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**Part 1            General**

**1.1            RELATED REQUIREMENTS**

- .1      Section 23 05 00 – Common work results for HVAC.
- .2      Section 23 05 29 – Hangers and supports for HVAC piping and equipment
- .3      Section 23 05 48 – Vibration and seismic controls for HVAC piping and equipment.
- .4      Section 23 05 49.01 – Seismic protection systems.

**1.2            REFERENCES**

- .1      ASME
  - .1      ASME Boiler and Pressure Vessel Code (BPVC), Section VII.
- .2      ASTM International
  - .1      ASTM A47/A47M, Standard Specification for Ferritic Malleable Iron Castings.
  - .2      ASTM A278/A278M, Standard Specification for Gray Iron Castings for Pressure-Containing Parts for Temperatures up to 650 degrees F (350 degrees C).
  - .3      ASTM A516/A516M, Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate - and Lower - Temperature Service.
  - .4      ASTM A536, Standard Specification for Ductile Iron Castings.
  - .5      ASTM B62, Standard Specification for Composition Bronze or Ounce Metal Castings.
- .3      CSA Group
  - .1      CSA B51, Boiler, Pressure Vessel, and Pressure Piping Code.

**1.3            ACTION AND INFORMATIONAL SUBMITTALS**

- .1      Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2      Product Data:
  - .1      Submit manufacturer's instructions, printed product literature and data sheets for expansion tanks, air vents, separators, valves, and strainers and include product characteristics, performance criteria, physical size, finish and limitations.
- .3      Shop Drawings:
  - .1      Submit drawings stamped and signed by a professional engineer registered or licensed in the Province of Quebec, Canada.
  - .2      Indicate the following:
    - .1      Components and accessories.

#### **1.4 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for hydronic specialties for incorporation into manual.
  - .1 Include specific requirements in regards to maintenance.

#### **1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance 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 hydronic specialties from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.

### **Part 2 Products**

#### **2.1 DIAPHRAGM TYPE EXPANSION TANK**

- .1 Cylindrical, horizontal or vertical steel pressurized diaphragm type expansion tank.
- .2 Butyl membrane and polypropylene interior lining, sealed to tank walls.
- .3 Working pressure: 800 kPa (125 psi) with ASME stamp and certification.
- .4 Maximum working temperature: 115 °C (240 °F).
- .5 Air precharged to minimum system service pressure (initial fill pressure of system).
- .6 Base mount for vertical installation.
- .7 Acceptable products: Extrol or substitute approved by addendum in accordance with the Instructions to tenderers.

#### **2.2 AUTOMATIC AIR VENT**

- .1 For unit heaters, fan-coils and coils
  - .1 Chrome plated bronze body, copper seat, synthetic rubber disc with removable seat, working pressure 690 kPa (100 psi).
  - .2 Acceptable products acceptables Armstrong AV-13 DN 20 mm (¾") Braukman and Maid-O-Mist or substitute approved by addendum in accordance with the Instructions to tenderers.
- .2 To be installed in mechanical and boiler rooms and at elevated points on pipe networks.
  - .1 Float type vent, industrial use, cast iron body, NPS 19 mm (¾").

- .2 Stainless steel float and needle, Buna "N" seat.
- .3 Maximum design working pressure: 1725 kPa (250 psig).
- .4 Acceptable product: Armstrong 21-AR or substitute approved by addendum in accordance with the Instructions to tenderers.
- .5 Each vent to be provided with a stop valve, a 6 mm (¼") test valve and a vent piped to nearest floor drain.
- .3 To be installed at high point of risers.
  - .1 Float type airvent with cast iron body and NPS 19 mm (¾").
  - .2 Stainless steel float and needle, Buna "N" seat.
  - .3 Maximum design working pressure: 2070 kPa (300 psig) at 93 °C (200 °F).
  - .4 Acceptable products: Armstrong 1-AV, or substitute approved by addendum in accordance with the Instructions to tenderers.

## **2.3 MAKE-UP WATER REGULATOR**

- .1 Complete assembly: stop valves, strainer, pressure regulator, pressure gauge and relief valve.
  - .1 Membrane type pressure reducing valve, bronze body, stainless or nickel/chrome seat, pressure gauge fitting. Maximum inlet pressure 242/1585 kPa (35/230 psi). Diameter: 25 (1").
    - .1 Acceptable products: Armstrong GD-24, Gunzenhauzer (Methot Inc.) 1130, Conbraco Serie 36 or substitute approved by addendum in accordance with the Instructions to tenderers.
  - .2 Relief valve with cast bronze body, internal accessories in brass with spring and lever. Maximum pressure 1110 kPa (160 psi) at 120 °C (250 °F).
    - .1 Acceptable products: Kunkle No 137-B NPS 19 mm (¾"), Conbraco or substitute approved by addendum in accordance with the Instructions to tenderers.
  - .3 Strainers, gauges and valves as described elsewhere in Specifications.

## **2.4 AIR SEPARATOR - BOILER MOUNTED**

- .1 Complete with dip tube.
- .2 Working pressure: 860 kPa.

## **2.5 AIR SEPARATOR - EXPANSION TANK FITTING**

- .1 Complete with adjustable vent tube and built-in manual vent valve.
- .2 Working pressure: 860 kPa.

## **2.6 "Y" STRAINER**

- .1 Body: cast iron, bronze or carbon steel.
- .2 Strainer in stainless steel 304, nominal diameter perforations:
  - .1 Water, to NPS 100 mm (4"): 1.6 mm (1/16");

- .2 Water, up to NPS 125 mm (5"): 3.2 mm (1/8").
- .3 Strainer over DN 40 mm (1.5") in diameter: supply nipple and drain valve for steam service, drain valve with hose fitting for liquid service.
- .4 Connection: threaded sockets for NPS 50 mm (2") and less, flanged for larger diameters.
- .5 Strainer to withstand higher of following pressures: effective steam gauge pressure of 860 kPa (class 125) or 1½ times effective service pressure.
 

NPS 10 to 50 mm (3/8" to 2")	Cast iron Threaded ends Pressure 1723 kPa (250 psig)	ASTM A-278
NPS 50 to 250 mm (2" to 10")	Cast iron flanged Pressure 860 kPa (125 psig)	ASTM A-278
NPS 65 to 150 mm (2½" to 8")	Cast iron Pressure 1723 kPa (250 psig)	ASTM A-278
NPS 65 to 150 mm (2½" to 6")	Carbon steel flanged Pressure 1035 kPa (150 psig)	ASTM A-216 Grade WCB
NPS 12 to 150 mm (½" to 6")	Carbon steel flanged Pressure 2070 kPa (300 psig)	ASTM A-216 Grade WCB
- .6 Pressure drop, with clean strainer, not over 6.9 kPa (1 psi), at nominal network flow.
- .7 Acceptable products: Armstrong, Crane, Victaulic 730, Gruvlok 7260, Conbraco or substitute approved by addendum in accordance with the Instructions to tenderers.

## 2.7 COLLECTORS AND HEADERS

- .1 Made of pipes, fittings and accessories to specifications, appropriate for service intended.
  - .1 Full-flanged ends.
  - .2 Welded inlets and outlets with weldolet or threadolet, and welded flange with threaded sockets or unions.
  - .3 Install flanges at a minimum height determined by insulation thickness.
  - .4 Supply inlets and outlets with stop valves installed 1220 mm (4') above finished floor.
  - .5 Hydrostatic test: twice the operating pressure.
- .2 Supply shop drawing to Engineer for approval.

## 2.8 SUCTION DIFFUSER

- .1 Body: cast iron with flanged connections.
- .2 Strainer: with built-in, disposable 1.19 mm mesh, low pressure drop screen and NPS 1 blowdown connection.
- .3 Permanent magnet particle trap.

- .4 Full length straightening vanes.
- .5 Pressure gauge tapings.
- .6 Adjustable support leg.

## **2.9 PUMP SUCTION DIFFUSER**

- .1 General: Angle pattern fitting, with built-in strainer, with minimal pressure loss, made to be installed on pump suction, with a minimal pipe length.
- .2 Body: for a maximum working pressure of 1200 kPa (175 psi); cast iron, flanged or grooved connection, on pump and network side.
- .3 Straightening vane made of steel in closed circuits and made of stainless steel in open circuits. Stainless steel strainer with 4.76 mm (3/16") maximum openings.
- .4 Start-up strainer, made of 16 mesh bronze, installed over permanent strainer. This strainer shall be removed after one month of continuous pump operation by the present Section.

## **2.10 PUMP COMBINED VALVE**

- .1 General: Angle valve used as check valve, balance valve and shutoff valve, made to be installed at pump discharge with a minimal pipe length.
- .2 Body: for a maximum working pressure of 1200 kPa (175 psi); cast iron, flanged or grooved connection, on pump and network side.
- .3 Bronze or plastic material seat, replaceable bronze disc with EPDM seat insert, stainless steel stem and spring.
- .4 Openings for pressure gauges, graduations on valve to determine flow.

## **2.11 SAFETY AND RELIEF VALVES 0-274 KPA (0-40 PSIG)**

- .1 Control spring type bronze valve, high volume and maximum aperture, in compliance with ASME Code and piped to outdoors.
- .2 Materials: cast iron body, malleable iron housing, cadmium steel spring, bronze or stainless steel internal parts.
- .3 Acceptable products: Kunkle, Consolidated, Conbraco or substitute approved by addendum in accordance with the Instructions to tenderers.
- .4 Refer to the table in the Appendix of this Section.

## **2.12 TANK**

- .1 Vertical cylinder made of steel SA-516 GR 70, pressurized type. With an outdoor paint coating.
- .2 Operating pressure 690 kPa (100 lbs/sq. in.), ASME stamp and certification.
- .3 Maximum operating temperature 115°C (240°F).
- .4 Openings and ports : Provide enough connections and ports for fittings and services.
- .5 Supports: Provide four (4) legs for the vertical support of the tank.

- .6 Capacity : 4700 liters, 1500 diam. x 2500 high.
- .7 Acceptable manufacturer : AT&S Gilfab or substitute approved by addendum in accordance with the Instructions to tenderers.

### **2.13 VACUUM BREAKER 0,85-68 KPA (0-10 PSI)**

- .1 Vacuum breaker to regulate, within prescribed limits, vacuum created in closed recipients and piping networks.
- .2 Materials: brass body and cap, stainless steel spring, brass stem and seat.
- .3 Acceptable products : Hoffman No 62, Armstrong, Braukman, Conbraco or substitute approved by addendum in accordance with the Instructions to tenderers.

## **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 hydronic specialties installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

### **3.2 APPLICATION**

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and data sheets.

### **3.3 GENERAL**

- .1 Run drain lines and blow off connections to terminate above nearest drain.
- .2 Maintain adequate clearance to permit service and maintenance.
- .3 Should deviations beyond allowable clearances arise, request and follow Departmental Representative's directive.
- .4 Check shop drawings for conformance of tappings for ancillaries and for equipment operating weights.

### **3.4 STRAINERS**

- .1 Install in horizontal or down flow lines.
- .2 Ensure clearance for removal of basket.
- .3 Install ahead of each pump.

- .4 Install ahead of each automatic control valve larger than NPS 1 and radiation and as indicated.

### **3.5 AIR VENTS**

- .1 Install at high points of systems.
- .2 Install gate valve on automatic air vent inlet. Run discharge to nearest drain.

### **3.6 EXPANSION TANKS**

- .1 Adjust expansion tank pressure as indicated.

### **3.7 PRESSURE SAFETY RELIEF VALVES**

- .1 Run discharge pipe to terminate above nearest drain.

### **3.8 SUCTION DIFFUSERS**

- .1 Install on inlet to pumps having suction size greater than 50.

### **3.9 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .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 74 11 - Cleaning.

**END OF SECTION**