Part 1 General

1.1 RELATED REQUIREMENTS

.1 Common Work Results for HVAC — Section 23 05 00

1.2 SECTION INCLUDES

.1 This Section includes requirement s for pipe and pipe fittings for all mechanical services and systems, inside and outside building perimeter, except:

.1 Domestic water, services from 1.5 m outside building perimeter to utility connection point.

.2 Sprinkler system.

1.3 RELATED SECTIONS

.1 Mechanical and Electrical Service Connections: — Division 01

.2 Piped Utilities: — Division 33

.3 Wet Pipe Sprinkler System: — Section 21 13 13

1.4 ALTERNATIVES

.1 Pipe and pipe fitting products are specified by system in Piping Schedule at end of this Section. Unless otherwise specified, where schedule specifies more than one type of material for a single system, select any one of the specified alternative materials.

1.5 REFERENCE DOCUMENTS

.1 Fabricate systems in accordance with the following fabrication standards:

.1 Natural Gas:

.1 Natural gas vapour phase, up to 70 kPa: to ANSI/ASME B31.3.

.2 Refrigerant System: to ANSI/ASME B31.5.

1.6 COORDINATION WITH WORK SPECIFIED IN OTHER SECTIONS

.1 Coordinate piping installation routes and elevations with installation of sprinkler, sheet metal and electrical work.

1.7 PRODUCT OPTIONS AND SUBSTITUTIONS

.1 Refer to Division 1 for requirements pertaining to product options and substitutions.

1.8 SYSTEM FABRICATION CODES AND STANDARDS

.1 Fabricate piping systems in accordance with Alberta Regulation 49/2006, Safety Codes Act, Pressure Equipment Safety Regulation:

.2 Natural gas to CSA B149.1.

.3 Refrigerant systems to ANSI/ASME B31.5.

1.9 CONTRACTORS QUALITY CONTROL

.1 For the following joint systems:

.1 Mechanically Formed Connections

.2 Retain services of joint system supplier to:

.1 Prior to proceeding with work, review piping system with Consultant and instruct the workmen installing the piping on the correct use of the jointing system. Review support, anchor, guide, requirements and provisions for expansion.

.2 Inspect ten random samples of installed joints.

.3 Submit a report describing findings of the inspection to the Consultant.

Part 2 Products

2.1 PRODUCT SELECTION

.1 Pipe and pipe fittings are specified by system.

.2 Within each system one or more materials may be specified. Unless otherwise specified, any of the specified pipe, fitting and joint materials may be used in construction of the system.

2.2 HYDRONIC HEATING SYSTEMS; (UP TO 110°C, UP TO 1035 KPA)

.1 Ferrous

.1 Pipe:

.1 Black Steel Pipe: electric resistance welded, schedule 40 to ASTM A53, Grade B.

.2 Fittings:

.1 Malleable Iron Threaded Fittings: to ANSI B16.3-1992.

.2 Wrought Steel Butt Welding Fittings: factory made to ANSI B16.9.

.3 Malleable Iron Cast Fittings: to ASTM A47.

.4 Ductile Iron Cast Fittings: to ASTM A536.

.3 Joints:

.1 Steel Flanges and Fittings: to ANSI B16.5.

.2 Unions: to ANSI B16.9.

.2 Copper

.1 Pipe:

.1 Copper Tube: Type L to ASTM B88.

.2 Fittings:

.1 Wrought Copper, Solder Joint: to ANSI B16.22.

.2 Cast Copper, Solder Joint: to ANSI B16.8.

.3 Joints:

.1 Solder: to ASTM B32.

2.3 EQUIPMENT DRAINS AND OVERFLOW SYSTEMS

.1 Ferrous

.1 Pipe:

.1 Galvanized Steel: electric resistance welded, schedule 40 to ASTM A53 Grade B.

.2 Fittings:

.1 Galvanized Malleable Iron Threaded Fittings: 1035 kPa banded to ANSI B16.3.

.3 Joints:

.1 Unions: to ANSI B16.39.

.2 Threaded Fittings: protected with galvanized pipe paste.

.2 Copper

.1 Pipe:

.1 Copper tube, Type "L" to ASTM B88M.

.2 Fittings:

.1 Wrought Copper, Solder Joint: to ANSI B16.22.

.3 Joints:

.1 Solder: to ASTM B32.

2.4 DOMESTIC WATER SYSTEMS (ABOVE GRADE)

.1 Copper

.1 Pipe:

.1 Copper Tube: Type “L” to ASTM B88M for nominal pipe diameters up to and including 50 mm.

.2 Fittings:

.1 Wrought Copper: solder joint type to ANSI B16.22.

.2 Cast Copper: solder joint type to ANSI B16.8.

.3 Joints:

.1 Solder: 95/5 (95% tin; 5% other metals; lead free to ASTM B32).

2.5 SANITARY DRAINAGE AND VENT SYSTEMS (ABOVE GRADE)

.1 Ferrous

.1 Pipe:

.1 Cast Iron Soil Pipe: to CSA B70.

.2 Fittings:

.1 Hubless Cast Iron Pipe Fittings: to FSWW-P-401.

.3 Joints:

.1 Rubber Gaskets for Cast Iron Soil and Pipe Fittings: to ASTM C564.

.2 Compression Gaskets: ASTM C564-70.

.2 Copper

.1 Pipe:

.1 Copper Tube: DWV to ASTM B306.

.2 Fittings:

.1 Wrought Copper: solder joint type to ANSI B16.22.

.2 Cast Copper: solder joint to ANSI B16.8.

.3 Joints:

.1 Solder: to ASTM B32.

2.6 NATURAL GAS SYSTEMS (INSIDE BUILDING)

.1 Ferrous

.1 Pipe:

.1 Black Steel Pipe: electric resistance welded, schedule 40 to ASTM A53, Grade B.

.2 Fittings:

.1 Malleable Iron Threaded Fittings: to ANSI B16.3 (for pipe diameters up to and including 50 mm).

.2 Wrought Steel Butt Welding Fittings: to factory made ANSI B16.9.

.3 Joints:

.1 Steel Flanges and Fittings: to ANSI B16.5.

.2 Unions: to ANSI B16.9.

Part 3 Execution

3.1 PREPARATION AND ASSEMBLY

.1 Use only long radius elbows.

.2 Connections for 50 mm piping may be either screwed or welded.

.1 Pipe diameters less than 50 mm use screwed connections.
.2 Pipe diameters greater than 50 mm use welded connections.

.3 On galvanized piping systems use only screwed fittings.

.3 Ream piping and tubing, clean off scale and dirt inside and outside before assembly. Remove welding slag or other foreign material from piping.

3.2 TEEING OFF MAIN LINE - STEEL PIPE SYSTEM

.1 Mains 150 mm and smaller:

.1 Use saddle type connections where main is at least one size larger than branch.

.2 Use direct connection where branch is at least three sizes smaller than main.

3.3 MECHANICALLY FORMED CONNECTIONS, COPPER PIPE

.1 Mechanically formed tee connection with brazed joints may be used in lieu of tee fittings in copper tubing provided they meet the following:

.1 Size and wall thickness of main tube and branch tube are listed by manufacture of forming equipment as an acceptable application.

.2 Height of drawn collar is not less than three times wall thickness of main tubing.

.3 End of branch tube is notched to conform to inner curve of main tube and dimpled to set exact penetration depth into collar.

.4 Resulting joint is minimum of three times as long as thickness of thinner joint member and brazed.

3.4 UNIONS

.1 Make connections to equipment and branch mains with unions.

.2 Unions 50 mm and smaller:

.1 Malleable iron unions, 1035 kPa with bronze to iron ground joint union for threaded ferrous piping.

.2 Bronze unions for copper piping.

.3 Provide air tested unions for gas service.

.3 Unions 65 mm and larger:

.1 Forged steel slip on flanges for ferrous piping (1030 kPa).

.2 Bronze flanges for copper piping (1030 kPa).

.3 For gas service, provide synthetic rubber.

3.5 NON-FERROUS PIPING CONNECTIONS

.1 Use non-toxic joint compound on potable water lines.

.2 Provide non-conducting type connections wherever joining dissimilar metals. Brass adaptors and valves are acceptable.

.3 Coat brass fittings used underground with an asphaltic compound to prevent dezincification.

.4 Underground copper piping shall be connected using copper to copper flare coupling. Joints are not permitted under grade.

3.6 GAS PIPING

.1 Use isolating gas cocks on primary gas line installed with isolating union at outlet.

.2 Bond interior gas piping to electrical system ground conductor to maintain gas piping at electrical system ground.

.3 For piping which will be buried, use piping with welded fittings with factory or site applied plastic jacketing.

.4 Apply heat shrink plastic jacketing to joints on buried piping.

.5 Install gas piping in open or ventilated spaces. Pitch lines and provide drip legs for condensation and dirt at appliance connection. Where gas piping is run in a concealed space, provide ventilation grilles to CAN/CGA B149.1.

3.7 ROUTES AND GRADES

.1 Route piping in an orderly manner and maintain proper grades.

.2 Install piping to conserve headroom and interfere as little as possible with use of space.

.3 Route above grade piping parallel to walls.

.4 Group piping wherever practical at common elevations. Provide adequate clearances to allow for insulation.

.5 Install concealed pipes close to building structure to keep furring to a minimum. In finished areas install piping in areas which will furred in.

.6 Slope hydronic and domestic water system piping at 0.2% and arrange to drain at low points.

.7 On closed loop water systems, equip low points with 20 mm drain valves and hose nipples. At high points, provide collecting chambers and high capacity float operated automatic air vents.

.8 Make reductions in water, steam and condensate piping with eccentric reducing fittings to provide clear drainage and venting.

.9 Grade horizontal sanitary drainage vent piping at 2% minimum.

3.8 PLASTIC PIPE INSTALLATION

.1 Note PVC-DWV is not permitted to be installed in the following applications:

.1 A ceiling plenum used for return air.

.2 A vertical shaft.

.2 Comply to all requirements defined in the Alberta Building Code.

3.9 INSTALLATION REQUIREMENTS

.1 Install piping system in accordance with the following:

.1 Natural gas distribution system: to CAN/CGA B149.1.

.2 Plumbing and drainage system: to National Plumbing Code.

.3 Heating system: to comply with recommendations of ASHRAE Guide.

.2 Install piping to allow for expansion and contraction without exceeding maximum allowable stresses for pipe and equipment flanges.

.3 Provide clearance for proper installation of insulation and for access to valves, air vents, drains and unions.

.4 Provide all offsets required to install piping systems within the physical limitations of the building.

3.10 PIPING SCHEDULE

System	Pipe	Fitting	Joint
Hydronic heating up to 120°C and 1035 kPa	Black steel Schedule 40, 50 mm or less	Threaded	Screwed
		Welding	Welded
	Black steel, Schedule 40, greater than 50 mm	Welding	Welded
		Mechanical grooved	Clamped
	Pressfitting 50 mm or less	Pressfitting	Compression
	Copper water tube type L, Drawn temper	Wrought copper	Soldered, 95-5 tin-antimony
		Cast copper	Soldered, 95-5 tin-antimony
Equipment drains and overflows	Galvanized steel, Schedule 40, ASTM A53-96 only	Galvanized threaded	Screwed

System	Pipe	Fitting	Joint
	Copper water tube, Type L, drawn temper	Wrought copper	Soldered, 95-5 tin-antimony
Domestic water above grade	Copper water tube type L, drawn temper	Wrought copper	Soldered, 95-5 tin-antimony
		Cast copper	Soldered, 95-5 tin-antimony
DWV above grade and buried	Cast iron	Hubless cast iron	Clamped
Natural gas low pressure less than 1400 kPa, inside building	Black steel, Schedule 40 50 mm or less	Threaded	Screwed
		Welding	Welded
	Black steel, Schedule 40 greater than 50 mm	Welding	Welded
Domestic hot water recirculation/DHWH condensate drainage	CPVC	CPVC	Solvent Welded

END OF SECTION