

1.0 AIR SEPARATOR

- .1 External air separation unit consisting of a steel tank with base ring.
- .2 Construction:
 - .1 ASME boiler and pressure vessel code stamped
 - .1 Section VIII Div. 1
 - .2 61 kPa (125 Psig) design pressure @ 375°F.
- .3 Connections:
 - .1 Flanged inlet and outlet.
 - .2 Strainer removal.
 - .3 Top – Separate fittings for: (1) system expansion tank and (2) air vent.
 - .4 Bottom – Blow down cleaning.
- .4 Removable strainer:
 - .1 Stainless steel with 05 mm (3/16") diameter perforations
 - .2 Free area of not less than five times the cross-sectional area of the connecting pipe.

1.1 EXPANSION TANKS

- .1 Steel/bladder: Full acceptance with base ring.
- .2 Connections:
 - .1 Air side charge.
 - .2 Water side inlet.
- .3 Lifting rings.
- .4 Inspection hole.
- .5 Construction:
 - .1 ASME boiler and pressure vessel code stamped
 - .1 Section VIII Div. 1
 - .2 61 kPa (125 Psig) design pressure @ 375°C (375°F).
 - .3 Shell:
 - .1 Fabricated Steel.
 - .4 Air chamber:
 - .1 Heavy duty butyl diaphragm bonded with polypropylene liner to steel shell, separating air chamber from water.
 - .2 Suitable for glycol use.
 - .3 Removable for inspection.

1.2 PLATE HEAT EXCHANGER

- .1 Provide factory authorized start up.
- .2 Fully assembled gasketed plates, double wall arrangement, requiring no additional on-site assembly.
 - .1 Supported in a frame capable of being opened and closed
 - .1 Items supplied by others.
 - .1 Anchor bolts
- .3 Performance clean condition: ARI 400-2001.

LIQUID HEAT TRANSFER EQUIPMENT

- .1 Perform first year testing by an independent ARI approved testing lab.
- .4 Design
 - .1 Thermal
 - .1 To maintain velocity and reduce fouling: sized to 100% of the area required.
 - .2 Liquid velocity through the inlet and outlet ports: maximum of 25 feet per second, to minimize pressure drop and erosion.
 - .3 Future expansion to accommodate a minimum of twenty (20) percent extra heat transfer surface area.
 - .2 Mechanical
 - .1 Frame, tie bolts,(compression bolts, nuts, and washers:
 - .1 Zinc-plated, low alloy steel (SA-193-B7/SA-194-2H)
 - .2 Material construction: SA-516 or SA-515-70.
 - .3 frame assembly coated with corrosion-resistant polyurethane paint.
 - .4 Fixed and movable end frames constructed as to eliminate any need for adding stiffeners to provide reinforcement for less frame thickness.
 - .1 Supports shall permit the future installation of twenty (20) percent additional plates.
 - .5 Carrier bar.
 - .6 Guide bar.
 - .7 End support frame.
- .5 Plates
 - .1 Minimum thickness: 0.5 mm, 316 stainless steel.
 - .2 Nozzle connections: force each fluid across the plate surface in a diagonal path. Parallel flow paths not permitted.
 - .3 Withstand a hydro test pressure of 1.3 times the design pressure.
 - .1 Each flow channel to be pressurized independently during testing.
 - .4 Metal to metal contact between adjacent plates. Designs which do not have metal to metal contact are not acceptable.
 - .5 Gasket grooves: in the compressed state, the gasket will interlock between adjacent plates.
 - .6 Supported by the carrier bar.
 - .1 Carrier bar surfaces in contact with the heat transfer plates: stainless steel.
 - .7 Guide bar to:
 - .1 Maintain plate alignment. Guide bar shall
 - .2 Not be used for support.
 - .1 Made of stainless steel.
 - .8 First and last plates: designed to prevent fluid contact with the fixed or movable heads.
- .6 Gaskets
 - .1 Glued design.
 - .1 Elastomeric, compressed asbestos not be used.
 - .1 When plates are tightened, gaskets to be compressed a minimum of 20 to 25 percent.
 - .2 Gasket adhesive: applied to the plate gasket groove, only one side of each gasket is glued.
- .7 Port holes (flanged)
 - .1 In each plate: (1) fully gasketed and (2) vented to the atmosphere.
- .8 Movable Heads

- .1 Nozzle connections: located on the fixed head for double wall single pass arrangements, unless otherwise specified.

1.3 PUMPS

- .1 Provide factory authorized start up.
- .2 Provide coupling guards on all pumps.
- .3 Vertical In-Line Circulating Pump:
 - .1 Pump volute or casings shall be constructed of class 30 cast iron
 - .1 Equal suction and discharge ports
 - .2 Drilled and tapped for gauge ports at both the suction and discharge flanges and for drain port at the bottom of the casing
 - .2 Impeller:
 - .1 Bronze
 - .2 Hydraulically balanced by the back impeller hub and balancing holes.
 - .3 Dynamically balanced fitted to the shaft with a key.
 - .3 Pump cover:
 - .1 Machined balanced chamber between the back impeller hub and the cover.
 - .2 Maximum flexibility of mechanical shaft seals and flush glands.
 - .4 Seat/seal materials:
 - .1 Suitable for glycol: 250°F
 - .5 Shaft:
 - .1 Dry shaft design.
 - .2 Covered with a replaceable stainless steel shaft sleeve.
 - .6 Motor
 - .1 High efficiency "NEMA Premium® Induction Motors CBIP, Powersmart and LEED approved (30 RPS maximum speed unless noted otherwise)
 - .1 Suitable for variable frequency drive. Coordinate with Johnson Controls.
- .4 Factory installed vent/flush line.
- .5 Suitable to accept Variable Frequency Drive control.

1.4 BOILERS

- .1 Up to 94% Thermal Efficiency at Full Rate
 - .1 Provide factory authorized start up.
- .2 Construction
 - .1 Indoor
 - .2 Front Controls Enclosed
 - .3 PolyTuf Powder Coat Finish
 - .4 Rear Connections (Electrical, Gas, Vent, Combustion Air)
 - .5 Top Connections (Water)
 - .6 Design Certified ANSI Z21.13/CSA 4.9
- .3 Control
 - .1 120V, 60Hz, 1Ø, Power Supply
 - .2 Digital Operating Control with LCD display.
 - .3 Outdoor reset with Indirect Priority with aquastat for DHW/Pool.
 - .4 0-10 VDC input for BMS to match Johnson Controls.
 - .5 Spark Ignition (IID)

LIQUID HEAT TRANSFER EQUIPMENT

- .6 Remote Flame Sensor
- .7 High Limit, Manual Reset, Fixed, 200°F
- .8 Auto Limit, Fixed, 210°F
- .9 Alarm Dry Contact Connection
- .10 On/Off Power Switch
- .11 Blocked Vent Pressure Switch
- .12 Boiler, DHW/Pool & System Pump Contacts
- .13 Water Temperature Sensors (3)
 - .1 B-36 TempTracker Mod+ Digital Controller, 2-4 Boilers, OA Reset
 - .2 S-1 Low Gas Pressure Switch, Manual Reset
 - .3 S-2 High Gas Pressure Switch, Manual Reset
 - .4 Z-12 Condensate Neutralizer Kit

- ,4 Burner
 - .1 Ultra-Low NOx: Less than 20 PPM

- .5 Gas Train
 - .1 Fuel: Natural gas
 - .2 Zero Governor Regulator
 - .3 Dual-Seat Combination Valve
 - .4 Electronic Modulating Firing Mode (H7) 5:1 turndown

TABLE 1 - AIR SEPARATOR

Mark	Mfrs.	Model	Strainer	Strainer Face Area	Max. Flow GPM	Remarks
AIR.S.-1 Building system	ITT/B+G	R8F	✓	246 Sq. inches	1500	
AIR.S.-2 Envelope	ITT/B+G	R5F	✓	112 Sq. inches	550	
AIR.S.-3 Domestic	ITT/B+G	R4F	✓	83 Sq. inches	330	
AIR.S.-4 Preheat	ITT/B+G	R3F	✓	51 Sq. inches	190	

TABLE 2 - EXPANSION TANKS

Mark	Mfrs.	Model	Pneumatic	Bladder	Volume	Dia.	Remarks
EXP.T.-1A Building system	ITT/B+G	B600		✓	158 GAL.	30"X81"H	
EXP.T.-1B Building System	ITT/B+G	B600		✓	158 GAL.	30"X81"H	
EXP.T.-2 Envelope	ITT/B+G	B500		✓	132 GAL.	24"X78"H	
EXP.T.-3 Domestic	ITT/B+G	B500		✓	132 GAL.	24"X78"H	
EXP.T.-4 Preheat	ITT/B+G	B300		✓	80 GAL.	24"X50"H	

LIQUID HEAT TRANSFER EQUIPMENT

Bid Opportunity: 889-2009
Specification 15600

TABLE 3 - PLATE HEAT EXCHANGER

Description	PHX -1 Envelope		PHX -2 Domestic		PHX -3 Preheat		PHX -4 Pool	
	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot
Mfr. Taco	TPX457-100		TP457-100		TP457-100		TPX287-100	
Model Code Designation (ASME Stamp Required)	√		√		√		√	
Heat Exchanger Coating	CS Epoxy Painted							
Plate Material	SS 316		SS 316		SS 316		SS 316	
Plate Thickness inches								
Type of Fluid	Water	Water	Water	Water	Glycol 50%	Water	Water	Water
Flow Rate: gpm	282	282	228	150	201	230	Existing	135
Specific Heat Btu/(lb) °F	1.0009	1.0009	1.0009	1.0009	0.8872	0.8872		0.8872
Specific Gravity (Ave)	0.9777	0.9777	0.9777	0.9777	1.0157	1.0157		1.0157
Thermal Conductivity Btu/(hr) (ft) °F	0.3825	0.3825	0.3825	0.3825	0.2172	0.2172		0.2172
Viscosity Cp (Average)	0.40	0.40	0.40	0.40	1.79	1.79		1.79
Temperature in T1, °F	170	180	150	160	140	150		140
Temperature out T2, °F	150	160	140	150	120	130		126
Operating Pressure P _{sig}	50	50	50	50	50	50		50
Heat exchanged BTU/hr	2,580,000		2,000,000		2,000,000		1,340,000	
Design pressure psig	150		150		150		150	
Design Temperature °F	250		250		250		250	

LIQUID HEAT TRANSFER EQUIPMENT

TABLE 4 – PUMPS

Mark	Mfrs.	Model	Motor	Rpm	Gpm	Hd (Ft)	Impeller	Remarks
PU-1 A Building system	ITT/B+G	4x4x9½	15 Hp	1760	439	65	9	A, B
PU-1B Building System	ITT/B+G	4x4x9½	15 Hp	1760	439	65	9	A, B
PU-2A Envelope Building Side	ITT/B+G	3x3x9½B	7.5 Hp	1760	282	69	9	A, B
PU-2B Envelope Exchanger Side	ITT/B+G	3x3x9½B	7.5 Hp	1760	282	69	9	A, B
PU-3A Domestic Building Side	ITT/B+G	3x3x9½B	7.5 Hp	1760	228	69	9	A, B
PU-3B Domestic Exchanger Side	ITT/B+G	2½x2½x9½B	7.5 Hp	1760	150	60	9	A, B
PU-4A Preheat Building Side	ITT/B+G	4x4x9½	7.5 Hp	1760	201	50	9	A, B
PU-4B Preheat Exchanger Side	ITT/B+G	4x4x9½	7.5 Hp	1760	230	50	9	A, B, C
PU-5A Pool Building Side	ITT/B+G	2½x2½x9½B	7.5 Hp	1760	135	60	9	A, B
PU-5B Pool Exchanger Side	Existing							

Remarks:

- A Motor to be high efficiency type.
- B Pump supplier shall meet horsepower requirements stated and “not” submit based only on “HD”/“GPM” listed above.
- C Glycol corrected.

TABLE 5 – CONDENSING BOILER

Mark	Mfrs.	Model	Gross <small>Input/Output</small> (MBH)	Thermal Effentcey	Remarks
B-BLR-1 to 11	Raypak	XFyre – Type H	850/799	94%	A, B, C, D

Remarks:

- A Boiler supplier to provide computer run for final chimney arrangement sizing to the approval of Department of Labour using
- B Full modulation.
- C Condensing.
- D The boiler supplier shall coordinate all interfacing with Johnson Controls,

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