003 RB
- Nap-Gard Mark X 7-2500
- 3M, Scotchkote 134

Surface Preparation shall conform to Sec. 3.2 of AWWA Standard C213-96 and all current revisions. Coatings shall be applied to a preheated surface by the fluidized bed method or the electrostatic powder spray gun method. The coating thickness shall be 0.50mm (15 mil) minimum, 0.64mm (20 mil) maximum.

3.3.2 Valve Boxes – Plastic

Valve boxes shall be the sliding type with a ductile iron top socket and lid. The top socket and lid shall both have corrosion resistive bitumous coating.

The upper assembly shall be polypropylene with the middle section being PVC. The box shall extend from 2440mm to 3280mm.

The boot shall be made from a single molded piece of ABS or PVC plastic and have a minimum inside diameter of 190.5mm for 150mm to 200mm valves, or 215mm for 250mm to 300mm valves.

The operating rod shall be solid steel, 32mm square, with a 50mm square operating nut and socket. The rod shall be supplied with a stone and centering disk. A guide plate shall be supplied and installed below the valve operating nut.

08001-4 Hydrants

Hydrants shall conform to AWWA C502-80 and shall have a compression type main valve of 127 mm nominal diameter which closes with water pressure. The stem and ground line flange shall be designed to break on impact. The operating nut shall be rotated counter clockwise to open the hydrant.

The hydrant shall have two 65 mm nozzles and one 114 mm pumper nozzle. The nozzle threads shall be to City standard, 6 threads per inch for 65 mm nozzles and 8 threads per inch for 114 mm nozzles. The operating nut on the top of the hydrant and on the nozzle caps shall be triangular and shall match the City of Saskatoon standard. Nozzle caps shall be fitted with chains or cables and shall be secured to the hydrant.

The inlet elbow (boot) shall be supplied with rubber gasket and shall be suitable for connection to 150 mm pipe. Hydrant Base Slabs Shall be 450 mm x 450 mm x 100 mm.

The length of bury, from the ground line flange to the bottom of the boot, shall be 2900 mm. The hydrant barrel, and stem shall be capable of extension at the ground line flange.

The hydrant shall be painted with two coats of highway yellow enamel from the factory. Bolts and/or studs and nuts below ground shall be A304 stainless steel.

Prior to painting, the hydrant shall be thoroughly cleaned according to preparation directions on the paint specified. The hydrant shall then be primed if required using an anti-rust alkyd primer to cover bare metal or rust. The entire hydrant shall be painted in yellow up to and including the breakaway flange if necessary. If a significant portion of the barrel is exposed, it shall be painted black. Paint shall be applied so that moving parts and hood covers do not become "painted shut". This is particularly important for operating nuts, port caps and chains. Brass parts shall be left unpainted. Hydrant hood covers shall be painted according to the Water Main Colour coding table with either Devoe Devguard or Metalclad Alkyd Gloss Enamel. No other colours, marking or designs shall be on the hydrant**.**

Table 1: Hydrant Paint Requirements

Water Main Colour Coding		**Paint Product Number**	
Water Main Size	**Hood Colour**	**Devoe Devguard**	**Metalclad**
150mm (6")	Safety Red	4308-9000	218419
200mm (8")	Safety Yellow	4308-9400	218413
250mm (10")	Black	4308-9990	218420
300mm (12")	Imperial Blue	4308-7850	*
350mm (14")	Safety Orange	4308-9200	218427
400mm (16")	Safety Green	4308-9700	*
450mm (18") and larger	Silver (Aluminum)	4308-9020	218420

*Metalclad neutral base can be colour matched to Imperial Blue and Safety Green.

08001-5 Fittings

The following fittings may be used on distribution mains up to 300 mm diameter:

5.1 Cast Iron

Cast iron fittings shall conform to AWWA C110-82 and shall be suitable for working pressure of 1035 kPa.

The fittings shall be cast from grey iron only with rubber gasket joints conforming to AWWA C111-80. Gaskets shall be supplied with the fitting. The fittings shall be coated with asphaltic varnish.

5.2 Polyvinyl Chloride

Polyvinyl Chloride fittings shall be HARCO Class 150 as manufactured by the Harrington Corporation, or approved equal.

5.3 Fabricated Fittings

Fabricated fittings, manufactured in accordance with the requirements of AWWA C900-97, may be used on distribution mains from 150mm to 300mm diameter. Such fittings shall meet the testing requirements of CSA specification B137.3. Upon request from the Engineer, proof of compliance with testing requirements shall be provided.

Fabricated fittings, manufactured in accordance with the requirements of AWWA C905-97, may be used on distribution mains from 400mm to 1200mm diameter on a project to project basis as determined by the Engineer. Such fittings shall meet the testing requirements of CSA specification B137.3. Upon request from the Engineer, proof of compliance with testing requirements shall be provided.

08001-6 Pipe Couplings

Pipe couplings shall be manufactured in compliance with AWWA C219-11 or the most current specification. The Coupling shall be supplied with a center ring and end plates produced from the following:

- Ductile iron conforming to ASTM A536-84;
- Carbon steel conforming to ASTM A512 and A53 with a yield strength of 30,000 psi;
- Cast Iron Conforming to ASTM A97 Grade 32510 or 35018; or
- Type 304 stainless steel.

The center ring shall be clearly and permanently marked with the manufacturers name and OD range. Gaskets shall be made of virgin rubber for water service and have a good shelf life with antioxidant and antiozonant properties. Gaskets shall be clearly and permanently marked with the nominal size, pipe OD working range, and the manufacturers' name. The Gaskets shall conform to NSF/ANSI 61, ASTM D2000 and the latest version of AWWA C111.

Table 2: Length and Bolt Numbers for Couplings

Nominal Size mm (inches)	Minimum Overall Length mm (inches)	Minimum No. of bolts 16 mm (5/8”)
100 (4)	140 (5.6)	4
150 (6)	178 (7)	4
200 (8)	175 (6.9)	5
250 (10)	175 (6.9)	6
300 (12)	175 (6.9)	8
350 (14)	180 (7.1)	9
400 (16)	180 (7.1)	10

A two bolt design may also be accepted if it meets all other standards.

All couplings shall be supplied complete with cap anodes for each bolt on the coupling. The Anodes shall be Zinc complying with ASTM B418-09 Type II and shall be a minimum of 300 grams.

Bolts shall be a minimum of 16 mm (5/8”) diameter track head type. Bolts and nuts shall be made of high strength, low alloy steel with NC thread and heavy hex nuts conforming with the AWWA C111-85 standard. The bolt length shall be sufficient to allow for the installation of anodes following installation of the coupling.

The center ring, end plates and bolts shall be factory coated with either fusion bonded epoxy or nylon coating. The requirements for each option are as follows:

Fusion bond epoxy coating shall conform to the AWWA C213-85 standard. The coating thickness shall be 0.30 mm (0.012”) minimum and 0.50 mm (0.020”) maximum. Electrical conductivity must be provided between bolts and end plates and between end plates by removing a small portion of the coating from under the nut bearing area. Each end plate shall be provided with one 6 mm (1/4”) NC cadmium plated set screw for electrical conductivity between the end plate and the center ring.

Or

Nylon coating shall conform to Rilsan Nylon 11 in compliance with Wis 4-53-02 Part 1 shall be used to coat the body, end plates and bolts of the coupling.

Couplings shall be packaged and delivered as a complete unit (i.e.: center ring, gaskets, and end plates, nuts, bolts and anodes shall be packaged as a single unit). Couplings

shall be available for all nominal pipe sizes between 100 mm and 400 mm (4 to 16 inches) to accommodate cast iron, PVC, rough barrel and machined end asbestos cement class 150 and standard steel pipe.

08001-7 Repair Clamps/Sleeves

Repair clamps shall be Robar 5600 series or approved equal.

The material of the repair clamps shall be fully passivated all Stainless Steel construction. Gaskets shall be full wrap-around SBR (Buna S) rubber gaskets. Fasteners shall be T304 Stainless Steel material.

The material of the abandon service sleeve shall be fully passivated all stainless steel construction. Gaskets shall be full wrap-around SBR (Buna S) rubber and shall also have a NBR (Buna N) outlet gasket. Fasteners shall be T304 Stainless steel material.

Repair couplings shall have a minimum length to diameter ratio of 1.5:1.

End of Specification 08001