

1 GENERAL

- 1.1 The work of this section includes the provision of all design, labour, materials, equipment and services required to fabricate and install domestic water distribution as required for a complete project. The work includes, but is not necessarily limited to, the items referenced herein:
- 1.1.1 Copper Pipe Components
 - 1.1.2 Joint and Fitting Components
 - 1.1.3 Unions and Flanges
 - 1.1.4 Valves
 - 1.1.5 Hose Bibs
 - 1.1.6 Drain Valves
 - 1.1.7 Water Hammer Arresters
 - 1.1.8 In-Line Circulator Pumps
 - 1.1.9 Domestic Hot Water Storage Tanks
 - 1.1.10 Domestic Hot Water Heaters
 - 1.1.11 Insulation
- 1.2 Regulations: Systems shall meet the most stringent requirements of the Ontario Building Code.

2 DESIGN

- 2.1 Provide Domestic Water Distribution System as required by fittings, fixtures and equipment. Valves and piping shall be routed in corridors and common areas.
- 2.2 Also refer to space data sheets for fixtures and equipment.
- 2.3 Insulate all domestic water piping.
- 2.4 Provide isolation valves for each floor of branch services.

3 MATERIALS

- 3.1 Copper Pipe Components:
- 3.1.1 Copper Water Tube: to *[ASTM B 88]*.
 - 3.1.2 ACR Copper Tube: to *[ASTM B 280]*.
 - 3.1.3 DAW Copper Tube: to *[ASTM B 306]*.
- 3.2 Joint and Fitting Components:

- 3.2.1 Wrought Copper Fittings: to *[ANSI B 16.22]*.
- 3.2.2 Cast Copper, Brass & Bronze Fittings: to *[ANSI B 16.18]*.
- 3.2.3 Solder Joints: to *[ASTM B 32]*.
- 3.2.4 Brazed Joints: to *[ASTM B 664]*.
- 3.3 Unions and flanges:
 - 3.3.1 Pipe size 50 mm and smaller: 1035 kPa: bronze unions.
 - 3.3.2 Pipe size 65 mm and larger: 1035 kPa: bronze flanges.
- 3.4 Valves:
 - 3.4.1 Valves of same type by a single manufacturer.
 - 3.4.2 Gate Valves:
 - 3.4.2.1 Isolating: service 65 mm and larger. Body: cast iron with wedge guide. Trim: bronze. Stem: rising OS&Y. Connection: flanged ends. Wedge: solid bronze.
 - 3.4.3 Ball Valves: Isolating service or throttling service, 50 mm or smaller. Body and trim: bronze. Stem: brass. Connection: soldered or screwed ends. Seats: buna up to 90°C, Viton up to 150°C. Ball: brass chrome plated.
 - 3.4.4 Check Valves:
 - 3.4.4.1 Swing check valve 50 mm and smaller. Body: bronze Y pattern. Trim: bronze. Disc: swing. Connection: screwed or soldered.
 - 3.4.4.2 Swing check valve 65 mm and larger. Body: iron Y pattern. Trim: bronze. Disc and seat: renewable. Connection: flanged ends.
 - 3.4.4.3 Wafer check valve 65 mm and larger. Body: cast iron. Trim: bronze. Connection: threaded lugs.
 - 3.4.4.4 Lift check valve 65 mm and larger. Body: cast iron. Trim: bronze. Connection. flanged ends. Use: vertical piping.
 - 3.4.5 Spring Loaded Check Valves:
 - 3.4.5.1 50 mm and smaller. Body: bronze. Stem: brass. Spring: beryllium copper. Disc and seat: Teflon. Connection: screwed.
 - 3.4.5.2 65 mm and larger. Body: cast iron. Seat: bronze. Plug: bronze. Spring: stainless steel. Connection: flanged.
- 3.5 Hose Bibs:

- 3.5.1 Standard Type Hose Bibs. Body: bronze. Disc: replaceable hexagonal. Spout: with hose thread. Finish: chrome plated on exposed surfaces, complete with back-flow prevention stops.
- 3.5.2 Non-Freeze Type Hose Bibs. Body: bronze. Disc: replaceable. Spout: with hose thread. Finish: chrome plated, complete with back-flow prevention stops. Style: recessed box and removable key.
- 3.6 Drain Valves:
 - 3.6.1 Globe Type Drain Valves. Body: bronze. Disc: compression stop. Ends: nipple and cap or hose.
 - 3.6.2 Ball Type Drain Valves. Body: bronze. Ends: cap and chain.
- 3.7 Water Hammer Arresters:
 - 3.7.1 Install water supply to each fixture or group of fixtures with an air chamber. Provide air chambers same size as supply line or 20 mm min, and min 450 mm long.
 - 3.7.2 Install stainless steel bellows type water hammer arresters on water lines connected to solenoid valves, flush valves and to fixture or group of fixtures. Install complete with accessible isolation valve.
- 3.8 In-Line Circulator Pumps:
 - 3.8.1 Type: horizontal mount, centrifugal, close coupled, mounted in-line.
 - 3.8.2 Casing: Bronze for 860 kPa working pressure.
 - 3.8.3 Impeller: bronze.
 - 3.8.4 Shaft: carbon steel alloy with integral thrust collar.
 - 3.8.5 Bearings: bronze with spiral grooves to convey lubricant the entire length of the bushing.
 - 3.8.6 Seals: spring loaded carbon rotating washer complete with rubber bellow held against a stationary floating stellite seat and seat ring.
- 3.9 Domestic Hot Water Storage Tanks:
 - 3.9.1 Body Construction: closed type pressure vessel, welded steel.
 - 3.9.2 Coating: red zinc rich primer, inside and out.
 - 3.9.3 Support: steel support saddles.
 - 3.9.4 Lining: minimum 20 mm thick internal corrosive resistant concrete lining. Line tank and connections.
 - 3.9.5 Accessories: thermometer, access manhole, chlorine resistant stainless steel screwed fittings.

- 3.9.6 Tappings: inlet, outlet, drain pressure relief valve, water make-up, spare.
- 3.10 Domestic Hot Water Heaters: Immersion hot water converter utilizing the boilers for heat source.
- 3.11 Insulation:
- 3.11.1 Hot Pipe Insulation: Mineral Fibre: formed rigid mineral fibre sleeving to CAN/CGSB-51.9-92. "K" value: max 0.035 W/m.°C at 24°C mean temperature. Service temperature: up to 150°C. Jacket: factory applied general-purpose jacket.
 - 3.11.2 Hot Equipment Insulation:
 - 3.11.2.1 Flat Surfaces: rigid mineral fibre to [CAN/CGSB-51.10-92]. "K" value: maximum 0.035 W/m.°C at 24°C mean temperature. Service temperature: 20°C to 120°C.
 - 3.11.2.2 Curved Surfaces: mineral fibre blanket to [CAN/CGSB-51.11-92-92]. "K" value: maximum 0.035 W/m.°C at 24°C mean temperature. Service temperature: 20°C to 120°C.
 - 3.11.3 Cold Pipe Insulation:
 - 3.11.3.1 Mineral Fibre. formed mineral fibre rigid insulation sleeving to [CGSB 51-GP-9M]. "K" value: maximum 0.035 W/m.°C at 24°C mean temperature. Service temperature: - 14°C to 100°C. Jacket: factory applied vapour barrier jacket to [CGSB 51-GP-52Ma], Type 1, with longitudinal lap seal.
 - 3.11.3.2 Black Rubber: flexible elastomeric unicellular preformed pipe covering to [CAN/CGSB-51.40-95]. "K" value: 0.04 W/m.°C at 24°C mean temperature. Service temperature: -4°C to 100°C. Maximum allowable thickness: 13 mm.
 - 3.11.4 Insulation Accessories:
 - 3.11.4.1 For mineral fibre insulation. Joint tape: 100 mm wide tape with vapour barrier, fixed in place with manually applied adhesive. Adhesive: quick setting adhesive for joints and lap sealing.
 - 3.11.4.2 Black rubber insulation adhesive: manufacturers recommended contact cement.

4 INSTALLATION

- 4.1 Routes and Grades:
- 4.1.1 Route piping in an orderly manner and maintain proper grades.
 - 4.1.2 Install piping to conserve headroom and space.

- 4.1.3 Route above grade piping parallel to walls.
- 4.1.4 Where practicable, group piping at common elevations.
- 4.1.5 Install concealed pipes close to building structure to keep furring to a minimum.
- 4.1.6 Slope domestic water system piping at 0.2% and drain at low points.
- 4.2 Copper Piping: mechanically formed tee connections with brazed joints may be used in place of the fittings in copper tubing provided they meet the following:
 - 4.2.1 Size and wall thickness of main tube and branch tube are listed by manufacture of forming equipment as an acceptable application. Height of drawn collar is not less than three times wall thickness of main tubing.
 - 4.2.2 End of branch tube is notched to conform to inner curve of tube and dimpled to set exact penetration depth into collar.
 - 4.2.3 Resulting joint is brazed and is minimum of three times as long as thickness of thinner joint member.
- 4.3 Unions and Flanges: make connections to equipment and branch mains with unions or flanges. Use 1.5 mm thick preformed synthetic rubber asbestos gaskets for flanged connections for all services (except gas).

4.4 Piping Schedule:

System	Pipe	Fitting	Joint
Domestic water above grade	Copper water tube type L drawn temper	Wrought copper or Cast copper	Soldered 95-5 tin-antimony solder
Domestic water below grade	Copper water tube type K soft annealed	No Joints Single Length	N/A

4.5 Valve Schedule:

- 4.5.1 Gate Valves:
 - 4.5.1.1 Shut-off.
 - 4.5.1.2 Isolating Service - Isolate equipment and vertical risers.
 - 4.5.1.3 Branch take-offs.
 - 4.5.1.4 Group of fixtures
- 4.5.2 Globe and Angle Globe Valves:
 - 4.5.2.1 Throttling service.
 - 4.5.2.2 Meter bypass.

- 4.5.2.3 Ball and Quick Opening Valves.
- 4.5.3 Ball Valves: interchangeable with gate and globe valves.
- 4.5.4 Swing Check Valves:
 - 4.5.4.1 Discharge of pumps.
 - 4.5.4.2 Backflow prevention.
- 4.5.5 Spring Loaded Check Valves: water booster pumps.
- 4.5.6 Hose Bibs: shut off valve for water service.
- 4.5.7 Drain Valves:
 - 4.5.7.1 Near main shut-off valves.
 - 4.5.7.2 Low points in piping systems.
 - 4.5.7.3 Bases or vertical risers.
 - 4.5.7.4 At equipment.
- 4.5.8 Install vacuum breakers on plumbing lines where contamination of domestic water may occur. Generally, necessary on boiler make-up lines, hose bibs and flush valves.
- 4.5.9 Acceptable valve manufacturers: [*Crane, Red & White, Jenkins*] (all heavy duty service)

4.6 Insulation Type and Thickness Schedule:

<u>Service</u>	<u>Pipe size</u>	<u>Insulation Type</u>	<u>Insulation thickness</u>
Domestic hot water	40 mm and smaller	Hot Pipe	12 mm
And recirculation	50 mm and larger	Hot Pipe	25 mm
Domestic cold water	All sizes	Cold Pipe	12 mm

End of Section