

**INDEX TO SPECIFICATONS**

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**PART 1: GENERAL****1.1 SHOP DRAWINGS AND SUBMITTALS**

- .1 After award of contract provide and submit shop drawings within 10 working days. Clearly identify with references to recognized design standards used, and indicate layouts, quantity, details of equipment, control wiring diagrams, sizes, capacities and roughing in and exact requirements for concrete pits, bases and other supporting members. Until the submission is reviewed the Work involving relevant products must not proceed.
- .2 Each shop drawing must be certified by manufacturer and as such shall indicate that all product engineering has been performed to ensure the product will meet the requirements of the intended installation.
- .3 Guarantee of delivery, when required, is not conditional on approval of shop drawings unless they are submitted within 10 working days after Contract award.
- .4 All Work and equipment shown on shop drawings is taken as part of Contractor's Work unless specifically excluded.
- .5 Secure and verify all field dimensions and where fabrication must proceed before these are available, ensure that field dimensions are followed to suit.
- .6 Each shop drawing shall include name of the job, Contractor, and clause under which equipment is specified.
- .7 Checking of shop drawings by the Contract Administrator does not constitute acceptance of responsibility. Such checking constitutes assistance only to the Contractor in the proper execution of his Work.
- .8 Prior to submittal of shop drawings the Contractor shall check and verify that all details have been included and then indicate so by signing each drawing to this effect.

**NOTE:** ANY SHOP DRAWINGS SUBMITTED THAT DO NOT MEET THE ABOVE REQUIREMENTS WILL BE RETURNED WITHOUT APPROVAL FOR COMPLIANCE AND SHALL BE RESUBMITTED.

**1.2 DELIVERY AND STORAGE**

- .1 Check and do not deliver finished equipment to the jobsite until weatherproof dry storage is available. In no case shall delivery of the equipment be later than September 10, 2007. This contract shall include all delivery costs and to the site, including any craning or hoisting costs if necessary.

**1.3 MAINTENANCE AND OPERATING INSTRUCTIONS**

- .1 Provide upon delivery seven sets of all brochures or literature supplied by manufacturers of each piece of equipment, including the following and bind into seven sets with hardback covers, and deliver to Contract Administrator:
  - .1 Complete list of mechanical equipment supplied including description, make, type, size, capacity, serial number and list of repair and replacement parts, with names and addresses of suppliers.
  - .2 Correct installation procedure.
  - .3 Manufacturer's recommended operating and maintenance instructions.
  - .4 Separate lubrication schedule including each piece of equipment and showing frequency of service and grade of oil or grease required. This schedule shall be inserted at the front of the manuals.
- .2 At no cost to the Owner, provide instruction to the Contract Administrator's designated employees in proper care, operation, use and maintenance of the equipment, and provide general explanatory literature required and start up supervision and instructions. Upon completion of instructions, forward to Contract Administrator a letter indicating person instructed and dates that the instruction took place. If in Contract Administrator's opinion, this is not done

satisfactorily, Contract Administrator may direct such instruction, and charge all costs involved to relevant section.

- .3 Include in the front of each manual a maintenance schedule, showing equipment name and location, type and frequency of required maintenance with referral to manufacturer's maintenance sheet.

#### 1.4 MATERIALS

- .1 As specified under respective sections.  
 .2 Submit copies of orders for all materials and equipment as evidence of purchase within 5 days of receipt of approved shop drawings.

#### 1.5 ABBREVIATIONS

A.S.H.R.A.E.	-	American Society of Heating, Refrigerating and Air Conditioning Engineers Inc.
A.S.A.	-	American Standards Association
A.S.M.E.	-	American Society of Mechanical Engineers
A.S.T.M.	-	American Society for Testing Materials
A.W.W.A.	-	American Water Works Association
C.E.M.A.	-	Canadian Electrical Manufacturer's Association
C.F.M.	-	Cubic Feet per Minute
C.F.U.A.	-	Canadian Fire Underwriters Association
C.I.	-	Cast Iron
C.O.	-	Clean Out
C.P.	-	Chromium Plated
C.S.A.	-	Canadian Standards Association
D.B.I.U.	-	Dominion Board of Insurance Underwriters
F.P.M.	-	Feet per Minute
G.P.H.	-	Gallons per Hour
G.P.M.	-	Gallons per Minute
H.P.	-	High Pressure or Horsepower
K.W.	-	Kilowatts
N.B.F.U.	-	National Board of Fire Underwriters
N.E.C.	-	National Electrical Code
N.E.M.A.	-	National Electrical Manufacturers Association
N.F.P.A.	-	National Fire Prevention Association
N.P.T.	-	National Pipe Thread
O.S. & Y.	-	Outside Screw and Yoke
O.H.S.A.	-	Occupational Health & Safety Association
P.S.I.	-	Pounds per Square Inch
P.S.I.G.	-	Pounds per Square Inch Gauge
R.P.M.	-	Revolutions per Minute
S.P.	-	Static Pressure
U.L.C.	-	Underwriters' Laboratories of Canada
U.S.	-	United States (usually combined with other abbreviations)
W.S.I.	-	Watts per Square Inch

- .2 Other abbreviations will be interpreted as referred to in the American Society of Heating, Refrigerating and Air Conditioning (A.S.H.R.A.E.) Handbook, current edition.

**GENERAL****1.1 GENERAL REQUIREMENTS**

- .1 The General Conditions and General Specifications form an integral part of this specification and must be read in conjunction herewith.

**1.2 SCOPE OF WORK**

- .1 This section shall provide all equipment and services necessary for, and reasonable incidental to the supply only of the equipment shown on the schedules and hereinafter specified. Generally this shall include the following:
  - .1 The supply of new electric hot water boilers, heat exchanger, expansion tank and pumps, delivered to the site (coordinate delivery time and location with the Contract Administrator).
  - .2 Assistance to the contractor in commissioning of the boilers.
  - .3 Instruct the Contract Administrator's designated employees in proper care, operation, use and maintenance of the equipment (refer to Section 15010).

**MATERIALS****2.1 PLATE & FRAME HEAT EXCHANGER**

- .1 Supply a plate and frame, water to water, type heat exchanger of the sizes and capacities noted on the schedule. The heat exchanger shall consist of 0.0157 inch AISI 316 stainless steel heat transfer plates, steel end plates, and a zinc plated carrying bar, of single pass configuration. Unit shall be specifically designed for 150 PSIG working pressure at 210°F. Heat exchanger selection shall be optimized by the manufacturer to provide minimum heat transfer surface area requirements under specified capacity and pressure drops.
- .2 The plate heat exchanger shall be shipped to the Site as completely assembled units. The heat exchanger shall be pressure tested and flushed clean at the factory prior to shipment. All nozzle connections shall be factory sealed prior to shipment to prevent the entrance of foreign matter into the heat exchanger during shipment, storage, and installation.
- .3 Corrugated channel steel plates shall be of type 316 stainless steel. Channel plate ports shall be double gasketed to prevent cross contamination of hot and cold side fluids. Gaskets shall be of a one piece design formulated from Nitrile rubber. Plates shall be grooved to accept the gaskets and gasket clips to minimize movement.
- .4 Channel carrying bar shall be of AISI 316 stainless steel.
- .5 Fixed frame plates and movable pressure plates shall be constructed of type 316 stainless steel. Flow through the plates shall be of a counter flow design to maximize the heat transfer capability of the unit.
- .6 The hot side connections shall be shall be carbon steel NPT tapings. The cold side connections shall be shall be AISI 316 stainless steel NPT tapings.
- .7 Connection ports shall be integral to the frame or pressure plate.
- .8 Unit to be supplied with OSHA approved splash guard, enclosing exterior channel plate and gasketed surfaces. Heat exchanger shall be provided with the scheduled square footage of heat transfer area.
- .9 Unit shall be constructed in accordance with ASME Code Rules and shall have a manufacturer's data report for pressure vessels, form No. U-1. Form U-1 shall be furnished to the Contract Administrator upon request. An authorized inspector, holding a National Board commission, certifying that construction conforms to the latest ASME Code for pressure vessels must sign this form. The ASME "U" symbol should also be stamped on the Heat Exchangers. In addition, each unit must be registered with the National Board of Boiler and Pressure Vessel Inspectors.

- .10 **Standard of Acceptance:**
  - .1 Armstrong S-X13-500L-33

## 2.2 ELECTRIC HYDRONIC BOILERS

- .1 Supply two Cleaver-Brooks Model No. CWB-122 Electric Hot Water boilers.
- .2 The capacity of each boiler shall be rated at 737 MBTU/hr, 216 kW @ 600 / 3 / 60.
- .3 The pressure vessels shall be manufactured to ASME Section IV Code and designed for 150 psig.
- .4 The boiler construction shall be as per NEC & ULC & the package shall be approved and labelled for operation in the Province of Manitoba.
- .5 The casing shall be 16 gauge steel, filled with 4" fibreglass insulation.
- .6 The electrical control panel shall be provided with a key-locked door and mounted integral with the boiler on a common steel based.
- .7 Heating elements shall be 6 kW each, 75 WSI copper sheathed, individually mounted, for ease of replacement.
- .8 The boiler shall be provided with components as follows:
  - .1 ASME safety relief valve.
  - .2 Pressure gauge with cock.
  - .3 Digital temperature readout.
  - .4 120V fused control transformer.
  - .5 On-off switch with pilot light.
  - .6 Magnetic contactors rated for 500,000 cycles.
  - .7 Status pilot light for each step.
  - .8 KW demand interface terminal strip, 1 pt. per step.
  - .9 Manual KW limit switches for each step.
  - .10 Float-type low water cut-off w/ three-way water column test valves.
  - .11 Adjustable high limit cut-outs, manual reset.
  - .12 Automatic temperature control.
  - .13 Proportional sequencing step control for 6 at 36 kW each.
  - .14 Alarm buzzer with silencing switch and pilot light to signal low water and high temperature, with common alarm dry contact.
- .9 Upon notification of completion of the installation the boiler manufacturer shall provide the services of a field technician for a period of one (1) day per boiler to commission and test the operation of the boiler and train the operating personnel.
  - .1 **Standard of Acceptance:**
    - .1 Cleaver-Brooks CWB-122

## 2.3 DIAPHRAGM TYPE EXPANSION TANK

- .1 Generally as shown on the schedules supply pressurized diaphragm-type expansion tank. Tank shall be air precharged to the initial fill pressure of the system. Tank shall be suitable for maximum working pressure of 862 kPa (125 psi) and shall be constructed in accordance with Section VII of the ASME Boiler and Pressure Vessel Code with stamp and certification papers. Tanks shall have an integral heavy duty Butyl rubber diaphragm suitable for an operating temperature of (240°F) 118°C. Tank shall be furnished with base mount.
  - .1 **Standard of Acceptance:**
    - .1 Armstrong AX-15.

## 2.4 CIRCULATING PUMPS

- .1 Supply circulating pumps of the size and type and capacity as indicated in the Pump Schedule.
- .2 The pumps shall be of bronze fitted construction, vertical-in-line pump, close-coupled, capable of servicing without disturbing piping connections.

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- .3 The motor shall meet NEMA specifications and shall be the size, voltage and enclosure called for on the schedule. It shall have heavy-duty, grease lubricated ball bearings, completely adequate for the maximum load for which the pump is designed.
- .4 The complete pumping unit shall be suitable for the service shown in the Pump Schedule and the pump manufacturer shall conduct running tests to verify the conditions of head capacity specified.
- .5 Renewable bronze wearing rings shall be provided on both the impeller and the wheel to prevent wear.
- .6 The pump manufacturer shall include checking and aligning all pumps prior to start up.
- .7 All piping adjacent to each pump shall be adequately supported from the structure so that no weight is carried on the pump casings. In addition, long sweep elbows shall be used on each pump section and discharge.
- .8 See clause "Sound Control" for vibration isolators.
- .9 Pumps shall be sized on the capacities, heads, motor sizes and RPM specified. However, the impeller size selected shall not be greater than 85% of the maximum size impeller.
- .10 Pumps shall be complete with triple-duty valve, with cast iron body, outlet grid vanes, removable stainless steel strainer and discharge combination shut-off, balancing and check valve with positive spring evaded seating flange cast iron body, bronze disc and seat and stainless steel stem and spring. Guide to be matched to pump flange and complete with support leg to carry pump. Supports shall be resiliently mounted on 3/8" U pad, neoprene washers to be used on lagdown bolt to eliminate short circuitry.
- .11 **Standard of Acceptance:**  
.1 Armstrong Series 4360