SECTION **PAGE**

PART 1 - GENERAL

1.1 GENERAL

.1 All drawings and all sections of the specifications shall apply to and form an integral part of this section.

1.2 REFERENCES

.1 ANSI B16.1, Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800.

.2 ANSI/ASME B16.3, Malleable Iron Threaded Fittings, Classes 150 and 300.

.3 ANSI B16.5, Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and other Special Alloys.

.4 ANSI/ASME B 16.9, Factory Made Wrought Steel Butt Welding Fittings.

.5 ANSI B18.2.1, Square and Hex Bolts and Screws.

.6 ANSI/ASME B18.2.2, Square and Hex Nuts.

.7 ANSI/AWWA C111/A21.11, Rubber Liquid propaneket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.

.8 ASTM A47M, Specification for Ferritic Malleable Iron Castings.

.9 ASTM A53, Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless.

.10 ASTM A536, Specification for Ductile Iron Castings.

.11 ASTM B61, Specification for Steam or Valve Bronze Castings.

.12 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.

.13 ASTM E202, Test Method for Analysis of Ethylene Glycols and Propylene Glycols.

.14 CSA B242, Groove and Shoulder Type Mechanical Pipe Couplings.

.15 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

.16 CSA W47.1S1-M10, Supplement No. 1-M1989, Steel Fixed Offshore Structures to W47.1-1983.

.17 MSS-SP-67, Butterfly Valves.

.18 MSS-SP-70, Cast Iron Gate Valves, Flanged and Threaded Ends.

.19 MSS-SP-71, Cast Iron Swing Check Valves, Flanged and Threaded Ends.

.20 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.

.21 MSS-SP-85, Cast Iron Globe and Angle Vales, Flanged and Threaded Ends.

1.3 SCOPE OF WORK

.1 Provide labour, materials, plant, tools, equipment and services necessary for and reasonably incidental to completion of:

- .1 Connection to existing hot water boiler system with associated piping valving and devices to plate heat exchanger.
- .2 New plate heat exchanger with associated piping, valving, pump, equipment and devices.
- .3 Glycol mix tank and associated valving and piping.
- .4 Under Engineer's Seal provide shop drawings and certification of control system installation c/w full commissioning of the plate heat exchanger and supply fan control c/w inter-facing City's 'Metasys' system (include all wiring in conduit, with wiring and devices). See schedule section 15600 and 15800.
- .6 Assist chemical treatment supplier: Provide drain ports for flushing of system. Note if glycol new circulating pump is used, gaskets and seals are to be replaced.
- .7 Assist to TAB contractor. Provide revised pump impellers as required.

1.4 RELATED WORK SPECIFIED ELSEWHERE

.1 Insulation: Section 15100
.2 Plumbing: Section 15430

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

.1 Pipe: Steel
- .1 19mm (3/4") to 150mm (6"):
  - .1 Schedule 40, black steel pipe conforming to CSA Standard B63, ASTM A53, Grade B.

.2 Fittings: Steel
- .1 Screwed fittings:
  - .1 Malleable iron, to ANSI/ASME B16.3, Class 150
- .2 Pipe flanges and flanged fittings:
  - .1 Steel: to ANSI/ASME B16.5
- .3 Butt welding fittings:
  - .1 Steel, to ANSI/ASME B16.9
- .4 Unions:
  - .1 Malleable iron, to ASTM A47M and ANSI/ASME B16.3

2.2 VALVES

.1 Valves shall be of one manufacture. Submit brochure of valves selected, showing make, figure numbers and use.

.2 Gate Valves: Steel
- .1 Up to 682 kPa (100 Psi):
  - .1 Up to 50mm (2") screwed ends
  - .2 Over 50mm (2") flanged ends
    - .1 Rising stem:
      to MSS SP-80, Class 125, 860 KPa. Bronze body solid wedge disc.
      - .1 Crane, Nibco, Lunkenheimer, Toyo
    - .2 Non rising stem:
      to MSS-70, Class 125, 860 kPa, cast iron body, bronze trim, bolted bonnet.
      - .1 Crane, Nibco, Lunkenheimer, Toyo
- .2 Over 682 kPa (100 Psi):
  - .1 Up to 50mm (2") screwed ends
  - .2 Over 50mm (2") flanged ends
    - .1 Rising stem:
      to MSS SP-80, Class 300, 2068 kPa. Bronze body solid wedge disc.
      - .1 Crane, Nibco, Lunkenheimer, Toyo
    - .2 Non rising stem:
      to MSS-80, Class 250, 1723 kPa, cast iron body, bronze trim, bolted bonnet.
      - .1 Crane, Nibco, Lunkenheimer, Toyo

.3 Butterfly Valves: Steel
- .1 63 mm (2-1/2") and over, lug body
  - .1 To MSS SP-67, Class 150, 1 MPa WOG, cast iron disc, stainless steel stem replaceable seat, locking handle.
- .2 Operators:
  - .1 63 mm (2-1/2") and over:
    - .1 Locking type lever handle.
      - .1 Centreline, Keystone, Lunkenheimer, Nibco, Toyo,
  - .2 152 mm (6") and over:
    - .1 Gear operator.
      - .1 Centreline, Keystone, Lunkenheimer, Nibco, Toyo

.4 Globe Valves: Steel
.1 Up to 682 kPa (100 Psi):
.1 Up to 50mm (2") screwed ends
.2 Over 50mm (2") flanged ends
.1 To MSS SP-80, Class 125, 860 kPa. Bronze body screwed over bonnet, composition disc suitable for service.
.1 Crane, Nibco, Lunkenheimer, Toyo
.2 Over 682 kPa (100 Psi):
.1 Up to 50mm (2") screwed ends
.2 Over 50mm (2") flanged ends
.1 To MSS SP-85, Class 250, 1723 kPa. Cast iron body, bronze trim, OS+Y, bolted bonnet, bronze disc and seat ring.
.1 Crane, Nibco, Lunkenheimer, Toyo

.5 Ball Valves: Brass
.1 Up to 50mm (2") screwed ends
.1 To ASTM B62, 4 MPa WOG, bronze body, screwed ends, TFE seal, hard chrome solid ball, teflon seats and lever handle.
.1 Toyo, Nibco.

.6 Swing Check Valves: Steel
.1 Up to 50mm (2") screwed ends:
.1 To MSS SP-80, Class 125, 860 kPa bronze body, bronze swing disc, screw in cap, regindable seat.
.1 Toyo, Crane, Jenkins, Lunkenheimer, Nibco

.2 Over 50mm (2"), flanged:
.1 To MSS SP-71, Class 125,860 kPa cast iron body, FF flanged, grooved, renewable seat, bronze disc, bolted cap.
.1 Toyo, Crane, Jenkins, Lunkenheimer, Nibco

.7 Silent Check Valves: Steel
.1 Up to 50mm (2"):
.1 To ASTM B62, Class 125,860 kPa, cast steel, wafer style, brass seat rings, brass inner valve, stainless steel spring, heavy duty spring in vertical down flow application.
.1 Kitz, Toyo, Crane, Lunkenheimer, Nibco
.2 Over 50mm (2"):
.1 Class 125,860 kPa, cast steel, wafer style, bronze trim, stainless steel spring, heavy duty spring in vertical down flow application.
.1 Kitz, Toyo, Crane, Lunkenheimer, Nibco

.8 Lubricated Plug Cocks: Steel
.1 Up to 50mm (2") screwed ends:
.1 To ASTM B61, Class 150, 1 MPa, bronze body.
.1 DeZurk, Mueller

.9 Strainers: Steel
.1 Strainers shall be type Sarco "YS" for sizes up to and including 50mm (2") screwed ends.
.2 On pipe sizes 63mm (2 1/2") and larger, use std. type "D" for systems operating below 689 kPa (100 Psi) and use extra heavy type "D" for systems operating at 689 kPa (100 Psi) and above.
.3 Screens shall be stainless steel with perforations as follows:

.1 Heating (except pump suctions) - 1.6mm.
.2 Pump Suctions - 3.17 mm.
.3 Provide one set of spare screens for strainers ahead of pumps.

.4 Provide Sarco "Y" type pipe strainers in the following locations and where shown on the drawings:
.1 Pressure reducing valves.
.2 Pump suctions.

.10 Balancing Valves: Steel
.1 Circuit Setter:
.1 Circuit Y style globe valve with valved ports for connecting to differential pressure meter. Readout to be within plus or minus 2% of actual flow at design flow rate. Drain connection to be valved 19 mm (3/4") and capped suitable for hose socket to be incorporated into the valve body or provided as separate item.
.2 Up to 50 mm (2"):
.1 Maximum WP: 1723 kPa (250 Psi); maximum temperature: 121^{0}C (250^{0}F), Pressure die-cast zinc desincification resistant copper alloy (Ametal), stainless steel construction; Teflon disc, screwed in bonnet screwed ends. Flow control with digital hand wheel and tamperproof concealed mechanical memory.
.1 B&G, CB 1/2 -CB2, CB4F - CB8F, Armstrong, CBVS, CBVI, Tour and Anderson.
.3 Over 50mm (2"):
.1 Maximum WP: 1723 kPa (250 Psi); maximum temperature: 121^{0}C (250^{0}F), Body and Epoxy resin coated cast iron: bonnet and trim of zinc dezincification resistant copper alloy (Ametal); bonnet bolts of stainless steel, ANSI Class 125 flanged ends. Flow Control handwheel with vernier type ring settings and tamperproof concealed mechanical memory.
.1 B&G, CB 2 1/2F-CB8F, Armstrong, CBVII, Tour and Anderson

.11 Drain Valves: Steel
.1 Sediment hose faucet c/w brass cap and chain at base all risers and where noted on plans.
.1 Kitz Type 58CC.

2.3 ANCHORS
.1 Provide on horizontal piping. Fit anchors on vertical piping to ensure that water or air is not trapped. Fabricate from channels and angles to suit location; brace to building structure.

.2 To accommodate specified thickness of insulation. Vapour barriers and jackets to remain uninterrupted. (See Section 15205 GENERAL REQUIREMENTS).

2.4 GUIDES
.1 Pipe guide assembly to direct pipe movement along a longitudinal axis, consisting of:
.1 A 4 finger "spider" inside a guiding sleeve formed of two halves suitable for clamping into pipe.

.2 A guiding sleeve formed of two parts suitable to be bolted to supporting structure. (See Section 15205 GENERAL REQUIREMENTS).

2.5 AIR VENTS

.1 On each water fed unit convector and forced flow unit, key-operated air vent rated at 1034 kPa (150 Psi), complete with copper tube extensions carried through ends of wall hung cabinets, or through fronts of recessed cabinets.

.2 On wall fin sections with standard and special cabinets, key operated air vent rated at 1034 kPa (150 Psi) with copper tube extensions with screwdriver operated air vent rated at 1034 kPa. (150 Psi).

.3 Install at system high points, where air may be trapped and where noted (Unit Heater), Manual air vents.

.4 Automatic Air Vents:

.1 Standard float vent:

.1 Brass body and vent, 3.17mm (1/8") connection and rated at 690 kPa (100 Psi) working pressure.

.1 Amtrol, Armstrong, Braukman

.2 Industrial float vent:

.1 Cast iron body, 12mm (1/2") connection and rated at 860 kPa (125 Psi) working pressure.

.1 Amtrol, Armstrong, Braukman, Maid-O-Mist, Taco

.3 Float:

.1 Solid material suitable for 115°C (240°F) working temperature.

2.6 EXPANSION COMPENSATION

.1 Provide equipment required to control expansion and contraction of piping, with pipe loops, pipe offsets, swing joints. (See Section 15205 SUBMITTALS).

.2 Expansion joint shop drawings shall include maximum allowable temperature and pressure rating, and maximum expansion compensation.

.3 Base expansion calculations on 10^0C (50^0F) installation temperature to 3.8 times actual operating temperature.

2.7 AIR SEPARATOR

.1 Furnish and install as shown on plans an external air separation unit consisting of a steel tank.

.2 The unit shall have flanged inlet and outlet connections and strainer removal connection. The removable strainer shall be of stainless steel with .05 mm (3/16") diameter perforations and a free area of not less than five times the cross-sectional area of the connecting pipe. Remove and clean strainer after 24 hours operation and after 30 days operation.

.3 Unit shall have separate top fittings for connection to system expansion tank and for air vent.

.4 There shall be a bottom connection for blow down cleaning.

.5 Unit must be constructed in accordance with the ASME boiler and pressure vessel code and stamped 861 kPa (125 Psig) design pressure.

2.8 EXPANSION TANKS

.1 Bladder/Diaphram:

.1 Shell:

.1 Fabricated Steel Designed and Constructed per ASME Section VIII. Div. 1.

.2 Air chamber:
.1 Heavy duty butyl diaphram bonded with polypropylene liner to steel shell, separating air chamber from water suitable for glycol use.

.3 Bladder/Diaphragm Full Acceptance:
.1 Bladder to be removable for inspection.

.4 Air side charge connection, water side inlet connection.

.5 862 kPa (125 PSIG)

2.9 PLATE HEAT EXCHANGER

.1 Provide a fully assembled exchanger, requiring no additional on-site assembly. Gasketed heat transfer plates supported in a frame capable of being opened and closed

.2 Items to be supplied by others.
.1 Anchor bolts
.2 External process piping, nuts, and gaskets

.3 Performance Guarantee
.1 Vendor shall warrant goods against faulty workmanship or the use of defective materials, under normal use and service, and that such goods will conform to mutually agreed upon written specifications, drawings and are guaranteed to meet specified performance requirements, for a period of twelve (12) months from the date of shipment.
.2 The heat exchanger performance, in clean condition, shall be in accordance with ARI 400-2001.

.4 Thermal Design
.1 To maintain velocity and reduce fouling, unit shall be sized to provide 100% of the area required.
.2 The unit shall be designed for future expansion to accommodate a minimum of twenty (20) percent extra heat transfer surface area.
.3 Liquid velocity through the inlet and outlet ports shall be a maximum of 25 feet per second, to minimize pressure drop and erosion.

.5 Mechanical Design
.1 Frame, tie bolts,(compression bolts, nuts, and washers shall be zinc-plated, low alloy steel (SA-193-B7/SA-194-2H) and supports shall permit the future installation of twenty (20) percent additional plates. Carrier bar, guide bar end support frame.
.2 Fixed and movable end frames shall each be constructed as to eliminate any need for adding stiffeners to provide reinforcement for less frame thickness. Material of construction is SA-516 or SA-515-70. The frame assembly shall be coated with corrosion-resistant polyurethane paint.

.6 Plates
.1 Minimum thickness of each plate shall be 0.5 mm, 316 stainless steel.
.2 The plate nozzle connections shall be arranged to force each fluid across the plate surface in a diagonal path. This arrangement will insure proper fluid distribution. Parallel flow paths shall not be permitted.
.3 Plate design must be adequate to withstand a hydro test pressure of 1.3 times the design pressure. Each flow channel shall be pressurized independently during testing.
.4 The design of the plates must permit metal to metal contact between adjacent plates. Designs which do not have metal to metal contact are not acceptable.

.5 Gasket grooves must be designed such that in the compressed state, the gasket will interlock between adjacent plates.
.6 Plates must be fully supported by the carrier bar. Carrier bar surfaces that are in contact with the heat transfer plates shall be stainless steel.
.7 The guide bar shall be designed to maintain plate alignment. Guide bar shall not be used for support. Guide bar shall be stainless steel.
.8 The first and last plates of the plate pack shall be designed to prevent fluid contact with the fixed or movable heads.

.7 Gaskets
.1 Gaskets shall be of the glued design, to prevent slippage during assembly and cleaning of the unit.
.2 All gaskets must be elastomeric. Inelastic gaskets, such as compressed asbestos, must not be used.
.3 Gaskets shall be designed so that when the plates are tightened the gaskets will be compressed a minimum of 20 to 25 percent.

.8 Port holes (flanged) in each plate must be fully gasketed and vented to the atmosphere to force any leaks to the outside.
.1 A high quality gasket adhesive shall be used. The adhesive shall be applied to the plate gasket groove so that only one side of each gasket is glued.

.9 Movable Heads
.1 All nozzle connections shall be located on the fixed head for double wall single pass arrangements, unless otherwise specified.

2.10 PUMPS

.1 General:
.1 Provide factory authorized start up.
.2 Piping adjacent to pump to be supported from structure so no weight is carried on pump casings. Use long sweep elbows at pump.
.3 Provide coupling guards on all pumps.
.4 Submit with shop drawings, certified pump curves. Pump impeller not to exceed 85% of maximum impeller diam.
.5 Mount on cast iron or heavy steel base, having drip lips and tapped drainage holes. Provide air cock on each pump.
.6 Provide spool pieces on pump suction and discharge for fittings of vibration isolators. To be 457 mm (18") long for piping up to and including 50mm (2") and 610mm (24") long for piping 63mm (2 1/2") and above.

.2 Vertical In-Line Circulating Pump:
.1 In-line circulating pumps of iron body standard construction suitable for working pressure of 862 kPa. Shafts to have integral thrust collar, supported by two oil lubricated bronze sleeve bearings. Watertight arm seal long life mechanical seals.

.2 Provide 1.0mm galv. iron pan with 25mm (1") high edges under all pumps located in ceiling spaces. Pans shall have all seams and joints soldered to be watertight.

2.11 GLYCOL

.1 Propylene glycol to ASTM E202, premixed, softened water, third party verified, inhibited. New only.

.2 Provide solution 50% by weight.

.1 Acceptable Material: Dow Frost – HD inhibited propylene glycol based, specific gravity @ 60/60°F, 1.05-1.06 pH of solution (50% glycol) 9.0 – 10.0 reserve alkalinity (min.) 10.6 ml.

2.12 GLYCOL MIX TANK

.1 Hot water Heating Systems:
- .1 Construction : Polypropylene c/w cover.
- .2 Size: 48 gallon (180 litre) tank
- .3 Plug: standard outlet
- .4 Fluid level switch shut of pump at low level.
- .5 Diverter valve: purging of air on initial start-up and manual agitation of solution
- .6 Flexible connection hose with system check valve.
  - .1 Expanflex.

2.13 COILS

.1 Hot Water Heating: Glycol
- .1 Constructed of 5/8" ø seamless copper tube and continuous (aluminium/copper) plate fins. Tubes shall be pressure boned to the fin collars by expanding the tubes into the fin collars to achieve a minimum interference of 0.10 inches. Each multiple row coils shall be of staggered tube design circuited to optimise capacity with minimum pressure drop. Solder bonding of tubes to fins shall be unacceptable.
- .2 Fins shall be die formed into a Flat Pattern to provide maximum capacity with minimum air pressure drop and shall be spaced not closer than ten (10) fins per inch. The die formed fins with integral spacing collars shall cover the entire tube circumference.
- .3 Supply return headers with steel male pipe thread connections. 63 mm ø (2 1/2" ø) Drain and Vent connections shall be provided.
- .4 Casings shall be constructed of heavy gauge galvanized steel with tube sheets having extruded tube holes.
- .5 Each coil shall be factory leak tested at 1068 kPa (300 Psig) dry air pressure.
- .6 The coil shall be installed for counterflow operation.

PART 3 - EXECUTION

3.1 PIPING GENERAL

.1 The inside of all pipe fittings, valves and all other equipment to be smooth, clean and free from blisters, loose mill scale, sand and dirt when erected.

.2 Install unions or flanges at all equipment connections, valves, etc.

.3 Welding to suit Provincial Department of Labour Regulations. Welders to be licensed.

.4 Use long radius elbows. For pipe reductions use eccentric reducing sockets.

.5 Provide screwed or flanged connections at all pieces of equipment. Keep pipe connections clear for tube removal, etc.

.6 Use Grinnell backing rings on butt welded joints in piping other than flanges. Remove nubs.

3.2 VALVES

.1 Provide isolating valves in the following locations and where shown on the drawings.
- .1 Suction and discharge of pumps.
- .2 Before all temperature control valves.
- .3 Each piece of heating equipment.

.2 Provide three valve by-passes in the following locations and where shown on the drawings:
- .1 Pressure reducing valves.

.3 Provide check valves on parallel operation pump discharges and also where noted. The check valves shall be installed in a horizontal section of piping.

.4 Provide balancing valves in the following locations and where noted.
- .1 Pump Discharges.
- .2 Outlet piping from all water coils and sectional runouts on piping system.

.5 A union or flange dependent on size of piping shall be provided between valves and the equipment which they serve to permit isolation and removal of the equipment.

3.3 PIPE SYSTEM

.1 Water Piping Systems:
- .1 Grade up in flow direction or as noted so air may pass through connecting risers, etc. Minimum grading to be 1:480.

.2 General:
- .1 Install branch riser take-offs to grade up to riser.
- .2 Run piping parallel to walls and as unobtrusive as possible when viewed from inside or outside building.
- .3 Where pipe change in direction is shown to take up expansion, spring piping cold.

3.4 TESTING OF SYSTEMS

.1 Tests to be carried out in accordance with following time pressure requirements and regulations and requirements of authorities having jurisdiction.
- .1 Hot water heating at 862 kPa (125 Psi), or to a pressure 1 1/2 times operating pressure, whichever is largest, for 12 hours.

.2 Piping, concealed prior to completion of total service, to be test in sections prior to concealment. Tests to be witnessed by Contract Administrator's representative. Two working days prior notice to be given Contract Administrator of such tests. Pressures to be as registered at systems highest point. When sections are being tested additional pressure developed by static head of remainder of system above, to be added to specified test pressure.

.3 Tests to be with water, unless noted otherwise, prior to insulation being applied.

.4 Make good leaks, replace defective parts, flush out defective section, re-test and adjust until system functions correctly.

.5 Prior to City takeover, systems to be balanced and ready for operation, with traps strainers, drip legs, etc. cleaned.

PART 4 - SCHEDULES

TABLE 11 - PUMPS

Mark	Mfrs.	Model	Motor	Rpm	Gpm	Hd	Impeller	Remarks
WPU-1A Fill	Expanflex	GMP2-50	¼ Hp		1.8	161.7		A
WPU- 2A Circ	Taco	2007	3 Hp	1760	12	45	7.50	B

Remarks:
A Automatic operation with internal control as part of the mix tank. Instruct electrical of power connection.
B Glycol: 50%

TABLE 12 - AIR SEPARATOR

Mark	Mfrs.	Model	Strainer	Strainer Face Area	Max. Flow GPM	Remarks
WAIR.S.-1A	Taco	AC2F	√	22 Sq. inches	80	

TABLE - 13 - EXPANSION TANK

Mark	Mfrs.	Model	Pneumatic	Bladder	Volume	Dia.	Remarks
WEXP.T. 1A	Taco	CA11		√	11 GAL.	14" D X 33 "H	A

Remarks:
A Suitable for glycol.

TABLE 14 – BALANCING VALVES

Mark	System Location	Model	GPM	Size	Turns	Remarks
WBV-1A	Boiler Side: Return	STAD	22	1 ½"	1 ¾	A
WBV-2A	Glycol Pump: circulating	STAD	12	1 ¼"	2	A
WBV-3A	Glycol Secondary: return #1	STAD	6	1"	2 ¼	A
WBV-4A	Glycol Secondary: return #2	STAD	6	1"	2 ¼	A
WBV-5A, 6A	By-Pass: at each preheat coil	STAD	6	1"	2 ¼	A

Remarks:
(A) Based on Tour and Anderson.

TABLE 15 - HOT WATER PREHEAT COIL GLYCOL

Mark	Mfrs.	Velocity	Air (cfm)	Size	APD ΔP	Gpm	WPD ΔFt	BTU	Remarks
WPHC-1A, 2A	Eng. Air	360	800	22"x15"	.16	6	4.2	88,000	A

Remarks:
A Glycol: 50%, 120F – 109F

TABLE - 16 – PLATE HEAT EXCHANGER

Description	WHEX-1A	
	Hot	Cold
Mfr. Taco	TPX87-25	
Model Code Designation (ASME Stamp Required)	√	
Heat Exchanger Coating	CS Epoxy Painted	
Plate Material	SS 316	
Plate Thickness inches		
Type of Fluid	Water	Glycol 50%
Flow Rate: gpm	22	12
Specific Heat Btu/(lb) ºF	1.0009	0.8872
Specific Gravity (Ave)	0.9777	1.0157
Thermal Conductivity Btu/(hr) (ft) ºF	0.3825	0.2172
Viscosity Cp (Average)	0.40	1.79
Temperature in T1, ºF	180	150
Temperature out T2, ºF	160	116
Operating Pressure Psig	50	50
Heat exchanged BTU/hr	180,000	
Design pressure psig	150	
Design Temperature ºF	250	

TABLE 17 – PUMP CONTROL (THROUGH DDC): **To be read in conjunction with 15800**

Mark	Status	Start/Stop Indoor Outdoor reset	Graphics	Alarm Failure	Trending	Interlock
WPU-2A Glycol Circ	√	√	√	√	√	√

TABLE 18 – 3-WAY VALVE CONTROL (THROUGH DDC): **To be read in conjunction with 15800**

Mark	Status	Start/Stop Valve Enabled Modulating Position	Graphics	Alarm (Failure)		Sup water temp	Ret water temp	Room Temp	Room Temp Reset	Trending	Remarks
				Pump	Valve						
WPHC-1A, 2A Glycol	√	√	√	√	√	√	√	√	√	√	

----------END----------