METROLINX

Domestic Water Piping and Specialties Specification

Specification 22 11 00

Revision 02

September 2025

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Metrolinx,

an Agency of the Government of Ontario

Amendment Record Sheet

Amendment in Clause No.	Date of Amendment	Description of Changes
Various	September 2018	Revised to coordinate with corresponding.
1.3.3	September 2025	Added new paragraph to add Section 20 05 25 Mechanical Insulation to article for Related Works.
1.4.12	September 2025	Added new paragraph to add "Ontario Building Code" to article for Reference Standards.
1.4.13	September 2025	Added new paragraph to add Transport Canada Standard for piping under railways.
2.1.4	September 2025	Replaced article for polyethylene tubing with new article for PEX tubing.
2.16	September 2025	Revised article to "Electronic Trap Seal Primer." Deleted paragraphs 2.16.1 and 2.16.2 for manual type trap seal primers.
2.23	September 2025	Added new article for "Domestic Water Thermal Expansion Tank."
3.2.2 b)	September 2025	Revised requirement for trap seal primer piping shall be PEX tubing.
3.2.2 e)	September 2025	Added new paragraph for underground piping under railways.
3.2.6	September 2025	Added new paragraph to indicate that piping shall be insulated in accordance with Section 20 05 25.
3.14.2	September 2025	Deleted paragraph, which indicated to provide primer valves for 1 – 6 traps.
3.14.2	September 2025	Revised article to indicate that electronic trap seal primers shall be used for single or multiple traps.
3.14.3	September 2025	Added new paragraph to indicate "Trap seal primer shall be located in a heated room or enclosure and 2.5 feet (1500 mm) above the floor."

Contents:

1. GENERAL

1.1. SCOPE OF WORK

1.1.1. Provide domestic water piping and specialties as required, scheduled, and specified herein.

1.2. DESIGN REQUIREMENTS

1.2.1. Design requirements are based on Part 2 specified requirements of products.

1.3. RELATED WORKS

1.3.1. Section 20 05 05 – Mechanical Work General Instructions.

1.3.2. Section 20 05 10 – Basic Mechanical Materials and Methods.

1.3.3. Section 20 05 25 – Mechanical Insulation.

1.3.4. Section 20 05 40 – Mechanical Work Commissioning.

1.4. REFERENCE STANDARDS

1.4.1. Standards and codes shall be latest editions adopted by and enforced by local governing authorities.

1.4.2. ASTM F1960, Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing.

1.4.3. AWWA B300-10, Hypochlorites.

1.4.4. CAN/CSA B125.1, Plumbing Supply Fittings.

1.4.5. CAN/CSA B125.3, Plumbing Fittings.

1.4.6. CAN/CSA B137 Series, Thermoplastic Pressure Piping Compendium.

1.4.7. CAN/ULC S102.2, Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies.

1.4.8. CAN/ULC S101, Fire Endurance Tests of Building Construction and Materials.

1.4.9. NSF/ANSI 14, Plastics Piping System Components and Related Materials.

1.4.10. NSF/ANSI 61, Drinking Water System Components – Health Effects.

1.4.11. NSF/ANSI 372, Drinking Water System Components – Lead Content.

1.4.12. Ontario Building Code.

1.4.13. TC E-10, Standards Respecting Pipeline Crossings Under Railways.

1.5. TRAINING

1.5.1. Training shall be a full review of all components, including but not limited to a full operation and maintenance demonstration, with abnormal events.

1.5.2. Include for 2 training sessions of maximum 7 hours duration per session for 10 Metrolinx people per session.

1.5.3. Refer to Section 20 05 05 for additional general requirements.

1.6. WARRANTY

1.6.1. Products shall be guaranteed by manufacturer, for a minimum of 2 years after acceptance by Metrolinx.

1.7. DELIVERY, STORAGE AND HANDLING.

1.7.1. Handle and store products in accordance with manufacturer's instructions, in locations approved by Metrolinx. Include one copy of these instructions with product at time of shipment.

1.8. SUBMITTALS

1.8.1. Refer to submittal requirements in Section 20 05 05.

1.8.2. As specified in Part 3 of this Section, submit a letter from anchor design engineer stating anchor installation has been examined at site and anchors are properly fabricated and installed.

1.8.3. Submit shop drawings/product data sheets as follows:

a) To regulatory authority for review and approval prior to submitting to Consultant;

b) For all products specified in Part 2 of this Section except for pipe and fittings, and chlorine; and

c) Copies of all calculations, stamped and signed by same engineer who signs layout drawings, and a listing of all design data used in preparing the calculations, system layout and sizing requirements.

1.8.4. Product Data

a) Submit product data sheets indicating:

1) Technical data, supplemented by bulletins, component illustrations, detailed views, technical descriptions of items, and parts lists;

2) Performance criteria, compliance with reference standards, characteristics, limitations, and troubleshooting protocol;

3) Product transportation, storage, handling, and installation requirements; and

4) Product identification in accordance with Metrolinx requirements.

1.8.5. Shop Drawings

a) Submit shop drawings indicating:

1) Capacity and ratings;

2) Mounting details to suit locations shown, indicating methods and hardware shall be used; and

3) Applicable control components and control wiring schematic.

1.8.6. As required by local regulatory authorities, submit following to authorities and copies to Consultant:

a) Cross connection survey report;

b) Signed test results and a properly and clearly identified and marked inspection and test record card for each backflow preventer; and

c) Submit signed test results and a properly and clearly identified and marked inspection and test record card for each backflow preventer.

1.8.7. Commissioning Package

a) Submit the following in accordance with Sections 20 05 05 and 20 05 40:

1) Commissioning Plan;

2) Commissioning Procedures;

3) Certificate of Readiness;

4) Complete test sheets specified in Section 20 05 40 and attach them to the Certificate of Readiness; and

5) Source Quality Control inspection and test results, and attach to the Certificate of Readiness.

1.8.8. Commissioning Closeout Package

a) Submit the following in accordance with Section 20 05 05:

1) Deficiency Report;

2) Commissioning Closeout Report; and

3) Submit the following for each Product for incorporation into the Operation and Maintenance Manuals in accordance with Section 20 05 05:

i) Identification: manufacturer's name, type, year, serial number, number of units, capacity, and identification to related systems;

ii) Functional description detailing operation and control of components;

iii) Performance criteria and maintenance data;

iv) Safety precautions;

v) Operating instructions and precautions;

vi) Component parts availability, including names and addresses of spare part suppliers;

vii) Maintenance and troubleshooting guidelines/protocol;

viii) Product storage, preparation, handling, and installation requirements; and

ix) Commissioning Report.

1.9. QUALITY ASSURANCE

1.9.1. Domestic water piping and valves shall comply with codes, regulations and standards listed above and applicable local codes and regulations.

1.9.2. Site personnel shall be licensed in jurisdiction of the work and under continuous supervision of a foreman who is an experienced system installer.

1.9.3. Manufacturers Qualifications

a) Manufacturer shall be ISO 9000, 9001 or 9002 certified. Manufacturer of product shall have produced similar product for a minimum period of five years. When requested by Consultant, an acceptable list of installations with similar product shall be provided demonstrating compliance with this requirement; and

b) Where manufacturers provide after installation onsite inspection of product installations, include for manufacturer's authorized representative to perform onsite inspection and certificate of approvals.

1.9.4. Installers Qualifications

a) Installers for work shall be performed by or work under licensed Mechanical Contractor.

b) Installers of systems shall be qualified and experienced installers of respective products and work in which they are installing.

c) Where manufacturers provide training sessions to installers and certificates upon successful completion, installers to have obtained such certificates and submit copies with shop drawings.

1.9.5. Regulatory Requirements

a) Products and work to comply with applicable local governing authority regulations, bylaws, and directives; and

b) Include for required inspections and certificate of approvals of installation work from local governing authorities.

2. PRODUCTS

2.1. PIPE, FITTINGS AND JOINTS

2.1.1. Soft Copper

a) Type K soft copper to ASTM B88, supplied in a continuous coil with no joints if possible, and complete with, if joints are required, compression-type flared joint couplings.

2.1.2. Hard Copper – Solder Joint

a) Type L hard-drawn seamless copper to ASTM B88, complete with copper solder type fittings to ASME/ANSI B16.18 and soldered joints using Canada Metal Co. Ltd. "SILVABRITE 100" or approved equivalent lead-free solder for cold water pipe, and 95% tin/ 5% Antimony or "SILVABRITE 100" solder for other services.

2.1.3. Copper Pressure Coupled Joint

a) Type L hard-drawn seamless copper to ASTM B88 with Viega "ProPress with Smart Connect feature" or approved equivalent, copper fittings with EDPM seals, and pressure-type crimped joints made by use of manufacturer-recommended tool.

2.1.4. Cross-Linked Polyethylene (PEX) Tubing:

A) Non-barrier type PEX-A piping manufactured by peroxide cross-linking (the Engel method), manufactured in accordance with ASTM F876 and ASTM F877 and tested for compliance by an independent third-party agency, 25/50 flame spread/smoke developed rated when tested to CAN/ULC S102.2 and complete with brass inserts, cold-expansion joint fittings and couplings.

2.2. SHUT-OFF VALVES

2.2.1. Ball Valves

a) Class 600, 4140 kPa (600 psi) WOG-rated, lead-free, full-port ball-type valves, each complete with a forged brass body with solder ends, forged brass cap, blowout-proof stem, solid forged brass chrome-plated ball, Teflon or PTFE seat, and a removable lever handle. Valves in insulated piping shall be complete with stem extensions.

b) Standard of accepted manufacturers are:

1) Toyo Valve Co. Fig. 5049A-LF;

2) Milwaukee Valve Co. #UPBA485B;

3) Kitz Corporation Code 859;

4) Apollo Valves #77LF-200;

5) Watts Industries (Canada) Inc. #LFFBVS-3C; or

6) Approved equivalent.

2.2.2. Butterfly Valves – Flanged Joint

a) Non-corrosive, minimum 1200 kPa (175 psi) cold water pressure-rated, resilient seated butterfly valves, each complete with a coated cast ductile iron lug-type body, stainless steel shaft, bronze disc, and EPDM seat, and each suitable for domestic water bubble-tight dead-end service with valve in position and either side of connecting piping removed.

b) Butterfly valves up to and including 100 mm (4") diameter shall be equipped with lever handles.

c) Butterfly valves larger than 100 mm (4") diameter shall be equipped with worm gear operators.

d) Standard of accepted products are:

1) DeZurik #632L Series;

2) Kitz Corporation Code #6122EL/EG;

3) Toyo Valve Co. #918BESL/EG;

4) Bray Valve and Controls Canada Series 31;

5) Apollo Valves #141 Series;

6) Watts Industries (Canada) Inc. #BF-03; or

7) Approved equivalent.

2.2.3. Gate Valve

a) 50 mm (2") and smaller: MSS SP80, Bronze, 1034 kPa (150 lb), wedge disc, rising stem, union bonnet.

b) 65 mm (2½") and larger: Flanged, outside screw and yoke.

c) 2.6.5.3 MSS SP 70, iron body, bronze mounted, 861 kPa (125 psig) wedge disc.

d) Standard of accepted manufacturers are:

1) Watts Industries (Canada) Inc. Series 408;

2) Toyo Valve Co. Fig 421A;

3) Kitz Corporation; or

4) Approved equivalent.

2.3. CHECK VALVES

2.3.1. Horizontal

a) Lead-free, Class 125, bronze, 1380 kPa (200 psi) WOG-rated horizontal swing type check valves with solder ends.

b) Standard of accepted products are:

1) Toyo Valve Co. Fig. 237A-LF;

2) Milwaukee Valve Co. #UP1509;

3) Kitz Corporation Code 823;

4) Apollo Valves #61LF Series; or

5) Approved equivalent.

2.3.2. Vertical

a) Kitz Corp. Code 826 or approved equivalent, lead-free, 1725 kPa (250 psi) WOG-rated vertical lift check valve with soldering ends.

2.4. DRAIN VALVES

2.4.1. Minimum 2070 kPa (300 psi) water-rated, 20 mm (¾") diameter, straight pattern full port bronze ball valves, each complete with a threaded outlet suitable for coupling connection of 20 mm (¾") diameter Garden hose, a cap and chain.

2.4.2. Standard of accepted products are:

a) Toyo Valve Co. Fig. 5046;

b) Dahl Brothers Canada Ltd. Fig. No. 50. 430;

c) Kitz Corporation Code 58CC;

d) Apollo Valves #78-104-01;

e) Watts Industries (Canada) Inc. #B6000; or

f) Approved equivalent.

2.5. DOMESTIC HOT WATER PIPING BALANCING VALVES

2.5.1. Solder or flanged end type as required, globe style, non-ferrous circuit balancing valves designed to facilitate precise flow measurement, precision flow balancing, and positive shut-off, complete with capped and valved drain connection, and valved ports for connection to a differential pressure meter.

2.5.2. Standard of accepted products are:

a) S.A. Armstrong Model CBV Series;

b) Tour and Andersson Model TBV Series;

c) Watts Industries (Canada) Inc. Model CSM Series; or

d) Approved equivalent.

2.6. PARTITION STOPS

2.6.1. Dahl Brothers Canada Ltd. Fig. E2300 Series or approved equivalent, lead-free partition stops with EDPM packing, slotted spindles, extension tubes, stainless steel access plates, and 3 identified keys.

2.7. PRESSURE REDUCING VALVES

2.7.1. For piping less than or equal to 50 mm (2") diameter, lead-free, non-corrosive, non-ferrous direct spring acting pressure reducing valves to CAN/CSA B356, each factory set at 345 kPa (50 psi) unless otherwise specified or required, each field adjustable from 175 kPa (25 psi) to 520 kPa (75 psi) and each complete with an integral inlet strainer.

a) Standard of accepted products are:

1) Apollo Valves #36HLF Series;

2) Zurn/Wilkins #600XL Series;

3) Watts Industries (Canada) Inc. #LF25AUB-Z3 Series;

4) Cash-Acme EB-25 Series; or

5) Approved equivalent.

2.7.2. For piping greater than or equal to 65 mm (2-½") diameter, lead-free, non-corrosive pilot-operated pressure reducing valve to CAN/CSA B356, factory set at required pressure, field adjustable, and complete with a bronze body and trim, screwed or flanged connections, and brass body pilot valve with stainless steel seat.

a) Standard of accepted products are:

1) Singer Valve #106 PR;

2) Zurn/Wilkins #ZW209;

3) Watts Industries (Canada) Inc. #LFN223 Series; or

4) Approved equivalent.

2.8. DOMESTIC HOT WATER THERMOSTATIC MIXING VALVES

2.8.1. Lawler Manufacturing Co. Inc. 800 Series "High-Low Thermostatic Mixer" or approved equivalent, factory assembled rough bronze thermostatic mixing valve assembly complete with rotatable union end inlet piping with check stops and stainless-steel strainer screens, union outlet piping with thermometer connection, all sized as shown, and following:

a) Mixing valve with liquid motor, stainless steel piston and liner, tamper-resistant control adjustment, and 3-way protection against runaway temperatures, thermal shock, and scalding;

b) Dial-type thermometer conforming to requirements specified in Section entitled Basic Mechanical Materials and Methods;

c) Ball-type outlet shut-off valve conforming to valve requirements specified in this Section;

d) Surface wall mounting, enamelled steel cabinet with hinged door, key lock, and permanent identification; and

e) Recessed wall mounting Type 304 stainless steel cabinet with a #4 finish, hinged door, key lock, and permanent identification.

2.8.2. Standard of accepted products are:

a) Lawler Manufacturing Co. Inc.;

b) Leonard Valve Co.;

c) Symmons Industries Inc.; or

d) Approved equivalent.

2.9. DIELECTRIC FITTINGS

2.9.1. Provide dielectric couplings or unions between ferrous and non-ferrous pipe.

2.10. CHLORINE

2.10.1. As required by local governing authorities, or:

a) Liquid Chlorine: ASTM E1120;

b) Hypochlorite: ASTM E1229 Standard Specification for Calcium Hypochlorite, or Fed. Spec. AA-1427C, grade B;

C) Sodium hypochlorite to AWWA B300-10.

2.11. WATER METER

2.11.1. Neptune Technology Group (Canada) Ltd. "Neptune T-10" or approved equivalent, tamper-proof, in line serviceable meter in accordance with requirements of American Water Works Association AWWA C701 and NSF/ANSI 61, suitable for connection of a remote automatic reading and billing unit and complete with a cast bronze main case, a roll sealed register, and a positive displacement mutating disc measuring chamber.

2.11.2. Neptune Technology Group (Canada) Ltd. "Neptune High Performance Turbine" or approved equivalent, tamper-proof, in-line serviceable meter in accordance with requirements of AWWA C701 and NSF/ANSI 61, suitable for connection of a remote automatic reading and billing unit and complete with a cast bronze main case, a roll-sealed magnetic drive register, and a turbine measuring element.

2.11.3. Meter shall be complete with Neptune Technology (Canada) Ltd. or "Tricon," or approved equivalent, hardware for interface connection to building automation system for water flow and consumption monitoring.

2.12. INTERIOR HOSE BIBBS

2.12.1. Flush-Concealed

a) Recessed, 92 mm (3-5/8") deep, recessed, encased wall hydrant with lockable bronze or stainless steel box with hinged cover identified "WATER," bronze interior parts, a screwdriver-operated stop in the supply, key-operated control valve, 20 mm (¾") diameter hose connection, and a vacuum breaker.

b) Standard of accepted products are:

1) Watts Industries (Canada) Inc. #HY-330;

2) Jay R. Smith #5509QT-CL-SAP;

3) Zurn #Z1350;

4) Mifab #MHY-55; or

5) Approved equivalent.

2.12.2. Semi-Recessed – Finished Areas

a) Anti-siphon type, 100 mm (4") deep hose bibb with stainless steel face with operating key, bronze interior parts, 20 mm (¾") diameter solder inlet, 20 mm (¾") diameter hose connection, and integral vacuum breaker.

b) Standard of accepted products are:

1) Watts Industries (Canada) Inc. #HY-430;

2) Jay R. Smith #5619-SAP-98;

3) Zurn #Z1333 "ECOLOTROL";

4) Mifab #MHY-30; or

5) Approved equivalent.

2.12.3. Surface – Exposed – Cold Water – Unfinished Areas

a) Brass or bronze hose bib with hose end vacuum breaker.

b) Standard of accepted products are:

1) Watts Industries (Canada) Inc. #SC8-1;

2) Jay R. Smith #5609QT-SAP;

3) Zurn/Wilkins # Z1341 with hose end vacuum breaker;

4) Chicago Faucets #293-E27CP; or

5) Approved equivalent.

2.12.4. Exposed – Unfinished Areas – Hot and Cold Water

a) Mixing faucet for surface mounting.

b) Standard of accepted products are:

1) Watts Industries (Canada) Inc. #HY-300-2-VB;

2) Jay R. Smith #5560QT-LB-SAP;

3) Zurn #Z841L1-RC;

4) Delta Commercial #28T8083; or

5) Approved equivalent.

2.13. EXTERIOR NON-FREEZE WALL HYDRANTS

2.13.1. Flush-Concealed

a) Recessed, encased, self-draining hydrants, each complete with a copper casing, operating rod assembly to suit wall thickness, polished nickel bronze box with hinged locking cover, 20 mm (¾") diameter threaded hose connection outlet, vacuum breaker, and a loose tee handle operating key.

b) Standard of accepted products are:

1) Watts Industries (Canada) Inc. #HY-725;

2) Jay R. Smith #5519-98;

3) Zurn #Z1320;

4) Mifab #MHY-26; or

5) Approved equivalent.

2.13.2. Semi-Recessed

a) Self-draining hydrants, each complete with a copper casing, operating rod assembly to suit the wall thickness, 20 mm (¾") diameter threaded hose connection outlet, vacuum breaker, and a loose tee handle operating key.

b) Standard of accepted products are:

1) Watts Industries (Canada) Inc. #HY-420;

2) Jay R. Smith #5619-98;

3) Zurn #Z1321;

4) Mifab #MHY-16; or

5) Approved equivalent.

2.14. EXTERIOR NON-FREEZE GROUND HYDRANTS

2.14.1. Flush

a) Flush with grade mounting, encased head, self-draining bronze hydrants, each complete with a casing and operating rod assembly to suit the depth of piping bury, valve housing with drain port, grade box with hinged lockable cover and drain port, 20 mm (¾") diameter threaded hose connection, and a loose tee handle operating key.

b) Standard of accepted products are:

1) Watts Industries (Canada) Inc. #HY-500;

2) Jay R. Smith #5810-N-NV;

3) Zurn #Z1360;

4) Mifab #MHY-60; or

5) Approved equivalent.

2.14.2. Exposed

a) Self-draining exposed head bronze post hydrants, each complete with a casing and operating rod assembly to suit the height of hose outlet above grade and the depth of piping bury, valve housing with drain port, 20 mm (¾") diameter threaded hose connection assembly with vacuum breaker and gravel guard, and a loose tee handle operating key.

b) Standard of accepted products are:

1) Watts Industries (Canada) Inc. #HY-600;

2) Jay R. Smith #5910-NV-H;

3) Zurn #Z1385;

4) Mifab #MHY-65; or

5) Approved equivalent.

2.15. NON-FREEZE ROOF HYDRANT

2.15.1. Woodford Mfg. Model RHY2-MS or approved equivalent, non-freeze roof hydrant with 25 mm (1") diameter inlet connection, 20 mm (3/4") diameter hose end outlet with dual check backflow preventer, a 3.2 mm (1/8") diameter inlet connection drain hole to automatically drain hydrant when shut-off, a mounting system with cast iron support and under deck flange, and required mounting hardware and accessories.

2.16. ELECTRONICTRAP SEAL PRIMERS

2.16.1. Electronic Type

a) Precision Plumbing Products #PT Series or approved equivalent, surface wall mounting, CSA certified, 115 V, 1-phase, 60 Hz., electronic, automatic trap priming manifolds, each sized to suit the number of drain traps or interceptors serviced, and each complete with:

1) Galvanized steel cabinet with door;

2) 20 mm (¾") diameter NPT copper pipe inlet with shut-off valve and water hammer arrestor;

3) Solenoid valve, an atmospheric vacuum breaker, and a discharge manifold with 12 mm (½") diameter compression-type copper tube connections on 40 mm (1-½") centres with quantity to suit the number of items to be primed; and

4) Control panel with circuit breaker, 5 A fuse, 24-hour timer, and manual override toggle switch.

2.17. SHOCK ABSORBERS

2.17.1. Type 304 stainless steel piping shock absorbers, each complete with a nesting type bellows and a casing of sufficient displacement volume to dissipate kinetic energy generated in piping system, and each sized to suit connecting potable water pipe and equipment it is provided for.

2.17.2. Standard of accepted products are:

a) Watts Industries (Canada) Inc. "SG" Series;

b) Jay R. Smith 5000 Series "HYDROTROL";

c) Zurn #Z1700 "SHOKTROL";

d) Mifab "HAMMERGUARD" WHB Series; or

e) Approved equivalent.

2.18. WATER HAMMER ARRESTORS

2.18.1. Piston type, sealed, pressurized water hammer arrestors suitable for either horizontal or vertical installation, each complete with a hard-drawn copper body, "O"-ring piston seals, an air charge, and an inlet opening equal to diameter of pipe in which arrestor is required.

2.18.2. Standard of accepted products are:

a) Watts Industries (Canada) Inc.;

b) Zurn #Z1705;

c) Precision Plumbing Products Inc. #SC;

d) Mifab MWH Series; or

e) Approved equivalent.

2.19. BACKFLOW PREVENTERS

2.19.1. Double Check Valve Assembly

a) Minimum 1205 kPa (175 psi) rated lead-free dual check valve assembly backflow preventer to CAN/CSA B64 (including supplements), complete with tight-closing resilient seated shut-off valves, test cocks and strainer.

b) Standard of accepted products are:

1) Watts Industries Canada;

2) Zurn/Wilkins;

3) Apollo Valves (Conbraco Industries); or

4) Approved equivalent.

2.19.2. Reduced Pressure Zone Assembly

a) Lead-free reduced pressure zone assembly backflow preventer in accordance with CAN/CSA B64 (including supplements), each of bronze or epoxy coated cast iron bronze fitted construction depending on size, and complete with inlet strainer, inlet and outlet shut-off valves, an intermediate relief valve, ball valve type test cocks, and a proper air gap fitting.

b) Standard of accepted products are:

1) Watts Industries #LF009QT-S for 12 mm (½") size, #LF909QT-S for 20 mm to 50 mm (¾" to 2") size, and #LF909-NRS-S for 65 mm (2-½") and larger size;

2) Zurn/Wilkins 975XL2 and 375 Series;

3) "Apollo" Valves manufactured by Conbraco Industries Inc. Series 4ALF;

4) Danfoss Flomatic Corp. Series RPZ; or

5) Approved equivalent.

2.20. PIPING EXPANSION COMPENSATORS AND GUIDES

2.20.1. Pressurized type, selected to withstand system pressure and to suit calculated movement from -5 °C (23 °F) to maximum operating temperature plus 25% safety factor, complete with stainless steel bellows and shroud, copper tube sweat-type female ends, anti-torque device, and proper and suitable alignment guides for both sides of each compensator.

2.20.2. Standard of accepted products are:

a) Senior Flexonics Series HB;

b) Hyspan Precision Products Series 8500; or

c) Approved equivalent.

2.21. PIPE ANCHORS

2.21.1. Welded structural black steel anchors of a design, size, and type to securely anchor pipe at point shown. Each anchor shall withstand 150% axial thrust, and shall be designed and detailed by a professional structural engineer registered and licensed in jurisdiction of the work. Submit anchor design and fabrication shop drawings, stamped by design engineer.

2.22. AIR VENTS

2.22.1. ITT Hoffman Specialty No. 78 cast brass or approved equivalent, 1035 kPa (150 psi) rated, 20 mm (¾") straight water main vent valves, each tapped at the top for a 3.2 mm (1/8") safety drain connection.

2.23. DOMESTIC WATER THERMAL EXPANSION TANK

2.23.1. Pre-charged domestic water thermal expansion tank in accordance with Section VIII of the ASME Boiler and Pressure Code, carbon steel outer shell construction and complete with fixed butyl rubber bladder to prevent water from contacting shell interior, top NPT stainless steel system connection, 7.6 mm to 813 mm (0.301" to 32") charging valve connection and prime painted exterior.

2.23.2. Acceptable products are:

a) Watts Industries (Canada) Inc. Series DETA;

b) Zurn/Wilkins Model WTTA; or

c) Approved equivalent

3. EXECUTION

3.1. UNDERGROUND MUNICIPAL SERVICE CONNECTION

3.1.1. Make required arrangements with Municipality for installation of domestic water service piping from Municipal main to property line.

3.1.2. Pay charges levied by Municipality for service connection work.

3.2. PIPING INSTALLATION REQUIREMENTS

3.2.1. Provide required domestic water piping.

3.2.2. Piping, unless otherwise specified, is as follows:

a) For underground buried piping less than 100 mm (4") diameter inside building – Type K soft copper;

b) For 12 mm (½") diameter trap seal primer tubing located underground or in concrete or masonry construction – PEX-A tubing;

c) For underground piping outside building to fixtures/outlets at grade level – flexible polyethylene, snaked in the trench and in a continuous length wherever possible;

d) For pipe inside building and aboveground in sizes to 100 mm (4") diameter – Type L hard copper with solder joints or Type L hard copper with pressure-coupled mechanical joints; and

e) For underground piping outside the building crossing under railways, piping shall be encased in a larger pipe called casing piping. Both the carrier or inner pipe and the casing or outer pipe shall conform to the applicable requirements of AREMA Chapter 1, Section 5.3 "Guidelines for Pipelines Conveying Non-Flammable Substances," with respective materials in conformance with CSA standards. Carrier pipe shall be Type K soft copper with soldered joints.

3.2.3. Brace and secure underground water service pipe at bends, tees, and similar fittings with restraint devices, and provide concrete thrust blocks in accordance with Municipal standards and details. Regardless of what is specified elsewhere in this Specification regarding provisions of concrete, provide thrust block concrete. Paint restraint devices with two coats of corrosion-resistant black asphalt base coating prior to backfilling.

3.2.4. Lay pipes true to line and grade with bells upgrade. Fit sections together so that, when complete, pipe has a smooth and uniform invert. Keep pipe thoroughly clean so jointed compound shall adhere. Inspect pipe for defects before being lowered into trench.

3.2.5. Slope piping so it can be completely drained.

3.2.6. Insulate piping in accordance with the requirements specified in Section 20 05 25.

3.2.7. Provide cast brass dielectric-type adapters/unions at connections between ferrous and copper pipe or equipment.

3.3. INSTALLATION OF SHUT-OFF AND CHECK VALVES

3.3.1. Refer to Part 3 of Section entitled Basic Mechanical Materials and Methods.

3.3.2. For shut-off valves installed on solder joint copper piping up to and including 50 mm (2") diameter, provide ball-type valves, and for flanged joints, copper or stainless-steel piping larger than 50 mm (2") diameter, provide butterfly-type valves or gate-type valves.

3.4. INSTALLATION OF DRAIN VALVES

3.4.1. Provide a drain valve at the bottom of domestic water piping risers, at other piping low points, and wherever else shown.

3.4.2. Locate drain valves so they are easily accessible.

3.5. INSTALLATION OF DOMESTIC HOT WATER PIPING BALANCING VALVES

3.5.1. Provide balancing valves in domestic hot water recirculation piping where shown or required.

3.5.2. Locate each valve so it is easily accessible.

3.6. INSTALLATION OF PARTITION STOPS

3.6.1. Provide partition stops in domestic water piping to each group of suite washroom plumbing fixtures. Locate partition stops in piping near floor level in inconspicuous but accessible locations. Confirm exact locations prior to roughing-in.

3.7. INSTALLATION OF PRESSURE REDUCING VALVES

3.7.1. Provide domestic water pressure reducing valves. Install so each valve is readily accessible. Whenever possible, provide pressure-reducing valves factory pre-set to required pressures.

3.7.2. Check and test operation and adjust as required.

3.8. INSTALLATION OF DOMESTIC HOT WATER THERMOSTATIC MIXING VALVES

3.8.1. Provide a domestic hot water thermostatic mixing valve assembly and wall mount.

3.8.2. Adjust each valve to design requirements and check and test operation. Set maximum temperature limit stops.

3.8.3. Identify each valve and its water temperature delivery setting with an engraved nameplate.

3.9. INSTALLATION OF WATER METER

3.9.1. Provide domestic water service meter. Secure meter in place on a concrete housekeeping pad and connect with piping, including required valve bypass.

3.9.2. Installation of water meter shall comply with local municipal requirements.

3.10. INSTALLATION OF HOSE BIBBS

3.10.1. Provide hose bibbs.

3.10.2. Unless otherwise shown, specified, or required, mount hose bibbs approximately 1 m (3') above floor. Confirm exact locations prior to roughing-in.

3.11. INSTALLATION OF EXTERIOR NON-FREEZE WALL HYDRANTS

3.11.1. Provide non-freeze wall hydrants.

3.11.2. Install hydrants level and plumb such that hose outlets are approximately 450 mm (1.5') above grade level. Confirm exact locations prior to roughing-in.

3.11.3. Provide a shut-off valve inside building to each exterior non-freeze wall hydrant.

3.12. INSTALLATION OF EXTERIOR NON-FREEZE GROUND HYDRANTS

3.12.1. Provide non-freeze ground hydrants. Confirm exact locations prior to roughing-in.

3.12.2. Ensure length of piping to outlet box suits depth of underground piping, and underground piping elbow and valve housing is set in an envelope of clean, sharp, 100% Proctor density compacted sand. Provide a length of small-bore copper tubing from valve drain port into sand envelope.

3.12.3. Provide a shut-off valve inside building to each ground hydrant.

3.13. INSTALLATION OF NON-FREEZE ROOF HYDRANT

3.13.1. Provide non-freeze roof hydrants. Confirm exact locations prior to roughing-in.

3.13.2. Coordinate installation with trades providing roof opening and roofing work to ensure a water-tight roof penetration.

3.13.3. Provide 3.2 mm (1/8") diameter drain piping from inlet connection assembly inside building to a funnel floor drain or other suitable indirect connection location.

3.14. INSTALLATION OF TRAP SEAL PRIMERS

3.14.1. Provide required accessible trap seal primers to automatically maintain a water seal in floor drain traps, funnel floor drain traps and hub drain traps, whether shown on drawings or not.

3.14.2. Provide 115 V, electronic, surface wall mounting trap primer assemblies for single or multiple (1 to 30) traps. Include for a 115 V 15 A panel breaker and wiring in conduit from closest panelboards to primer assembly, all to wiring standards of Electrical Division. Adjust primer water flow and timing to suit number of traps served.

3.14.3. Trap seal primer shall be located in a heated room or enclosure and 2.5 feet (1500 mm) above the floor.

3.14.4. Ensure trap primer piping is secured to drain primer tapping and not terminated through the tapping in the throat of the drain.

3.15. INSTALLATION OF SHOCK ABSORBERS

3.15.1. Provide accessible shock absorbers in domestic water piping.

3.15.2. Ensure size of each shock absorber is properly selected to suit size of domestic water pipe and equipment pipe is connected to.

3.16. INSTALLATION OF WATER HAMMER ARRESTORS

3.16.1. Provide accessible water hammer arrestors in domestic water piping in locations as follows:

a) In headers at groups of plumbing fixtures;

b) At top of risers;

c) At ends of long horizontal runs of piping;

d) In piping connecting solenoid valves or equipment with integral solenoid valves;

e) Wherever else shown or required by local governing code.

3.16.2. Install each unit in a piping tee either horizontally or vertically in the path of potential water shock in accordance with manufacturer's instructions and details.

3.17. INSTALLATION OF BACKFLOW PREVENTERS

3.17.1. Provide a double check valve assembly backflow preventer on incoming DCW service. Provide a reduced-pressure zone assembly backflow preventer in each direct domestic water connection to equipment other than plumbing fixtures and fittings.

3.17.2. Locate each backflow preventer on floor or wall between 765 mm and maximum 1.5 m (30" and 60") above floor such that it is easily accessible for maintenance and testing. Equip each backflow preventer with an air gap fitting and pipe the reduced-pressure zone water outlet to drain.

3.17.3. Test operation of each backflow preventer in accordance with requirements of CAN/CSA B64 by personnel certified for such testing by governing authorities and submit signed test results and a properly and clearly identified and marked inspection and test record card for each backflow preventer.

3.18. INSTALLATION OF EXPANSION COMPENSATORS, GUIDES AND ANCHORS

3.18.1. Provide expansion compensators in domestic water piping.

3.18.2. Ensure pipe ends are properly aligned. Provide alignment guides on each side of expansion compensators, properly secured to building structure.

3.18.3. Provide anchors to secure domestic water piping to structure. Locate anchors generally where shown, but with exact locations to suit piping as installed and requirements of reviewed anchor shop drawings.

3.18.4. When installation of anchors is complete, arrange and pay for anchor design engineer to visit site to review anchor installation. Submit a letter from design engineer confirming each anchor is properly installed.

3.19. INSTALLATION OF AIR VENTS

3.19.1. Provide accessible air vents in domestic water piping to prevent air binding.

3.19.2. Extend copper indirect drain piping from top drain connection of each vent to nearest suitable drain.

3.19.3. Locate exact vent locations on as-built record drawings.

3.20. INSTALLATION OF DOMESTIC WATER THERMAL EXPANSION TANK

3.20.1. Provide domestic water thermal expansion tanks.

3.20.2. Unless otherwise specified, mount at least 450 mm (18") from cold water inlet to domestic water heater.

3.20.3. Adjust pre-charge to match incoming water pressure after installation.

3.20.4. Install in accordance with manufacturer's instructions and as per local governing Codes and Regulations.

3.21. FLUSHING AND DISINFECTING PIPING

3.21.1. Flush and disinfect all new and/or reworked domestic water piping after leakage testing is complete.

3.21.2. Isolate new piping from existing piping prior to flushing and disinfecting procedures.

3.21.3. Flush piping until all foreign materials have been removed and flushed water is clear. Provide connections and pumps as required. Open and close valves, faucets, hose outlets, and service connections to ensure thorough flushing.

3.21.4. When flushing is complete, disinfect the piping with a solution of chlorine or approved equivalent, in accordance with AWWA C601.

3.21.5. When disinfecting is complete, submit water samples to a certified laboratory for purity testing and, when testing indicates pure water in accordance with governing standards, submit a copy of test results and fill the systems.

END OF SECTION