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**Part 1            General**

**1.1                SECTION INCLUDES**

- .1     Pipe, pipe fittings, valves, and connections for piping systems.
  - .1     Sanitary sewer.
  - .2     Domestic water.

**1.2                RELATED SECTIONS**

- .1     Section 23 05 53 - Mechanical Identification.
- .2     Section 23 07 19 - Piping Insulation.

**1.3                REFERENCES**

- .1     ASME B31.9 - Building Services Piping.
- .2     ASME B16.3 - Malleable Iron Threaded Fittings.
- .3     MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
- .4     MSS SP69 - Pipe Hangers and Supports - Selection and Application.
- .5     MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves.
- .6     MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
- .7     MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.
- .8     NCPWB - Procedure Specifications for Pipe Welding.
- .9     ASTM F708 - Design and Installation of Rigid Pipe Hangers.
- .10    AWWA C651 - Disinfecting Water Mains.
- .11    ASTM D2665 - Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.
- .12    ASTM D2564 - Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
- .13    ASTM D2855-96 (2002) - Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
- .1     NSF/ANSI 61 – Drinking Water System Components – Health Effects

- .2 AWWA C220 – Stainless Steel Pipe 1/2In. (13 mm) and Larger.
- .3 ASTM A312 – Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
- .4 ASTM A779 – Standard Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products

#### **1.4 SUBMITTALS FOR REVIEW**

- .1 Section 21 05 00: Submission procedures.
- .2 Product Data: Provide data on all valves larger than 50mm (2”), and all backflow prevention devices and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.

#### **1.5 CLOSEOUT SUBMITTALS**

- .1 Section 21 05 00: Submission procedures.
- .2 Record Documentation: Record actual locations of valves on record drawings.

#### **1.6 QUALITY ASSURANCE**

- .1 Perform Work to the standards of the Province and Municipality of Jurisdiction.
- .2 Valves: Manufacturer's name and pressure rating marked on valve body.
- .3 Welding Materials and Procedures: Conform to ASME SEC IX and applicable Provincial labour regulations.
- .4 Welder's Certification: To Manitoba Department of Labour standards.
- .5 Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.
- .6 All carbon steel pipe and fittings shall be manufactured in Canada or the United States of America. This does not include stainless steel.

#### **1.7 REGULATORY REQUIREMENTS**

- .1 Perform Work to the latest version of the Manitoba Plumbing Code and local Municipal requirements.
- .2 Conform to applicable code for installation of backflow prevention devices.
- .3 Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

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**1.8 DELIVERY, STORAGE, AND PROTECTION**

- .1 Refer to specification section Product Requirements: Transport, handle, store, and protect products.
- .2 Accept valves on Site in shipping containers with labelling in place. Inspect for damage.
- .3 Provide temporary protective coating on cast iron and steel valves.
- .4 Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- .5 Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

**1.9 ENVIRONMENTAL REQUIREMENTS**

- .1 Refer to specification section Environmental Protection: Environmental conditions affecting products on Site.
- .2 Do not install underground piping when bedding is wet or frozen.

**Part 2 Products**

**2.1 SANITARY SEWER PIPING, ABOVE GRADE**

- .1 PVC Pipe with FSR25: CSA B181.2
  - .1 Fittings: PVC.
  - .2 Joints: ASTM D2855, solvent weld to ASTM D2565.
- .2 PVC Pipe with FSR25/SDC50: CSA B181.2. Piping shall be tested and listed in accordance with CAN/ULC-S102.2 and clearly marked with the certification logo indicating a flame spread rating (FSR) not exceeding 25 and a smoke developed classification (SDC) not exceeding 50.
  - .1 Fittings: PVC.
  - .2 Joints: ASTM D2855, solvent weld to ASTM D2565.
  - .3 Manufacturer: IPEX System XFR or equal.

**2.2 WATER PIPING, ABOVE GRADE**

- .1 Stainless Steel pipe over 50mm (2"): Schedule 10, type 304/304L or 316/316L. Pipe to meet ASTM 312 or ASTM 778.
  - .1 Fittings:
    - .1 Welded fittings to ASTM A312 or A778 or,
    - .2 Grooved fittings to ANSI/NSF 61 & ANSI/NSF 372 for potable water service.

**2.3 FLANGES, UNIONS, AND COUPLINGS**

- .1 Pipe Size Over 25 mm (1 inch):

- .1 Ferrous pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
- .2 Grooved and Shouldered Pipe End Couplings:
  - .1 Housing: Malleable iron clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; steel bolts, nuts, and washers; galvanized for galvanized pipe.
  - .2 Sealing gasket: "C" shape composition sealing gasket.
- .3 Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

## **2.4 BALL VALVES**

- .1 Manufacturers:
  - .1 American Valve
  - .2 MAS
  - .3 Kitz
  - .4 Crane.
  - .5 Substitutions: in accordance with B7.
- .2 Construction:
  - .1 Ball valves shall be of the floating-ball design capable of providing bi-directional, tight shutoff in accordance with MSS SP-72.
  - .2 The valves shall be rated at 150# WSP/300# WOG.
  - .3 Bodies shall be ductile iron per ASTM A536, With ANSI Class 150 raised-face flanges.
  - .4 The interior and exterior of the body shall be epoxy-coated.
  - .5 The ball shall be PFA infused stainless steel, with a stainless steel blowout-proof stem.
  - .6 The seats and body seals shall be PTFE.
  - .7 The stem seal shall be PTFE, externally adjustable chevron type.
- .3 Valves shall be equipped with locking handles as standard. If service conditions require, valves may be equipped with 2" square operating nuts, manual gear operators, or pneumatic, electric, or hydraulic actuators.

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Section 21 05 00: Verify existing conditions before starting work.
- .2 Verify that excavations are to required grade, dry, and not over-excavated.

### **3.2 PREPARATION**

- .1 Ream pipe and tube ends. Remove burrs.

- .2 Remove scale and dirt, on inside and outside, before assembly.
- .3 Prepare piping connections to equipment with flanges or unions.

### **3.3 INSTALLATION**

- .1 Install to manufacturer's written instructions.
- .2 Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- .3 Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- .4 Install piping to maintain headroom, conserve space, and not interfere with use of space.
- .5 Group piping whenever practical at common elevations.
- .6 Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 23 07 19.
- .7 Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- .8 Provide support for utility meters to requirements of utility companies.
- .9 Install valves with stems upright or horizontal, not inverted.
- .10 Install water piping to ASME B31.9.

### **3.4 PIPE PRESSURE TESTING**

- .1 Do not insulate pipe prior to pressure testing. Pressure test in sections if necessary before concealing or insulating pipe.
- .2 Do not introduce water for testing where freezing conditions exist or where piping systems being tested are located above sensitive areas or equipment that may be damaged or contaminated by water leakage.
- .3 Hydraulically test all pipe. Pneumatic testing not permitted without prior approval from the Contract Administrator and the Authority Having Jurisdiction.
- .4 Should leaks develop in any part of the piping system, remove and replace defective sections, fittings and equipment. Pipe dope, caulking, tape, lead wool, dresser couplings, etc. shall not be used to correct deficiencies. The contractor shall be responsible for all cleanup related to leakage during flushing, testing, and chemical treatment of piping, including original building piping if included in the testing.
- .5 Subject piping to a hydrostatic pressure of at least that 1-½ times the operating pressure of the system for a period of at least 12 hours. If leaks are detected, such leaks shall be repaired and the test started over. Record results and submit witnessed (by Contract Administrator or the City's representative) reports to the Contract Administrator.

- .6 Register pressures at the highest system point.
- .7 Provide at least 48 hours (during working days) notice to Contract Administrator or the City’s Representative prior to testing to allow the tests to be witnessed.

**3.5 APPLICATION**

- .1 Use grooved mechanical couplings and fasteners only in accessible locations.
- .2 Install unions downstream of valves and at equipment or apparatus connections.
- .3 Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- .4 PVC DWV piping installed in non-combustible buildings shall comply with the restrictions in the following table.

Product	NON-COMBUSTIBLE BUILDING				
	General Usage	Air Plenum <sup>1</sup>	Vertical Services Spaces <sup>2</sup>	High-Rise Building	Underground
Combustible Pipe FSR25: (eg. IPEX System 15)	P	N <sup>3</sup>	N	N	P
Combustible Pipe FSR25/SDC50: (eg. IPEX XFR, CPVC)	P	P	N	P	P
MJ Grey Coupling	P	P	N	P	N
1. Restrictions for air plenums also apply to combustible buildings as well. 2. Certified firestopping devices are required whenever the system penetrates a vertical or horizontal separation, and shall be certified to CAN4-S115 and tested with a pressure differential of 50 Pa. 3. Sizes 20” and 24” are N					

**3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM**

- .1 Prior to starting work, verify system is complete, flushed and clean.
- .2 Ensure pH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).

- .3 Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- .4 Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- .5 Maintain disinfectant in system for 24 hours.
- .6 If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- .7 Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- .8 Take samples no sooner than 24 hours after flushing, from 5 percent of outlets and from water entry, and analyze to AWWA C651.

**END OF SECTION**

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**Part 1            General**

**1.1                SECTION INCLUDES**

- .1      Backflow preventers.
- .2      Water Meter

**1.2                RELATED SECTIONS**

- .1      Section 22 10 00 - Plumbing Piping.

**1.3                REFERENCES**

- .1      ASSE 1012 - Backflow Preventers with Immediate Atmospheric Vent.
- .2      ASSE 1013 - Backflow Preventers, Reduced Pressure Principle.

**1.4                SUBMITTALS FOR REVIEW**

- .1      Section 21 05 00: Submission procedures.
- .2      Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- .3      Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.

**1.5                CLOSEOUT SUBMITTALS**

- .1      Section 21 05 00: Submission procedures.
- .2      Operation Data: Indicate frequency of treatment required for interceptors.
- .3      Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.
- .4      Record Documentation: Record actual locations of equipment, cleanouts, backflow preventers, water hammer arrestors, trap seal primers.

**1.6                MAINTENANCE MATERIAL SUBMITTALS**

- .1      Section 01 78 40: Maintenance and extra material requirements.

**1.7                QUALITY ASSURANCE**

- .1      Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience.

**1.8                DELIVERY, STORAGE, AND PROTECTION**

- .1      Section 21 05 00: Transport, handle, store, and protect products.



- .2 Accept specialties on Site in original factory packaging. Inspect for damage.

## **Part 2 Products**

### **2.1 BACKFLOW PREVENTERS**

- .1 Reduced Pressure Backflow Preventers:
  - .1 Manufacturers:
    - .1 Beeco.
    - .2 Zurn.
    - .3 Watts.
    - .4 Substitutions: in accordance with B7.
  - .2 ANSI/ASSE 1013 / CSA B64.4,
  - .3 Bronze body with bronze internal parts and stainless steel springs,
  - .4 Two independently operating, spring loaded check valves,
  - .5 Diaphragm type differential pressure relief valve located between check valves,
  - .6 Third check valve that opens under back pressure in case of diaphragm failure,
  - .7 Non-threaded vent outlet,
  - .8 Assembled with two gate valves, strainer, and four test cocks.\
- .2 Double Check Valve Assemblies:
  - .1 Manufacturers:
    - .1 Beeco.
    - .2 Zurn.
    - .3 Watts.
    - .4 Substitutions: in accordance with B7.
  - .2 ANSI/ASSE 1024 / CSA B64.4
  - .3 Bronze body with corrosion resistant internal parts and stainless steel springs,
  - .4 Two independently operating check valves with intermediate atmospheric vent.

### **2.2 WATER METER**

- .1 Provided by City of Winnipeg.

## **Part 3 INSTALLATION**

### **3.1 General**

- .1 Install to manufacturer instructions.
- .2 Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibs.

- .3 All water cross connection and backflow prevention shall comply with City of Winnipeg By-Law 2289 and CSA B64.10. Note that where severe hazards exist, an approved control device must be installed both on service pipe as well as on pipe at source of potential contamination.
- .4 Expenses for material, installation, testing and approval of cross connection and backflow prevention shall be paid by Division 22.
- .5 Provide minimum 1-1/4" (32mm) clearance between backflow preventer body and adjacent structure (wall, ceiling, etc.) and equipment. Clearance space to be sufficient to facilitate easy removal for servicing. The BFP shall be located no higher on wall than 48" (1200mm) above the finished floor.
- .6 Backflow preventers shall be sized for the maximum rated flow of the equipment it is serving.
- .7 All testable backflow prevention devices shall be installed in accessible locations as defined by CSA-B64.10-01. If this cannot be accomplished, provide access platforms, etc. at no extra cost to the City.
- .8 Pipe relief from backflow preventer to nearest drain.
- .9 City of Winnipeg water meter to be installed as per Drawing SD-027, revision 11. Note the following:
  - .1 No test port required
  - .2 No strainer required.
  - .3 Installation heights and separation conditions as per SD-027
  - .4 Refer to contract drawings for arrangements on this project.

**END OF SECTION**

**Part 1 General**

**1.1 SECTION INCLUDES**

- .1 Pipe, Pipe Fittings, and Valves

**1.2 RELATED SECTIONS**

- .1 Section 21 05 00 – Submittal Procedures.
- .2 Section 21 05 00 - Product Requirements.

**1.3 REFERENCES**

- .1 ANSI Z21.56-2006/CSA 4.7-2006.
- .2 ASTM D1785 - Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
- .3 ASTM D2467 - Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
- .4 ASTM D2855-96(2002) - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.
- .5 NPSI (National Pool and Spa Institute) - Minimum Standards for Public Swimming Pools.
- .6 NSF 50 - Circulation System Components and Related Materials for Swimming Pools, Spas/Hot Tubs.
- .7 UL 1081 - Swimming Pool Pumps, Filters, and Chlorinators.
- .8 UL 1261 - Standard for Electric Water Heaters for Pools and Tubs.

**1.4 SUBMITTALS FOR REVIEW**

- .1 Section 21 05 00: Submission procedures.
- .2 Product Data:
  - .1 Include data on pipe materials, pipe fittings, valves and accessories.
  - .2 Include component sizes, rough-in requirements, service sizes, and finishes.
  - .3 Include product description, model, dimensions, component sizes, rough-in requirements, service sizes, and finishes.
  - .4 Include dimension drawings of water heaters indicating components and connections to other equipment and piping.
  - .5 Include heat exchanger dimensions, size of trappings, and performance data.
  - .6 Include dimensions of tanks, tank lining methods, anchors, attachments, lifting points, trappings, and drains.

- .7 Indicate pump type, capacity, power requirements, and affected adjacent construction. Submit certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
- .8 Provide electrical characteristics and connection requirements.
- .3 Shop Drawings: Indicate detailed assembly of components of each system or sub-system.

## **1.5 SUBMITTALS FOR INFORMATION**

- .1 Section 21 05 00: Submission procedures.
- .2 Manufacturer's Instructions: Indicate installation details, components assembly, and start-up procedures.
- .3 Manufacturer's Field Reports: Indicate results of water treatment system set-up and testing.

## **1.6 CLOSEOUT SUBMITTALS**

- .1 Section 21 05 00: Submission procedures.
- .2 Operation Data: Include installation instructions, lubrication instructions, and assembly views.
- .3 Maintenance Data: Include maintenance and inspection data, replacement part numbers and availability, and service depot location and telephone number.
- .4 Record Documentation: Record actual locations of controlling devices and underfloor piping.
- .5 Warranty Documentation: Submit manufacturer warranty and ensure forms have been completed in the City's name and registered with manufacturer.

## **1.7 QUALITY ASSURANCE**

- .1 Products of This Section: Manufactured to ISO 9000 certification requirements.
- .2 Perform Work to NSF.
- .3 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years' experience.
- .4 Installer Qualifications: Company specializing in performing the work of this section with minimum three (3) years' experience

## **1.8 REGULATORY REQUIREMENTS**

- .1 Conform to applicable code for installation of swimming pool systems.
- .2 Perform work to local regulations.

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**1.9 DELIVERY, STORAGE, AND PROTECTION**

- .1 Section 21 05 00: Transport, handle, store, and protect products.
- .2 Accept equipment on Site in shipping containers with labelling in place. Inspect for damage.
- .3 Protect equipment from damage and elements by maintaining shipping packaging in place until installation. Maintain temporary inlet and outlet caps in place until installation.

**1.10 WARRANTY**

- .1 Section 21 05 00: Warranties.

**Part 2 Products**

**2.1 WATER PIPING AND PIPE FITTINGS**

- .1 PVC Pipe: ASTM D1785, Schedule 80.
  - .1 Fittings: ASTM D2467, PVC.
  - .2 Joints: ASTM D2855, solvent weld.
- .2 Unions for Pipe Sizes 50 mm(2 inch) and Under: PVC for plastic piping.
- .3 Flanges for Pipe Sizes over 50 mm(2 inch): PVC for plastic piping.
- .4 Butterfly Valves: Iron body, bronze disc, resilient replaceable seat for service to 82 degrees C (180 degrees F) lug style, geared wheel, 316L bolts/fasteners on all components.

**Part 3 Execution**

**3.1 INSTALLATION**

- .1 Install equipment to manufacturer's instructions.
- .2 Install Work to City of Winnipeg, standards.
- .3 Install piping to conserve building space, not interfere with use of space and other work. Route piping in orderly manner, and maintain gradient. Group whenever practical at common elevations.
- .4 Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Provide access to valves and fittings.

**END OF SECTION**