

Part 1 General

1.1 SECTION INCLUDES

- .1 Pipe, pipe fittings, valves, and connections for piping systems.
 - .1 Sanitary sewer.
 - .2 Domestic water.
 - .3 Storm water.

1.2 RELATED SECTIONS

- .1 Access Doors and Frames.
- .2 Painting.
- .3 Section 23 05 53 - Mechanical Identification.
- .4 Section 23 07 19 - Piping Insulation.
- .5 Section 23 05 29 – Supports and Anchors.
- .6 Electrical

1.3 REFERENCES

- .1 AGA Z21.22 - Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems.
- .2 ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
- .3 ASME B16.3 - Malleable Iron Threaded Fittings.
- .4 ASME B16.4 - Grey Iron Threaded Fittings.
- .5 ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
- .6 ASME B16.22-2001 (R2005) - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- .7 ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV.
- .8 ASME B16.26 - Copper Alloy Bronze Fittings for Flared Copper Tubes.
- .9 ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.
- .10 ASME B16.32 - Cast Copper Alloy Solder Joint Fittings for Solvent Drainage Systems.
- .11 ASME B31.1 - Power Piping.
- .12 ASME B31.2 - Fuel Gas Piping.

- .13 ASME B31.9 - Building Services Piping.
- .14 ASME SEC IV - Construction of Heating Boilers.
- .15 ASME SEC IX - Welding and Brazing Qualifications.
- .16 ASTM A47/A47M - Ferritic Malleable Iron Castings.
- .17 ASTM A53/A53M - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- .18 ASTM A74 - Cast Iron Soil Pipe and Fittings.
- .19 ASTM A234/A234M - Piping Fittings of Wrought-Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
- .20 ASTM B32-04 - Solder Metal.
- .21 ASTM B42 - Seamless Copper Pipe, Standard Sizes.
- .22 ASTM B43 - Seamless Red Brass Pipe, Standard Sizes.
- .23 ASTM B68 - Seamless Copper Tube, Bright Annealed.
- .24 ASTM B75 - Seamless Copper Tube.
- .25 ASTM B88-03 - Seamless Copper Water Tube.
- .26 ASTM B88M-05 - Seamless Copper Water Tube [Metric].
- .27 ASTM B251 - General Requirements for Wrought Seamless Copper and Copper-Alloy Tube.
- .28 ASTM B280-03 - Seamless Copper Tube for Air Conditioning and Refrigeration field Service.
- .29 ASTM B302 - Threadless Copper Pipe, Standard Sizes.
- .30 ASTM B306 - Copper Drainage Tube (DWV).
- .31 ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- .32 ASTM C1053 - Borosilicate Glass Pipe and Fittings for Drain, Waste, and Vent (DWV) Applications.
- .33 ASTM D1785 - Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
- .34 ASTM D2239 - Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.
- .35 ASTM D2241 - Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).

- .36 ASTM D2447 - Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter.
- .37 ASTM D2466 - Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
- .38 ASTM D2513 - Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.
- .39 ASTM D2564 - Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
- .40 ASTM D2609 - Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe.
- .41 ASTM D2662 - Polybutylene (PB) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.
- .42 ASTM D2665 - Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.
- .43 ASTM D2666 - Polybutylene (PB) Plastic Tubing.
- .44 ASTM D2683 - Socket-Type Polyethylene Fillings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.
- .45 ASTM D2729 - Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- .46 ASTM D2846 - Chlorinated Polyvinyl Chloride (CPVC) Pipe, Fittings, Solvent Cements and Adhesives for Potable Hot Water Systems.
- .47 ASTM D2855-96(2002) - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.
- .48 ASTM D2996 - Filament-Wound 'Fibreglass' (Glass-Fibre-Reinforced Thermosetting-Resin) Pipe.
- .49 ASTM D2997 - Centrifugally-Cast 'Fibreglass' (Glass-Fibre-Reinforced Thermosetting-Resin) Pipe.
- .50 ASTM D3000 - Polybutylene (PB) Plastic Pipe (SDR-PR) Based on Outside Diameter.
- .51 ASTM D3034 - Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- .52 ASTM D3262 - 'Fibreglass' (Glass-Fibre-Reinforced Thermosetting-Resin) Sewer Pipe.
- .53 ASTM D3309 - Polybutylene (PB) Plastic Hot- and Cold-Water Distribution System.
- .54 ASTM E814 - Fire Tests of Through-Penetration Fire Stops.
- .55 ASTM F437 - Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
- .56 ASTM F438 - Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40.

- .57 ASTM F439 - Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
- .58 ASTM F441 - Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80.
- .59 ASTM F442 - Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe(SDR-PR).
- .60 ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- .61 ASTM F493 - Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.
- .62 ASTM F679 - Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
- .63 ASTM F708 - Design and Installation of Rigid Pipe Hangers.
- .64 ASTM F1281 - Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX-AL-PEX) Pressure Pipe.
- .65 ASTM F1282 - Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure Pipe.
- .66 AWS A5.8 - Filler Metals for Brazing and Braze Welding.
- .67 AWWA C105 - Polyethylene Encasement for Ductile-Iron Piping Systems.
- .68 AWWA C110 - Ductile - Iron and Gray - Iron Fittings, 3 In. - 48 In. (76 mm - 1219 mm), for Water.
- .69 AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- .70 AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast, for Water.
- .71 AWWA C651 - Disinfecting Water Mains.
- .72 AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe (and Fabricated Fittings), 4 inch - 12 inch (100 mm - 300 mm), for Water Distribution.
- .73 AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 inch - 3 inch (13 mm - 76 mm) for Water Service.
- .74 AWWA C902 - Polybutylene (PB) Pressure Pipe and Tubing, 1/2 inch - 3 inch (13 mm - 76 mm) for Water.
- .75 AWWA C905 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 inch - 48 inch (350 mm - 1200mm).
- .76 CISPI 301 - Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications.
- .77 CISPI 310 - Joints with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.

- .78 MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
- .79 MSS SP-67 - Butterfly Valves.
- .80 MSS SP69 - Pipe Hangers and Supports - Selection and Application.
- .81 MSS SP-70 - Cast Iron Gate Valves, Flanged and Threaded Ends.
- .82 MSS SP-71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.
- .83 MSS SP-78 - Cast Iron Plug Valves, Flanged and Threaded Ends.
- .84 MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves.
- .85 MSS SP-85 - Cast Iron Globe & Angle Valves, Flanged and Threaded Ends.
- .86 MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
- .87 MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

1.4 SUBMITTALS FOR REVIEW

- .1 Section 21 05 01: Submission procedures.
- .2 Product Data: Provide data on all valves larger than 50mm (2"), and all backflow prevention devices and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.

1.5 CLOSEOUT SUBMITTALS

- .1 Section 21 05 01: Submission procedures.
- .2 Record Documentation: Record actual locations of valves on record drawings.

1.6 QUALITY ASSURANCE

- .1 Perform Work to the standards of the Province and Municipality of Jurisdiction.
- .2 Valves: Manufacturer's name and pressure rating marked on valve body.
- .3 Welding Materials and Procedures: Conform to ASME SEC IX and applicable Provincial labour regulations.
- .4 Welder's Certification: To Manitoba Department of Labour standards.
- .5 Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.
- .6 All carbon steel pipe and fittings shall be manufactured in Canada or the United States of America. This does not include stainless steel.

1.7 REGULATORY REQUIREMENTS

- .1 Perform Work to the latest version of the Manitoba Plumbing Code and local Municipal requirements.
- .2 Conform to applicable code for installation of backflow prevention devices.
- .3 Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

1.8 DELIVERY, STORAGE, AND PROTECTION

- .1 Refer to specification section Product Requirements: Transport, handle, store, and protect products.
- .2 Accept valves on site in shipping containers with labelling in place. Inspect for damage.
- .3 Provide temporary protective coating on cast iron and steel valves.
- .4 Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- .5 Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.9 ENVIRONMENTAL REQUIREMENTS

- .1 Refer to specification section Environmental Protection: Environmental conditions affecting products on site.
- .2 Do not install underground piping when bedding is wet or frozen.

Part 2 Products

2.1 SANITARY SEWER PIPING, BURIED BEYOND 1500 MM (5 FEET) OF BUILDING

- .1 PVC Pipe: SDR 35; CSA B181.2.
 - .1 Fittings: PVC.
 - .2 Joints: ASTM F477, elastomeric gaskets.

2.2 SANITARY SEWER PIPING, BURIED WITHIN 1500 MM (5 FEET) OF BUILDING

- .1 Cast-iron mechanical joint or pipe and fittings to CSA B70, Class 4000
 - .1 Fittings: Cast iron.
 - .2 Joints: Neoprene gasket and stainless steel clamp and shield assemblies.
- .2 PVC Pipe: CSA B181.2
 - .1 Fittings: PVC.

.2 Joints: ASTM D2855, solvent weld to ASTM D2565.

2.3 SANITARY SEWER PIPING, ABOVE GRADE

- .1 75mm (3") and over - Cast Iron Pipe: ASTM A74, service weight. Class 4000
 - .1 Fittings: Cast iron.
 - .2 Joints: ASTM C564, neoprene gasket system or lead and oakum.
- .2 75mm (3") and over - Cast Iron Pipe: CISPI 301, hubless, service weight. Class 4000
 - .1 Fittings: Cast iron.
 - .2 Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.
- .3 Copper Tube: ASTM B306, DWV.
 - .1 Fittings: ASTM B306 with lead-free soldered cast brass drainage fittings to CSA B158.1 or wrought copper fittings to ANSI B16-29
 - .2 Joints: ASTM B32, lead-free solder, Grade 50B.

2.4 WATER PIPING, BURIED BEYOND 1500 MM (5 FEET) OF BUILDING

- .1 Ductile Iron Pipe: AWWA C151.
 - .1 Fittings: AWWA C110, ductile or gray iron, standard thickness.
 - .2 Joints: AWWA C111, rubber gasket with 19 mm (3/4 inch) diameter rods.
- .2 PVC Pipe: AWWA C900.
 - .1 Joints: CSA B137.3 ring gasket joints class 150
- .3 Up to 50mm (2"): Soft temper copper, Type K: ASTM B88
 - .1 Fittings: ANSI B22.18 or ANSI B16.18 soldered pressure fittings.
 - .2 Joints: ASTM B32, lead-free solder, Grade 50B.

2.5 WATER PIPING, BURIED WITHIN 1500 MM (5 FEET) OF BUILDING

- .1 Up to 50mm (2"): Soft temper copper, Type K: ASTM B88
 - .1 Fittings: ANSI B22.18 or ANSI B16.18 soldered pressure fittings.
 - .2 Joints: ASTM B32, lead-free solder, Grade 50B.
- .2 Ductile Iron Pipe: AWWA C151.
 - .1 Fittings: Ductile iron, standard thickness.
 - .2 Joints: AWWA C111, rubber gasket with 19 mm (3/4 inch) diameter rods.

2.6 WATER PIPING, ABOVE GRADE

- .1 Copper Tubing 50mm (2') and under: ASTM B88, Type L hard drawn.
 - .1 Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - .2 Joints ASTM B32, solder, Grade 95TA.

- .2 Copper Tubing over 50mm (2"): ASTM B88, Type L hard drawn.
 - .1 Fittings: Silver brazed fittings.
- 2.7 STORM WATER PIPING, BURIED BEYOND 1500 MM (5 FEET) OF BUILDING**
 - .1 Cast-iron mechanical joint or pipe and fittings to CSA B70. Class 4000
 - .1 Fittings: Cast iron.
 - .2 Joints: Neoprene gasket and stainless steel clamp and shield assemblies.
 - .2 PVC Pipe: SDR 35; CSA B181.2.
 - .1 Fittings: PVC.
 - .2 Joints: ASTM F477, elastomeric gaskets.
- 2.8 STORM WATER PIPING, BURIED WITHIN 1500 MM (5 FEET) OF BUILDING**
 - .1 Cast-iron mechanical joint or pipe and fittings to CSA B70. Class 4000
 - .1 Fittings: Cast iron.
 - .2 Joints: Neoprene gasket and stainless steel clamp and shield assemblies.
 - .2 PVC Pipe: SDR 35; CSA B181.2.
 - .1 Fittings: PVC.
 - .2 Joints: ASTM F477, elastomeric gaskets.
- 2.9 STORM WATER PIPING, ABOVE GRADE**
 - .1 Cast Iron Pipe: ASTM A74 extra heavy weight. Class 4000
 - .1 Fittings: Cast iron.
 - .2 Joints: ASTM C564, neoprene gasket system or lead and oakum.
 - .2 Cast Iron Pipe: CISPI 301, hubless, service weight. Class 4000
 - .1 Fittings: Cast iron.
 - .2 Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.
- 2.10 FLANGES, UNIONS, AND COUPLINGS**
 - .1 Pipe Size 80 mm (3 inches) and Under:
 - .1 Ferrous pipe: Class 150 malleable iron threaded unions.
 - .2 Copper tube and pipe: Class 150 bronze unions with soldered joints.
 - .2 Pipe Size Over 25 mm (1 inch):
 - .1 Ferrous pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
 - .2 Copper tube and pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
 - .3 Grooved and Shouldered Pipe End Couplings:

- .1 Housing: Malleable iron clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; steel bolts, nuts, and washers; galvanized for galvanized pipe.
- .2 Sealing gasket: "C" shape composition sealing gasket.
- .4 Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.11 GLOBE VALVES

- .1 Construction Up To and Including 80 mm (3 inches), bronze disc:
 - .1 Manufacturers:
 - .1 Red-White/Toyo
 - .2 Kitz
 - .3 Crane
 - .4 Substitutions: Refer to Section 21 05 02.
 - .2 MSS SP-80, Class 150, bronze body, bronze trim, handwheel, bronze, solder ends.
- .2 Construction Up To and Including 80 mm (3 inches), teflon disc:
 - .1 Manufacturers:
 - .1 Kitz
 - .2 Crane
 - .3 Substitutions: Refer to Section 21 05 02.
 - .2 MSS SP-80, Class 150, bronze body, bronze trim, handwheel, teflon disc, solder ends.
- .3 Construction: 50 mm (2 inches) and Larger:
 - .1 Manufacturers:
 - .1 Red-White/Toyo
 - .2 Kitz
 - .3 Crane
 - .4 Substitutions: Refer to Section 21 05 02.
 - .2 MSS SP-85, Class 150, iron body, bronze trim, handwheel, outside screw and yoke, renewable bronze plug-type disc, renewable seat, flanged ends.

2.12 BALL VALVES

- .1 Manufacturers:
 - .1 MAS
 - .2 Kitz
 - .3 Crane.
 - .4 Substitutions: Refer to Section 21 05 02.
- .2 Construction, 100 mm (4 inches) and smaller: MSS SP-110, Class 150, 2760 kPa (400 psi) brass, two piece body, 316 stainless ball and trim, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle, solder ends.

2.13 PLUG VALVES

- .1 Manufacturers:
 - .1 Nordstrom Valves, Inc. MSS SP-78, Type II.
 - .2 Substitutions: Refer to Section 21 05 02.
- .2 Construction 65 mm (2-1/2 inches) and larger: MSS SP-78, 1200 kPa (175 psi), cast iron body and plug, pressure lubricated, teflon or Buna N packing, flanged ends. Provide lever operator with set screw.

2.14 SWING CHECK VALVES

- .1 Construction: Up to and including 80 mm (3 inches):
 - .1 Manufacturers:
 - .1 Kitz.
 - .2 Substitutions: Refer to Section 21 05 02.
 - .2 MSS SP-80, Class 150, bronze body and cap, bronze swing disc with rubber seat, solder ends.
- .2 Construction: 50 mm (2 inches) and Larger:
 - .1 Manufacturers:
 - .1 American Valve, Inc.
 - .2 Kitz Corporation.
 - .3 Watts Regulator ;
 - .4 Zy-Tech Global Industries, Inc.
 - .5 Substitutions: Refer to Section 21 05 02.
 - .2 MSS SP-71, Class 125, iron body, bronze swing disc, renewable disc seal and seat, flanged ends.

2.15 RELIEF VALVES

- .1 Temperature and Pressure Relief:
 - .1 Manufacturers:
 - .1 Watts.
 - .2 Conbraco.
 - .3 Substitutions: Refer to Section 21 05 02.
 - .2 AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 98.9 degrees C (210 degrees F), capacity ASME SEC IV certified and labelled.

2.16 STRAINERS

- .1 Construction: Size 50 mm (2 inch) and under:
 - .1 Manufacturers:
 - .1 Spirax-Sarco
 - .2 Substitutions: Refer to Section 21 05 02.

- .2 Threaded bronze body Y pattern 2070 kPa (300 psi) CWP, Y pattern with 0.8 mm 1/32 inch stainless steel perforated screen.

2.17 FIRE STOP SYSTEMS

- .1 General Purpose Fire Stopping Sealant:
 - .1 Manufacturers:
 - .1 Dow Corning Silicone Elastomer Fire Stop Penetration Seal and/or Dow-Corning liquid silicone elastomer Fire Stop Foam of density, width and depth to maintain assembly fire resistive rating.
 - .2 Hilti.
 - .3 Substitutions: Refer to Section 21 05 02.
 - .2 Water based, non-slumping, premixed sealant with intumescent properties, rated for 3 hours per ASTM E814 and UL 1479.
- .2 DWV Plastic Pipe Systems Fire Stopping Sealant:
 - .1 Manufacturers:
 - .1 Hilti FS-ONE Intumescent Firestop Sealant
 - .2 Substitutions: Refer to Section 21 05 02.
 - .2 Silicone based, premixed sealant with intumescent properties, vibration and moisture resistant, rated for 3 hours per ASTM E814 and UL 1479 with metal collars.

Part 3 Execution

3.1 EXAMINATION

- .1 Section 21 05 00: Verify existing conditions before starting work.
- .2 Verify that excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

- .1 Ream pipe and tube ends. Remove burrs.
- .2 Remove scale and dirt, on inside and outside, before assembly.
- .3 Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION

- .1 Install to manufacturer's written instructions.
- .2 Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- .3 Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- .4 Install piping to maintain headroom, conserve space, and not interfere with use of space.

- .5 Group piping whenever practical at common elevations.
- .6 Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- .7 Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 23 07 19.
- .8 Provide access where valves and fittings are not exposed. Coordinate size and location of access doors.
- .9 Establish elevations of buried piping outside the building to ensure not less than 2.4 m (8 ft) of cover.
- .10 Install vent piping penetrating roofed areas to maintain integrity of roof assembly.
- .11 Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- .12 Provide support for utility meters to requirements of utility companies.
- .13 Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Division 09.
- .14 Install bell and spigot pipe with bell end upstream.
- .15 Install valves with stems upright or horizontal, not inverted.
- .16 Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.
- .17 Install water piping to ASME B31.9.
- .18 Sleeve pipes passing through partitions, walls and floors.

3.4 APPLICATION

- .1 Use grooved mechanical couplings and fasteners only in accessible locations.
- .2 Install unions downstream of valves and at equipment or apparatus connections.
- .3 Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- .4 Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- .5 Install globe or ball valves for throttling, bypass, or manual flow control services.
- .6 Provide spring loaded check valves on discharge of water pumps.
- .7 Provide plug valves in natural and propane gas systems for shut-off service.
- .8 Provide flow controls in water recirculating systems where indicated.

3.5 ERECTION TOLERANCES

- .1 Division 01: Tolerances.
- .2 Establish invert elevations, slopes for drainage to one percent (1/8 inch per foot) minimum. Maintain gradients.
- .3 Slope water piping minimum 0.25 percent and arrange to drain at low points.

3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- .1 Prior to starting work, verify system is complete, flushed and clean.
- .2 Ensure Ph of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- .3 Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- .4 Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- .5 Maintain disinfectant in system for 24 hours.
- .6 If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- .7 Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- .8 Take samples no sooner than 24 hours after flushing, from 5 percent of outlets and from water entry, and analyze to AWWA C651.

3.7 SERVICE CONNECTIONS

- .1 Provide new sanitary and storm sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
- .2 Provide new water service complete with approved reduced pressure double check backflow preventer and water meter with by-pass valves and pressure reducing valve. Meter and valve arrangement to confirm to the requirements of the Authority Having Jurisdiction.
 - .1 Provide 1.20 mm (18 gauge) galvanized sheet metal sleeve around service main to 150 mm (6 inch) above floor and 1800 mm (6 feet) minimum below grade. Size for minimum of 50 mm (2 inches) of loose batt insulation stuffing.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Roof and floor drains.
- .2 Trap seal primers.
- .3 Cleanouts.
- .4 Hose bibs.
- .5 Hydrants.
- .6 Water hammer arrestors.
- .7 Thermostatic mixing valves.

1.2 RELATED SECTIONS

- .1 Section 01 10 13 - Summary of Work: Product requirements for City of Winnipeg Provided equipment.
- .2 Roofing Section.
- .3 Section 22 10 00 - Plumbing Piping.
- .4 Section 22 42 02 - Plumbing Fixtures.
- .5 Section 22 47 00 - Plumbing Equipment.
- .6 Equipment Wiring: Electrical characteristics and wiring connections.

1.3 REFERENCES

- .1 ASME - SEC 8D - Boilers and Pressure Vessels Code - Rules for Construction of Pressure Vessels.
- .2 ASME A112.21.1 - Floor Drains.
- .3 ASME A112.21.2 - Roof Drains.
- .4 ASME A112.26.1 - Water Hammer Arrestors.
- .5 ASSE 1011 - Hose Connection Vacuum Breakers.
- .6 ASSE 1012 - Backflow Preventers with Immediate Atmospheric Vent.
- .7 ASSE 1013 - Backflow Preventers, Reduced Pressure Principle.
- .8 ASSE 1019 - Wall Hydrants, Frost Proof Automatic Draining Anti-Backflow Types.

- .9 ASTM C478 - Precast Reinforced Concrete Manhole Sections.
- .10 AWWA C506 - Backflow Prevention Devices - Reduced Pressure Principle and Double Check Valve Types.
- .11 NSF/ANSI 61 – Drinking Water System Components – Health Effects
- .12 PDI G-101 - Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data.
- .13 PDI WH-201 - Water Hammer Arrestors.

1.4 SUBMITTALS FOR REVIEW

- .1 Division 01: Submission procedures.
- .2 Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- .3 Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.

1.5 CLOSEOUT SUBMITTALS

- .1 Division 01: Submission procedures.
- .2 Operation Data: Indicate frequency of treatment required for interceptors.
- .3 Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.
- .4 Record Documentation: Record actual locations of equipment, cleanouts, backflow preventers, water hammer arrestors, trap seal primers.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- .1 Division 01: Maintenance and extra material requirements.
- .2 Extra Stock Materials: Supply two (2) loose keys for lockable outside hose bibs.

1.7 QUALITY ASSURANCE

- .1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience.

1.8 DELIVERY, STORAGE, AND PROTECTION

- .1 Division 01: Transport, handle, store, and protect products.
- .2 Accept specialties on site in original factory packaging. Inspect for damage.

Part 2 Products

2.1 ROOF DRAINS

- .1 Manufacturers:
 - .1 Mifab
 - .2 Zurn
 - .3 Watts.
 - .4 Substitutions: Refer to Division 01.
- .2 Standard Roof Drain (RD-1): Mifab R1100 or equivalent.
 - .1 Assembly: ANSI A112.21.2.
 - .2 Body: Lacquered cast iron with sump.
 - .3 Strainer: Removable cast metal dome with vandal proof screws.
 - .4 Accessories: Coordinate with roofing type, refer to Roofing Section:
 - .1 Membrane flange and membrane clamp with integral gravel stop.
 - .2 Adjustable under deck clamp.
 - .3 Roof sump receiver.
 - .4 Waterproofing flange.
 - .5 Levelling frame.
 - .6 Adjustable extension sleeve for roof insulation.
 - .7 Strainer free area of 43 square inches.

2.2 FLOOR DRAINS

- .1 Manufacturers:
 - .1 Mifab
 - .2 Zurn.
 - .3 Watts.
 - .4 Substitutions: Refer to Division 01.
- .2 Floor Drain (FD-1):
 - .1 ANSI A112.21.1,
 - .1 Lacquered cast iron two piece body with double drainage flange,
 - .2 Weep holes,
 - .3 Reversible clamping collar, and round, adjustable nickel-bronze strainer.
 - .4 Complete with ½" trap primer connection.
- .3 Floor Drain (FD-2):
 - .1 ANSI A112.21.1,
 - .1 Lacquered cast iron two piece body with double drainage flange,
 - .2 Weep holes,
 - .3 Reversible clamping collar, and round, adjustable nickel-bronze strainer.

- .4 Round, adjustable nickel-bronze strainer with polished bronze funnel.
- .5 Complete with ½” trap primer connection.

2.3 TRAP SEAL PRIMER

- .1 Manufacturers:
 - .1 Mifab
 - .2 Zurn.
 - .3 Watts.
 - .4 Substitutions: Refer to Division 01.
- .2 Pressure drop activated brass trap seal primer
 - .1 Inlet opening of 1/2" (13mm) male N.P.T. and outlet opening of female 1/2" (13mm) N.P.T.
 - .2 Complete with four view holes and removable filter screen.
 - .3 Requires no site adjustments and no air pre-charge.
 - .4 Each trap seal primer shall be installed with brass trap seal primer air gap fitting,
 - .5 Where multiple floor drains are being served install a trap seal primer distribution unit.
 - .6 Primers shall be installed with union directly upstream, and shut off valve.
 - .7 Supply line to primer shall have a reverse bend in it to reduce the change of sediment collecting in primer, refer to manufacturer’s installation instructions.

2.4 CLEANOUT COVERS

- .1 Refer to Contract Administratorural plans and specifications to determine correct type of cleanout.
- .2 Exterior Surfaced Areas (CO-1):
 - .1 Manufacturers:
 - .1 Mifab
 - .2 Zurn.
 - .3 Watts.
 - .4 Substitutions: Refer to Division 01.
 - .2 Round cast nickel bronze access frame and non-skid cover.
- .3 Exterior Unsurfaced Areas (CO-2):
 - .1 Line type with lacquered cast iron body and round epoxy coated gasketed cover.
- .4 Interior Finished Floor Areas (CO-3):
 - .1 Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.
- .5 Interior Finished Wall Areas (CO-4):

- .1 Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.
- .6 Interior Unfinished Accessible Areas (CO-5):
 - .1 Caulked or threaded type.
 - .2 Bolted stack cleanouts on vertical rainwater leaders.

2.5 HOSE BIBS

- .1 HB-1: Interior type.
 - .1 Manufacturers:
 - .1 Mifab
 - .2 Zurn.
 - .3 Watts.
 - .4 Substitutions: Refer to Division 01.
 - .2 Exposed-type anti-contamination wall faucet with 3/4" (19mm) male hose connection and anti-siphon vacuum breaker.
 - .3 Exterior finish to be brass, operating handle to be cast-iron, coloured blue or red (for cold or hot), and inlet connection shall be 1/2" (13mm) F.P.T.
 - .4 Vacuum breaker to be certified to A.S.S.E. Standard 1011 and listed by I.A.P.M.O.

2.6 HYDRANTS

- .1 WH-1: Wall Hydrant
 - .1 Manufacturers:
 - .1 Mifab
 - .2 Zurn.
 - .3 Watts.
 - .4 Substitutions: Refer to Division 01.
 - .2 Certified exposed type, self draining, non freeze wall hydrant
 - .3 With ANSI/ASSE 1019 approved anti-siphon and vandal resistant integral vacuum breaker, 3/4" (19) male hose connection.
 - .4 Hydrant assembly complete with neoprene plunger to control both the flow and drain functions, hardened bronze operating stem, drain port under the hexagon nut, heavy duty brass casing, 360 degree swivel inlet connection, heavy duty chrome plated bronze head casting, polished chrome plated face plate and satin finished nickel bronze box with hinged locking cover.
 - .5 Operating key to be furnished with each hydrant.

2.7 BACK WATER VALVES

- .1 Cast Iron:
 - .1 Manufacturers:
 - .1 Mifab
 - .2 Zurn.
 - .3 Watts.

- .4 Substitutions: Refer to Division 01.
- .2 ANSI A112.21.2; lacquered cast iron body and cover, brass valve, 150 mm (6 inch) extension sleeve, and access cover.

2.8 WATER HAMMER ARRESTORS

- .1 Manufacturers:
 - .1 Mifab
 - .2 Zurn.
 - .3 Watts.
 - .4 Substitutions: Refer to Division 01.
- .2 ANSI A112.26.1,
 - .1 Stainless steel construction,
 - .2 Bellows type sized to PDI WH-201,
 - .3 Pre-charged suitable for operation in temperature range -73 to 149 degrees C (-100 to 300 degrees F) and maximum 1700 kPa (250 psi) working pressure.

2.9 THERMOSTATIC MIXING VALVES

- .1 Manufacturer: Guardian Model G3600
 - .1 Substitutions: Refer to Division 01
- .2 Valve: Chrome plated cast brass body, stainless steel or copper alloy bellows, integral temperature adjustment.
- .3 Capacity:
 - .1 Minimum flow: 0.5 gpm
 - .2 6 gpm at 20 psi differential.
- .4 Accessories:
 - .1 Check valve on inlets.
 - .2 Volume control shut-off valve on outlet.
 - .3 Stem thermometer on outlet.
 - .4 Strainer stop checks on inlets.
 - .5 Heavy duty mounting bracket
 - .6 ½" NPT threaded female outlet.
 - .7 Fail Safe: In the event of loss of hot water the internal bypass allows valve to deliver cold water to safety units.
- .5 Cabinet: None.

2.10 INSTALLATION

- .1 Install to manufacturer instructions.
- .2 Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.

- .3 Encase exterior cleanouts in concrete flush with grade.
- .4 Install floor cleanouts at elevation to accommodate finished floor.
- .5 Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, premise isolation, irrigation systems, flush valves, interior and exterior hose bibs.
- .6 All water cross connection and backflow prevention shall comply with City of Winnipeg By-Law 2289 and CSA B64.10. Note that where severe hazards exist, an approved control device must be installed both on service pipe as well as on pipe at source of potential contamination.
- .7 Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to washing machine outlets, banks of flush valve fixtures (eg. Water closets, urinals).
- .8 Install air chambers on hot and cold water supply piping to each fixture or group of fixtures (each washroom). Fabricate same size as supply pipe or 20 mm (3/4 inch) minimum, and minimum 450 mm (18 inches) long.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Water closets.
- .2 Urinals.
- .3 Lavatories.
- .4 Service sinks.
- .5 Flush mounted wall box

1.2 RELATED SECTIONS

- .1 Division 01.
- .2 Section 23 05 29 - Supports And Anchors.
- .3 Section 22 10 00 - Plumbing Piping.
- .4 Section 22 42 01 - Plumbing Specialties.
- .5 Section 22 47 00 - Plumbing Equipment.
- .6 Equipment Wiring: Electrical characteristics and wiring connections.

1.3 REFERENCES

- .1 CSA B651 – Barrier-free Design.
- .2 ANSI Z124.1 - Gel-Coated Glass-Fibre Reinforced Polyester Resin Bathtub Units.
- .3 ANSI Z124.2 - Gel-Coated Glass-Fibre Reinforced Polyester Resin Shower Receptor and Shower Stall Units.
- .4 ANSI Z358.1 - Emergency Eye Wash and Shower Equipment.
- .5 ARI 1010 - Self-Contained Mechanically Refrigerated Drinking Water Coolers.
- .6 ASME A112.6.1 - (Floor Affixed) Supports for Off-the-Floor Plumbing Fixtures for Public Use.
- .7 ASME A112.18.1 / CSA-B125.1-05- Plumbing Fixture Fittings.
- .8 ASME A112.19.1 / CSA B45.2-08 - Enamelled Cast Iron Plumbing Fixtures.
- .9 ASME A112.19.2 / CSA B45.1-08 - Vitreous China Plumbing Fixtures.

- .10 ASME A112.19.3 / CSA B45.4-08- Stainless Steel Plumbing Fixtures (Designed for Residential Use).
- .11 ASME A112.19.4 - Porcelain Enamelled Formed Steel Plumbing Fixtures.
- .12 ASME A112.19.5 - Trim for Water-Closet Bowls, Tanks, and Urinals.
- .13 NFPA 70 - National Electrical Code.
- .14 NBCC 2010 - National Building Code of Canada
- .15 NPCC 2010 – National Plumbing Code of Canada
- .16 NFCC 2010 – National Fire Code of Canada

1.4 SUBMITTALS FOR REVIEW

- .1 Division 01: Submission procedures.
- .2 Product Data: Provide catalogue illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

1.5 CLOSEOUT SUBMITTALS

- .1 Division 01: Submission procedures.
- .2 Maintenance Data: Include fixture trim exploded view and replacement parts lists.
- .3 Warranty Documentation: Submit manufacturer warranty and ensure forms have been completed in City of Winnipeg's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

- .1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience.

1.7 REGULATORY REQUIREMENTS

- .1 Products Requiring Electrical Connection: Listed and classified by CSA as suitable for the purpose specified and indicated.

1.8 DELIVERY, STORAGE, AND PROTECTION

- .1 Division 01 Transport, handle, store, and protect products.
- .2 Accept fixtures on site in factory packaging. Inspect for damage.
- .3 Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

Part 2 Products

2.1 FLUSH VALVE WATER CLOSETS – WALL-MOUNTED

- .1 WC-1:
 - .1 Manufacturer: Kohler Model K-4325.
 - .2 Other acceptable manufacturers offering equivalent products.
 - .1 American Standard.
 - .2 Crane.
 - .3 Substitutions: Refer to Division 01.
 - .3 ASME A112.19.2 / CSA B45.1:
 - .1 Wall-mounted, vitreous china closet bowl, with elongated rim,
 - .2 Siphon-jet
 - .3 (1-1/2 inch) 38 mm top spud,
- .2 Exposed Sensor Operated Flush Valve:
 - .1 Manufacturer: Delta Model 81T221HW.
 - .1 Substitutions: Refer to Division 01.
 - .2 ASME A112.19.2 / CSA B45.1:
 - .1 Exposed chrome plated,
 - .2 Electronic hard wired diaphragm flush valve with infrared sensor,
 - .3 Integral screwdriver stop and vacuum breaker,
 - .4 Metal “non hold down” ADA compliant over-ride button,
 - .5 Pressure loss check angle stop with cap,
 - .6 Valve outlet tube 292 mm (11-1/2 inches) height
 - .7 Factory-set to 4.8L (1.28 gal) flush volume.
- .3 Seat:
 - .1 Manufacturer: Kohler K-4731-SC.
 - .2 Other acceptable manufacturers offering equivalent products.
 - .1 Olsonite 10 CC/SS.
 - .2 Substitutions: Refer to Division 01.
 - .3 Solid white plastic, open front less cover, extended back,
 - .4 Self-sustaining hinge, brass bolts.
 - .5 Self-sustaining hinge, brass bolts,
 - .6 Sized for elongated bowl.
 - .7 Provide lid for barrier free fixtures. (x3)
- .1 Wall Mounted Carrier (for fixtures on concrete block wall):
 - .1 Manufacturer: Mifab MC-10-EXT.
 - .2 Other acceptable manufacturers offering equivalent products.

- .1 Zurn.
- .2 Substitutions: Refer to Division 01.
- .3 ASME A112.6.1:
 - .1 Adjustable coated cast iron frame,
 - .2 Integral 4" drain hub and 2" vent,
 - .3 Adjustable spud,
 - .4 Lugs for floor and wall attachment,
 - .5 Complete with rolling thread cast iron nipple of appropriate length to accommodate wall thickness, refer to plan.
 - .6 Threaded fixture studs with nuts and washers.
- .2 Wall Mounted Carrier (for fixtures on stud wall):
 - .1 Manufacturer: Mifab MC-10-EXT-FM.
 - .2 Other acceptable manufacturers offering equivalent products.
 - .1 Zurn.
 - .2 Substitutions: Refer to Division 01.
 - .3 ASME A112.6.1:
 - .1 Adjustable coated cast iron frame,
 - .2 Integral 4" drain hub and 2" vent,
 - .3 Adjustable spud,
 - .4 Lugs for floor and wall attachment,
 - .5 Threaded fixture studs with nuts and washers.
 - .6 Complete with rolling thread cast iron nipple of appropriate length to accommodate wall thickness, refer to plan.
 - .7 Floor mount.

2.2 WALL HUNG URINALS

- .1 UR-1:
 - .1 Manufacturer: Kohler Model K-4960-ET.
 - .2 Other acceptable manufacturers offering equivalent products.
 - .1 American Standard.
 - .2 Crane.
 - .3 Substitutions: Refer to Division 01.
 - .3 ASME A112.19.2 / CSA B45.1:
 - .1 Vitreous china,
 - .2 Wall hung washout urinal with shields,
 - .3 Integral trap,
 - .4 19 mm (3/4 inch) top spud,
 - .5 Steel supporting hanger.
 - .4 ADA / CSA B651:
 - .1 Barrier-free compliant when installed at proper height. Refer to drawings.
- .2 Exposed Sensor Operated Flush Valve:

- .1 Manufacturer: Delta Model 81T231BTA.
- .2 Other acceptable manufacturers offering equivalent products.
 - .1 Powers.
 - .2 Substitutions: Refer to Division 01.
- .3 ASME A112.18.1:
 - .1 Exposed chrome plated, battery-operated diaphragm type with infrared sensor for 19mm (3/4 inch) top-inlet urinal fixture,
 - .2 Four AA batteries, factory-installed, low battery indicator,
 - .3 Vandal-resistant cover screw,
 - .4 Metal “non hold open” handle,
 - .5 Integral screwdriver stop,
 - .6 Vacuum breaker,
 - .7 Cover tube and SS wall flange, spud flange and sput nut.
- .3 Wall Mounted Carrier:
 - .1 Manufacturer: Mifab Model MC-31
 - .2 Other acceptable manufacturers offering equivalent products.
 - .1 Zurn.
 - .2 Substitutions: Refer to Division 01.
 - .3 ASME A112.6.1:
 - .1 Cast iron and steel frame with tubular legs,
 - .2 Lugs for floor and wall attachment,
 - .3 Threaded fixture studs for fixture hanger to bearing studs.

2.3 LAVATORIES

- .1 Vitreous China Wall Hung Basin (LAV-1):
 - .1 Manufacturer: Kohler Model K-1728.
 - .2 Other acceptable manufacturers offering equivalent products.
 - .1 American Standard.
 - .2 Crane.
 - .3 Substitutions: Refer to Division 01.
 - .3 ASME A112.19.2 / CSA B45.1:
 - .1 Vitreous china wall hung lavatory,
 - .2 48.9 x 43.8 mm (19-1/4 x 17-1/4 inch),
 - .3 Ledge back,
 - .4 Drillings on 100 mm (4 inch) centres,
 - .5 Rectangular basin and splash lip,
 - .6 Integral front overflow.
 - .7 Angle valve screwdriver stop,
 - .8 Chrome-plated copper supplies.
 - .4 ADA / CSA B651:

- .1 Barrier-free compliant.
- .2 Basin to be supplied as part of counter, by others (LAV-2):
 - .1 Lavatory Metered Faucet:
 - .1 Manufacturer: Delta Model 591T0250
 - .2 Other acceptable manufacturers offering equivalent products.
 - .1 Substitutions: Refer to Division 01.
 - .3 ASME A112.18.1:
 - .1 Hands free (touchless) on/off faucet,
 - .2 H2Optics™ technology, no external adjustments required,
 - .3 all metal faucet construction,
 - .4 5 1/4" long rigid spout, no lift rod hole,
 - .5 vandal resistant 0.5 gpm (1.9 L/min) spray outlet,
 - .6 Hard Wire (24VAC) infrared electronic handwash(Product supplied with a Converter to convert 24VAC to 6 VDC) 4" (102mm) centers - 2-1/2" x 7" (64 mm x 178 mm) forged coverplate with locking mechanism (anti-rotation), 3 hole installation,
 - .7 supplied with open grid strainer, chrome finish
 - .8 Solenoid and Controller in Plastic Surface Mount Housing-NO MIXING VALVE SUPPLIED
- .2 Accessories:
 - .1 Chrome plated 1.3 mm (17 gauge) brass P-trap with clean-out plug and arm with escutcheon.
 - .2 Offset waste with perforated open strainer.
 - .3 Straight valve screwdriver stop,
 - .4 Chrome-plated copper supplies.

2.4 SERVICE SINKS

- .1 Mop Sink:
 - .1 Manufacturer: Fiat MSB 24" x 24" x 10" (610 x 610 x 254 mm)
 - .2 Other acceptable manufacturers offering equivalent products.
 - .1 Not permitted.
 - .3 Configuration:
 - .1 Size: 600 x 600 x 250 mm (24 x 24 x 10 inch) high,
 - .2 Floor mounted molded stone mop service basin, with 832 hose and holder, 889 cc. mop hanger, and E-77-AA vinyl bumper guard.
 - .3 Stainless steel strainer.
- .2 Trim:
 - .1 Manufacturer: Delta Model 28T2383.

- .1 Not permitted.
- .2 ASME A112.18.1
 - .1 Polished chrome wallmount service faucet with rigid spout, 8" centres, cast brass construction, chrome-plated.
 - .2 Two handle with integral check stops, polished chrome plated finish, lever-blade handles.
 - .3 Long rigid spout with pail hook and adjustable top wall brace, pail hook and 3/4" hose thread on spout.
 - .4 Body mounted angle vacuum breaker, garden hose end outlet on spout.
 - .5 Vacuum breaker, integral stops.
- .3 Accessories:
 - .1 1.5 m (5 feet) of 13 mm (1/2 inch) diameter plain end reinforced rubber hose,
 - .2 Hose clamp hanger,
 - .3 Mop hanger.

2.5 FLUSH MOUNTED WALL BOX

- .1 VB-1:
 - .1 Manufacturer: MIFAB Series MHY-95
 - .2 Other acceptable manufacturers offering equivalent products.
 - .1 Substitutions: Refer to Division 01.
 - .3 Flush cast mounted brass wall box with hydrant.
 - .4 Complete with Cylinder key lock.
 - .5 Custom cut hole to suite 38mm domestic water line. Coordinate material with Owner.

Part 3 Execution

3.1 EXAMINATION

- .1 Division 01: Verify existing conditions before starting work.
- .2 Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- .3 Verify that electric power is available and of the correct characteristics.
- .4 Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.2 PREPARATION

- .1 Rough-in fixture piping connections to minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.3 INSTALLATION

- .1 Install to manufacturer's instructions.

- .2 Install each fixture with trap, easily removable for servicing and cleaning.
- .3 Provide chrome plated rigid supplies to fixtures with screwdriver stops, reducers, and escutcheons. Install all exposed piping and valves neatly and close to the wall. Supplies should be run as plumb as possible.
- .4 Install components level and plumb.
- .5 All mixing valves serving multiple fixtures shall be installed in recessed cabinets.
- .6 Install lavatory mixing valves neatly and out of site under millwork unless specified as installed in recessed cabinet. Secure with proper fasteners – galvanized strapping is not acceptable. Where provided on the drawings, refer to mixing valve installation details.
- .7 Install and secure fixtures in place with wall supports or wall carriers (as specified in Part 2 Products) and bolt, washer, nut fasteners.
- .8 Seal fixtures to wall and floor surfaces with sealant as specified in Division 07, colour to match fixture.
- .9 Seal sinks and lavatories to the millwork. Install gasket where supplied or recommended by sink or lavatory manufacturer.
- .10 Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.
- .11 Emergency shower / eye-wash stations should be installed so that shower head is at least 82" above floor and 32" from wall or nearest obstruction.
- .12 Thermally insulate and jacket all exposed drain pipe extensions, traps, and trap arms below barrier-free wall-hung lavatories.

3.4 INTERFACE WITH OTHER PRODUCTS

- .1 Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.5 ADJUSTING

- .1 Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.
- .2 Adjust stops or valves to comply with specified flow rates.

3.6 CLEANING

- .1 Section 01 74 00: Cleaning installed work.
- .2 Clean plumbing fixtures and equipment.

3.7 PROTECTION OF FINISHED WORK

- .1 Section 01 78 40: Protecting installed work.

.2 Do not permit use of fixtures.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Water heaters.

1.2 RELATED SECTIONS

- .1 Equipment Wiring: Electrical characteristics and wiring connections.

1.3 REFERENCES

- .1 ASHRAE 90A - Energy Conservation in New Building Design.
- .2 ASME Section 8D - Boilers and Pressure Vessel Codes - Rules for Construction of Pressure Vessels.
- .3 CSA B51-03 - Boiler, Pressure Vessel, and Pressure Piping Code.
- .4 NFPA 30 - Flammable and Combustible Liquids Code, 2008 Edition.
- .5 NFPA 54 - National Fuel Gas Code, 2006 Edition.
- .6 NFPA 58 - Liquefied Petroleum Gas Code, 2008 Edition.
- .7 UL 1453 - Electric Booster and Commercial Storage Tank Water Heaters.
- .8 UL 174 - Household Electric Storage Tank Water Heaters.
- .9 CAN/CSA-C191 - Performance of Electric Storage Tank Water Heaters for Domestic Hot Water Service.
- .10 ANSI Z21.10.3/CSA 4.3 - Gas water heaters - Volume III, Storage water heaters with input ratings above 75,000 Btu per hour, circulating and instantaneous

1.4 SUBMITTALS FOR REVIEW

- .1 Division 01: Submission procedures.
- .2 Product Data:
 - .1 Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
 - .2 Indicate pump type, capacity, power requirements.
 - .3 Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
 - .4 Provide electrical characteristics and connection requirements.
- .3 Shop Drawings:
 - .1 Indicate heat exchanger dimensions, size of tappings, and performance data.

- .2 Indicate dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tappings, and drains.

1.5 QUALITY ASSURANCE

- .1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years experience.
- .2 Provide pumps with manufacturer's name, model number, and rating/capacity identified.
- .3 Ensure products and installation of specified products are to recommendations and requirements of the following organizations:
 - .1 American Gas Association (AGA).
 - .2 National Sanitation Foundation (NSF).
 - .3 American Society of Mechanical City of Winnipegs (ASME).
 - .4 National Board of Boiler and Pressure Vessel Inspectors (NBBPVI).
 - .5 National Electrical Manufacturers' Association (NEMA).
 - .6 Underwriters Laboratories (UL).
- .4 Ensure pumps operate at specified system fluid temperatures without vapour binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

1.6 REGULATORY REQUIREMENTS

- .1 Conform to CGA / AGS requirements for water heaters.
- .2 Conform to ASME Section 8D for manufacture of pressure vessels for heat exchangers.
- .3 Conform to ASME Section 8D for tanks.
- .4 Products Requiring Electrical Connection: Listed and classified by testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.7 DELIVERY, STORAGE, AND PROTECTION

- .1 Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.8 WARRANTY

- .1 Provide a five (5) year warranty to include coverage for failure to meet specified requirements, for domestic water heaters, water storage tanks, and packaged water heating systems.

Part 2 Products

2.1 COMMERCIAL ELECTRIC WATER HEATERS

- .1 Manufacturers:
 - .1 A.O. Smith.

- .2 Rheem/Ruud.
- .3 Bradford White.
- .4 Aerco.
- .5 Substitutions: Refer to Division 01.
- .2 Type: Factory-assembled and wired, electric, vertical storage.
- .3 Performance:
 - .1 Refer to schedules on drawings.
- .4 Tank:
 - .1 Glass lined welded steel,
 - .2 Thermally insulated with minimum insulating value of RSI-2.2 (R-12.5), encased in corrosion-resistant steel jacket.
 - .3 Baked-on high-temperature porcelain enamel finish.
 - .4 Working pressure rating of 150 psi.
- .5 Controls:
 - .1 Automatic immersion water thermostat,
 - .2 Externally adjustable temperature range from 16 to 82 degrees C (60 to 180 degrees F),
 - .3 Flanged or screw-in nichrome elements,
 - .4 Integral, manual reset, high temperature limit thermostat.
- .6 Accessories:
 - .1 Brass water connections and dip tube,
 - .2 Drain valve,
 - .3 Magnesium anode, rigidly supported,
 - .4 ASME rated temperature and pressure relief valve.

Part 3 Execution

3.1 INSTALLATION

- .1 Install water heaters to manufacturer's instructions and to local regulations and requirements.
- .2 Coordinate with plumbing piping and electrical work to achieve operating system.

END OF SECTION