

PART 1 - GENERAL

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| <u>1.1 SUBMITTALS</u> | .1 | Submittals: in accordance with Section 01 33 00 - Submittal Procedures. |
| | .2 | Shop drawings and product data accompanied by: <ul style="list-style-type: none">.1 Detailed drawings of bases, supports, and anchor bolts..2 Acoustical sound power data, where applicable..3 Points of operation on performance curves..4 Manufacturer to certify current model production..5 Certification of compliance to applicable codes. |
| <u>1.2 QUALITY ASSURANCE</u> | .1 | Quality Assurance: in accordance with Section 01 45 00 - Quality Control. |

PART 3 - EXECUTION

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| <u>3.1 PAINTING REPAIRS AND RESTORATION</u> | .1 | Prime and touch up marred finished paintwork to match original. |
| | .2 | Restore to new condition, finishes which have been damaged. |
| <u>3.2 DEMONSTRATION</u> | .1 | Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing. |
| | .2 | 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. |
| | .3 | Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials. |
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<u>3.2 DEMONSTRATION</u> (Cont'd)	.4	Instruction duration time requirements as specified in appropriate sections.
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<u>3.3 PROTECTION</u>	.1	Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.
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PART 1 - GENERAL

1.1 RELATED REQUIREMENTS .1.

- 1.2 REFERENCES .1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME)
- .1 ANSI/ASME B16.15-06, Cast Bronze Threaded Fittings, Classes 125 and 250.
 - .2 ANSI/ASME B16.18-01, Cast Copper Alloy Solder Joint Pressure Fittings.
 - .3 ANSI/ASME B16.22-01, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 - .4 ANSI/ASME B16.24-01, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.
- .2 ASTM International Inc.
- .1 ASTM A 307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .2 ASTM A 536-84(2004)e1, Standard Specification for Ductile Iron Castings.
 - .3 ASTM B 88M-05, Standard Specification for Seamless Copper Water Tube (Metric).
- .3 Canadian Standards Association (CSA International)
- .1 CSA B242-05, Groove and Shoulder Type Mechanical Pipe Couplings.
- .4 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).
- .1 MSS-SP-80-03, Bronze Gate, Globe, Angle and Check Valves.
- .5 Transport Canada (TC)
- .1 Transportation of Dangerous Goods Act, 1992, c. 34 (TDGA).

- 1.3 ACTION AND INFORMATIONAL SUBMITTALS .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
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| 1.3 ACTION AND
INFORMATIONAL
SUBMITTALS
(Cont'd) | .2 | Product Data:
.1 Provide manufacturer's printed product literature and datasheets for insulation and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations. |
| | .3 | Closeout Submittals:
.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals. |

PART 2 - PRODUCTS

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| 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.
.2 Buried or embedded: copper tube, soft annealed, type K: to ASTM B 88M, 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. |
| | .2 | Cast bronze threaded fittings, Class 125 and 250: to ANSI/ASME B16.15. |
| | .3 | Cast copper, solder type: to ANSI/ASME B16.18. |
| | .4 | Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22. |
| | .5 | NPS 2 and larger: ANSI/ASME B16.18 or ANSI/ASME B16.22 roll grooved to CSA B242. |
| | .6 | NPS 1 ½ and smaller : wrought copper to ANSI/ASME B16.22 cast copper to ANSI/ASME B16.18; with 301 stainless steel internal components and EPDM seals. Suitable for operating pressure to 1380 kPa. |
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2.3 JOINTS

- .1 Rubber gaskets, latex-free 1.6 mm thick: to AWWA C111.
- .2 Bolts, nuts, hex head and washers: to ASTM A 307, heavy series.
- .3 Solder: 95/5 tin copper alloy.
- .4 Teflon tape: for threaded joints.
- .5 Grooved couplings: designed with angle bolt pads to provide rigid joint, complete with EPDM gasket.
- .6 Dielectric connections between dissimilar metals: dielectric fitting, complete with thermoplastic liner.

2.4 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.
 - .2 Lockshield handles: as indicated.
- .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.
 - .2 Lockshield handles: as indicated.

2.5 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 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.
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- 2.6 BALL VALVES .1 NPS 2 and under, screwed:
- .1 Class 150.
 - .2 Bronze Forged Brass body, chrome plated brass stainless steel ball, PTFE adjustable packing, brass gland and PTFE Bunan TFE seat, steel lever handle as specified Section 23 05 23.01 - Valves - Bronze.
- .2 NPS 2 and under, soldered:
- .1 To ANSI/ASME B16.18, Class 150.
 - .2 Bronze body, chrome plated brass stainless steel ball, PTFE adjustable packing, brass gland and PTFE Bunan seat, steel lever handle, with NPT to copper adaptors as specified Section 23 05 23.01 - Valves - Bronze.

PART 3 - EXECUTION

- 3.1 APPLICATION .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.
- 3.2 INSTALLATION .1 Install in accordance with NPC Province(s) Plumbing Code and local authority having jurisdiction.
- .2 Assemble piping using fittings manufactured to ANSI standards.
- .3 Install CWS piping below and away from HWS and HWC and other hot piping so as to maintain temperature of cold water as low as possible.
- .4 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.
- .5 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.

- 3.3 VALVES
- .1 Isolate equipment, fixtures and branches with ball valves.
 - .2 Balance recirculation system using lockshield globe valves. Mark settings and record on as-built drawings on completion.
- 3.4 PRESSURE TESTS
- .1 Conform to requirements of Section 21 05 01 - Common Work Results for Mechanical.
 - .2 Test pressure: greater of 1 times maximum system operating pressure or 860 kPa.
- 3.5 FLUSHING AND CLEANING
- .1 Flush entire system for 8 h. Ensure outlets flushed for 2 hours. Let stand for 24 hours, then draw one sample off longest run. Submit to testing laboratory to verify that system is clean to Provincial Federal potable water guidelines. Let system flush for additional 2 hours, then draw off another sample for testing.
- 3.6 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.
- 3.7 DISINFECTION
- .1 Flush out, disinfect and rinse system to approval of Departmental Representative.
 - .2 Upon completion, provide laboratory test reports on water quality for Departmental Representative approval.
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3.8 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 Monitor piping HWS and HWC piping systems for freedom of movement, pipe expansion as designed.
 - .4 Check control, limit, safety devices for normal and safe operation.
- .4 Rectify start-up deficiencies.

3.9 PERFORMANCE
VERIFICATION

- .1 Scheduling:
 - .1 Verify system performance after pressure and leakage tests and disinfection are 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 plumbing.
 - .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

3.9 PERFORMANCE VERIFICATION (Cont'd)	.2	Procedures:(Cont'd) .7 (Cont'd) arrestor or re-charge air chambers. Repeat for outlets and flush valves. .8 Confirm water quality consistent with supply standards, and ensure no residuals remain as result of flushing or cleaning.
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3.10 CLEANING	.1	Clean in accordance with Section 01 74 11 - Cleaning.
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PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

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1.2 REFERENCES

- .1 ASTM International Inc.
.1 ASTM D 2235-04, Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
.2 ASTM D 2564-04e1, Standard Specification for Solvent Cements for Poly(Vinyl-Chloride) (PVC) Plastic Piping Systems.
- .2 Canadian Standards Association (CSA International)
.1 CAN/CSA-Series B1800-06, Thermoplastic Nonpressure Pipe Compendium - B1800 Series.

PART 2 - PRODUCTS

2.1 PIPING AND FITTINGS

- .1 For buried and or above ground DWV piping to:
.1 CAN/CSA B1800.

2.2 JOINTS

- .1 Solvent weld for PVC: to ASTM D 2564.
.2 Solvent weld for ABS: to ASTM D 2235.

PART 3 - EXECUTION

3.1 APPLICATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.
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- 3.2 INSTALLATION .1 Install in accordance with National Plumbing Code Provincial Plumbing Code and local authority having jurisdiction except .
- 3.3 TESTING .1 Pressure test buried systems before backfilling.
- .2 Hydraulically test to verify grades and freedom from obstructions.
- 3.4 PERFORMANCE VERIFICATION .1 Cleanouts:
- .1 Ensure accessible and that access doors are correctly located.
- .2 Ensure fixtures are properly anchored, connected to system and effectively vented.
- 3.5 CLEANING .1 Clean in accordance with Section 01 74 11 - Cleaning.

PART 1 - GENERAL

- 1.1 SUMMARY .1 Related Sections:
- .1 Section 01 33 00 - Submittal Procedures.
 - .2 Section 01 35 29.06 - Health and Safety Requirements.
 - .3 Section 01 45 00 - Quality Control.
 - .4 Section 01 78 00 - Closeout Submittals.
- 1.2 REFERENCES .1 American Society for Testing and Materials International (ASTM).
- .1 ASTM A 126-95(2001), Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
 - .2 ASTM B 62-02, Specification for Composition Bronze or Ounce Metal Castings.
- .2 Canadian Standards Association (CSA International).
- .1 CSA-B64 Series-01, Backflow Preventers and Vacuum Breakers.
 - .2 CSA-B356-00, Water Pressure Reducing Valves for Domestic Water Supply Systems.
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
- .1 Material Safety Data Sheets (MSDS).
- .4 Plumbing and Drainage Institute (PDI).
- .1 PDI-WH201-92, Water Hammer Arresters Standard.
- 1.3 SUBMITTALS .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet for fixtures and equipment.
 - .2 Indicate dimensions, construction details and materials for specified items.
- .3 Shop Drawings:
- .1 Submit shop drawings to indicate materials, finishes, method of anchorage, number of anchors, dimensions construction and assembly details and accessories.
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- 1.3 SUBMITTALS
(Cont'd)
- .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .5 Instructions: submit manufacturer's installation instructions.
 - .6 Manufacturers' Field Reports: manufacturers' field reports specified.
 - .7 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals, 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.
- 1.4 QUALITY ASSURANCE
- .1 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

PART 2 - PRODUCTS

- 2.1 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.
 - .2 Access Covers:
 - .1 Wall Access: face or wall type, polished nickel bronze or stainless steel square and or round cover with flush head securing screws, bevelled edge frame complete with anchoring lugs.
 - .2 Floor Access: rectangular round cast iron body and frame with adjustable secured nickel bronze top cast box and:
 - .1 Plugs: bolted bronze with neoprene gasket.
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2.1 CLEANOUTS (Cont'd)	.2	Access Covers:(Cont'd) .2 Floor Access:(Cont'd) .2 Cover for Unfinished Concrete Floors: cast iron nickel bronze round or square, gasket, vandal-proof screws. .3 Cover for Tile and Linoleum Floors: polished nickel bronze with recessed cover for linoleum or tile infill, complete with vandal-proof locking screws. .4 Cover for Carpeted Floors: polished nickel bronze with deep flange cover for carpet infill, complete with carpet retainer vandal-proof locking screws.
2.2 NON-FREEZE WALL HYDRANTS	.1	Surface mount Recessed with integral vacuum breaker, NPS 3/4 hose outlet, removable operating key. Chrome plated Polished bronze finish.
2.3 WATER HAMMER ARRESTORS	.1	Stainless steel Copper construction, bellows piston type: to PDI-WH201.
2.4 VACUUM BREAKERS	.1	Breakers: to CSA-B64 Series, vacuum breaker atmospheric hose connection laboratory faucet intermediate.
2.5 HOSE BIBBS AND SEDIMENT FAUCETS	.1	Bronze construction complete with integral back flow preventer, hose thread spout, replaceable composition disc, and chrome plated in finished areas.

PART 3 - EXECUTION

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| <u>3.1 MANUFACTURER'S INSTRUCTIONS</u> | .1 | Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet. |
| <u>3.2 INSTALLATION</u> | .1 | Install in accordance with National Plumbing Code of Canada provincial codes, and local authority having jurisdiction. |
| | .2 | Install in accordance with manufacturer's instructions and as specified. |
| <u>3.3 CLEANOUTS</u> | .1 | Install cleanouts at base of soil and waste stacks, and rainwater leaders, at locations required code, and as 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 NPS4. |
| <u>3.4 NON-FREEZE WALL HYDRANTS</u> | .1 | Install 600 mm above finished grade unless otherwise indicated. |
| <u>3.5 WATER HAMMER ARRESTORS</u> | .1 | Install on branch supplies to fixtures or group of fixtures where indicated. |
| <u>3.6 HOSE BIBBS AND SEDIMENT FAUCETS</u> | .1 | Install at bottom of risers, at low points to drain systems, and as indicated. |
| <u>3.7 START-UP</u> | .1 | Timing: start-up only after:
.1 Pressure tests have been completed.
.2 Disinfection procedures have been completed. |
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3.7 START-UP
(Cont'd)

- .1 Timing:(Cont'd)
 - .3 Certificate of static completion has been issued.
 - .4 Water treatment systems operational.

3.8 TESTING AND
ADJUSTING

- .1 Timing:
 - .1 After start-up deficiencies rectified.
 - .2 After certificate of completion has been issued by authority having jurisdiction.
- .2 Application tolerances:
 - .1 Pressure at fixtures: +/- 70 kPa.
 - .2 Flow rate at fixtures: +/- 20%.
- .3 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.
- .4 Vacuum breakers, backflow preventers, backwater valves:
 - .1 Test tightness, accessibility for O&M of cover and of valve.
 - .2 Simulate reverse flow and back-pressure conditions to test operation of vacuum breakers, backflow preventers.
 - .3 Verify visibility of discharge from open ports.
- .5 Access doors:
 - .1 Verify size and location relative to items to be accessed.
- .6 Cleanouts:
 - .1 Verify covers are gas-tight, secure, yet readily removable.
- .7 Water hammer arrestors:
 - .1 Verify proper installation of correct type of water hammer arrester.
- .8 Wall, Ground hydrants:
 - .1 Verify complete drainage, freeze protection.
 - .2 Verify operation of vacuum breakers.

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS .1.

1.2 REFERENCES .1 Canadian Standards Association (CSA International)
.1 CAN/CSA-B45 Series-02(R2008), Plumbing Fixtures.
.2 CAN/CSA-B125.3-05, Plumbing Fittings.
.3 CAN/CSA-B651-04, Accessible Design for the Built Environment.

1.3 ACTION AND INFORMATIONAL SUBMITTALS .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
.2 Product Data:
.1 Provide manufacturer's printed product literature and datasheets for fixtures, and include product characteristics, performance criteria, physical size, finish and limitations.
.3 Shop drawings:
.1 Provide drawings stamped and signed by Professional Engineer registered and licenced in the Province of New Brunswick, Canada.

1.4 CLOSEOUT SUBMITTALS .1 Provide maintenance data in accordance with Section 01 78 00 - Closeout Submittals.
.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.

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: as indicated.
- .5 Fixtures to be product of one manufacturer.
- .6 Trim to be product of one manufacturer.
- .7 Stainless steel counter-top sinks.
 - .1 SC-1: single compartment, non-ledge back.
 - .1 From 1.0 mm thick type 302 stainless steel, self-rimming, undercoated, clamps. Inside sizes: 520 x 460 x 130 mm barrier-free.
 - .2 Trim: chrome plated brass, with swing spout, aerator, blade handles.
- .8 Fixture piping:
 - .1 Hot and cold water supplies to each fixture:
 - .1 Chrome plated rigid flexible supply pipes each with screwdriver handwheel 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.
- .9 Chair carriers:
 - .1 Factory manufactured floor-mounted carrier systems for all wall-mounted fixtures.

PART 3 - EXECUTION

- 3.1 APPLICATION .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.
- 3.2 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.
- 3.3 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.
- 3.4 CLEANING .1 Clean in accordance with Section 01 74 11 - Cleaning.
.1 Remove surplus materials, excess materials, rubbish, tools and equipment.