

ANNEX 3

CITY OF MARKHAM
WATERWORKS MATERIAL SPECIFICATIONS

**MATERIAL SPECIFICATIONS FOR
WATERMAINS AND APPURTENANCES**

Table of Contents

1. GENERAL	1
2. WATERMAIN AND SERVICE PIPES	1
3. WATERMAIN FITTINGS.....	2
4. COUPLINGS	2
5. FLANGED COUPLING ADAPTERS	2
6. TAPPING SLEEVES	2
7. VALVES.....	3
8. VALVE BOXES AND VALVE BOX EXTENSIONS	4
9. VALVE CHAMBERS.....	4
10. HYDRANTS AND HYDRANT EXTENSIONS	5
11. ANTI TAMPERING DEVICE	6
12. AIR VALVES.....	6
13. SERVICE SADDLES	6
14. REPAIR CLAMPS	7
15. BACKFLOW PREVENTION DEVICES.....	7
16. WATERWORKS BRASS FITTINGS.....	7
17. CORROSION PROTECTION	8
18. TRACER WIRE	9
19. TIE RODS	9
20. EYE BOLTS	9
21. JOINT RESTRAINTS	9

Annex 3 - Waterworks Material Specifications**1. GENERAL**

Materials incorporated in the finished work and used during construction shall be in accordance with Standards, or the latest revision thereof, specified in this Section. Alternate materials shall not be permitted without the written consent of the Director, Environmental Services.

Abbreviations

The following abbreviations shall be used throughout these sections:

ANSI	American National Standards Institute
ASTM	American Society for Testing Materials
AWWA	American Water Works Association
CSA	Canadian Standards Association
MJ	Mechanical Joint
MOE	Ministry of the Environment
MTO	Ministry of Transportation of Ontario
OPSC	Ontario Provincial Standards Committee
SSPC	The Society for Protective Coatings
ULC	Underwriters Laboratories of Canada

For list of approved materials/suppliers, refer to “Annex 3A - Manufacturer Approved Products List”.

2. WATERMAIN AND SERVICE PIPES**2.1 Ductile Iron**

- Ductile iron pipe shall be Class 52 in sizes of up to and including 300 mm diameter manufactured to AWWA C152 and supplied with standard thickness cement lining (AWWA C104). Ductile iron pipe shall be supplied with push-on joints complete with bonding straps or lock wedges for maintaining electrical continuity
- Ductile Iron Class 53 pipe to the above Sections must be used in 400 mm and 600 mm diameter sizes
- Ductile Iron Class 54 pipe for crossings or as specified

NOTE: See Section 17 for Corrosion Protection

Annex 3 - Waterworks Material Specifications**2.2 Polyvinyl Chloride (PVC)**

- All PVC pipe shall be Class 150, DR18, conforming to AWWA C-900 standard
- Cast iron outside diameter with tyton joints

2.3 Copper

- All copper piping shall be type K copper and conform to ASTM Standard B88

3. WATERMAIN FITTINGS

- Watermain fittings shall be cast iron or ductile iron, cement lined, mechanical joint
- Cast iron fittings shall conform to AWWA specification C110
- Ductile iron fittings shall conform to AWWA specification C153 Class 350
- All fittings shall be supplied with MJ glands and gaskets, cor blue nuts and bolts

NOTE: See Section 17 for Corrosion Protection Coatings

4. COUPLINGS

- Cast couplings shall be supplied with stainless steel bolts and nuts, epoxy coating and conform to AWWA C114

5. FLANGED COUPLING ADAPTERS

- All flanged coupling adapters shall be supplied with stainless steel bolts and nuts and epoxy coating

NOTE: See Section 17 for Corrosion Protection

6. TAPPING SLEEVES

- Tapping sleeves for all pipes types (DI, CI, PVC and AC) pipes shall be stainless steel
- All sleeves shall be constructed entirely of type 304 stainless steel and all welds shall be passivated by chemical dip method

Main & Tap Sizes in mm

150 x 100				
200 x 100	200 x 150			
250 x 100	250 x 150	250 x 200		
300 x 100	300 x 150	300 x 200	300 x 250	
400 x 100	400 x 150	400 x 200	400 x 250	400 x 300

7. VALVES

- Valves supplied for projects west of McCowan Road (centreline) shall be left hand close
- Valves supplied for projects east of McCowan Road (centreline) shall be right hand close

7.1 Gate Valves (Line and Tapping)

- Valves in sizes 100 mm-300 mm shall be resilient seat gate valves conforming to AWWA specification C509
- Valves shall be MJ or flanged ends as required
- Valves shall be supplied with 304 stainless steel trim
- Valves shall be supplied with a 50 mm square operating nut
- MJ valves shall be supplied with MJ glands and gaskets, cor blue bolts and nuts
- Flanged valves shall be supplied with red rubber gaskets and 304 stainless steel nuts and bolts

7.2 Butterfly Valves

- Valves in sizes 400 mm and larger shall be butterfly valves and shall conform to AWWA specification C504
- Valve operator shall be suitable for continuous submersion and manufactured by the valve manufacturer
- Valves shall be MJ or flanged ends as required
- Valves shall be supplied with 304 stainless steel trim
- Valves shall be supplied with 50 mm square operating nut
- MJ valves shall be supplied with MJ glands and gaskets, cor blue bolts and nuts
- Flanged valves shall be supplied with red rubber flange gasket and 304 stainless steel bolts and nuts

NOTE: See Section 17 for Corrosion Protection

8. VALVE BOXES AND VALVE BOX EXTENSIONS

8.1 Valve Boxes

- Valve boxes shall be 100 mm sliding type box
- Top section length shall be 0.75 m
- Lower section length shall be 1.75 m complete with guide plate

8.2 Valve Box Extensions

- Valve boxes shall be extended from the lower section only
- Extensions shall be cast iron pipe of the same size diameter as the valve box lower section
- Extensions shall be coupled to the lower section by means of a flexible rubber coupling

9. VALVE CHAMBERS

Chambers shall conform to ASTM specification C-478M

9.1 Chamber Steps

- Steps shall conform to Engineering Standards. Steps shall be part of the precast unit and be made from non-corrosive material and shall conform to the Construction Safety Act

9.2 Chamber Tops

- Chamber tops shall conform to Engineering Standards Nos. MW10 and MW11
- All tops for offset valves must be without centre plug - sewer type with the word "water" cast into lid

9.3 Precast Concrete Adjuster Rings

- Moduloc full circle type with Modulast, mortar joint at the valve chamber cap
- Outside surface shall be completely parged prior to backfill

10. HYDRANTS AND HYDRANT EXTENSIONS

10.1 Hydrants

All hydrants shall conform to ANSI/AWWA specification C502, have FM and ULC approvals and be supplied as follows:

- a) Nozzles
 - 2 - 65 mm CSA hose nozzles
 - 1 - 100 mm storz nozzles with black cap marked STORZ
- b) Direction of Operation
 - Left hand open
- c) Seating
 - Brass seat casing to brass main valve seat, fully draining
- d) Connection
 - MJ Boot
- e) Intermediate Section
 - Ductile iron with breakaway flange at ground level
 - Internal operating rod to have a breakaway coupling at ground level
 - Zinc anode installed on operating rod just above the drip valve
 - Hydrant must be clearly marked on the outside indicating brass to brass seating, draining, zinc anode and depth of bury
- f) Upper Barrel
 - Must be able to position the upper barrel at any angle to obtain proper orientation to the street
 - Must clearly be marked with manufacturer's name, model number and date of manufacture
- g) Protective Coatings

Hydrants are shall be treated with Protective Coatings to comply with the following specifications:

 - 1) Surface Preparation
 - Commercial Sand Blasting (SSPC-SP6-63)
 - 2) Base Coat
 - Belzona liquid anode applied as per the manufacturer's specifications
 - 3) Finish Coat
 - Finish coat shall be Tremclad Rust Paint standard yellow

NOTE 1:

Hydrants supplied to Markham shall have only specifications 1 and 2 completed

NOTE 2:

See Section 17.1 for Corrosion Protection

10.2 Hydrant Extensions

- Multiple extensions on one hydrant shall not be accepted
- All hydrant extensions shall have a breakaway flange at ground level
- Hydrant extension rod shall have a breakaway coupling at ground level

11. ANTI TAMPERING DEVICE

- ATD's shall be constructed of cadmium or zinc plated steel and have a 75 mm yellow reflective adhesive stripe on the entire length of both outer sides of the device
- ATD's shall be of a design that does not allow hydrant operating nut or nozzle caps shall be turned and is secured to the hydrant by a banding strap
- Banding strap shall be metal material which is easily broken by hydrant key for emergency use by fire department

12. AIR VALVES

- Air valves shall be 25 mm and shall have a 25 mm F.I.P. inlet
- Air valves shall be installed by using an approved service saddle and a 25 mm AWWA x 25 mm F.I.P. main stop (ball type)
- A 25 mm x 100 mm brass nipple shall be used to connect the air valve to the main cock

NOTE 1: See Section 17 for Corrosion Protection

NOTE 2: See Section 16a for approved Main Stop manufacturers

13. SERVICE SADDLES

- Shall be double bolt manufactured of type 304 Stainless Steel welded construction, completely passivated by chemical dip method
- Tap shall be AWWA thread
- Service saddles shall be required as follows:

AC pipe - all sizes of taps

PVC pipe - all sizes of taps

DI pipe - 32 mm - 50 mm taps

CI pipe - 32 mm - 50 mm taps

Annex 3 - Waterworks Material Specifications**14. REPAIR CLAMPS**

- Shall be manufactured of type 304 Stainless steel, welded construction, completely passivated by chemical dip method
- Shall have a taper gasket and copper electrical continuity strip

15. BACKFLOW PREVENTION DEVICES

- All devices shall comply with AWWA Spec. C506-78 and shall be supplied as follows:

<u>WM Size</u>	<u>Device Size</u>
100 - 150 mm	25 mm
200 - 250 mm	40 mm
300 - up	50 mm

16. WATERWORKS BRASS FITTINGS

- All Waterworks Brass used in the City of Markham shall adhere to NSF 61 (as of July 1, 2012) and shall be of the no lead variety.

16.1 Main Stops

- Shall conform to AWWA spec C-800, NSF 61
- Shall be ball valves
- Shall be AWWA x compression joint

16.2 Curb Stops

- Shall conform to AWWA spec C-800, NSF 61
- Shall be ball valves
- Shall be compression joint x compression joint
- Shall be available in draining type as specified

16.3 Corporation Couplings

- Shall conform to AWWA spec C-800, NSF 61
- Shall be compression joint x compression joint

17. CORROSION PROTECTION

17.1 Sacrificial Anodes

- Zinc
 - **Alloy** - Anodes shall be high grade zinc of 99.9% purity and conform to alloy specification ASTM B418-95A
 - **Package** - Anodes shall be packaged in a water permeable cardboard container filled with a mixture of 20% Bentonite, 5% Sodium Sulphate and 75% gypsum
 - **Wire** - Anodes shall be supplied with 3 m of #10-7 strand copper wire with THW insulation silver soldered to a 1/4" electrogalvanized steel core extending 100% of the anode length
- Magnesium
 - **Alloy** - Anodes shall be of primary magnesium metal only and conform to alloy specification ASTM B843-93
 - **Package** - Anodes shall be packaged in a water permeable cardboard container filled with a mixture of 20% Bentonite, 5% Sodium Sulphate and 75% gypsum
 - **Wire** - Anodes shall be supplied with 3 m of #10-7 strand copper wire with THW insulation silver soldered to a electrogalvanized steel core extending to 75% of the anode length
- Anode Installation Requirement
 - Anodes shall be installed on all buried metallic fittings except for stainless steel
 - Anode connections shall be cadwelded only. No other type of connection shall be accepted
 - The cadweld site shall be coated with TC mastic or approved equal
 - Connections to copper pipe shall be completed with a stainless steel gear clamp or a ground clamp

17.2 Protective Coatings

- Protective coatings shall be petroleum based products consisting of a primer paste, a cold applied mastic and a cold applied anti-corrosion tape
- All metal fittings and metal pipe in chambers or direct bury with the exception of hydrants and fittings of all stainless steel construction shall have protective coatings applied
- Protective coatings shall be applied to the manufacturer's specifications or to the satisfaction of the Director, Environmental Services or his designate
- Aluminium foil duct tape shall be applied to PVC watermain immediately adjacent to MJ glands to prevent anti-corrosion tape from contacting the pipe

Annex 3 - Waterworks Material Specifications**18. TRACER WIRE**

- Tracer wire shall be 12 gauge stranded copper with TWU insulation
- Tracer wire shall be joined by use of bronze split bolt connectors and wrapped with rubber insulating tape and electrical tape

19. TIE RODS

- Tie rods shall be 19 mm zinc plated all thread rod. Nuts and washers shall be zinc plated

20. EYE BOLTS

- Eye bolts shall be 19 mm x 113 mm complete with nuts. Bolts and nuts shall be zinc plated

21. JOINT RESTRAINTS**21.1 PVC pipe**

- Joint restraints used on PVC pressure pipes shall conform to AWWA specification C900-89 or C905-88 and must adhere to UNI-B-13-92 and ULC standard testing procedures

21.2 Ductile Iron

- Joint restraints used on ductile iron pipes shall conform to AWWA/ANSI specification C151/A21.51-91 and must adhere to ULC standard testing procedures