

PART 1 – GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .3 Section 01 35 29 - Health and Safety Requirements.
- .4 Section 01 78 00 - Closeout Submittals.
- .5 Section 23 05 23.01 - Valves - Bronze.
- .6 Section 23 05 23.02 Valves - Cast Iron.
- .7 Section 23 05 93 - Testing, Adjusting and Balancing for HVAC

1.2 REFERENCES

- .1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME).
 - .1 ANSI/ASME B16.15-2011, Cast Bronze Threaded Fittings, Classes 125 and 250.
 - .2 ANSI/ASME B16.18-2001(R2012), Cast Copper Alloy Solder Joint Pressure Fittings.
 - .3 ANSI/ASME B16.22-2001(R2012), Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 - .4 ANSI/ASME B16.24-2011, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.
 - .2 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM A 307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .2 ASTM B 88M-05, Standard Specification for Seamless Copper Water Tube (Metric).
 - .3 ASTM F 492-95, Standard Specification for Propylene and Polypropylene (PP) Plastic-Lined Ferrous Metal Pipe and Fittings.
 - .3 American Water Works Association (AWWA).
 - .1 ANSI/AWWA C111/A21.11-07, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - .4 Canadian Standards Association (CSA International).
 - .1 CSA B242-05, Groove and Shoulder Type Mechanical Pipe Couplings.
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- .5 Department of Justice Canada (Jus).
 - .1 Canadian Environmental Protection Act, 1999, c. 33 (CEPA).
- .6 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Material Safety Data Sheets (MSDS).
- .7 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).
 - .1 MSS-SP-67-2002a, Butterfly Valves.
 - .2 MSS-SP-70-2006, Cast Iron Gate Valves, Flanged and Threaded Ends.
 - .3 MSS SP-71-2005, Cast Iron Swing Check Valves, Flanged and Threaded Ends.
 - .4 MSS-SP-80-2008, Bronze Gate, Globe, Angle and Check Valves.
- .8 National Research Council (NRC)/Institute for Research in Construction.
 - .1 NRCC 38728, National Plumbing Code of Canada (NPC) - 1995.

1.3 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit product data for following: valves.
- .3 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 HEALTH AND SAFETY

- .1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

PART 2 – PRODUCTS

2.1 PIPING

- .1 Domestic hot, cold and recirculation systems, within building.
 - .1 Above ground: copper tube, hard drawn, type L: to ASTM B 88M-05.
 - .2 Buried or embedded: copper tube, soft annealed, type K: to ASTM B 88M-05, in long lengths and with no buried joints.
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2.2 FITTINGS

- .1 Bronze pipe flanges and flanged fittings, Class 150 and 300: to ANSI/ASME B16.24-2006.
- .2 Cast bronze threaded fittings, Class 125 and 250: to ANSI/ASME B16.15-2006.
- .3 Cast copper, solder type: to ANSI/ASME B16.18-2001(R2005).
- .4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22-2001(R2005).

2.3 JOINTS

- .1 Rubber gaskets, latex-free 1.6 mm thick: to ANSI/AWWA C111/A21.11-07.
- .2 Bolts, nuts, hex head and washers: to ASTM A 307-07b, heavy series.
- .3 Solder: 95/5 tin copper alloy.
- .4 Teflon tape: for threaded joints.
- .5 Dielectric connections between dissimilar metals: dielectric fitting to ASTM F 492-95, complete with thermoplastic liner.

2.4 GATE VALVES

- .1 NPS 2 and under, soldered:
 - .1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 23.01 - Valves - Bronze.
 - .2 Acceptable Material:
 - .1 Crane.
 - .2 Jenkins.
 - .3 Red White.
- .2 NPS 2 and under, screwed:
 - .1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 23.01 - Valves - Bronze.
 - .2 Acceptable Material:
 - .1 Crane.
 - .2 Jenkins.
 - .3 Red White.
- .3 NPS 2-1/2 and over, flanged:
 - .1 Rising stem: to MSS-SP-70, Class 125, 860 kPa, flat flange faces, cast-iron body, OS&Y bronze trim specified Section 23 05 23.02 - Valves -

- Cast Iron.
- .2 Acceptable Material:
 - .1 Crane.
 - .2 Jenkins.
 - .3 Red White.

2.5 GLOBE VALVES

- .1 NPS2 and under, soldered:
 - .1 To MSS-SP-80, Class 125, 860 kPa, bronze body, renewable composition disc, screwed over bonnet as specified Section 23 05 23.01 - Valves – Bronze, complete with position indicator.
 - .2 Lockshield handles: as indicated.
 - .3 Acceptable Material:
 - .1 Crane.
 - .2 Jenkins.
 - .3 Red White.
- .2 NPS 2 and under, screwed:
 - .1 To MSS-SP-80, Class 150, 1 MPa, bronze body, screwed over bonnet, renewable composition disc as specified Section 23 05 23.01 - Valves – Bronze, complete with position indicator.
 - .2 Lockshield handles: as indicated.
 - .3 Acceptable Material:
 - .1 Crane.
 - .2 Jenkins.
 - .3 Red White.

2.6 SWING CHECK VALVES

- .1 NPS 2 and under, soldered:
 - .1 To MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat as specified Section 23 05 23.01 - Valves - Bronze.
 - .2 Acceptable Material:
 - .1 Crane.
 - .2 Jenkins.
 - .3 Red White.
- .2 NPS 2 and under, screwed:
 - .1 To MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat as specified Section 23 05 23.01 - Valves - Bronze.
 - .2 Acceptable Material:
 - .1 Crane.
 - .2 Jenkins.
 - .3 Red White.

- .3 NPS 2-1/2 and over, flanged:
 - .1 To MSS-SP-71, Class 125, 860 kPa, cast iron body, flat flange faces, renewable seat, bronze disc, bolted cap specified Section 23 05 23.02 - Valves - Cast Iron: Gate, Globe, Check.
 - .2 Acceptable Material:
 - .1 Crane.
 - .2 Jenkins.
 - .3 Red White.

2.7 BALL VALVES

- .1 NPS 2 and under, screwed:
 - .1 Class 150.
 - .2 Bronze body, stainless steel ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle as specified Section 23 05 23.01 - Valves - Bronze.
 - .3 Acceptable Material:
 - .1 Crane.
 - .2 Jenkins.
 - .3 Red White.
- .2 NPS 2 and under, soldered:
 - .1 To ANSI/ASME B16.18-2001(R2005), Class 150.
 - .2 Bronze body, stainless steel ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle, with NPT to copper adaptors as specified Section 23 05 23.01 - Valves - Bronze.
 - .3 Acceptable Material:
 - .1 Crane.
 - .2 Jenkins.
 - .3 Red White.

PART 3 – EXECUTION

3.1 INSTALLATION

- .1 Install in accordance with National Plumbing code, Provincial Plumbing Code, and local authority having jurisdiction and in accordance with Section 23 05 05 – Installation of Pipework.
- .2 Assemble piping using fittings manufactured to ANSI standards.
- .3 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.

3.2 VALVES

- .1 Isolate equipment, fixtures and branches with ball valves.
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- .2 Balance recirculation system using circuit balancing valves. Mark settings and record on as-built drawings on completion.

3.3 PRESSURE TESTS

- .1 Test pressure: greater of 1.5 times maximum system operating pressure or 860 kPa.
- .2 Pressure test report to be submitted to Departmental Representative and Commissioning Agent prior to installation of pipe insulation.

3.4 FLUSHING AND CLEANING

- .1 Flush entire system for 8 h. Ensure outlets flushed for 2 h. Let stand for 24 h, then draw one sample off longest run. Submit to testing laboratory to verify that system is clean to Provincial and Federal potable water guidelines. Let system flush for additional 2 h, then draw off another sample for testing.

3.5 PRE-START-UP INSPECTIONS

- .1 Systems to be complete, prior to flushing, testing and start-up.
- .2 Verify that system can be completely drained.
- .3 Ensure that pressure booster systems are operating properly.
- .4 Ensure that air chambers, expansion compensators are installed properly.

3.6 DISINFECTION

- .1 Flush out, and rinse system to approval of Departmental Representative.
- .2 Upon completion, provide laboratory test reports on water quality for Departmental Representative's approval.
- .3 Disinfection: liquid chlorine to ANSI/AWWA 13 303-10, Under take disinfection in accordance with ANSI/AWWA C651.

3.7 START-UP

- .1 Timing: Start up after:
 - .1 Pressure tests have been completed.
 - .2 Disinfection procedures have been completed.
 - .3 Certificate of static completion has been issued.
 - .4 Water treatment systems operational.

- .2 Provide continuous supervision during start-up.
- .3 Start-up procedures:
 - .1 Establish circulation and ensure that air is eliminated.
 - .2 Check pressurization to ensure proper operation and to prevent water hammer, flashing and/or cavitation.
 - .3 Bring HWS storage tank up to design temperature slowly.
 - .4 Monitor piping systems for freedom of movement, pipe expansion as designed.
 - .5 Check control, limit, safety devices for normal and safe operation.
- .4 Rectify start-up deficiencies.

3.8 PERFORMANCE VERIFICATION

- .1 Timing:
 - .1 After pressure and leakage tests and disinfection completed, and certificate of completion has been issued by authority having jurisdiction.
- .2 Procedures:
 - .1 Verify that flow rate and pressure meet Design Criteria.
 - .2 TAB HWC in accordance with Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
 - .3 Adjust pressure regulating valves while withdrawal is maximum and inlet pressure is minimum.
 - .4 Sterilize HWS and HWC systems for Legionella control.
 - .5 Verify performance of temperature controls.
 - .6 Verify compliance with safety and health requirements.
 - .7 Check for proper operation of water hammer arrestors. Run one outlet for 10 seconds, then shut of water immediately. If water hammer occurs, replace water hammer arrestor or re-charge air chambers. Repeat for outlets and flush valves.
 - .8 Confirm water quality consistent with supply standards, verifying that no residuals remain as a result of flushing and/or cleaning.
- .3 Reports:
 - .1 Include certificate of water flow and pressure tests conducted on incoming water service, demonstrating adequacy of flow and pressure.

PART 1 – GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Section 01 35 29 - Health and Safety Requirements.

1.2 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM D 2235-04, Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
 - .2 ASTM D 2564-04(2009)e1, Specification for Solvent Cements for Poly(Vinyl-Chloride) (PVC) Plastic Piping Systems.
- .2 Canadian Standards Association (CSA International).
 - .1 CSA-Series B1800-06, Plastic Nonpressure Pipe Compendium.
 - .2 CSA/CSA B1800-06, PVC Drain, Waste and Vent Pipe and Pipe Fittings.
 - .3 CSA-B182.1-02, Plastic Drain and Sewer Pipe and Pipe Fittings.

PART 2 - PRODUCTS

2.1 PIPING AND FITTINGS

- .1 For buried and or concealed above ground DWV piping to:
 - .1 CSA/CSA B1800-02.
- .2 For aboveground pumped sanitary piping:
 - .1 PVC pressure piping in accordance with Section 22 13 19 – Non-Potable/Process Water Piping.
- .3 For buried pumped sanitary piping:
 - .1 In accordance with Section 33 34 00 – Sanitary Utility Sewage Force Mains.

2.2 JOINTS

- .1 Solvent weld for PVC: to ASTM D 2564-04(2009)e1.
 - .2 Solvent weld for ABS: to ASTM D 2235-04.
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2.3 VALVES

- .1 In accordance with Section 22 13 19 – Non-Potable/Process Water Piping and Section 23 05 23.06 – Valves – Plastic.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install in accordance with National Plumbing Code and Provincial Plumbing Code and local authority having jurisdiction.
- .2 Plastic piping used in exposed locations must be XFR with a smoke/flame spread rating of 50/25.

3.2 TESTING

- .1 Pressure test buried systems before backfilling.
- .2 Hydraulically test to verify grades and freedom from obstructions.

3.3 PERFORMANCE VERIFICATION

- .1 Cleanouts:
 - .1 Ensure accessible and that access doors are correctly located.
 - .2 Open, cover with linseed oil and re-seal.
 - .3 Verify cleanout rods can probe as far as the next cleanout, at least.
- .2 Test to ensure traps are fully and permanently primed.
- .3 Storm water drainage:
 - .1 Verify domes are secure.
 - .2 Ensure weirs are correctly sized and installed correctly.
 - .3 Verify provisions for movement of roof system.
- .4 Ensure fixtures are properly anchored, connected to system and effectively vented.
- .5 Affix applicable label (storm, sanitary, vent, pump discharge etc.) c/w directional arrows every floor or 4.5 m (whichever is less).

PART 1 – GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .3 Section 01 35 29 - Health and Safety Requirements.
- .4 Section 01 78 00 - Closeout Submittals.
- .5 Section 23 05 05 - Installation of Pipework.
- .6 Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

1.2 REFERENCES

- .1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME).
 - .1 ANSI/ASME B16.15-2006, Cast Bronze Threaded Fittings, Classes 125 and 250.
 - .2 ANSI/ASME B16.18-2001 (R2005), Cast Copper Alloy Solder Joint Pressure Fittings.
 - .3 ANSI/ASME B16.22-2001(R2005), Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 - .4 ANSI/ASME B16.24-2006, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.
 - .2 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM A 307-04e1, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .2 ASTM D1744-92, specification for Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl chloride (CPVC) Compounds.
 - .3 ASTM D2564-04e1, specification for solvent Cements for Polyvinyl chloride (PVC) Plastic Pipe and Fittings.
 - .3 American Water Works Association (AWWA).
 - .1 ANSI/AWWA C111/A21.11-07, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - .4 Canadian Standards Association (CSA International).
 - .1 CAN/CSA B137.3-05, Pressure Rated PVC Pipe.
 - .2 CSA B242-05, Groove and Shoulder Type Mechanical Pipe Couplings.
 - .5 Department of Justice Canada (Jus).
 - .1 Canadian Environmental Protection Act, 1999, c. 33 (CEPA).
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- .6 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Material Safety Data Sheets (MSDS).
- .7 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).
 - .1 MSS SP-67-2002a, Butterfly Valves.
 - .2 MSS SP122-2005, Plastic Industrial Ball Valves.
- .8 National Research Council (NRC)/Institute for Research in Construction.
 - .1 NRCC 38728, National Plumbing Code of Canada (NPC) - 1995.
- .9 Transport Canada (TC).
 - .1 Transportation of Dangerous Goods Act, 1992, c. 34 (TDGA).

1.3 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit product data for following: valves.
- .3 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 HEALTH AND SAFETY

- .1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 – PRODUCTS

2.1 PIPING AND FITTINGS

- .1 Salt water and non-potable water.
 - .2 Plastic pressure piping:
 - .1 Piping: PVC, Type 1, Grade 1, to CAN/CSA B137.3 and to ASTM D1784-06, Cell Classification 12454, Grade B, as follows:
 - .1 To NPS 4: Schedule 80.
 - .2 NPS 6 and Up: Schedule 40.
 - .2 Pipe Joints:
 - .1 Solvent weld: to ASTM D2564-04e1, solvent must be compatible with raw salt water.
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- .2 Screwed: on valves, fittings, with PTFE tape.
- .3 Fittings:
 - .1 Screwed fittings: PVC, to ASTM D1784-06, Cell Classification 12454, and to CSA B137.3.
 - .2 Solvent weld fittings: PVC, to ASTM D1784-06, Cell Classification 12454 and to CSA B137.3.
 - .3 Unions: ASTM D1784-06, Cell Classification 12454 and to CSA B1347.3.
- .4 Flanged Joints:
 - .1 Flanges: PVC, conforming dimensionally to ANSI/ASME B16.1, for 1032 kPa: slip-on full faces, solvent welded to pipe.
 - .2 Gaskets: neoprene, 3 mm thick.
 - .3 Bolts and nuts: to ASTM A 307, Grade B, ANSI B18.2.1, ANSI B18.2.2: stud bolts, stainless steel, semi finished with heavy hex nuts, complete with washers.

2.2 BALL VALVES

- .1 Application: non-potable water distribution piping, fixture shutoff, drainage/sanitary.
 - .1 Class 150, with screwed union ends, PVC body and ball, in accordance with Section 23 05 23.06 - Valves - Plastic.

2.3 BUTTERFLY VALVES

- .1 Application: salt water and non-potable water distribution piping.
 - .1 Class 150, wafer style with full set of ANSI Class 150 flange locating bolt holes, PVC body, polypropylene disc, in accordance with Section 23 05 23.06 - Valves – Plastic.

2.4 SWING CHECK VALVES

- .1 Application: salt water and non-potable water distribution piping, sanitary piping.
 - .1 Class 150, compatible with ANSI Class 150 flanges, PVC body, o-ring seals and shutter shall be made of EPDM, bolts and washers shall be made of 304 stainless steel.

2.5 GLOBE VALVES

- .1 Application: salt water and non-potable water distribution piping.
 - .1 Class 150 compatible with ANSI Class 150 Flanges, PVC body, EPDM seals, copper stem with trapezoid screw seat, bolts and washers to be stainless steel, PP disc PP hand wheel, position indicator.
 - .2 PVC shall conform to ASTM D1784 and PP conforming to ASTM D4101.
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2.6 STRAINERS: BASKET TYPE

- .1 860 KpA, basket type with 177 micron (80 mesh) stainless steel removable screen.
- .2 PVC body, flanged connections, EPDM or Vitcon seals.
- .4 Acceptable Material:
 - .1 Hayward.
 - .2 Eaton.
 - .3 Chemline.

PART 3 – EXECUTION

3.1 INSTALLATION

- .1 Install in accordance with NPC, Provincial Plumbing Code and local authority having jurisdiction.
- .2 Install pipe work in accordance with Section 23 05 05 - Installation of Pipework supplemented as specified herein.
- .3 Assemble piping using fittings manufactured to ANSI standards.
- .4 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.
- .5 Paint all non-potable water piping insulation jackets olive green and also identify in accordance with Section 23 05 53.01 Mechanical Identification.
- .6 Hydraulically test to verify grades and freedom from obstructions.

3.2 VALVES

- .1 Isolate equipment, fixtures and branches with butterfly valves.

3.3 PRESSURE TESTS

- .1 Conform to requirements of Section 23 05 00 - Common Work Results - Mechanical.
 - .2 Test pressure: greater of 1 times maximum system operating pressure or 860 kPa, pressure piping only. Test gravity piping in accordance with Section 22 13 18 - Drainage Waste and Vent Piping - Plastic.
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3.4 PRE-START-UP INSPECTIONS

- .1 Systems to be complete, prior to flushing, testing and start-up.
- .2 Verify that system can be completely drained.
- .3 Ensure that pressure booster systems are operating properly.
- .4 Ensure that air chambers, expansion compensators are installed properly.

3.5 START-UP

- .1 Timing: Start up after:
 - .1 Pressure tests have been completed.
 - .2 Certificate of static completion has been issued.
 - .3 Water treatment systems operational.
- .2 Provide continuous supervision during start-up.
- .3 Start-up procedures:
 - .1 Establish circulation and ensure that air is eliminated.
 - .2 Check pressurization to ensure proper operation and to prevent water hammer, flashing and/or cavitation.
 - .3 Monitor piping systems for freedom of movement.
 - .4 Check control, limit, safety devices for normal and safe operation.
- .4 Rectify start-up deficiencies.

3.6 PERFORMANCE VERIFICATION

- .1 Pressure Piping:
 - .1 Timing:
 - .1 After pressure and leakage tests have been completed, and certificate of completion has been issued by authority having jurisdiction.
 - .2 Procedures:
 - .1 Verify that flow rate and pressure meet Design Criteria.
 - .2 Verify performance of temperature controls.
 - .3 Verify compliance with safety and health requirements.
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- .4 Check for proper operation of water hammer arrestors. Run one outlet for 10 seconds, then shut of water immediately. If water hammer occurs, replace water hammer arrestor or re-charge air chambers. Repeat for outlets and flush valves.
- .5 Confirm water quality consistent with supply standards, verifying that no residuals remain as a result of flushing and/or cleaning.
- .3 Reports:
 - .1 Include certificate of water flow and pressure tests conducted on incoming water service, demonstrating adequacy of flow and pressure.

PART 1 – GENERAL

1.1 RELATED SECTIONS

- .1 Section 22 11 18 - Domestic Water Piping - Copper.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA B51-03, Boiler, Pressure Vessel, and Pressure Piping Code.
 - .2 CSA C309-M90(R2009), Performance Requirements for Glass-Lined Storage Tanks for Household Hot Water Service.
 - .3 CAN/CSA C22.2 No. 110-94(R2009), Construction and Test of Electric Storage Tank Water Heaters.
 - .4 CAN/CSA-C191, Performance of Electric Storage Tank Water Heaters.

1.3 SHOP DRAWINGS

- .1 Submit shop drawings for review.
- .2 Indicate:
 - .1 Equipment, including connections, fittings, control assemblies and ancillaries, identifying factory and field assembled.

1.4 CLOSEOUT SUBMITTALS

- .1 Provide maintenance and engineering data for incorporation into manual.

PART 2 – PRODUCTS

2.1 ELECTRIC WATER HEATERS

- .1 DWH-1 to CAN/CSA C22.2 No. 110, CAN/CSA-C191, with copper resistored, “screw in” type element, 1.5 kW, 120 V, 1-Phase, and surface immersion type mounted or adjustable thermostats.
 - .1 Tank: size 10L. Tank interior shall be glass-lined, heavy foam 50 mm insulation, enameled steel jacket, 3 year warranty certificate.
 - .2 Accessories and trim:
 - .1 Complete with automatic adjustable temperature control with high temp safety cut-off, ASME rated P&T relief valve, 1” NPT pipe connections, hose drain connection and magnesium anode.
 - .1 Acceptable material:
 - .1 Rheem
 - .2 AO Smith
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.3 GSW

3.1 INSTALLATION

- .1 Install in accordance with manufacturer's recommendations and authority having jurisdiction.
- .2 Provide insulation between tank and supports.
- .3 Install on concrete housekeeping pad.

3.2 FIELD QUALITY CONTROL

- .1 Manufacturer's factory trained, certified Engineer to start up and commission DHW heaters.

PART 1 – GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 29 - Health and Safety Requirements.
- .3 Section 01 74 21 - Construction/Demolition Management and Disposal.
- .4 Section 01 78 00 - Closeout Submittals.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International).
 - .1 CAN/CSA B45 SERIES-02 (R2008), Plumbing Fixtures.
 - .2 CSA B125-01, Plumbing Fittings.

1.3 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Indicate, for all fixtures and trim:
 - .1 Dimensions, construction details, roughing-in dimensions.
- .3 Closeout Submittals:
 - .1 Submit maintenance data in accordance with Section 01 78 00 - Closeout Procedures.
 - .2 Include:
 - .1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.
 - .2 Details of operation, servicing, maintenance.
 - .3 List of recommended spare parts.

1.4 QUALITY ASSURANCE

- .1 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29 - Health and Safety Requirements.
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PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- .1 Fixtures: manufacture in accordance with CSA B45S1-04 series.
- .2 Trim, fittings: manufacture in accordance with CSA B125-01.
- .3 Exposed plumbing brass to be chrome plated.
- .4 Number, locations: architectural drawings to govern.
- .5 Fixtures in any one location to be product of one manufacturer and of same type.
- .6 Trim in any one location to be product of one manufacturer and of same type.
- .7 Stainless steel sinks.
 - .1 SS-1: 304 Stainless Steel, 1000mm minimum length, floor mounted:
 - .1 From 1.0 mm thick type 304 stainless steel, self-rimming, undercoated, clamps. Overall sizes: 1000 x 520 x 200 mm.
 - .2 Trim: chrome plated brass, with swivel gooseneck spout, aerator, blade lever handle, washerless controls, accessories to limit maximum flow rate to 7.3 litres/minute at 413 kPa.
 - .3 Waste fitting: integral stainless steel basket strainer/stopper, tailpiece, cast brass P-trap with cleanout.
 - .4 Acceptable Material:
 - .1 Franke
 - .2 Toto
 - .3 American Standard
 - .4 Kindred
 - .5 Novanni
 - .5 Acceptable Trim Material:
 - .1 Delta
 - .2 Toto
 - .3 American Standard
 - .4 Kindred
 - .5 Mustee.
 - .6 Crane.
- .8 Fixture piping:
 - .1 Hot and cold water supplies to each fixture:
 - .1 Chrome plated flexible supply pipes each with screwdriver stop, reducers, escutcheon.
 - .2 Waste:
 - .1 Brass P trap with clean out on each fixture not having integral trap.
 - .2 Chrome plated in all exposed places.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Mounting heights:
 - .1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified.

3.2 ADJUSTING

- .1 Conform to water conservation requirements specified this section.
- .2 Adjustments:
 - .1 Adjust water flow rate to design flow rates.
 - .2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.
- .3 Checks:
 - .1 Aerators: operation, cleanliness.
 - .2 Vacuum breakers, backflow preventers: operation under all conditions.
- .4 Thermostatic controls:
 - .1 Verify temperature settings, operation of control, limit and safety controls.

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Management and Disposal.

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM A 126-04(2009), Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
 - .2 ASTM B 62-09, Specification for Composition Bronze or Ounce Metal Castings.
- .2 American Water Works Association (AWWA)
 - .1 ANSI/AWWA C700-09, Cold Water Meters-Displacement Type, Bronze Main Case.
 - .2 ANSI/AWWA C701-07, Cold Water Meters-Turbine Type for Customer Service.
 - .3 ANSI/AWWA C702-01, Cold Water Meters-Compound Type.
- .3 Canadian Standards Association (CSA)
 - .1 CSA B64-Series-01 Series-01, Backflow Preventers and Vacuum Breakers.
 - .2 CSA B79-08, Floor, Area and Shower Drains, and Cleanouts for Residential Construction.
 - .3 CAN/CSA-B356-00(R2005), Water Pressure Reducing Valves for Domestic Water Supply Systems.
- .4 Plumbing and Drainage Institute (PDI)
 - .1 PDI-G101-96, Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data.
 - .2 PDI-WH201-92, Water Hammer Arresters Standard.

1.3 SUBMITTALS

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 For product data, indicate dimensions, construction details and materials for items specified herein.
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1.4 CLOSEOUT SUBMITTALS

- .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- .2 Data to include:
 - .1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.
 - .2 Details of operation, servicing and maintenance.
 - .3 Recommended spare parts list.

PART 2 - PRODUCTS

2.1 FLOOR DRAINS

- .1 Floor drains: to CSA B79-08.
- .2 FD-1: general duty; cast iron body round, adjustable head, nickel bronze strainer, integral seepage pan and water membrane flange.
 - .1 Acceptable material:
 - .1 Ancon
 - .2 Zurn
 - .3 J.R. Smith

2.2 ELECTRONIC TRAP PRIMERS

- .1 Built-in 120 to 24 volt transformer and fuse.
 - .2 LED indication of operation and power.
 - .3 Manual override and testing push button.
 - .4 Permanently programmed electronic timer.
 - .5 Normally-closed 24 VAC slow closing solenoid valve with integral strainer.
 - .6 Air gap.
 - .7 copper water inlet and manifold with 4 copper outlets.
 - .8 Minimum pressure 20.7 kPa, working pressure 2.5 to 690 kPa.
 - .9 Galvanized steel surface mounting box.
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2.3 CLEANOUTS

- .1 Cleanout Plugs: heavy cast iron ferrule with brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket.
- .2 Floor access covers:
 - .1 CO: round, cast iron body and frame, bolted bronze plug with neoprene gasket, cast iron round access cover complete with gasket and vandal-proof screws.

2.4 BACK FLOW PREVENTERS-REDUCED PRESSURE PRINCIPAL TYPE

- .1 Preventers: to CSA B64-Series-01 Series, reduced pressure principal assembly type consisting of two spring-loaded check valves with intermediate relief valve assembly, two OS&Y gate valves for shut-off, and a strainer on the assembly inlet.
- .2 Body: Epoxy coated cast iron.
- .3 Seals: Bronze
- .4 Trim: stainless steel
- .5 Test cocks: bronze
- .6 Discs: rubber
- .7 Relief valves: bronze
- .8 Maximum working temperature and pressure: 1220 kPa at 60°C.
- .9 Acceptable Material:
 - .1 Watts Series LF009
 - .2 Wilkins
 - .3 Febco

2.5 PRESSURE REGULATORS

- .1 Capacity: as indicated.
 - .2 Up to NPS 1-1/2 bronze bodies, screwed: to ASTM B62-09.
 - .3 NPS2 and over, semi-steel bodies, Class 125, flanged: to ASTM A 126-04(2009), Class B.
 - .4 Semi-steel spring chambers with bronze trim.
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- .5 Acceptable Material:
 - .1 Watts
 - .2 Fisher
 - .3 Wilkins

2.6 HOSE BIBS

- .1 Bronze construction complete with integral back flow preventer, hose thread spout, replaceable composition disc, and chrome plated in finished areas.
- .2 Acceptable Material:
 - .1 Cambridge
 - .2 Emco
 - .3 Febco

2.7 WATER METERS

- .1 HP Turbine type to ANSI/AWWA CLASS II for potable water service, accuracy within +/- 1.5%.
- .2 Pipe connections NPS 3.
- .3 Features:
 - .1 4-Line back-lit display with touch control.
 - .2 Outputs:
 - .1 4-20 mA.
 - .2 Pulse/frequency (active/passive).
 - .3 Relays.
 - .4 Status.
- .3 Continuous readout on meter pace (cu. m) and electronic pulse output for monitoring by EMCS.
- .4 Acceptable Material: Neptune

2.8 STRAINERS

- .1 860 kPa, Y type with 20 mesh, monel, bronze or stainless steel removable screen.
 - .2 NPS 2 and under, bronze body, screwed ends, with brass cap.
 - .3 NPS 2 1/2 and over, cast iron body, flanged ends, with bolted cap.
 - .4 Acceptable Material:
 - .1 Watts
 - .2 Zurn
 - .3 Wilkins
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2.9 FLEXIBLE CONNECTION

- .1 Application: to suit motion as required.
- .2 Minimum length in accordance with manufacturer's recommendations to suit offset.
- .3 Inner hose: stainless steel, corrugated.
- .4 Braided wire mesh stainless steel outer jacket.
- .5 Diameter and type of end connection:
 - .1 NPS 2 and under: threaded,
 - .2 NPS 2-1/2 and above: flanged.
- .6 Operating conditions:
 - .1 Working pressure: 1034 kPa.
 - .2 Working temperature: 100 degrees C.
 - .3 To match system requirements.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions and data sheet.

3.2 INSTALLATION

- .1 Install in accordance with Canadian Plumbing Code provincial codes, and local authority having jurisdiction.
- .2 Install in accordance with manufacturer's instructions and as specified.

3.3 CLEANOUTS

- .1 Install cleanouts at locations required by code, and as indicated.
 - .2 Bring cleanouts to wall or finished floor in finished areas.
 - .3 Building drain cleanout: line size to maximum NPS 4.
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3.4 FLOOR DRAINS

- .1 Install where indicated, and in accordance with manufacturer's instructions.

3.5 TRAP SEAL PRIMERS

- .1 Install for all floor drains.
- .2 Install on cold water supply to nearest frequently used plumbing fixture, in concealed space, to approval of Departmental Representative.
- .3 Install soft copper tubing to floor drain.

3.6 BACKFLOW PREVENTORS

- .1 Install in accordance with CSA B64-Series-01 Series, where indicated and elsewhere as required by code.
- .2 Pipe relief part discharge to drain to outdoors with appropriate air gap fitting.

3.7 STRAINERS

- .1 Install with sufficient room to remove basket.

3.8 WATER METERS

- .1 Install water meters as indicated, and in accordance with manufacturer's recommendations.

3.9 HOSE BIBBS

- .1 Install as indicated.

3.10 START-UP

- .1 Timing: Start-up only after:
 - .1 Pressure tests have been completed.
 - .2 Disinfection procedures have been completed.
 - .3 Certificate of static completion has been issued.
 - .4 Water treatment systems operational.
 - .2 Provide continuous supervision during start-up.
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3.11 TESTING AND ADJUSTING

- .1 Timing:
 - .1 After start-up deficiencies rectified.
 - .2 After certificate of completion has been issued by authority having jurisdiction.
- .2 Adjustments:
 - .1 Verify that flow rate and pressure meet design criteria.
 - .2 Make adjustments while flow rate or withdrawal is (1) maximum and (2) 25% of maximum and while pressure is (1) maximum and (2) minimum.
- .3 Floor drains:
 - .1 Verify operation of trap seal primer.
 - .2 Prime, using trap primer. Adjust flow rate to suit site conditions.
 - .3 Check operations of flushing features.
 - .4 Check security, accessibility, removability of strainer.
 - .5 Clean out baskets.
 - .6 Report will be submitted stating a trap seal primer has been checked.
- .4 Access doors:
 - .1 Verify size and location relative to items to be accessed.
- .5 Water hammer arrestors:
 - .1 Verify proper installation of correct type of water hammer arrestor.