Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 22 05 29 HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

.2 Section 20 05 53 MECHANICAL INDENTIFICATION

.3 Section 22 07 15 THERMAL INSULATION FOR PIPING

.4 Section 22 11 16 DOMESTIC WATER PIPING

.5 Section 22 13 17 DRAINAGE WASTE AND VENT PIPING - CAST IRON AND COPPER

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.2 Green Seal Environmental Standards (GSES)

.1 Standard GS-11-2008, 2nd Edition, Environmental Standard for Paints and Coatings.

.3 National Fire Code of Canada (NFCC 2005)

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 00 02 - Standard General Requirements.

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheets for piping and equipment and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 00 02 - Standard General Requirements.

.2 Delivery and Acceptance Requirements:

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Packaging Waste Management: remove for reuse and return of pallets crates packaging materials in accordance with Section 01 74 21 - Construction Waste Management and Disposal.

Part 2 Products

2.1 MATERIAL

.1 Paint: zinc-rich to CAN/CGSB-1.181.

.1 Primers, Paints, and Coating: Apply in accordance with manufacturer's recommendations for surface conditions.

.2 Primer: maximum VOC limit 250 g/L to Standard GS-11 to SCAQMD Rule 1113.

.3 Paints: maximum VOC limit 150 g/L to Standard GS-11 to SCAQMD Rule 1113.

.2 Sealants: in accordance with Section 07 92 00 - Joint Sealants.

.1 Sealants: maximum VOC limit to SCAQMD Rule 1168 to GSES GS-36.

.3 Sealants: maximum VOC limit to SCAQMD Rule 1168 to GSES GS-36.

.4 Adhesives: maximum VOC limit to SCAQMD Rule 1168 to GSES GS-36.

.5 Fire Stopping: in accordance with Section 07 84 00 – Fire Stopping.

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 CONNECTIONS TO EQUIPMENT

.1 In accordance with manufacturer's instructions unless otherwise indicated.

.2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.

.3 Use double swing joints when equipment mounted on vibration isolation and when piping subject to movement.

3.3 CLEARANCES

.1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer and National Fire Code of Canada.

.2 Provide space for disassembly, removal of equipment and components as recommended by manufacturer as indicated without interrupting operation of other system, equipment, and components.

3.4 DRAINS

.1 Install piping with grade in direction of flow except as indicated.

.2 Install drain valve at low points in piping systems, at equipment and at section isolating valves.

.3 Pipe each drain valve discharge separately to above floor drain.

.1 Discharge to be visible.

.4 Drain valves: NPS 3/4 gate or globe valves unless indicated otherwise, with hose end male thread, cap and chain.

3.5 DIELECTRIC COUPLINGS

.1 General: compatible with system, to suit pressure rating of system.

.2 Locations: where dissimilar metals are joined.

.3 NPS 2 and under: isolating unions or bronze valves.

.4 Over NPS 2: isolating flanges.

3.6 PIPEWORK INSTALLATION

.1 Install pipework to CSA B139.

.2 Screwed fittings jointed with Teflon tape.

.3 Protect openings against entry of foreign material.

.4 Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.

.5 Assemble piping using fittings manufactured to ANSI standards.

.6 Saddle type branch fittings may be used on mains if branch line is no larger than half size of main.

.1 Hole saw (or drill) and ream main to maintain full inside diameter of branch line prior to welding saddle.

.7 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.

.8 Install concealed pipework to minimize furring space, maximize headroom, and conserve space.

.9 Slope piping, except where indicated, in direction of flow for positive drainage and venting.

.10 Install, except where indicated, to permit separate thermal insulation of each pipe.

.11 Group piping wherever possible and as indicated.

.12 Ream pipes, remove scale and other foreign material before assembly.

.13 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.

.14 Provide for thermal expansion as indicated.

.15 Valves:

.1 Install in accessible locations.

.2 Remove interior parts before soldering.

.3 Install with stems above horizontal position unless indicated.

.4 Valves accessible for maintenance without removing adjacent piping.

.5 Install globe valves in bypass around control valves.

.6 Use gate, ball, or butterfly valves at branch take-offs for isolating purposes except where specified.

.7 Install butterfly valves on chilled water and related condenser water systems only.

.8 Install plug cocks ball valves for glycol service.

3.7 SLEEVES

.1 General: install where pipes pass through masonry, concrete structures, fire rated assemblies, and as indicated.

.2 Material: schedule 40 black steel pipes.

.3 Construction: use annular fins continuously welded at mid-point at foundation walls and where sleeves extend above finished floors.

.4 Sizes: 6 mm minimum clearance between sleeve and uninsulated pipe or between sleeve and insulation.

.5 Installation:

.1 Concrete, masonry walls, and concrete floors on grade: terminate flush with finished surface.

.2 Other floors: terminate 25 mm above finished floor.

.3 Before installation, paint exposed exterior surfaces with heavy application of zinc-rich paint to CAN/CGSB-1.181.

.6 Sealing:

.1 Foundation walls and below grade floors: fire retardant, waterproof non-hardening mastic.

.2 Elsewhere:

.1 Provide space for fire stopping.

.2 Maintain fire rating integrity.

.3 Sleeves installed for future use: fill with lime plaster or other easily removable filler.

.4 Ensure no contact between copper pipe or tube and sleeve.

3.8 ESCUTCHEONS

.1 Install on pipes passing through walls, partitions, floors, and ceilings in finished areas.

.2 Construction: one piece type with set screws.

.1 Chrome or nickel plated brass or type 302 stainless steel.

.3 Sizes: outside diameter to cover opening or sleeve.

.1 Inside diameter to fit around pipe or outside of insulation if so provided.

3.9 PREPARATION FOR FIRE STOPPING

.1 Install fire stopping within annular space between pipes, ducts, insulation and adjacent fire separation in accordance with Section 07 84 00 - Fire Stopping.

.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 movement without damaging fires topping material or installation.

.4 Insulated pipes and ducts: ensure integrity of insulation and vapour barriers.

3.10 CLEANING

.1 Clean in accordance with Section 01 00 02 - Standard General Requirements.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 22 11 16 DOMESTIC WATER PIPING

1.2 REFERENCES

.1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME)

.1 ANSI/ASME B1.20.1-1983 (R2006), Pipe Threads, General Purpose (Inch).

.2 ANSI/ASME B16.18-2001, Cast Copper Alloy Solder Joint Pressure Fittings.

.2 ASTM International

.1 ASTM A276-08, Standard Specification for Stainless Steel Bars and Shapes.

.2 ASTM B62-02, Standard Specification for Composition Bronze or Ounce Metal Castings.

.3 ASTM B283-08a, Standard Specification for Copper and Copper Alloy Die Forgings (Hot-Pressed).

.4 ASTM B505/B505M-08a, Standard Specification for Copper-Base Alloy Continuous Castings.

.3 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS)

.1 MSS-SP-25-1998, Standard Marking System for Valves, Fittings, Flanges and Unions.

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

.3 MSS-SP-110-1996, Ball Valves, Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 00 02 - Standard General Requirements.

.2 Product Data:

.1 Provide manufacturer's printed product literature and data sheets for equipment and systems and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit data for valves specified in this Section.

1.4 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for incorporation into manual specified in Section 01 00 02 - Standard General Requirements.

1.5 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Materials/Spare Parts:

.1 Furnish following spare parts:

.1 Valve seats: one for every 10 valves each size, minimum 1.

.2 Discs: one for every 10 valves, each size. Minimum 1.

.3 Stem packing: one for every 10 valves, each size. Minimum 1.

.4 Gaskets for flanges: one for every 10 flanged joints.

.2 Tools:

.1 Furnish special tools for maintenance of systems and equipment.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 00 02 - Standard General Requirements with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements:

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials in accordance with Section 01 74 21 - Construction Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

.1 Valves:

.1 Except for specialty valves, to be single manufacturer.

.2 Products to have CRN registration numbers.

.2 End Connections:

.1 Connection into adjacent piping/tubing:

.1 Steel pipe systems: screwed ends to ANSI/ASME B1.20.1.

.2 Copper tube systems: solder ends or grooved ends to ANSI/ASME B16.18.

.3 Lockshield Keys:

.1 Where lockshield valves are specified, provide 10 keys of each size: malleable iron cadmium plated.

.4 Ball Valves:

.1 NPS 2 and under:

.1 Body and cap: cast high tensile bronze to ASTM B62.

.2 Pressure rating: Class125 WOG 2760-kPa CWP 4140-kPa CWP, 860 kPa steam.

.3 Connections: screwed ends to ANSI B1.20.1 and with hexagonal shoulders solder ends to ANSI.

.4 Stem: tamperproof ball drive.

.5 Stem packing nut: external to body.

.6 Ball and seat: replaceable stainless steel solid ball and Teflon seats.

.7 Stem seal: TFE with external packing nut.

.8 Operator: removable lever handle.

.9 Full port type.

Part 3 Execution

3.1 INSTALLATION

.1 Install rising stem valves in upright position with stem above horizontal.

.2 Remove internal parts before soldering.

.3 Install valves with unions at each piece of equipment arranged to allow servicing, maintenance, and equipment removal.

3.2 CLEANING

.1 Clean in accordance with Section 01 00 02 - Standard General Requirements.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction Waste Management and Disposal

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 22 05 05 Installation of Pipework

1.2 REFERENCES

.1 American Society of Mechanical Engineers (ASME)

.1 ASME B31.1-07, Power Piping.

.2 ASTM International

.1 ASTM A125-2007, Standard Specification for Steel Springs, Helical, Heat-Treated.

.2 ASTM A307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.3 ASTM A563-07a, Standard Specification for Carbon and Alloy Steel Nuts.

.3 Factory Mutual (FM)

.4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)

.1 MSS SP58-2002, Pipe Hangers and Supports - Materials, Design and Manufacture.

.2 MSS SP69-2003, Pipe Hangers and Supports - Selection and Application.

.3 MSS SP89-2003, Pipe Hangers and Supports - Fabrication and Installation Practices.

.5 Underwriter's Laboratories of Canada (ULC)

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 00 02 - Standard General Requirements.

.2 Product Data:

.1 Provide manufacturer's printed product literature and data sheets for hangers and supports and include product characteristics, performance criteria, physical size, finish and limitations

.3 Shop Drawings:

.1 Submit shop drawings for:

.1 Bases, hangers and supports.

.2 Connections to equipment and structure.

.3 Structural assemblies.

.4 Upper attachment

.5 Middle attachment

.6 Pipe attachment.

.7 Riser clamps

.8 Shields and saddles

.9 Sway braces

.4 Certificates:

.1 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Manufacturers' Instructions:

.1 Provide manufacturer's installation instructions for incorporations into manual.

1.4 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for incorporation into manual specified in Section 01 00 02 - Standard General Requirements.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 00 02 - Standard General Requirements with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements:

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials in accordance with Section 01 74 21 - Construction Waste Management and Disposal.

Part 2 Products

2.1 SYSTEM DESCRIPTION

.1 Design Requirements:

.1 Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.

.2 Base maximum load ratings on allowable stresses prescribed by ASME B31.1 or MSS SP58.

.3 Ensure that supports, guides, anchors do not transmit excessive quantities of heat or vibration to building structure.

.4 Design hangers and supports to support systems under conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.

.5 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment in accordance with MSS SP58.

.6 Coordinate all hangers/supports with sections 20 05 48 – Vibration controls for piping and equipment, and 20 05 49 – Seismic restraints and services for mechanical piping, ductwork, and equipment.

2.2 GENERAL

.1 Fabricate hangers, supports and sway braces in accordance with MSS SP58, and ANSI B31.1.

2.3 PIPE HANGERS

.1 Finishes:

.1 Pipe hangers and supports: galvanized.

.2 Use electro-plating galvanizing process.

.3 Steel hangers, for copper piping shall be copper plated.

.2 Upper attachment structural: suspension from lower flange of I-Beam:

.1 Cold piping NPS 2 maximum: malleable iron C-clamp to MSS-SP-58, type 19. ULC listed with hardened steel cup point setscrew, locknut carbon steel retaining clip.

.1 Rod: 13 mm.

.2 Acceptable Manufacturer: Grinnell fig. 229 or approved equal.

.2 Cold piping NPS 2 1/2 or greater, hot piping: malleable iron beam clamp, eye rod, jaws and extension with carbon steel retaining clip, tie rod, nuts and washers, type 28 or 29 UL listed to MSS-SP58, or MSS-SP69.

.1 Acceptable Manufacturer: Grinnell fig. 229 or approved equal.

.3 Upper attachment structural: suspension from upper flange of I-Beam:

.1 Cold piping NPS 2 maximum: ductile iron top-of-beam C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip, type 19, UL listed to MSS-SP58 or to MSS SP69.

.1 Acceptable Manufacturer: Grinnell fig.61 or approved equal.

.2 Cold piping NPS 2 1/2 or greater, hot piping: malleable iron top-of-beam jaw-clamp with hooked rod, spring washer, plain washer and nut, type 25 UL listed to MSS-SP58.

.1 Acceptable Manufacturer: Grinnell fig.227 or approved equal.

.4 Upper attachment to concrete:

.1 Inserts for cast-in-place concrete galvanized steel wedge to MSS-SP-58, type 18 ULC listed for pipe NPS 3/4 through NPS 8

.1 Acceptable Manufacturer: Grinnell fig.281or approved equal.

.2 Carbon steel plate with clevis, for surface mount: malleable iron socket and expansion case and bolt. Minimum two expansion cases and bolts for each hanger. UL listed to MSS SP69.

.1 Acceptable Manufacturer: Grinnell, Plate fig.49, Eye Nut fig. 290, Expansion Case Fig. 117 or approved equal.

.5 Upper attachment to steel joist:

.1 Piping NPS 2 and under: steel washer plate with double locking nuts.

.1 Acceptable Manufacturer: Grinnell fig. 60 or approved equal.

.2 Cold piping NPS 2-1/2 and larger and all hot piping: steel washer plates with double locking nut, carbon steel clevis and malleable iron socket.

.1 Acceptable Manufacturer: Grinnell: washer plate, fig. 60; clevis, fig 66; eye nut, fig 290 or approved equal.

.6 Upper attachment to steel channel or angle (top):

.1 Piping NPS 2 and under; malleable iron "top of beam" C clamp to MSS-SP-58, type 19. ULC listed

.1 Acceptable Manufacturer: Grinnell or approved equal.

Cold piping NPS 2-1/2 and larger and all hot piping: steel jaw, hook rod with nut, spring washer and plain washer, to MSS-SP-58, type 25. ULC listed.

.1 Acceptable Manufacturer: Grinnell: fig.227 or approved equal.

.7 Hanger rods: Carbon steel threaded rod material to MSS SP58:

.1 Ensure that hanger rods are subject to tensile loading only.

.2 Provide linkages where lateral or axial movement of pipework is anticipated.

.3 Acceptable Manufacturer: Grinnell: fig.146 or approved equal

.8 Pipe attachments: material to MSS SP58:

.1 Cold piping, steel or cast iron: hot piping steel, with less than 25 mm horizontal movement; hot piping, steel, with more than 300 mm middle attachment (rod) length: adjustable clevis to MSS-SP-58, type 1. ULC listed.

.1 Acceptable Manufacturer: Grinnell: fig.260 or approved equal

.2 Cold copper piping, steel or cast iron: hot piping steel, with less than 25 mm horizontal movement; hot copper piping, steel, with more than 300 mm middle attachment (rod) length: adjustable clevis to MSS-SP-58, type 1 Copper plated. ULC listed.

.1 Acceptable Manufacturer: Grinnell: fig.CT-65 or approved equal

.3 Suspended hot piping, steel and copper, with horizontal movement in excess of 25mm; hot steel piping with middle attachment (rod) 300 mm or less; pipe roller to MSS-SP-58, type 43.

.1 Acceptable Manufacturer: Grinnell: fig.174 or approved equal

.4 Bottom supported hot piping, steel and copper: pipe roller stand to MSS-SP-58, type 45.

.1 Acceptable Manufacturer: Grinnell: fig.271 or approved equal

.5 Use insulation shields for hot pipework.

.6 Oversize pipe hangers and supports.

.9 Pipe rollers: cast iron roll and roll stand with carbon steel rod to MSS SP69.

2.4 RISER CLAMPS

.1 Steel or cast iron pipe: carbon steel to MSS SP58, type 42, UL listed.

.1 Acceptable Manufacturer: Grinnell fig 261 or approved equal

.2 Copper pipe: carbon steel copper plated to MSS SP58, type 42.

.1 Acceptable Manufacturer: Grinnell fig CT-121 or approved equal

.3 Bolts: to ASTM A307.

.4 Nuts: to ASTM A563.

2.5 INSULATION PROTECTION SHIELDS

.1 Insulated piping:

.1 64 kg/m^3 density insulation plus insulation protection shield with uninterrupted vapor barrier to: MSS SP69, galvanized sheet carbon steel.

.1 Acceptable Manufacturer: Grinnell fig 167 or approved equal.

.2 For hot piping, NPS 2.5 and greater, use 300mm long rigid calcium silicate block under shield.

.3 Length: Minimum 300mm.

2.6 EQUIPMENT SUPPORTS

.1 Fabricate equipment supports not provided by equipment manufacturer from structural grade steel.

2.7 HOUSE-KEEPING PADS

.1 Re-use existing.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install in accordance with:

.1 Manufacturer's instructions and recommendations.

.2 Vibration Control Devices:

.1 Install on piping systems at pumps, boilers, chillers, cooling towers, and as indicated.

.3 Clamps on riser piping:

.1 Support independent of connected horizontal pipework using riser clamps and riser clamp lugs welded to riser.

.2 Bolt-tightening torques to industry standards.

.3 Steel pipes: install below coupling or shear lugs welded to pipe.

.4 Cast iron pipes: install below joint.

.4 Clevis plates:

.1 Attach to concrete with 4 minimum concrete inserts, one at each corner.

.5 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

.6 Use approved constant support type hangers where:

.1 Vertical movement of pipework is 13 mm or more,

.2 Transfer of load to adjacent hangers or connected equipment is not permitted.

.7 Use variable support spring hangers where:

.1 Transfer of load to adjacent piping or to connected equipment is not critical.

.2 Variation in supporting effect does not exceed 25 % of total load.

3.3 HANGER SPACING

.1 Spacing and middle attachment (rod) diameter as specified in paragraphs below or as in table, whichever is more stringent.

.1 Plumbing piping: to Canadian Plumbing Code, or authority having jurisdiction

.2 Fire protection: to applicable fire code

.3 Gas and fuel oil piping: up to NPS 1/2: every 1.8m

.4 Copper piping: up to NPS 1/2: every 1.5 m.

.5 Flexible joint roll groove pipe: in accordance with table below for steel, but not less than one hanger at joints. Table listings for straight runs without concentrated loads and where full linear movement is not required.

.6 Within 300mm of each elbow.

Maximum Pipe Size : NPS	Maximum Spacing Steel	Maximum Spacing Copper
up to 1-1/4	2.4 m	1.8 m
1-1/2	3.0 m	2.4 m
2	3.0 m	2.4 m
2-1/2	3.7 m	3.0 m

.7 Pipework greater than NPS 12: to MSS SP69.

3.4 HANGER INSTALLATION

.1 Install hanger so that rod is vertical under operating conditions.

.2 Adjust hangers to equalize load.

.3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.

3.5 HORIZONTAL MOVEMENT

.1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4 degrees from vertical.

.2 Where horizontal pipe movement is less than 13 mm, offset pipe hanger and support so that rod hanger is vertical in the hot position.

3.6 FINAL ADJUSTMENT

.1 Adjust hangers and supports:

.1 Ensure that rod is vertical under operating conditions.

.2 Equalize loads.

.2 Adjustable clevis:

.1 Tighten hanger load nut securely to ensure proper hanger performance.

.2 Tighten upper nut after adjustment.

.3 C-clamps:

.1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.

.4 Beam clamps:

.1 Hammer jaw firmly against underside of beam.

3.7 CLEANING

.1 Clean in accordance with Section 01 00 02 - Standard General Requirements.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction Waste Management and Disposal

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 This section applies to all piping for this project including plumbing and hydronic systems.

.2 Fire protection piping is an exception.

1.2 REFERENCES

.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

.1 ASHRAE Standard 90.1-01, Energy Standard for Buildings except Low-Rise Residential Buildings (IESNA co-sponsored; ANSI approved; Continuous Maintenance Standard).

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM B209M-04, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate Metric.

.2 ASTM C335-04, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.

.3 ASTM C411-04, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.

.4 ASTM C449/C449M-00, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.

.5 ASTM C533-2004, Calcium Silicate Block and Pipe Thermal Insulation.

.6 ASTM C547-2003, Mineral Fiber Pipe Insulation.

.7 ASTM C921-03a, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

.3 Canadian General Standards Board (CGSB)

.1 CGSB 51-GP-52Ma-89, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.2 CAN/CGSB-51.53-95, Poly (Vinyl Chloride) Jacketing Sheet, for Insulated Pipes, Vessels and Round Ducts

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.5 Manufacturer's Trade Associations

.1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (Revised 2004).

.6 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S102-03, Surface Burning Characteristics of Building Materials and Assemblies.

.2 CAN/ULC-S701-01, Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.3 CAN/ULC-S702-1997, Thermal Insulation, Mineral Fibre, for Buildings

.4 CAN/ULC-S702.2-03, Thermal Insulation, Mineral Fibre, for Buildings, Part 2: Application Guidelines.

1.3 DEFINITIONS

.1 For purposes of this section:

.1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces. This shall include work above T-bar and drywall ceilings, in chases, shafts, tunnels, and plenums.

.2 "EXPOSED" - will mean "not concealed" as specified.

.2 TIAC ss:

.1 CRF: Code Rectangular Finish.

.2 CPF: Code Piping Finish.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals: in accordance with Section 01 00 02 - Standard General Requirements.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 00 02 - Standard General Requirements. Include product characteristics, performance criteria, and limitations.

.1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 00 02 - Standard General Requirements.

.3 Shop Drawings:

.1 Submit shop drawings in accordance with Section 01 00 02 - Standard General Requirements.

1.5 QUALITY ASSURANCE

.1 Qualifications:

.2 Installer: specialist in performing work of this Section, and have at least 3 years successful experience in this size and type of project, qualified to standards member of TIAC.

.3 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety Requirements.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 00 02 - Standard General Requirements.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.3 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.2 Storage and Protection:

.1 Protect from weather, construction traffic.

.2 Protect against damage.

.3 Store at temperatures and conditions required by manufacturer.

.3 Waste Management and Disposal:

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

.2 Place excess or unused insulation and insulation accessory materials in designated containers.

.3 Divert unused metal materials from landfill to metal recycling facility approved Consultant.

.4 Dispose of unused adhesive material at official hazardous material collections site approved by Consultant.

Part 2 Products

2.1 FIRE AND SMOKE RATING

.1 In accordance with CAN/ULC-S102.

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

2.2 INSULATION

.1 25mm thick mineral fibre specified includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C335.

.3 TIAC Code A-1: rigid moulded mineral fibre without factory applied vapour retarder jacket.

.1 Mineral fibre: to CAN/ULC-S702 ASTM C547.

.2 Maximum "k" factor: to CAN/ULC-S702.

.4 TIAC Code A-3: rigid moulded mineral fibre with factory applied vapour retarder jacket.

.1 Mineral fibre: to CAN/ULC-S702 ASTM C547.

.2 Jacket: to CGSB 51-GP-52Ma.

.3 Maximum "k" factor: to CAN/ULC-S702 ASTM C547.

2.3 INSULATION SECUREMENT

.1 Tape: self-adhesive, aluminum, reinforced, 50mm wide minimum.

.2 Contact adhesive: quick setting.

.3 Canvas adhesive: washable.

.4 Tie wire: 1.5mm diameter stainless steel.

.5 Bands: stainless steel, 19mm wide, 0.5mm thick.

2.4 CEMENT

.1 Thermal insulating and finishing cement:

.1 Hydraulic setting on mineral wool, to ASTM C449/C449M.

2.5 VAPOUR RETARDER LAP ADHESIVE

.1 Water based, fire retardant type, compatible with insulation.

2.6 INDOOR VAPOUR RETARDER FINISH

.1 Vinyl emulsion type acrylic, compatible with insulation.

2.7 OUTDOOR VAPOUR RETARDER FINISH

.1 Vinyl emulsion type acrylic, compatible with insulation.

.2 Reinforcing fabric: fibrous glass, untreated 305 g/m^2.

2.8 JACKETS

.1 Polyvinyl Chloride (PVC):

.1 One-piece moulded type and sheet to CAN/CGSB-51.53 with pre-formed shapes as required.

.2 Colours: to match adjacent finish paint by Consultant.

.3 Minimum service temperatures: -20 degrees C.

.4 Maximum service temperature: 65 degrees C.

.5 Moisture vapour transmission: 0.02 perm.

.6 Thickness: 0.5mm.

.7 Fastenings:

.1 Use solvent weld adhesive compatible with insulation to seal laps and joints.

.2 Tacks.

.3 Pressure sensitive vinyl tape of matching colour.

.8 Special requirements:

.1 Outdoor: UV rated material at least 0.5mm thick.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PRE-INSTALLATION REQUIREMENT

.1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.

.2 Surfaces clean, dry, free from foreign material.

3.3 INSTALLATION

.1 Install in accordance with TIAC National Standards.

.2 Apply materials in accordance with manufacturer’s instructions and this specification.

.3 Use two layers with staggered joints when required nominal wall thickness exceeds 75mm.

.4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.1 Install hangers, supports outside vapour retarder jacket.

.5 Supports, Hangers:

.1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

3.4 REMOVABLE, PRE-FABRICATED, INSULATION AND ENCLOSURES

.1 Application: at expansion joints, valves, primary flow measuring elements flanges and unions at equipment.

.2 Design: to permit movement of expansion joint to permit periodic removal and replacement without damage to adjacent insulation.

.3 Insulation:

.1 Insulation, fastenings and finishes: same as system.

.2 Jacket: aluminum.

3.5 INSTALLATION OF ELASTOMERIC INSULATION

.1 Insulation to remain dry. Overlaps to manufacturer's instructions. Ensure tight joints.

.2 Provide vapour retarder as recommended by manufacturer.

.3 Provide aluminum protective jacket.

3.6 PIPING INSULATION SCHEDULES

.1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.

.2 TIAC Code: A-1.

.1 Securements: Tape at 300mm on centre.

.2 Seals: lap seal adhesive, lagging adhesive.

.3 Installation: TIAC Code 1501-H.

.3 TIAC Code: A-3.

.1 Securements: Tape at 300mm on centre.

.2 Seals: VR lap seal adhesive, VR lagging adhesive.

.3 Installation: TIAC Code: 1501-C.

.4 Thickness of insulation as listed in following table.

.1 Run-outs to individual units and equipment not exceeding 4000mm long.

.2 Do not insulate exposed run outs to plumbing fixtures, chrome plated piping, valves, and fittings.

Application	Temp degrees C	TIAC code			
			Pipe sizes (NPS) and insulation thickness (mm)	Up to 1	1 1/4 to 2
Chilled Water	60 - 94	A-1		25	38
Domestic HWS		A-1		25	25
Domestic CWS		A-3		25	25

.5 Finishes:

.1 Exposed indoors: PVC.

.2 Exposed in mechanical rooms: PVC jacket.

.3 Concealed, indoors: canvas on valves, fittings. No further finish.

.4 Use vapour retarder jacket on TIAC code A-3 insulation compatible with insulation.

.5 Installation: to appropriate TIAC code CRF/1 through CPF/5.

3.7 FIELD QUALITY CONTROL

.1 Verification requirements in accordance with Section 01 35 21 - LEED Requirements: Contractor's Verification, include:

.1 Materials and resources.

.2 Storage and collection of recyclables.

.3 Construction waste management.

.4 Resource reuse.

.5 Recycled content.

.6 Local/regional materials.

.7 Certified wood.

.8 Low-emitting materials.

3.8 CLEANING

.1 Proceed in accordance with Section 01 00 02 - Standard General Requirements.

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 22 05 05 – Installation of pipework.

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.

.5 Shall comply with NSF/ANSI 61 Annex G. for lead requirements. This applies to all wetted components for drinking water.

.2 ASTM International Inc.

.1 ASTM A307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.2 ASTM A312-12a, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.

.3 ASTM A536-84(2004) e1, Standard Specification for Ductile Iron Castings.

.4 ASTM B88M-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 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.5 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).

.1 MSS-SP-67-02a, Butterfly Valves.

.2 MSS-SP-70-06, Gray Iron Gate Valves, Flanged and Threaded Ends.

.3 MSS-SP-71-05, Gray Iron Swing Check Valves, Flanged and Threaded Ends.

.4 MSS-SP-80-03, Bronze Gate, Globe, Angle and Check Valves.

.6 National Research Council (NRC)/Institute for Research in Construction

.1 NRCC 38728, National Plumbing Code of Canada (NPC) - 1995.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 00 02 - Standard General Requirements.

.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.

.2 Grooved joint couplings and fittings shall be referred to on shop drawings and product submittals and shall be identified by the manufacturer’s style or series designation. Trade names and abbreviations are not acceptable.

.3 Closeout Submittals:

.1 Provide maintenance data for incorporation into manual specified in Section 01 00 02 - Standard General Requirements.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Store and manage hazardous materials in accordance with Section 01 35 21 - LEED Requirements: Construction.

.2 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 21 - Construction Waste Management and Disposal.

.3 Place materials defined as hazardous or toxic in designated containers.

.4 Handle and dispose of hazardous materials in accordance with Regional and Municipal regulations.

1.5 SUSTAINABLE REQUIREMENTS

.1 Construction:

.1 Construction requirements detailed in Section 01 35 21 - LEED Requirements: Construction form integral part of this project including materials and products of this Section. Sustainable construction requirements include:

.1 Specific construction requirements for project.

.2 Specification text to ensure that project will comply with PWGSC green design process and sustainability requirements.

.3 Administrative, temporary and procedural requirements for the use of materials and methods of construction.

Part 2 Products

2.1 SUSTAINABLE REQUIREMENTS

.1 Materials and products in accordance with Section 01 35 21 - LEED Requirements: Construction

2.2 PIPING

.1 Domestic hot, cold and recirculation systems, within building.

.1 Above ground:

.1 Copper tube, hard drawn, type L: to ASTM B88M.

.2 Buried or embedded: copper tube, soft annealed, type K: to ASTM B88M, in long lengths and with no buried joints.

2.3 FITTINGS

.1 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.

.2 NPS 1 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.

.3 All fittings shall be UL classified in accordance with NSF-61 for potable water service. The system shall meet the low-lead requirements of NSF-372.

2.4 JOINTS

.1 Solder: 95/5 tin copper alloy.

.2 Teflon tape: for threaded joints.

.3 Dielectric connections between dissimilar metals:

.1 Dielectric fitting, complete with thermoplastic liner.

.2 Copper silicon casting conforming to UNS C87850 with grooved and/or threaded ends. Basis of Design: Victaulic Series 647.

.3 UL classified in accordance with NSF-61 for potable water service, and shall meet the low-lead requirements of NSF-372.

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 22 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 22 05 23.01 - Valves - Bronze.

.3 NPS 2 1/2 and over flanged:

.1 To MSS-SP-71, Class 125, 860 kPa, cast iron body, flat flange faces, regrind renewable seat, bronze disc, bolted cap specified Section 22 05 23.02 - Valves - Cast Iron: Gate, Globe, Check.

2.6 BALL VALVES

.1 NPS 2 and under, screwed:

.1 Class 150.

.2 Forged Brass body, stainless steel ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle as specified Section 22 05 23.01 - Valves - Bronze.

.2 NPS 2 and under, Vic-Press:

.1 2750 kPa.

.2 Grade CF8M stainless steel body, full port stainless steel ball, stainless steel, stem, PTFE seats, and stainless steel handle. Standard of Acceptance: Victaulic Series P569.

.3 NPS 2 and under, soldered:

.1 To ANSI/ASME B16.18, Class 150.

.2 Bronze body, stainless steel ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle, with NPT to copper adaptors as specified Section 22 05 23.01 - Valves - Bronze.

.4 UL classified in accordance with NSF-61 for potable water service, and shall meet the low-lead requirements of NSF-372.

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 local authority having jurisdiction.

.2 Install pipe work in accordance with Section 22 05 05 - Installation of Pipework, supplemented as specified herein.

.3 Assemble piping using fittings manufactured to ANSI standards.

.4 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.

.5 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.

.6 Grooved joint couplings and fittings shall be installed in accordance with the manufacturer's written installation instructions. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. Gaskets shall be verified as suitable for the intended service prior to installation. Gaskets shall be molded and produced by the coupling manufacturer. The grooved coupling manufacturer's factory trained representative shall provide on-site training for contractor's field personnel in the use of grooving tools, application of groove, and installation of grooved joint products. The manufacturer's representative shall periodically visit the jobsite and review installation. Contractor shall remove and replace any joints deemed improperly installed.

.7 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 gate, butterfly, or 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 20 05 01 - Common Work Results for Mechanical.

.2 Test pressure: greater of 1 time's 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 that system can be completely drained.

.3 Ensure that pressure booster systems are operating properly.

.4 Ensure that air chambers, expansion compensators are installed properly.

3.6 START-UP

.1 Timing: start up after:

.1 Pressure tests have been completed.

.2 Disinfection procedures have been completed.

.3 Certificate of static completion has been issued.

.4 Water treatment systems operational.

.2 Provide continuous supervision during start-up.

.3 Start-up procedures:

.1 Establish circulation and ensure that air is eliminated.

.2 Check pressurization to ensure proper operation and to prevent water hammer, flashing and/or cavitation.

.3 Bring HWS storage tank up to design temperature slowly.

.4 Monitor piping HWS and HWC piping systems for freedom of movement, pipe expansion as designed.

.5 Check control, limit, and safety devices for normal and safe operation.

.4 Rectify start-up deficiencies.

3.7 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 22 05 93 - Testing, Adjusting and Balancing for Plumbing and Heating.

.3 Adjust pressure regulating valves while withdrawals are at maximum and inlet pressure is at minimum.

.4 Sterilize HWS and HWC systems for Legionella control.

.5 Verify performance of temperature controls.

.6 Verify compliance with safety and health requirements.

.7 Check for proper operation of water hammer arrestors. Run one outlet for 10 seconds, then shut of water immediately. If water hammer occurs, replace water hammer arrestor or re-charge air chambers. Repeat for outlets and flush valves.

.8 Confirm water quality consistent with supply standards, and ensure no residuals remain as result of flushing or cleaning.

.3 Reports:

.1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: Reports, using report forms as specified in Section 01 91 13 - General Commissioning (Cx) Requirements: Report Forms and Schematics.

.2 Include certificate of water flow and pressure tests conducted on incoming water service, demonstrating adequacy of flow and pressure.

3.8 OPERATION REQUIREMENTS

.1 Co-ordinate operation and maintenance requirements including, cleaning and maintenance of specified materials and products with Section 22 05 05 - Installation of Pipework.

.2 Operational requirements in accordance with Section 01 35 21 – LEED Requirements: Operation, include:

.1 Cleaning materials and schedules.

.2 Repair and maintenance materials and instructions.

3.9 CLEANING

.1 Clean in accordance with Section 01 00 02 – Standard General Requirements.

.2 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction Waste Management and Disposal 01 35 21 - LEED Requirements.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 22 05 05 – Installation of pipework.

1.2 REFERENCES

.1 ASTM International Inc.

.1 ASTM B32-08, Standard Specification for Solder Metal.

.2 ASTM B306-02, Standard Specification for Copper Drainage Tube (DWV).

.3 ASTM C564-03a, Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

.2 Canadian Standards Association (CSA International).

.1 CSA B67-1972(R1996), Lead Service Pipe, Waste Pipe, Traps, Bends and Accessories.

.2 CAN/CSA-B70-06, Cast Iron Soil Pipe, Fittings and Means of Joining.

.3 CAN/CSA-B125.3-05, Plumbing Fittings.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 00 02 - Standard General Requirements.

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with Section 01 00 02 - Standard General Requirements.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 21 - Construction Waste Management and Disposal.

Part 2 Products

2.1 COPPER TUBE AND FITTINGS

.1 Above ground sanitary and vent Type DWV to: ASTM B306.

.1 Fittings.

.1 Cast brass: to CAN/CSA-B125.3.

.2 Wrought copper: to CAN/CSA-B125.3.

.2 Solder: 95:5, type TA to ASTM B32.

2.2 CAST IRON PIPING AND FITTINGS

.1 Buried sanitary, storm, and vent minimum NPS 3, to: CAN/CSA-B70, with one layer of protective coating.

.1 Joints:

.1 Mechanical joints:

.1 Neoprene or butyl rubber compression gaskets: to CAN/CSA-B70.

.2 Hub and spigot:

.1 Caulking lead: to CSA B67.

.2 Cold caulking compounds.

.2 Above ground storm and vent: to CAN/CSA-B70.

.1 Joints:

.1 Hub and spigot:

.1 Caulking lead: to CSA B67.

.2 Mechanical joints:

.1 Neoprene or butyl rubber compression gaskets with stainless steel clamps.

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 In accordance with Section 22 05 05 - Installation of Pipework.

.2 Install in accordance with National Plumbing Code.

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 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 ensure traps are fully and permanently primed.

.3 Ensure that fixtures are properly anchored, connected to system and effectively vented.

.4 Affix applicable label (storm, sanitary, vent, pump discharge etc.) c/w directional arrows every floor or 4.5 m (whichever is less).

3.5 CLEANING

.1 Clean in accordance with Section 01 00 02 - Standard General Requirements.

.2 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 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-B651-12, Accessible Design for the Built Environment.

.2 Green Seal Environmental Standards (GSES)

.1 Standard GS-36-00, Commercial Adhesives.

.3 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1168-A2005, Adhesive and Sealant Applications.

1.2 SUBMITTALS

.1 Provide submittals in accordance with Section 01 00 02 - Standard General Requirements.

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for washroom fixtures, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Indicate fixtures and trim:

.1 Dimensions, construction details, roughing-in dimensions.

.2 Factory-set water consumption per flush at recommended pressure.

.3 (For water closets, urinals): minimum pressure required for flushing.

1.3 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for washroom fixtures, for incorporation into manual specified in Section 01 00 02 - Standard General Requirements.

.2 Include:

.1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.

.2 Details of operation, servicing, maintenance.

.3 List of recommended spare parts.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with Section 01 00 02 - Standard General Requirements.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 21 - Construction Waste Management and Disposal.

Part 2 Products

2.1 GENERAL

.1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.

.2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.

.3 Exposed plumbing brass and escutcheons to be chrome plated.

.4 Number, locations and mounting heights: architectural drawings to govern.

.5 Fixtures in any one location to be product of one manufacturer and of same type.

.6 Trim in any one location to be product of one manufacturer and of same type.

.7 Bring hot and cold piping to each fixture as required min. 12mm (1/2") copper unless noted.

.8 Each fixture shall have heavy chrome plated copper flexible supply riser's c/w screw driver stop, reducer, and escutcheon.

.9 Specifications indicate "FRANKE" stainless steel sinks as standard of acceptance. Kindred and AMI also accepted provided specifications are met.

.10 All fixtures capable of working in pressure range of 20 psi (137Kpa), to 80 psi (550Kpa)

.11 Specifications indicate "Chicago" faucets as standard of acceptance MOEN Commercial and Delta Commercial also accepted provided specifications are met.

2.2 PLUMBING FIXTURES

.1 P-1 Sink – Stainless Steel – Single Bowl

.1 Bowl:

.1 Stainless steel type 304, 18 GA, single bowl self-rimming sink for counter top mount with drilling to metal specified faucet, satin finish bowl and rim, undercoated, rim seal, crumb-cup waste assembly with 38mm (1 ½") waste and mounting kit for bowl. Dimensions: Bowl: 16"w x 14" x 8" deep.

.2 Acceptable Material:

.1 FRANKE LBS4608P

.2 Approved Equal

.2 Faucet:

.1 Manually-operated, two handle, 100mm (4") centered with base, chrome plated lead-free solid brass body with ceramic cartridges ¼ turn, 102mm (4") long wrist blade handles, 133mm (5 ¼") rigid/swivel gooseneck spout with vandal resistant non-aerating, multi-laminar flow spray outlet, color (red and blue) indexed.

.2 Acceptable Material:

.1 Chicago 895

.2 Approved Equal

.3 Waste and Trap:

.1 Waste applied with fixture above

.2 P-traps, chrome-plated, heavy cast-brass adjustable body with slip-nut, 38mm (1 ½") with cleanout, box flange, seamless tubular wall bend and escutcheon.

.3 Acceptable Material:

.4 McGuire 8912 CB

.5 Approved Equal

.4 Supplies:

.1 Chrome-plated polished brass ¼-turn ball valve angle stops with vandal-proof loose key handle, 13mm (1/2") ID inlet and 127mm (5") horizontal extension tubes, flexible chrome-plated solid copper risers, and escutcheon.

.2 Acceptable Material:

.1 McGuire LFH 170 BV

.2 Approved Equal

.2 P-2 Sink – Stainless Steel – Single Bowl – Deep

.1 Bowl:

.1 Stainless steel type 304, 18 GA, single bowl self-rimming sink for counter top mount with drilling to metal specified faucet, satin finish bowl and rim, undercoated, rim seal, crumb-cup waste assembly with 38mm (1 ½") waste and mounting kit for bowl. Dimensions: Bowl: 23 ½"w x 17 ½" x 12" deep.

.2 Acceptable Material:

.1 FRANKE LBS7312P

.2 Approved Equal

.2 Faucet:

.1 Manually-operated, two handle, 100mm (4") centered with base, chrome plated lead-free solid brass body with ceramic cartridges ¼ turn, 102mm (4") long wrist blade handles, 133mm (5 ¼") rigid/swivel gooseneck spout with vandal resistant non-aerating, multi-laminar flow spray outlet, color (red and blue) indexed.

.2 Acceptable Material:

.1 Chicago 895

.2 Approved Equal

.3 Waste and Trap:

.1 Waste applied with fixture above

.2 P-traps, chrome-plated, heavy cast-brass adjustable body with slip-nut, 38mm (1 ½") with cleanout, box flange, seamless tubular wall bend and escutcheon.

.3 Acceptable Material:

.4 McGuire 8912 CB

.5 Approved Equal

.4 Supplies:

.1 Chrome-plated polished brass ¼-turn ball valve angle stops with vandal-proof loose key handle, 13mm (1/2") ID inlet and 127mm (5") horizontal extension tubes, flexible chrome-plated solid copper risers, and escutcheon.

.2 Acceptable Material:

.1 McGuire LFH 170 BV

.2 Approved Equal

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 manufacturer's recommendations, for barrier free, Refer to Architectural elevations measured from finished floor.

.2 Barrier free: to most stringent NBCC CAN/CSA B651

.2 Install all gooseneck faucets as follows: for single bowl sinks – rigid, for double bowl sinks-swivel.

.3 All under counter piping between components of trim and fixtures to be chrome-plated flexible copper. No braided ss hoses permitted.

.4 Vents: All vents 38mm with exceptions: 32mm for lavatories, 50mm for washer box

.5 Waste: Lavatories size 32mm, sinks size 38mm, urinal 50mm, water closet 75mm

3.3 ADJUSTING

.1 Conform to water conservation requirements specified this section.

.2 Checks:

.1 Aerators: operation, cleanliness.

.3 Thermostatic controls:

.1 Verify temperature settings, operation of control, limit and safety controls.

3.4 CLEANING

.1 Clean in accordance with Section 01 00 02 - Standard General Requirements.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 22 05 05 – Installation of pipework.

1.2 REFERENCES

.1 ASTM International

.1 ASTM A126-04(2009), Standard Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.

.2 ASTM B62-09, Standard Specification for Composition Bronze or Ounce Metal Castings.

.2 CSA International

.1 CSA B79-08, Commercial and Residential Drains and Cleanouts.

.2 Reducing Valves for Domestic Water Supply Systems.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 00 02 - Standard General Requirements.

.2 Shop Drawings:

.1 Indicate on drawings: materials, finishes, method of anchorage, and number of anchors, dimensions construction and assembly details accessories.

.3 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.4 Instructions: submit manufacturer's installation instructions.

.5 Manufacturers' Field Reports: manufacturers' field reports specified.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 00 02 - Standard General Requirements.

.2 Operation and Maintenance Data: submit operation and maintenance data for plumbing specialties and accessories for incorporation into manual.

.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.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 00 02 - Standard General Requirements with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect plumbing materials from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan.

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 round cover with flush head securing screws, bevelled edge frame complete with anchoring lugs.

.2 Floor Access: round cast iron body and frame with adjustable secured nickel bronze top:

.1 Plugs: bolted bronze with neoprene gasket.

.2 Cover for Unfinished Concrete Floors: cast iron

.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.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for plumbing specialities and accessories installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform General Contractor of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 MANUFACTURER'S INSTRUCTIONS

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

3.3 INSTALLATION

.1 Install in accordance with National Plumbing Code of Canada, provincial codes, local authority having jurisdiction.

.2 Install in accordance with manufacturer's instructions and as specified.

3.4 CLEANOUTS

.1 Install cleanouts at base of soil and waste stacks, at locations required code, and as indicated.

.2 Bring cleanouts to wall or finished floor.

.3 Building drain cleanout and stack base cleanouts: line size to maximum NPS 4.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 00 02 - Standard General Requirements.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 00 02 - Standard General Requirements.

.3 Waste Management: separate waste materials for reuse recycling in accordance with Section 01 74 21 - Construction Waste Management and Disposal.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by plumbing specialties and accessories installation.

END OF SECTION