

## **PART 1 - GENERAL**

### **1.1 REFERENCE STANDARDS**

- .1 American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE)
  - .1 ANSI/ASHRAE/IES Standard 90.1 (Latest Edition), Energy Standard for Buildings Except Low-Rise Residential Buildings.
- .2 CSA Group
  - .1 CAN/CSA-B214 (Latest Edition), Installation Code for Hydronic Heating Systems.
- .3 National Electrical Manufacturers' Association (NEMA)
  - .1 NEMA MG 1 (Latest Edition), Motors and Generators.

### **1.2 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 pump, circulator, and equipment and include product characteristics, performance criteria, physical size, finish and limitations indicate point of operation, and final location in field assembly.
- .3 Shop Drawings:
  - .1 Submit manufacturer's detailed composite wiring diagrams for control systems showing factory installed wiring and equipment on packaged equipment or required for controlling devices or ancillaries, accessories and controllers.

### **1.3 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 pumps for incorporation into manual.
- .3 Submit 2 copies of operation and maintenance manual.

### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and 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 pumps from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.

## **PART 2 - PRODUCTS**

### **2.1 EQUIPMENT**

- .1 Size and select components to: CAN/CSA-B214.

### **2.2 IN-LINE CIRCULATORS**

- .1 Volute: canned rotor cast iron flanged design suction and discharge connections.
- .2 Impeller: stainless steel.
- .3 Bearings: ceramic radial.
- .4 Motor: to NEMA MG 1 resilient mounted, 380 W 115/220/1/60, 3.5 A.
- .5 Capacity: 1.2 L/s, 5.5 m head.
- .6 Design pressure: 1000 kPa.

## **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 pump 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 INSTALLATION**

- .1 Install hydronic pumps to: CAN/CSA-B214.
- .2 In line circulators: install as indicated by flow arrows.
  - .1 Support at inlet and outlet flanges or unions.
  - .2 Install with bearing lubrication points accessible.
- .3 Check rotation prior to start-up.
- .4 Install pressure gauge test cocks.

### **3.4 START-UP**

- .1 General:
  - .1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: General Requirements; supplemented as specified herein.
  - .2 In accordance with manufacturer's recommendations.
- .2 Procedures:
  - .1 Before starting pump, check that cooling water system over-temperature and other protective devices are installed and operative.
  - .2 After starting pump, check for proper, safe operation.
  - .3 Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.
  - .4 Run-in pumps for 12 continuous hours minimum.
  - .5 Verify operation of over-temperature and other protective devices under low- and no-flow condition.
  - .6 Eliminate air from scroll casing.
  - .7 Adjust water flow rate through water-cooled bearings.
  - .8 Adjust flow rate from pump shaft stuffing boxes to manufacturer's recommendation.
  - .9 Adjust alignment of piping and conduit to ensure true flexibility.
  - .10 Eliminate cavitation, flashing and air entrainment.
  - .11 Adjust pump shaft seals, stuffing boxes, glands.
  - .12 Measure pressure drop across strainer when clean and with flow rates as finally set.
  - .13 Replace seals if pump used to degrease system or if pump used for temporary heat.
  - .14 Verify lubricating oil levels.

### **3.5 PERFORMANCE VERIFICATION (PV)**

- .1 General:
  - .1 Verify performance in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: General Requirements, supplemented as specified

herein.

- .2 Verify that manufacturer's performance curves are accurate.
- .3 Ensure valves on pump suction and discharge provide tight shut-off.
- .4 Mark points of design and actual performance at design conditions as finally set upon completion of TAB.
- .5 Commissioning Reports: in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements reports supplemented as specified herein. Reports to include:
  - .1 Record of points of actual performance at maximum and minimum conditions and for single and parallel operation as finally set at completion of commissioning on pump curves.
  - .2 Use Report Forms specified in Section 01 91 13 - General Commissioning (Cx) Requirements: Report Forms and Schematics.
  - .3 Pump performance curves (family of curves).

### **3.6 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**