

PART 1 GENERAL

1.1 DESCRIPTION
OF SYSTEMS

- .1 Provide complete plumbing system including:
 - .1 Sanitary waste, vent, storm, hot and cold water, trap primer water piping systems including fixtures, specialties and accessories.
- .2 Provide NPS½ priming lines to floor drain traps as indicated.
- .3 Do all work in accordance with the 2010 Canadian Plumbing Code and the local authorities having jurisdiction.
- .4 All underground drains to be a minimum of NPS 2.
- .5 Confirm that a minimum 50mm clearance is maintained between finished piping, including insulation.
- .6 Provide piping sleeves for piping penetrating concrete floor slabs.

1.2 RELATED
SECTIONS

- .1 Submittal Procedures: Section 01 33 00
- .2 Closeout Submittals: Section 01 78 00
- .3 Structural Steel: Section 05 12 23
- .4 Firestopping and Smoke Seals: Section 07 84 00
- .5 Painting: Section 09 91 23

1.3 FIXTURES
AND FITTINGS

- .1 In case of discrepancy between Architectural and Mechanical drawings as to the number and location of fixtures, the Architectural drawings will govern.

- .1 Caulking:
 - .1 Caulking is the responsibility of the appropriate Section of Division 07.
 - .2 Perform caulking in compliance with the requirements of Division 07.
- .2 Welding:
 - .1 All welding to be performed by Division 22 for all mechanical piping and structural supports and hangers.
 - .2 Perform welding by certified welders in accordance with the Provincial Labour Requirements and By-Laws of Nova Scotia.
- .3 Cutting and Patching:
 - .1 Cutting of all openings in concrete floors and walls and patching for mechanical work included in Division 22 will be the responsibility of Division 22, unless otherwise indicated on the structural drawings.
- .1 Equipment assemblies comprised of electro-mechanical components to be CSA approved where possible and bear the appropriate label. If the equipment in question is not CSA approved as an assembly, the manufacturer will arrange and pay for spot approval and labelling of the equipment prior to installation.
- .1 Provide unions and flanges to permit equipment maintenance and disassembly and to minimize disturbance to piping systems without interfering with other equipment.
- .2 Provide means of access for servicing equipment including permanently lubricated lifetime bearings.
- .3 Pipe equipment drains to floor drains.
- .4 Install equipment, rectangular cleanouts and similar items parallel to or perpendicular to building lines.

1.7 PIPE INSULATION .1 Pipe insulation to be as per Section 23 07 19.

1.8 ANCHOR BOLTS AND TEMPLATES .1 Supply anchor bolts and templates as required.

1.9 TRIAL USAGE .1 Departmental Representative may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

1.10 PROTECTION OF OPENINGS .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

1.11 EQUIPMENT SUPPORTS .1 Equipment supports supplied by equipment manufacturer: specified elsewhere in Division 22.

.2 Equipment supports not supplied by equipment manufacturer: fabricate from structural grade steel meeting requirements of Section 05 12 23. Submit structural calculations with shop drawings.

.3 Mount base mounted equipment on "Type B1" chamfered edge housekeeping pads, minimum of 100mm high and minimum 100mm larger than equipment dimensions all around. Concrete specified in a separate package.

.4 Pipe hangers to be as specified in Division 23.

1.12 SLEEVES .1 Pipe sleeves:
.1 Through masonry, concrete or fire rated assemblies: nominal 0.912mm (20 ga.) galvanized steel.
.2 Through foundation walls: Schedule 40 steel pipe with annular in continuously welded at midpoint of wall.

1.12 SLEEVES
(Cont'd)

- .1 Pipe sleeves:(Cont'd)
 - .3 Provide 25mm clearance all around service piping or ducting for building settlement/ movement.
- .2 Terminate pipe sleeves flush with surface of concrete and masonry walls, concrete floors on grade and 25mm above other floors.
- .3 Fill voids around pipes:
 - .1 Caulk between sleeve and pipe in foundation walls and below grade floors with waterproof, fire retardant, non- hardening mastic.
 - .2 Where sleeves pass through walls or floors, provide space for firestopping to maintain fire rating integrity.
 - .3 Where sleeves pass through interior walls not fire-rated, provide acoustic caulking.
 - .4 Ensure no contact between copper tube or pipe and ferrous sleeve.
 - .5 Fill future-use sleeves with lime plaster or other easily removable filler.
 - .6 Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc rich paint to CAN/CGSB- 1.181.

1.13 PREPARATION
FOR FIRESTOPPING

- .1 Firestopping material and installation within annular space between pipes, ducts, insulation and adjacent fire separation: specified in Section 07 84 00.
- .2 Uninsulated unheated pipes not subject to movement: no special preparation.
- .3 Uninsulated heated pipes subject to movement: wrap with non-combustible smooth material to permit pipe to move without damaging firestopping material.
- .4 Insulated pipes and ducts: cut back insulation at fire separation to allow proper firestopping.
- .5 Firestopping material for piping and duct penetrations by Section 07 84 00.

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- 1.14 ESCUTCHEONS .1 Use on pipes passing through walls, partitions, floors and ceilings in finished areas.
- .2 Chrome or nickel plated brass or Type 302 stainless steel, one piece type with set screws.
- .3 Outside diameter to cover opening or sleeve.
- .4 Inside diameter to fit around finished pipe.
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- 1.15 TESTS .1 Give 24 hour written notice of date for tests.
- .2 Insulate or conceal work only after testing and approval by Departmental Representative.
- .3 Conduct tests in presence of the Departmental Representative.
- .4 Bear costs including retesting.
- .5 Piping:
.1 General: maintain test pressure without loss for two (2) hours unless otherwise specified.
.2 Test drainage, waste and vent piping to the National Building Code, the Canadian Plumbing Code, and the authorities having jurisdiction.
.3 Test domestic hot, cold, and recirculation water piping at 1-1/2 times system operating pressure or minimum 862 kPa, whichever is greater.
- .6 Equipment: test as specified in relevant sections.
- .7 Prior to tests, isolate all equipment or other parts which are not designed to withstand test pressures or test medium.
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- 1.16 PAINTING .1 Finish painting as specified in Section 09 91 23 except where specified elsewhere in Division 22.
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| <u>1.16 PAINTING</u>
(Cont'd) | .2 | Apply at least one (1) coat of corrosion resistant primer paint to ferrous supports and site fabricated work. |
| | .3 | Prime and touch up marred finished paintwork to match original. |
| | .4 | Restore to new condition, finishes which have been damaged too extensively to be merely primed and touched up. |
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| <u>1.17 SPARE PARTS</u> | .1 | Furnish spare parts in accordance with Section 01 78 00 and as follows:
.1 One (1) set of packing for each pump.
.2 One (1) casing joint gasket for each size pump.
.3 Six (6) gaskets for plumbing cleanout plugs (each size).
.4 One (1) set of seats, washers, and o-rings for all flush valves, faucets, hose bibs, etc.
.5 Two (2) vandal-proof screw tools.
.6 And as specified elsewhere. |
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| <u>1.18 SPECIAL TOOLS</u> | .1 | Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 00. |
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| <u>1.19 ACCESS DOORS</u> | .1 | Supply access doors to concealed plumbing equipment for operating, inspecting, adjusting and servicing. |
| | .2 | Flush mounted 600mm x 600mm for body entry and 300mm x 300mm for hand entry unless otherwise noted. Doors to open 180°, have rounded safety corners, concealed hinges, screwdriver latches and anchor straps. Provide fire-rated access doors where penetrating fire-rated construction. Maintain fire rating integrity of construction. |
| | .3 | Material:
.1 Special areas only such as tiled surfaces: use stainless steel with #4 satin finish.
.2 Remaining areas: use prime coated steel. |
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| <u>1.19 ACCESS DOORS
(Cont'd)</u> | .3 | Material:(Cont'd)
.3 Nominal 1.897mm (14 ga.) material. |
| | .4 | Installation:
.1 Locate so that concealed items are accessible.
.2 Locate so that hand or body entry (as applicable) is achieved.
.3 Installation is specified in applicable sections. |
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| <u>1.20 DIELECTRIC
COUPLINGS</u> | .1 | General:
.1 To be compatible with and to suit pressure and temperature rating of piping system.
.2 Where pipes of dissimilar metals are joined. |
| | .2 | Pipes NPS 2 and under: isolating unions. |
| | .3 | Pipes NPS 2-1/2 and over: isolating flanges. |
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| <u>1.21 DRAIN VALVES</u> | .1 | Locate at low points and at section isolating valves unless otherwise specified. |
| | .2 | Minimum NPS 3/4 unless otherwise specified: bronze, ball valve with hose end male thread, complete with cap and chain. |
| | .3 | No water from any drain or relief valve shall discharge on the floor. Pipe drains to hub drains or funnel floor drains. |
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| <u>1.22 OPERATING AND
MAINTENANCE
INSTRUCTIONS</u> | .1 | Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble- shooting and servicing of all systems and equipment during regular work hours, prior to acceptance. |
| | .2 | Provide demonstrations and instructions in conjunction with the appropriate equipment manufacturer's representatives. |
| | .3 | Use operation and maintenance manual, record drawings, audio visual aids, etc. as part of instruction materials. |
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1.22 OPERATING AND .4
MAINTENANCE
INSTRUCTIONS
(Cont'd)

Give instructions in maintenance and operating of the following equipment by factory trained personnel and for the time period specified. The time specified does not include the time for start-up of systems and equipment:

.1 Give instruction on the operation and maintenance of all mechanical components including but not limited to pumps, fixtures and domestic hot water system. The instruction period will be for a period of not less than two (2) working days. Review with instructors for an additional 90 days after the acceptance of the building by the Owner.

.2 Where more detailed instructions for some equipment or systems are called for in other sections of the specifications, those sections of the specifications will take precedence over this section.

1.23 OPERATION AND .1
MAINTENANCE MANUAL

Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00.

.2 Operation and maintenance manual to be approved by and final copies deposited with Departmental Representative before final inspection.

.3 Operation data to include:

.1 Description of each system and its controls.

.2 Operation instruction for each system and each component.

.3 Description of actions to be taken in event of equipment failure.

.4 Valve schedule and flow diagram.

.5 Colour coding chart; identification system.

.4 Maintenance data to include:

.1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.

.2 Data to include schedules of tasks, frequency, tools required and task time.

.5 Performance data to include:

.1 Equipment manufacturer's performance data sheets with point of operation as left after commissioning is complete.

1.23 OPERATION AND
MAINTENANCE MANUAL
(Cont'd)

- .5 Performance data to include:(Cont'd)
 - .2 Equipment performance verification test results.
 - .3 Special performance data as specified elsewhere.
- .6 Approvals:
 - .1 Submit three (3) copies of draft Operation and Maintenance Manual to the Departmental Representative for approval. Submission of individual data will not be accepted unless so directed by the Departmental Representative.
 - .2 Make changes as required and re-submit as directed by the Departmental Representative.
- .7 Additional data: Prepare and insert into operation and maintenance manual when need for same becomes apparent during demonstrations and instructions specified above.

1.24 SHOP DRAWINGS
AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Section 01 33 00.
- .2 Shop drawings and product data to show:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances. (eg. access door swing spaces).
- .3 Shop drawings and product data to be accompanied by:
 - .1 Detailed drawings of bases, supports, and anchor bolts.
 - .2 Points of operation on performance curves.
 - .3 Manufacturer to certify as to current model production.
 - .4 Certification of compliance to applicable codes.

1.25 CLEANING

- .1 Clean interior and exterior of all systems including strainers.
- .2 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition.

1.26 RECORD DRAWINGS .1 Refer to Section 01 78 00.

1.27 WARRANTIES .1 Make good all defects other than normal wear and tear during the life of the warranty period. Warrant all work and installed equipment to operate quietly and satisfactorily and to accomplish the Work for which it was installed during the life of the warranty. At any time during this period, make any necessary changes and adjustments, or replacements, to accomplish this at no additional cost to the project.

.2 Submit written extended Warranties in Maintenance Manual as specified in Section 01 78 00.

1.28 PERMITS AND REGULATIONS .1 Comply with all regulations and authorities having jurisdiction where applicable, including but not limited to the following:

- .1 Department of Labour and Workforce Development.
- .2 Fire Marshall.
- .3 Plumbing Inspector.
- .4 Provincial Board of Insurance Under-writers.
- .5 National Building Code.
- .6 Occupational Health & Safety Act.
- .7 NFPA

.2 Obtain and pay for any permits required by local codes and regulations and arrange for inspections applicable.

.3 Any additional materials or labour required to conform to any of these rules and regulations will be furnished under the Contract with no additional cost to the project.

1.29 REFERENCE STANDARDS .1 Use the following latest editions and amendment of reference standards in effect on date of tender call:

- 1.29 REFERENCE .1 (Cont'd)
- ANSI American National Standards Institute
 - ASHRAE American Society of Heating, Refrigeration & Air Conditioning Engineers
 - ASME American Society of Mechanical Engineers
 - AST American Society of Testing & Materials
 - AWS American Welding Society
 - AWWA American Water Works Association
 - CEMA Canadian Electrical Manufacturers Association
 - CGSB Canadian Government Specification Board
 - CFUA Canadian Fire Underwriters' Association
 - CHVAC Canadian Heating, Ventilation & Air Conditioning Code (NCR) Fire Underwriters
 - CMB Construction Materials Board
 - CSA Canadian Standards Association
 - CUA Canadian Underwriters Association
 - HRA Heating, Refrigeration & Air Conditioning Institute of Canada
 - NBC National Building Code of Canada
 - NBFU National Board of Fire Underwriters'
 - NBS National Bureau of Standards
 - NFPA National Fire Protection Association
 - TIMA Thermal Insulation Manufacturers Association
 - UL Underwriters' Laboratories
 - ULC Underwriters' Laboratories of Canada
- 1.30 ELECTRICAL .1 Electrical Work to conform to Division 26 including the following:
- .1 Control wiring and conduit is specified in Division 26. Refer also to Division 26 and for wiring associated with control systems.

PART 2 - PRODUCTS Not Applicable.

PART 3 - EXECUTION Not Applicable.

PART 1 - GENERAL

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| <u>1.1 RELATED SECTIONS</u> | .1 | Section 01 33 00 - Submittal Procedures |
| <u>1.2 SHOP DRAWINGS AND PRODUCT DATA</u> | .1 | Submit shop drawings and product data in accordance with Section 01 33 00. |
| | .2 | Indicate: <ul style="list-style-type: none">.1 Equipment, including connections, fittings, control assemblies and ancillaries..2 Wiring, schematic diagrams and electrical data..3 Dimensions and recommended installation..4 Pump curves, head and RPM. |
| <u>1.3 MAINTENANCE DATA</u> | .1 | Provide maintenance data for incorporation into manual specified in Section 01 78 00. |
| | .2 | Data to include: <ul style="list-style-type: none">.1 Manufacturers name, type, model year, capacity and serial number..2 Details of operation, servicing and maintenance..3 Recommended spare parts list with names and addresses. |

PART 2 - PRODUCTS

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| <u>2.1 SUBMERSIBLE SUMP PUMP</u> | .1 | Construction: duplex pumps, CSA approved, housing epoxy coated cast iron, stainless steel shaft, non-clog impeller, mechanical shaft seal. Lift out guides to facilitate removal of sump pumps. |
| | .2 | Motor: as indicated hermetically sealed, with automatic thermal overload protection. |
| | .3 | Control integral mercury switches and duplex control and alarm box. Control panel shall be complete with IEC contractors, alternating relay, manual over ride relay, HOA switch, pump run lights, terminal blocks for float |
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- 2.1 SUBMERSIBLE SUMP PUMP (Cont'd)
- .3 (Cont'd)
controls, alarm light, alarm buzzer, NEMA 1
steel enclosure.
 - .4 Performance: as indicated on the drawings.
 - .5 Electrical: as indicated on the drawings.

PART 3 - EXECUTION

- 3.1 INSTALLATION
- .1 Make piping and electrical connections to
pump and motor assembly and controls as
indicated.
 - .2 Ensure pump and motor assembly do not support
piping.
 - .3 Confirm pump rotation is correct.
 - .4 Set up and adjust controls.
 - .5 Check starter protective devices.
 - .6 Check power supply.

PART 1 - GENERAL

1.1 RELATED SECTIONS .1 Section 01 33 00 - Submittal Procedures

1.2 REFERENCES .1 ASME B16.15-2011, Cast Bronze Threaded Fittings, Classes 125 and 250.

.2 ANSI B16.18-2012, Cast Copper Alloy Solder Joint Pressure Fittings.

.3 ANSI B16.22-2001, Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.

.4 ANSI B16.24-2011, Bronze Pipe Flanges and Fittings, Class 150 and 300.

.5 ANSI/AWWA C111/A21.11-07, Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings.

.6 ASTM A183-03 (2009), Specification for Carbon Steel Track Bolts and Nuts.

.7 ASTM A307-07b, Specification for Carbon Steel Bolts and Studs, 414 MPa Tensile Strength.

.8 ASTM B32-08, Specification for Solder Metal.

.9 ASTM B75-11, Specification for Seamless Copper Tube.

.10 ASTM B88M-09, Specification for Seamless Copper Water Tube (Metric).

.11 MSS SP-70-2011, Cast Iron Gate Valves, Flanged and Threaded Ends.

.12 MSS SP-71-2011, Cast Iron Swing Check Valves, Flanged and Threaded Ends.

.13 MSS SP-80-2008, Bronze Gate, Globe, Angle and Check Valves.

- 1.3 SHOP DRAWINGS .1 Submit shop drawings in accordance with Section 01 33 00.
- .2 Submit data for following: valves.

- 1.4 MAINTENANCE DATA .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00.

PART 2 - PRODUCTS

- 2.1 PIPING .1 Domestic Cold Water (DCW); Domestic Hot Water (DHW); Domestic Hot Water Recirculation (DHWR); Non-potable Water (NP), Trap Primer Piping (TP).
- .1 Above ground: copper tube, hard drawn, type L: to ASTM B88M.
- .2 Buried and embedded: copper tube, soft annealed, type K: to ASTM B88M, in long lengths and with no buried joints. CSA approved potable water piping with no joints may be used under slab.

- 2.2 FITTINGS .1 Bronze pipe flanges and flanged fittings, Class 150 and 300: to ANSI B16.24.
- .2 Cast bronze threaded fittings, Class 125 and 250: to ANSI/ASME B16.15.
- .3 Cast copper, solder type: to ANSI B16.18. (Lead-free).
- .4 Wrought copper and copper alloy, solder type: to ANSI B16.22.
- .5 Piping NPS 2-1/2 and over: roll groove copper fittings to ASTM B75, alloy C12200.
- .6 Mechanically formed Tee connections may be used on 25mm and above water pipe and where the branch line connection to the branch main is at least one pipe size smaller than the branch main.

2.3 JOINTS

- .1 Rubber gaskets, 3 mm thick: to ANSI/AWWA C111/A21.11.
- .2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.
- .3 Solder/brazing: tin-antimony 95-5: to ASTM B32, or tin-silver 94-6. (Lead free.)
- .4 Teflon tape: for threaded joints.
- .5 Piping NPS 2-1/2 and over: roll groove couplings with ductile or malleable iron housings, grade E EPDM flush seal gaskets and heat treated carbon steel bolts/nuts to ASTM A183.
- .6 Dielectric unions between dissimilar metals to ASTM F492, complete with thermoplastic liner.

2.4 GATE VALVES

- .1 NPS 2-1/2 and over, flanged:
 - .1 Non-rising stem: to MSS SP-70- 1998, Class 125, 125 psig, full faced, flanged ends, cast-iron body, bronze trim, bolted bonnet.

2.5 GLOBE VALVES

- .1 NPS 2 and under, soldered:
 - .1 To MSS SP-80, Class 125, 862 kPa, bronze body, renewable composition disc, screwed over bonnet.
 - .2 Lockshield handles: as indicated.
- .2 NPS 2 and under, screwed:
 - .1 To MSS SP-80, Class 125, 862 kPa, bronze body, screwed over bonnet, renewable composition disc.
 - .2 Lockshield handles: as indicated.

2.6 SWING CHECK VALVES

- .1 NPS 2 and under, soldered:
 - .1 To MSS SP-80, Class 125, 862 kPa, bronze body, bronze swing disc, screw in cap, re-grindable
- .2 NPS 2 and under, screwed:
 - .1 To MSS SP-80, Class 125, 862 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat.

2.6 SWING CHECK VALVES
(Cont'd) .3 NPS 2-1/2 and over; flanged:
.1 To MSS SP-71, class 125, 862 kPa, cast iron body, flat flanges faces, renewable seat, bronze disc, bolted cap.

2.7 BALL VALVES .1 NPS 2 and under, screwed:
.1 To ANSI B16.18, Class 150, 1034 kPa.
.2 Bronze body, stainless steel ball, PTFE Teflon adjustable packing, brass gland and PTFE Teflon Buna N seat, steel lever handle.
.2 NPS 2 and under, soldered:
.1 To ANSI B16.18, Class 150, 1034 kPa.
.2 Bronze body, chrome plated brass stainless steel ball, PTFE Teflon adjustable packing, brass gland and PTFE Teflon Buna N seat, steel lever handle, with NPT to copper adaptors.
.3 NPS 2-1/2 and over, roll groove:
.1 Bronze body, Class 150, 1034 kPa, with bronze trim, grade E EPDM coating bonded to ductile iron disc, enamelled two position detent handle.

PART 3 - EXECUTION

3.1 INSTALLATION .1 Install in accordance with the 2010 Canadian Plumbing Code and the local authority having jurisdiction.
.2 Cut square, ream and clean tubing and tube ends, clean recesses of fittings and assemble without binding.
.3 Assemble all piping using fittings manufactured to ANSI standards.
.4 Install tubing close to building structure to minimize furring, conserve headroom and space. Group exposed piping and run parallel to walls.
.5 Connect to fixtures and equipment in accordance with manufacturers instructions unless otherwise indicated.

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- 3.1 INSTALLATION
(Cont'd)
- .6 Buried tubing:
- .1 Lay in well compacted washed sand in accordance with AWWA Class B bedding.
 - .2 Bend tubing without crimping or constriction. Minimize use of fittings.
- .7 Provide union nuts at all faucets. Do not directly solder faucets to supplies.
- .8 Test piping systems in accordance with Section 22 05 00 and 23 05 05.
- 3.2 VALVES
- .1 Isolate equipment, fixtures and branches with ball valves and as indicated. Ball valves shall be used for shut-off applications on piping up to and including NPS 2.
- 3.3 DISINFECTION
- .1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction. After testing, provide acceptable water quality test report to the Departmental Representative for approval.
- 3.4 PRESSURE TESTS
- .1 Conform to requirements of Section 23 05 05.
- .2 Test pressure: greater of 1.5 times maximum system operating pressure or 860 kPa.
- 3.5 PRE-START-UP INSPECTIONS
- .1 Systems to be complete, prior to flushing, testing and start-up.
- .2 Verify system can be completely drained.
- .3 Confirm air chambers, expansion compensators are installed properly.
- 3.6 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.
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| 3.6 START-UP
(Cont'd) | .2 | Provide continuous supervision during start-up. |
| | .3 | Start-up procedures: <ul style="list-style-type: none">.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 DHWS 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. |
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| 3.7 PERFORMANCE
VERIFICATION | .1 | Timing: <ul style="list-style-type: none">.1 After pressure and leakage tests and disinfection completed, and certificate of completion has been issued by authority having jurisdiction. |
| | .2 | Procedures: <ul style="list-style-type: none">.1 Verify that flow rate and pressure meet Design Criteria..2 Adjust pressure regulating valves while withdrawal is maximum and inlet pressure is minimum..3 Sterilize DHWS systems for Legionella control..4 Verify performance of temperature controls..5 Verify compliance with safety and health requirements..6 Check for proper operation of water hammer arrestors. Run one (1) outlet for 10 seconds, then shut off water immediately. If water hammer occurs, replace water hammer arrestor or re-charge air chambers. Repeat for outlets and flush valves..7 Confirm water quality consistent with supply standards, verifying that no residuals remain as a result of flushing and/or cleaning. |
| | .3 | Reports: <ul style="list-style-type: none">.1 In accordance with Section 01 33 00 and 01 78 00. |
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3.7 PERFORMANCE VERIFICATION <u>(Cont'd)</u>	.3	Reports:(Cont'd) .2 Include certificate of water flow and pressure tests conducted on incoming water service, demonstrating adequacy of flow and pressure.
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PART 1 - GENERAL

1.1 RELATED SECTIONS .1 Installation of Pipework: Section 23 05 05

1.2 REFERENCES .1 American Society for Testing and Materials (ASTM)
.1 ASTM B32-08, Specification for Solder Metal.
.2 ASTM B306-09, Specification for Copper Drainage Tube (DWV).
.3 ASTM C564-11, Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
.2 Canadian Standards Association (CSA)
.1 CAN/CSA B70-2012, Cast Iron Soil Pipe, Fittings and Means of Joining.
.2 CAN/CSAB125.3-11, Plumbing Fittings.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS .1 Above ground sanitary storm and vent Type DWV to: ASTM B306.
.1 Fittings.
.1 Cast brass: to CAN/CSA B125.
.2 Wrought copper: to CAN/CSA B125.
.2 Solder: tin-lead, 50:50, type 50A lead free, tin- 95:5, type TA , to ASTM B32.

2.2 CAST IRON PIPING AND FITTINGS .1 Buried sanitary storm and vent minimum NPS 2, to: CAN/CSA-B70, with one (1) layer of protective coating of butimous.
.1 Joints.
.1 Mechanical joints.
.1 Neoprene or butyl rubber compression gaskets: to ASTM C 564 or CAN/CSA B70.
.2 Stainless steel clamps.
.2 Hub and spigot.
.1 Neoprene gasket : to CSA B70.
.2 Cold caulking compounds.

2.2 CAST IRON
PIPING AND FITTINGS
(Cont'd)

- .2 Above ground sanitary storm and vent: to CAN/CSA B70.
 - .1 Joints.
 - .1 Mechanical joints.
 - .1 Caulking lead: to CSA B67.
 - .2 Mechanical joints.
 - .1 Neoprene or butyl rubber compression gaskets with stainless steel clamps.
 - .1 Neoprene or butyl rubber compression gaskets with stainless steel clamps.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 In accordance with Section 23 05 05.
- .2 Install in accordance with the 2010 Canadian Plumbing Code and local authority having jurisdiction.
- .3 Install piping parallel and close to walls to conserve headroom and space, and grade as indicated.
- .4 Wherever possible coordinate the exact location of underground drain pipes to avoid structural footings. Where drain pipes pass perpendicular to footings coordinate, prior to tender award, with the concrete and excavation contractor to ensure that the footings are stepped down to accommodate the pipes. Sleeve the pipes through the wall or grade beam just above the footing with a minimum of 25mm clear space around the pipe. Fill the clear space with soft insulation prior to back-fill.
- .5 Install buried pipe on 150 mm bed of clean washed sand, shaped to accommodate fittings to line and grade (slope) as indicated. Backfill with minimum 150 mm of clean washed sand and upper 150 mm of rock free soil backfill.
- .6 Provide pipe firestop barriers and/or collars on the underside of fire-rated floors and both sides of fire-rated partitions that are penetrated.
 - .1 Acceptable material: 3M Firestop.

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| <u>3.1 INSTALLATION
(Cont'd)</u> | .7 | Install cast iron to CSA B70 for sanitary serving kitchen and boiler room. |
| | .8 | Make provision for Rain Water Leader thermal expansion. |
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| <u>3.2 TESTING</u> | .1 | Pressure test buried systems before backfilling. |
| | .2 | Hydraulically test to verify grades and freedom from obstructions. |
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| <u>3.3 PERFORMANCE
VERIFICATION</u> | .1 | Cleanouts:
.1 Confirm they are accessible and that access doors are correctly located.
.2 Open, cover with linseed oil and re-seal.
.3 Verify that cleanout rods can probe as far as the next cleanout, at least. |
| | .2 | Test to verify 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 that 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

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|---------------------------------|---|
| <u>1.1 REFERENCES</u> | <ul style="list-style-type: none">.1 ASTM D2235-04(R2011), Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings..2 ASTM D2564-04(R2009)e1, Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems..3 CSA B70-2012, Cast Iron Soil Pipe, Fittings and Means of Joining..4 CSA B1800-11, Plastic Nonpressure Piping Compendium. |
| <u>1.2 HANDLING AND STORAGE</u> | <ul style="list-style-type: none">.1 Handle and store pipe and fittings in such a manner as to avoid shock and damage. Do not use chains or cables passed through pipe bore..2 Store gaskets in cool location, out of direct sunlight, and away from petroleum products. |
| <u>1.3 APPLICATION</u> | <ul style="list-style-type: none">.1 Buried sanitary and storm piping:<ul style="list-style-type: none">.1 ABS or PVC DWV with cast iron to CSA B70 on sanitary serving kitchens and boiler rooms. |

PART 2 - PRODUCTS

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|---|---|
| <u>2.1 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS (DWV)</u> | <ul style="list-style-type: none">.1 Pipe, fittings and solvent cement: Polyvinyl chloride to CSA B1800..2 Solvent Weld to ASTM D2564..3 Storm piping below grade: PVC-SDR 35..4 Sanitary piping below grade: PVC-DWV. |
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PART 3 - EXECUTION

3.1 PREPARATION

- .1 Carefully inspect products for defects and remove defective products from site.
- .2 Clean pipe and fittings before installation.
- .3 Install buried pipe on 150 mm bed of clean washed sand, shaped to accommodate fittings to line and grade (slope) as indicated. Backfill with minimum 150 mm of clean washed sand and upper 150 mm of rock free soil backfill.

3.2 INSTALLATION

- .1 Lay and join pipe and fittings as specified in this section and according to manufacturer's published instructions.
- .2 Start laying at outlet and proceed in upstream direction with bell ends of pipe facing upgrade.
- .3 Prevent entry of foreign material, water or other foreign matter into pipe. Use temporary watertight bulkheads when pipe laying is not in progress.
- .4 Install gaskets in accordance with manufacturer's published instructions. During cold weather store gaskets in heated area to assure flexibility.
- .5 Align pipe carefully before joining. Do not use excessive force to join pipe sections.
- .6 Support pipes as required to assure concentricity until joint is properly completed.
- .7 Keep pipe joints free from mud, silt, gravel or other foreign matter.
- .8 Avoid displacing gasket or contaminating with dirt, petroleum products, or other foreign material. Remove, clean, reinstall and lubricate gaskets so disturbed.
- .9 Where deflection at joint is permitted, deflect only after joint is completed. Do not

- 3.2 INSTALLATION .9 (Cont'd)
(Cont'd) exceed maximum joint deflection recommended by
manufacturer.
- .10 Complete each joint before laying next length
of pipe.
- .11 Apply sufficient pressure in making joints to
ensure that joint is completed to
manufacturer's recommendations. Minimize
deflection after joint has been made to avoid
damage.

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.
- 1.2 REFERENCES
- .1 Canadian Standards Association (CSA)
 - .1 CAN/CSA-B45-02(R2013) Series, Plumbing Fixtures.
 - .2 CAN/CSA-B125.3-2013, Plumbing Fittings.
 - .3 CAN/CSA-B651-2012, Barrier-Free Design.
- 1.3 SUBMITTALS
- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Product Data: submit WHMIS MSDS - Material Safety Data Sheets.
 - .3 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.
 - .2 Factory set water consumption at recommended pressure.
 - .3 Minimum pressure required.
 - .4 Closeout Submittals:
 - .1 Submit maintenance data in accordance with Section 01 78 00.
 - .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.
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- 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.
- 1.5 DELIVERY STORAGE AND DISPOSAL .1 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Waste Management and Disposal.
.2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
.3 Fold up metal and plastic banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

- 2.1 MANUFACTURED UNITS .1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.
.2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.
.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.

<u>2.2 WATER CLOSETS</u>		.1					
WC Type	Mounting		Bowl		Flush Valve		Barrier-free/Accessible
	Wall	Floor	Elong	Reg	Exp'd	Conc'd	
P-1		X		X			X
P-2		X		X			X

- 2.2 WATER CLOSETS
(Cont'd)
- .2 P-1: Floor-mounted, flush tank.
.1 Bowl: vitreous china, syphon jet, elongated rim, close-coupled combination, bowl and bolt caps.
.2 Closet tank: vitreous china with tank liner, flapper type flush valve, 6 litres/flush.
- .3 P-2: Floor-mounted, flush tank as per P-1 but for barrier-free/accessible, 6 litres/flush.
- .4 Water Closet Seats and Brackrests.
.1 Seat: white, elongated , open front, molded solid plastic, less cover, stainless steel check hinges, stainless steel or solid brass insert post. For handicapped closets include cover.

- 2.3 WASHROOM
LAVATORIES
- .1 P-3 Counter-top:
.1 Vitreous China semi-counter top for 330 mm deep counter top, self-rimming, with rear overflow, semi-oval bowl, supply openings on 100 mm centres. Sizes: 546 X 559 mm outside, 482 X 381 X 175 mm nominal inside.
- .2 Washroom Lavatory Trim.
.1 102 mm two handle, cast brass centerset.
.2 Polished chrome plated finish.
.3 Heavy duty brass compression structures.
.4 90° flow with first 1/4 turn of operation, 180°.
.5 Positive shutoff even in poor water conditions.
.6 Metal hold-down package.
.7 Centerset with cast open grid strainer, no pop-up hole, 2-hole installation.
.8 Non-aerator 1.9 L/min. vandal resistant.
.9 102 mm blade handles, sanitary hood, metal color indexed vandal resistant screws.

- 2.4 STAINLESS STEEL
COUNTER-TOP SINKS
- .1 P-4: single compartment, ledge-back.
.1 From 0.9 mm thick type 302 stainless steel, self-rimming, undercoated, clamps. Overall sizes: 520 x 510 x 200 mm.
.2 Trim:
.1 203 mm center deckmount faucet.
.2 Two handle.
.3 Cast brass underbody.
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2.4 STAINLESS STEEL .1
COUNTER-TOP SINKS
(Cont'd)

- P-4:(Cont'd)
- .2 Trim:(Cont'd)
 - .4 Chrome plated stainless steel coverplate.
 - .5 Polished chrome plated finish.
 - .6 Heavy duty brass compression structures, ceramic not acceptable.
 - .7 90% flow with first ¼ turn of operation, 1800 turn.
 - .8 Positive shutoff even in poor water conditions.
 - .9 203 mm wallform swing spout.
 - .10 Flow control aerator 5.7 L/min. vandal resistant.
 - .11 102 mm blade handles-sanitary hoods-metal-color indexed-vandal resistant screws.
 - .3 Waste fitting: integral stainless steel basket strainer/stopper, tailpiece, cast brass P-trap with cleanout.
 - .4 Shut off valves underneath counter.

2.5 INDIVIDUAL .1
SHOWER STALL
SHOWERHEAD

- P-5: Individual showerhead handicapped.
- .1 Concealed in-wall single lever pressure balancing shower control valve.
 - .2 Requires 54 mm wall cavity.
 - .3 Back to back installation capability.
 - .4 Solid brass forged body.
 - .5 Monitor with scald-guard valve.
- Maintains balanced pressure of hot and cold water even when a valve is turned on or off elsewhere in the system.
- .6 No volume control-temperature only controlled with handle.
 - .7 Field adjustable to limit handle rotation into hot water zone.
 - .8 120 degree maximum handle rotation.
 - .9 All parts replaceable from the front of the valve.
 - .10 Integral stops and checks.
 - .11 Polished chrome plated finish.
 - .12 Inlets/outlets NPS ½ FIP or copper sweat with adaptors.
 - .13 Dual shower unit.
 - .14 Separate diverter valve, for wall shower, with 68 mm lever handle.
 - .15 Separate hand shower with 610 mm combination stainless steel slide/grab bar with slide mechanism.
 - .16 1778 mm long brass handshower hose.
 - .17 ASSE vacuum breaker.

2.5 INDIVIDUAL SHOWER STALL SHOWERHEAD (Cont'd)	.1	P-5:(Cont'd) .18 Wall elbow. .19 Vandal resistant metal level handle -57 mm. .20 Brass body showerhead. .21 Fixed flow rate 9.5 /min @ 551 kPa. .22 Brass bent showerarm, metal set screw flange. .23 Polished chrome finish.
2.6 FIXTURE PIPING	.1	Hot and cold water supplies to each fixture: .1 Chrome plated flexible supply pipes each with screwdriver stop, reducers, escutcheon for exposed supplies. .2 Waste: .1 Brass P trap with cleanout on each fixture not having integral trap. .2 Chrome plated in all exposed places.
2.7 CHAIR CARRIERS	.1	Factory manufactured floor-mounted carrier systems for all wall-mounted fixtures
PART 3 - EXECUTION		
3.1 INSTALLATION	.1	Mounting heights: .1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified. .2 Wall-hung fixtures: as indicated, measured from finished floor. .3 Physically handicapped: to comply with most stringent of either NBCC or CAN/CSA B651, or Provincial Buildings Accessibility Act and Regulations.
3.2 ADJUSTING	.1	Conform to water conservation requirements specified this section. .2 Do adjustments prior to pre-commissioning. .3 Adjustments: .1 Adjust water flow rate to design flow rates.

- 3.2 ADJUSTING
(Cont'd)
- .3 Adjustments:(Cont'd)
.2 Adjust pressure to fixtures to ensure no
splashing at maximum pressures.
- .4 Checks:
.1 Aerators: operation, cleanliness.
.2 Vacuum breakers, backflow preventers:
operation under all conditions.
- .5 Thermostatic controls:
.1 Verify temperature settings, operation
of control, limit and safety controls.

PART 1 - GENERAL

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| <u>1.1 RELATED SECTIONS</u> | .1 | Submittal Procedures: Section 01 33 00 |
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| <u>1.2 REFERENCES</u> | .1 | CAN/CSA-B64 Series-2011, Backflow Preventers and Vacuum Breakers. |
| | .2 | CSA-B79-08, Floor Drains, Area Drains, Shower Drains, and Cleanouts for Residential Construction. |
| | .3 | PDI-WH201-77(R2010), Water Hammer Arrestors. |
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| <u>1.3 SHOP DRAWINGS</u> | .1 | Submit shop drawings in accordance with Section 01 33 00. |
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| <u>1.4 PRODUCT DATA</u> | .1 | Submit product data in accordance with Section 01 33 00. |
| | .2 | Indicate dimensions, construction details and materials for the following: floor drains, (all types), cleanouts, non-freeze wall hydrants, water hammer arrestors, backflow preventers, hose bibbs, water make-up assemblies, strainers, traps, and trap seal primers, solenoid valves for traps, domestic cold water storage tank, domestic hot water expansion tanks and domestic cold water pressure tanks. |
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| <u>1.5 MAINTENANCE DATA</u> | .1 | Provide maintenance data for incorporation into manual specified in Section 01 78 00. |
| | .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. |
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PART 2 - PRODUCTS

2.1 FLOOR DRAINS

- .1 Floor drains: to CSA-B79.
- .2 FD-1: general duty; 100 mm, cast iron body, round adjustable head, nickel bronze strainer, integral seepage pan, clamping collar, and trap primer connection.
- .3 FD-2: combination funnel floor drain; 10 mm, cast iron body with integral seepage pan, clamping collar, nickel-bronze adjustable head strainer with integral oval funnel, trap primer connection.
- .4 FD-3: Vertical wall drain with backwater valve. 100mm pipe size. Dura-coated cast-iron body, bronze valve assembly and secured slotted grate.
- .5 FD-4: Shower drain to match shower system (see architectural drawings and specifications). Complete with polished nickel bronze 150 mm x 150 mm strainer and frame, trap primer connection, 50 mm outlet, suitable for membrane style water proofing system. Provide clamp ring for sealing membrane.

2.2 CLEANOUTS

- .1 Cleanout plugs: heavy cast iron male ferrule with brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket, vandal proof screws.
 - .1 Provide acid-resisting epoxy coated finish on all cleanouts for acid resisting sanitary pipe.
 - .2 Access covers:
 - .1 Wall access: face or wall type, stainless steel, square and or round cover with flush head vandal proof screws, bevelled edge frame complete with anchoring lugs.
 - .1 See also Section 22 05 00 for additional specifications regarding types and finishes of access covers.
 - .2 Provide fire rated access covers to maintain the integrity of fire rated construction.
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| 2.2 CLEANOUTS
(Cont'd) | .2 | Access covers:(Cont'd) |
| | .2 | Floor access: round cast iron body and frame with adjustable secured nickel bronze top and: |
| | .1 | Plugs: bolted bronze with neoprene gasket. |
| | .2 | Cover for unfinished concrete floors: nickel bronze, round, gasket, vandal-proof screws; cast iron, epoxy coated for lab area. |
| | .3 | Cover for tile and linoleum floors: polished nickel bronze with recessed cover for linoleum or tile infill, epoxy coated for lab areas complete with vandal-proof locking screws: |
| 2.3 WATER HAMMER
ARRESTORS | .1 | Stainless steel or copper construction, bellows type: to Plumbing and Drainage Institute Standard PDI-WH201. |
| 2.4 BACKFLOW
PREVENTERS | .1 | To CAN/CSA-B64 Series. |
| | .2 | Reduced pressure principle type complete with strainer, full port, 1/4 turn shut-off ball valves, air gap fitting piped to FFD (for boiler water make-up, domestic water service and as indicated): |
| | .3 | Double check valve assembly complete with shutoff valves and test cocks (for sprinkler system service and as indicated or required by Code). |
| 2.5 VACUUM BREAKERS | .1 | To CAN/CSA-B64 Series. |
| | .2 | Atmospheric vacuum breaker. |
| | .3 | Pressure vacuum breaker. |
| | .4 | Hose connection vacuum breaker. |

<u>2.6 HOSE BIBBS AND SEDIMENT FAUCETS</u>	.1	Bronze construction complete with integral back flow preventer, hose thread spout, replaceable composition disc, and chrome plated in finished areas.
<u>2.7 TRAP SEAL PRIMERS</u>	.1	Solenoid valves complete with vacuum breakers and transformers controlled by integral timer.
	.2	Provide wall access doors where required to conceal trap primer valve. Fire rated access doors in fire rated wall construction.
<u>2.8 STRAINERS</u>	.1	862 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.
<u>2.9 DEEP SEAL TRAPS AND RUNNING TRAPS</u>	.1	Cast iron body, piping connections to suit piping size, minimum seal equal to 125 mm.
	.2	Use corrosion resistant type for laboratory drainage piping.
<u>2.10 DOMESTIC HOT WATER EXPANSION TANK/BACKFLOW ACCOMODATORS</u>	.1	Diaphragm type pre-pressurized expansion vessel, fabricated and designed in accordance with the ASME code; for use on potable domestic hot water systems up to 862 kPa and 93°C max.
	.2	See also schedule on drawings.
	.3	Provide s.s. system connection, air valve, butyl rubber diaphragm, acrylic primer finish.

PART 3 - EXECUTION

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| <u>3.1 INSTALLATION</u> | .1 | Install in accordance with the 2010 Canadian Plumbing Code, and local authority having jurisdiction. |
| | .2 | Install in accordance with manufacturer's instructions and as specified. |
| | .3 | Provide access panels where components are installed in walls partitions or inaccessible ceiling spaces. |
| <u>3.2 CLEANOUTS</u> | .1 | In addition to those required by code, and as indicated, install at base of all soil and waste stacks, and rainwater leaders and where indicated. |
| | .2 | Bring cleanouts to wall or finished floor unless serviceable from below floor. |
| | .3 | Building drain cleanout and stack base cleanouts: line size to maximum NPS 4. |
| | .4 | For sinks and lavatory basins, provide cleanout in branch waste/stack or provide removable trap dip. |
| | .5 | Provide common cleanout in stack which serves two sinks or lavatory basins by using a double sanitary tee. |
| <u>3.3 ENCASED NON FREEZE WALL HYDRANTS</u> | .1 | Install wall hydrants 300 mm above finished grade unless otherwise indicated. |
| <u>3.4 WATER HAMMER ARRESTORS</u> | .1 | Install in the following locations, sized for the number of fixtures to be served:
.1 Branch supplies to individual fixtures or group of fixtures.
.2 Branch supplies to large washroom groups. |
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| <u>3.5 BACKFLOW PREVENTORS</u> | .1 | Install in accordance with CSA-B64, where indicated and elsewhere as required by code for proper functioning of equipment and/or systems. |
| | .2 | Pipe discharge from B.F.P. device over to nearest drain or service sink. |
| <u>3.6 VACUUM BEAKERS</u> | .1 | Install on each domestic water system and where indicated. |
| <u>3.7 HOSE BIBBS AND SEDIMENT FAUCETS</u> | .1 | Install at bottom of all risers, at low points to drain systems, and as indicated. |
| <u>3.8 WATER MAKE-UP ASSEMBLY</u> | .1 | Install complete with valved bypass. |
| | .2 | Pipe discharge from relief valve to nearest floor drain. |
| <u>3.9 TRAP SEAL PRIMERS</u> | .1 | Install NPS 1/2 soft copper tubing or PVC Pex tubing to floor drains. |
| | .2 | Install in accordance with manufacturer's recommendations. |
| <u>3.10 STRAINERS</u> | .1 | Install with sufficient room to remove basket. |
| <u>3.11 DOMESTIC HOT WATER EXPANSION TANKS</u> | .1 | Install and insulate as per manufacturers recommendations. |
| <u>3.12 COMMISSIONING</u> | .1 | In context of this paragraph, "verify" to include "demonstrate" to Departmental Representative. |
| | .2 | Timing: commission only after start-up deficiencies rectified. |
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- 3.12 COMMISSIONING .3 Access doors: verify size and location
(Cont'd)
- .4 Adjust to suit site conditions, including,
but not necessarily limited to, following:
- .1 Floor drains:
 - .1 Verify proper operation of trap
primer, flushing features.
 - .2 Verify security and removability of
strainers.
 - .2 Cleanouts:
 - .1 Verify covers are gastight, secure
and easily removable.
 - .2 Verify that cleanout rods can probe
as far as next cleanout.
 - .3 Non-freeze wall, hydrants:
 - .1 Verify complete drainage.
 - .2 Verify operation of vacuum breaker.
 - .4 Water hammer arrestors:
 - .1 Verify accessibility.
 - .5 Backflow preventers, vacuum breakers:
 - .1 Verify installation of correct type
to suit application.
 - .2 Adjust as necessary to ensure
proper operation.
 - .3 Verify visibility of discharge.
 - .6 Hose bibbs, sediment faucets:
 - .1 Verify operation.
 - .7 Water make-up assembly:
 - .1 Verify operation.
 - .8 Trap seal primers:
 - .1 Verify operation.
 - .2 Adjust flow rate to suit site
conditions.
 - .9 Pipeline strainers:
 - .1 Verify accessibility of basket.
 - .2 Clean out during commissioning
until system clean.
- .5 Commissioning reports:
 - .1 Record all results on approved report
forms.
 - .2 Include signature of tester and
supervisor.
- .6 Verification:
 - .1 Notify Departmental Representative 24
hours before commencing tests.
 - .2 All tests and procedures to be witnessed
by Departmental Representative.
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- 3.12 COMMISSIONING .7 Training:
(Cont'd) .1 Train O&M personnel in start-up,
operation, monitoring, servicing, maintenance
and shut-down procedures.
- .8 Demonstrations:
.1 Demonstrate full compliance with Design
Criteria.
.2 Demonstrations also to show completeness
of O&M personnel training.
- .9 Submit plumbing test certificates to
Departmental Representative for review.