

November 18, 2016

TECHNICAL DOCUMENT PREPARATION FOR A
CHILLER SYSTEM REPLACEMENT DESIGN BUILD PROJECT
ORGANIZATION OF AMERICAN STATES (OAS)
1889 F STREET, WASHINGTON, DC 20016

PURPOSE

Loring Consulting Engineers, Inc. (Loring) has prepared for the Organization of American States (OAS) this document to describe the technical requirements necessary to convey a Scope of Work to replace one or both electric chillers and associated pumps and accessories (as needed).

This description is the technical part of the Request for Proposal (RFP) document, soliciting your interest in bidding/pricing and completing the construction scope of work as a turn-key project.

The following is a technical document describing the Scope of Work (SOW) associated with updating the existing chilled water system serving 1889 F Street.

SCOPE OF ENGINEERING SERVICES

The OAS desires the replacement of the two (2) existing Carrier Model 19XL chillers installed in the 1996.

One goal of the project is to maximize energy efficiency by upgrading the chilled water system, including the upgrading of the chillers, evaporator and condenser water pumps, building controls, etc.

Loring will be assigned to each of your Contractor teams participating in the design-build solicitation as the Engineer of Record. Include any and all costs to utilize Loring to prepare the design and documentation for the project.

TECHNICAL CRITERIA

The OAS has a limited budget to replace a portion of the existing cooling system. The purpose of this project is to replace one (1) or both of the existing chillers, evaporator pumps, condenser water pumps, accessories, and reconfigure the surrounding piping. As the construction budget is limited, pricing shall be broken down as delineated herein to allow partial replacement of equipment.

Should only portions of the existing system be afforded at this time, the design shall accommodate future replacement of preexisting equipment without having to reconfigure the plant or replace newly purchased equipment.

EXISTING CHILLED WATER PLANT CONFIGURATION

The existing chilled water plant contains two (2) chillers, two (2) evaporator pumps, and two (2) condenser water pumps.

The existing chilled water plant configuration consists of two (2) evaporator water pumps in parallel, pumping into the two chillers configured in a series arrangement, and two (2) condenser water pumps in parallel, pumping into the two (2) chillers in a parallel arrangement.

The current piping arrangement does not allow one or the other chiller to be automatically bypassed, though this configuration can be accomplished through a manual bypass arrangement.

In 1996, the two chillers were replaced. The two existing chillers were arranged to operate as follows:

- CH-1: Carrier Model 19XL4040424CL, 310 Ton Capacity, 1488 GPM evaporator design (1444 GPM actual with 13 feet pressure drop), 47-degrees F to 42-degrees F, 930 GPM condenser design (872 GPM actual with 23.5 feet pressure drop), 85-degrees F to 95-degrees F. The chiller contains R22.
- CH-2 Carrier Model 19XL4040412CD, 310 Ton Capacity, 1488 GPM design (1444 GPM actual with 13 feet pressure drop), 52-degrees F to 47-degrees F, 930 GPM condenser design (872 GPM actual with 23.5 feet pressure drop), 85-degrees F to 95-degrees F. The chiller contains 1270 lbs. of R22.

The existing primary evaporator pumps were not replaced in 1996. They are as follows:

- PCWP – 1: Weinman 6L-2406, 975 GPM @ 90 Feet Head, with Lincoln motor, 40 HP.
 - Note, the final balance on this pump was 1444 GPM and 69 Feet Head.
- PCWP – 2: Weinman 6L-2406, 975 GPM @ 90 Feet Head, with Lincoln motor, 40 HP.
 - Note, the final balance on this pump was 1444 GPM and 70.5 Feet Head.

The existing condenser water pumps were not replaced in 1996. They are as follows:

- COWP – 1 (CP-1): Weinman 6L2, 1410 GPM @ 90 Feet Head, with Lincoln motor, 40 HP.
 - Note, the final balance on this pump was 1744 GPM and 70 Feet Head.
- COWP – 2 (CP-2): Weinman 6L2, 1410 GPM @ 90 Feet Head, with Lincoln motor, 40 HP.
 - Note, the final balance on this pump was 1744 GPM and 72 Feet Head.

The existing cooling towers are as follows:

- CT – 1: Evapco, USS 29-718.
- CT – 2: Evapco, USS 29-718.

Accessories include the following:

- Existing refrigeration monitoring system – Sherlock Refrigerant Gas Monitor.
- Existing chiller room exhaust system – two (2) wall mounted propeller fans.
- Existing electrical starters, disconnects, conductors, conduit, etc. serving the chillers, pumps, exhaust fans, etc.

GOALS OF THE CHILLED WATER PLANT RECONFIGURATION

If funding permits, the goal of the project would be to replace both chillers with two (2) new chillers, replace both chilled water pumps with two (2) new chilled water pumps, and replace both condenser water pumps with two (2) new condenser water pumps. Current funding limits this scope as described below.

DESCRIPTION OF WORK

Provide a complete price to furnish an operating system, including all costs and fees to provide a turnkey installation as follows:

- Replace existing Chiller #2 with a 340 ton, two (2) pass or four (4) pass evaporator bundle, a two (2) pass or four (4) pass condenser water bundle, and its associated chilled water pump with an 820 GPM pump with VFD control. The condenser flow rate shall match the existing. Provide Chiller IPLV data with the pricing submission.
- Provide automatic isolation valves on both chillers and crossover piping to allow for flexibility in operating either chiller on its own, or to allow operation of both chillers simultaneously.
- All existing and new associated pumps including the condenser water pumps and chilled water pumps shall be rebalanced.
- The turnkey construction price shall include all general conditions, insurances, licensing requirements, permitting requirements, including removal and installation, shop drawings, standard warranties, operating and maintenance manuals, and start up procedures. All work sequencing and system shutdowns for crossover and tie-ins (all trades) shall be coordinated with the OAS. The project shall include all necessary work, required by any trade, to accomplish the complete installation.
- This modification shall convert the existing Chiller #2 arrangement from having an evaporator that operates in series with the existing Chiller #1 to an arrangement where the two (2) chiller evaporators will now operate in parallel.
- Existing chilled water and condenser water piping should be retained and reused where possible to minimize piping reconfiguration.
- New digital controls shall be installed to allow for automatic sequencing and staging of both chillers, pumps, and valving. The new control system shall automate all system components including the two (2) chillers, the two cooling towers, the two condenser water pumps, and the two chilled water pumps.
- Provide for all of the upgrades identified as “accessory” work below.

The following “accessory” work shall be completed to accommodate the chilled water system updates:

- Reconfiguration of the existing Chiller room exhaust system so the system will operate on detection of a refrigerant leak from either chiller, even if they contain different refrigerants.
- Replace all existing electrical starters, disconnects, conductors, conduit, etc., required to provide operation to all new equipment while retaining operation of remaining equipment.

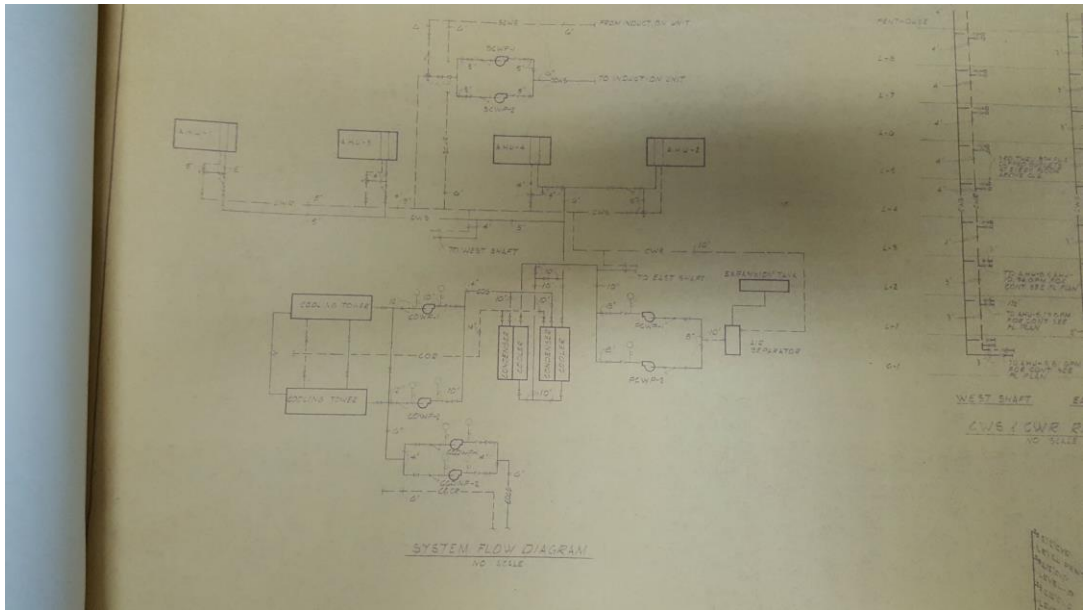
- Add variable frequency drives (VFD) to new and/or existing chilled water pumps.
- The cleaning and repainting of all cooling tower and cooling tower piping support steel (the existing support steel for the existing cooling towers need repair).
- Add automatic isolation valves on the inlet, outlet, equalizing line, and make up water fill line to each cooling tower cell.
- Add automatic isolation valve on the inlet, outlet, and bypass lines on the chilled water piping serving the two (2) chillers, whether one or both are replaced.
- Provide refrigerant venting.

All materials and methods utilized, including but not limited to items such as the materials, insulation, treatment of hangers and vibration isolation, housekeeping pads, labeling, painting, etc. shall meet or exceed the existing conditions. Flexible piping connections shall be added for new work (between new chillers and piping).

ADD ALTERNATE DESCRIPTION OF WORK

Provide a second (2nd) Add Alternate price to include all of the work described above, plus in addition include the replacement the second chiller, Chiller #1 (CH-1), and its associated chilled water pump, also with VFD control. The second chiller and its pump shall match the capacities and arrangements as discussed above for Chiller #2 (CH-2) and its pump.

APPENDIX – EXISTING PHOTOGRAPHS



EXHAUST FAN SCHEDULE

MARK	SERVES	LOCATION	CFM	EXT SP IN WG	TYPE	HP	O V F.P.M.	R.P.M.	MIN. WHEEL DIA	REMARK
EF-1	TOILETS	PENTHOUSE	15,990	1"	CENT	7 1/2	1175	381	48"	
EF-2	TRASH RM	PENTHOUSE	600	1/2"	INDLINE CENT	1/2	3574	1140	12"	
EF-3	GARAGE	PENTHOUSE	70,000	2"	INDLINE CENT	60	8500	706	72"	
EF-4	CAFETERIA	PENTHOUSE	4000	1/2"	INDLINE CENT	1 1/2	6211	1490	16"	
EF-5	KITCHEN HOOD	PENTHOUSE	6000	1 1/2"	CENT	2	1200	740	20"	
EF-6	ELEV MACH RM	PENTHOUSE	12,000	3/4"	INDLINE CENT	3	200	500	48"	
EF-7	PENTHOUSE	PENTHOUSE	5350	2-1"	INDLINE CENT	1 1/2	-	822	20"	
EF-8	CONDENSER	PENTHOUSE	8000	1"	CENT	1 1/2	1100	6100	30"	
EF-9	ELEC RM	G-2	1700	3/4"	INDLINE CENT	3/4	-	1140	18"	
EF-10	MECH RM	G-1	2050	3/4"	INDLINE CENT	1 1/2	-	930	20 1/2"	
EF-11	STORAGE	G-2	2001	3/8"	INDLINE CENT	1 1/2	-	1550	8"	
EF-12	STORAGE	G-1	250	1/4"	INDLINE CENT	1/2	-	1050	8"	
EF-13	STORAGE	LEVEL-LD RECEIVING	1410	1/2"	INDLINE CENT	1/4	-	815	18 1/4"	
F-14	MECH IN	G-2	2100	7/8"	INDLINE CENT	3/4	-	1100	18 1/4"	SUPPLY FAN
EF-20		LD RECEIVING								

PUMP SCHEDULE

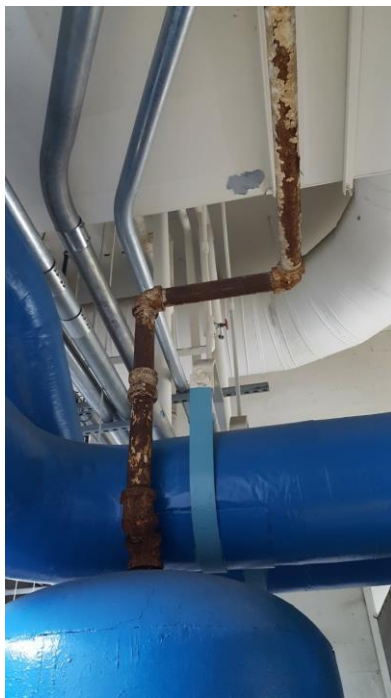
MARK	LOCATION	SERVES	GPM	TH D. FT.	H.P.	R.P.M.	REMARKS
PCWP-1	PENTHOUSE	A.H. UNITS	975	90	40	1750	DOUBLE SUCTION HORIZONTAL SPLIT CASE
PCWP-2	PENTHOUSE	A.H. UNITS	975	90	40	1750	DOUBLE SUCTION HORIZONTAL SPLIT CASE
ICWP-1	PENTHOUSE	INDUCTION UNITS	350	70	15	1750	DOUBLE SUCTION HORIZONTAL SPLIT CASE
ICWP-2	PENTHOUSE	INDUCTION UNITS	350	70	15	1750	DOUBLE SUCTION HORIZONTAL SPLIT CASE
CCWP-1	PENTHOUSE	CONDENSER	1410	90	40	1750	DOUBLE SUCTION HORIZONTAL SPLIT CASE
CCWP-2	PENTHOUSE	CONDENSER	1410	90	40	1750	DOUBLE SUCTION HORIZONTAL SPLIT CASE
SPP-1	PENTHOUSE	SPRAY	SEE NOTE 2			1750	IN LINE
SPP-2	PENTHOUSE	SPRAY				1750	IN LINE
SPP-3	PENTHOUSE	SPRAY				1750	IN LINE
SPP-4	PENTHOUSE	SPRAY				1750	IN LINE
CCWP-3	PENTHOUSE	COMM COND	150	95	10	1750	END SUCTION
CCWP-4	PENTHOUSE	COMM COND	150	95	10	1750	END SUCTION

1. PUMPS SHALL BE IN STABLE REGION OF PUMP CURVE W/ 1 PUMP OPERATING.
2. SPRAY PUMPS SHALL BE PROVIDED BY COOLING TOWER MANUFACTURER AT APPROXIMATELY 1 GPM PER SQ. FT. OF TOWER FACE AREA.

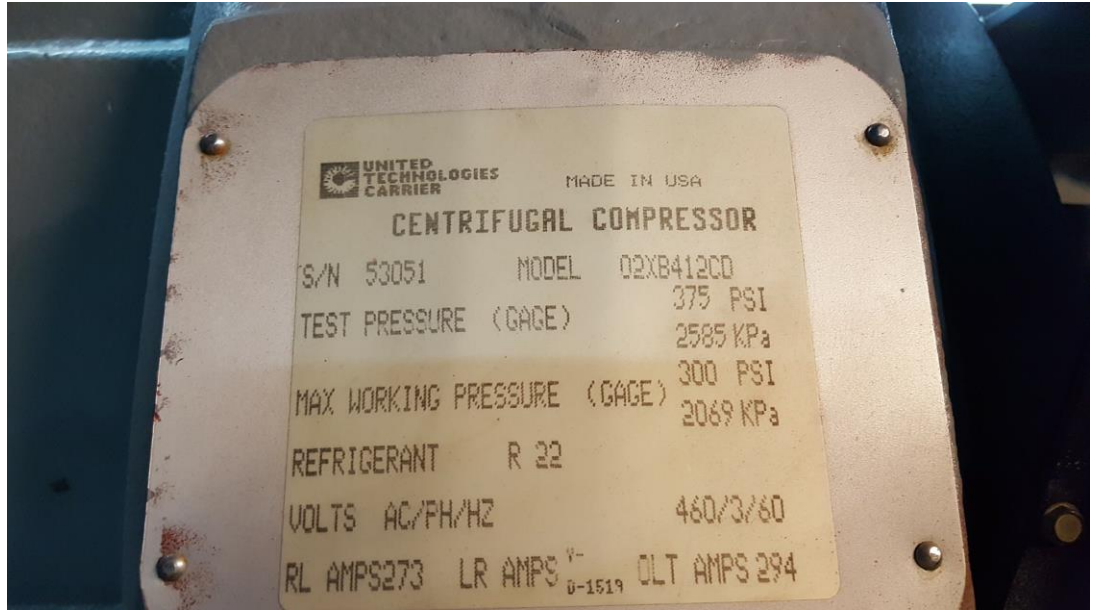


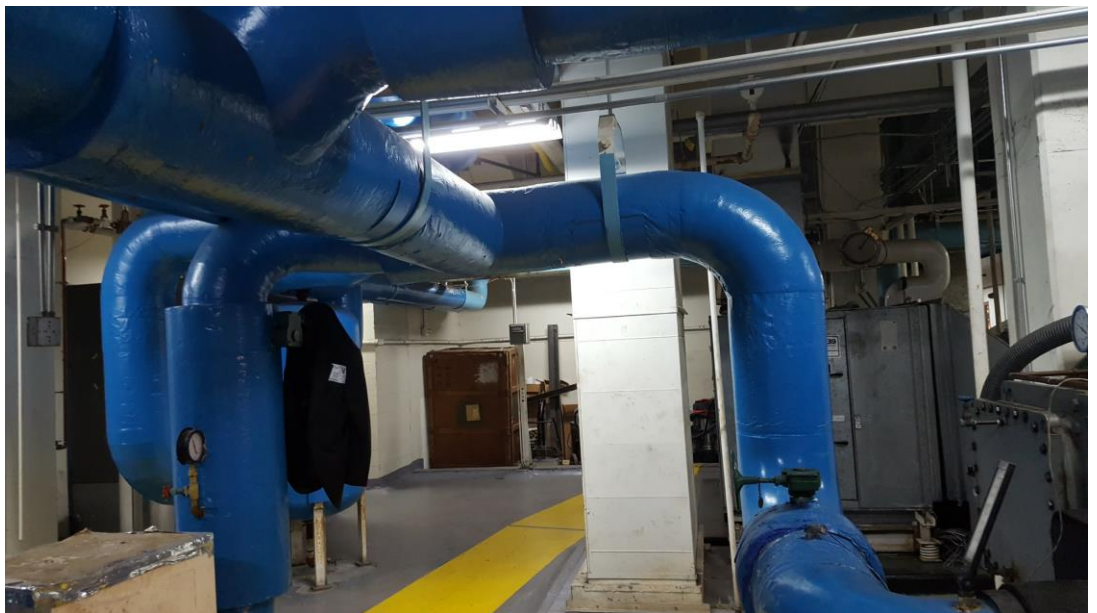


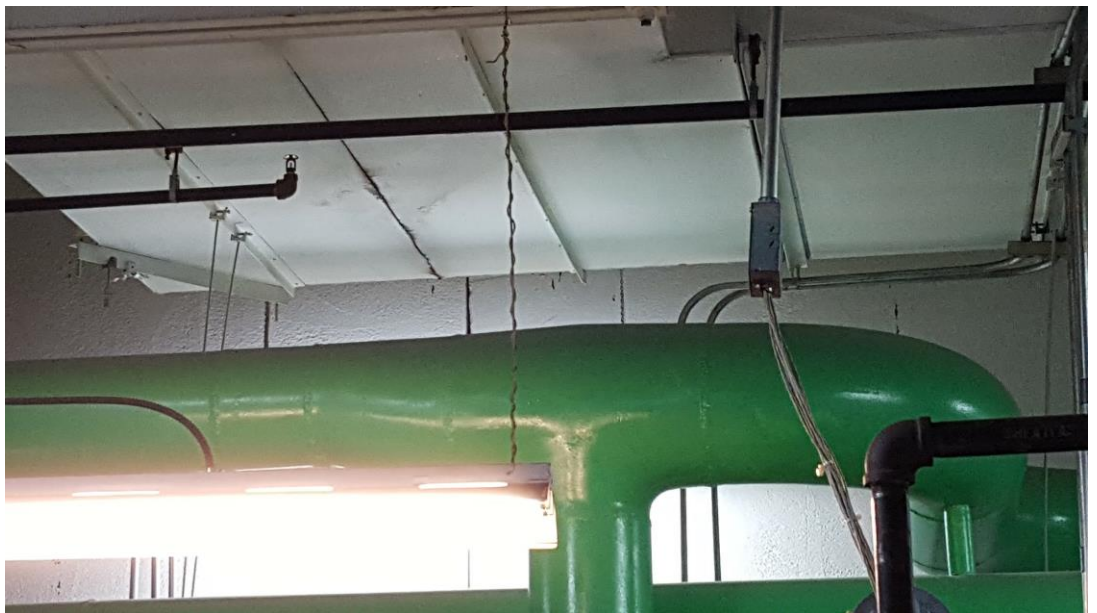






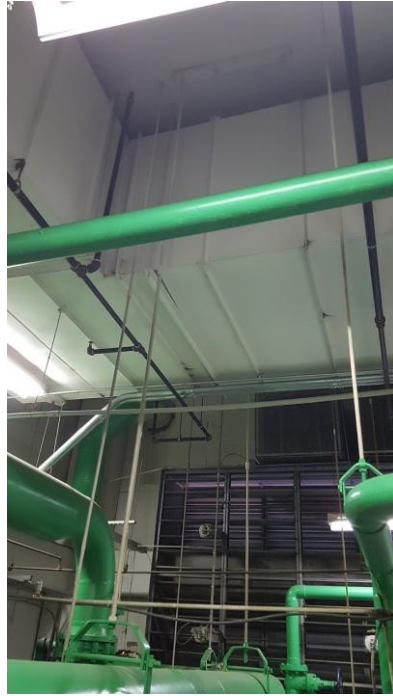












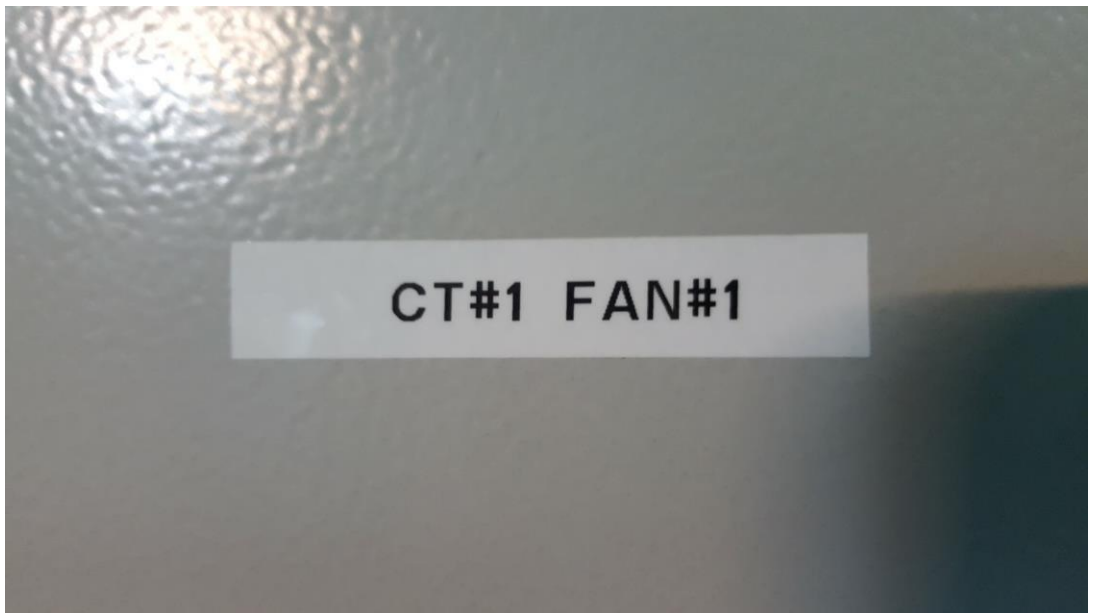








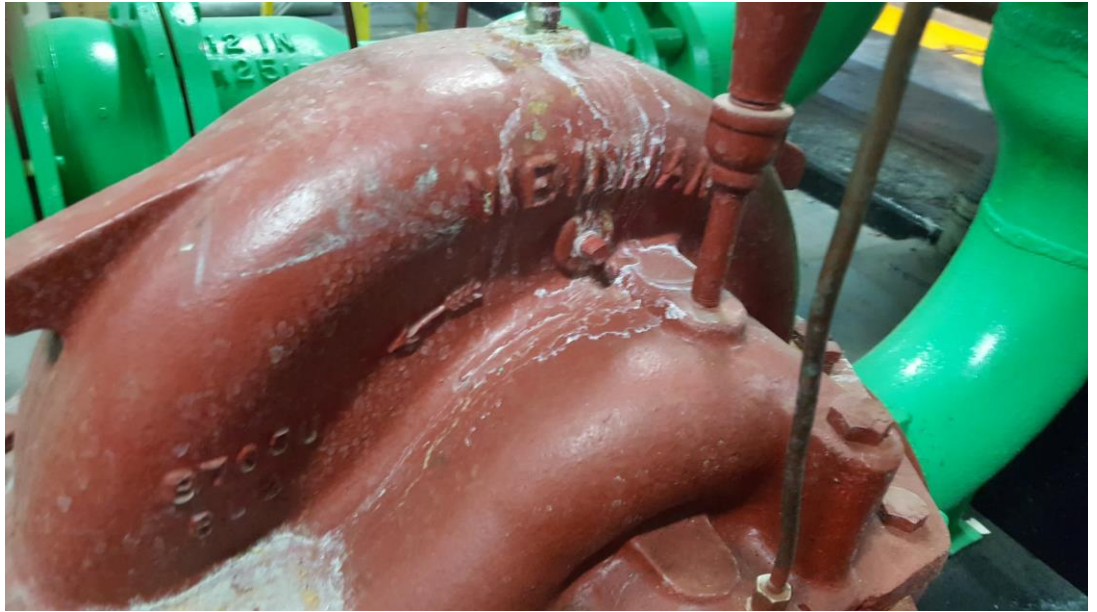


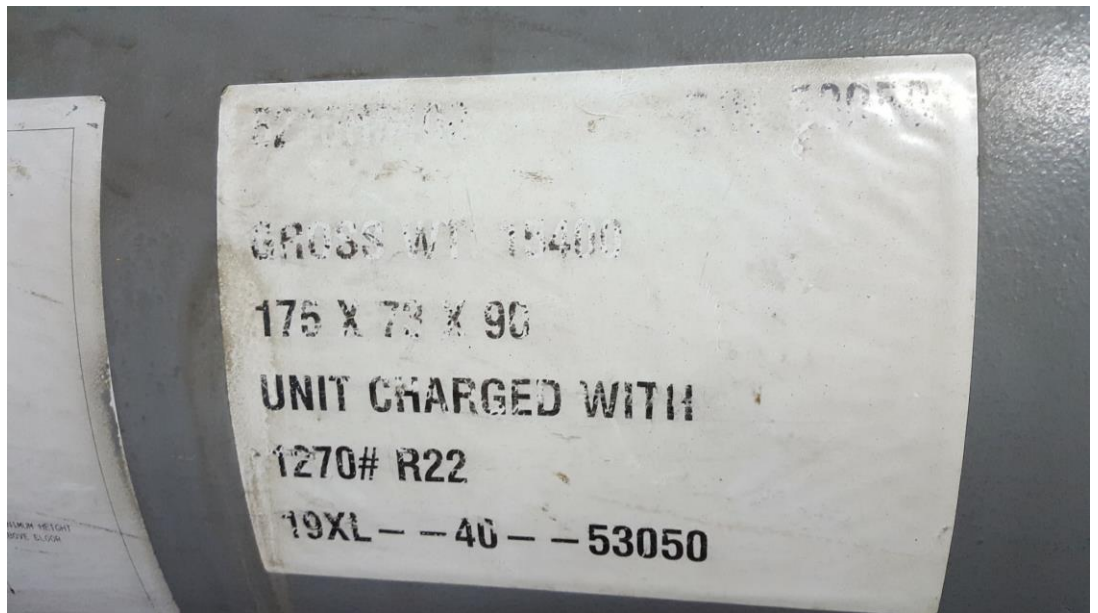














Carrier


REFRIGERATION LOG CARRIER 19XL HERMETIC CENTRIFUGAL REFRIGERATION MACHINE

Plant GSP MACHINE MODEL NO. 19XL MACHINE SERIAL NO. #1 0896753050 REFRIGERANT TYPE R-22
+040424CL #2. 0896753051

DATE	COOLER				CONDENSER				COMPRESSOR				OPERATOR INITIALS	REMARKS	
	Refrigerant		Water		Refrigerant		Water		Oil		Motor				
TIME	Press.	Temp.	In	Out	Press.	Temp.	In	Out	Press.	Temp.	Level	FLA	Amperage (or vane position)		
10/16 10/25/15	68.6	40.5	50	47	48.45	133.9	25	16.8	76.55	11.9	24.4	119.0	1.82	114	267/1227
7:30 11/2/15	72.3	43.3	54	43	50.48	134.1	34	18.8	77.81	12.9	24.4	119.0	2.03	114	216/1227
3:30 11/2/15	71.5	43.2	49	43	51.349	134.7	33.9	18.8	78.9634	12.2	24.4	119.0	1.14	114	216/1227
11:29 11-20-15	71.9	43.5	49	44	51.5	134.0	34.0	18.8	78.1594.0	13.4	24.4	119.0			216/1227
2:45 5/17/16	78.5	44.5	51	48.4	52.58	135.9	34.4	20.6	78.225	12.9	24.4	119.0	5.27	114	226/1227
4/1/16	78.2	45.7	52	52	52.48	136.0	34.6	20.6	77.77	12.4	24.4	119.0			227/1227
2:40 4/1/16	77.7	46.7	54	52	52.47	136.0	34.8	20.8	77.79	12.5	24.4	119.0			227/1227
2:30 4/1/16	Low	Chilled			Low	Chilled			75.79	12.6	23.9	129.5			227/1227
3:00 6/1/16	70.4	46.7	48	42	51.48	137.0	34.8	16.8	75.80	12.8	23.8	129.5			227/1227
3:00 6/2/16	69.9	40.9	45	43	51.48	137.0	34.8	16.8	75.80	12.8	23.8	129.5			227/1227
1:52 6/2/16	69.9	40.9	45	43	51.48	137.0	34.8	16.8	75.80	12.8	23.8	129.5			227/1227
5:09 am 3/14/16															

REMARKS: Indicate shutdowns on safety controls, repairs made, oil or refrigerant added or removed, air exhausted and water drained from dehydrator. Include amounts.

Fig. 35 - Refrigeration Log

REFRIGERATION MACHINE				COMPRESSOR MOTOR DATA		
	MODEL NUMBER	SERIAL NO.		VOLTS/PHASE/HERTZ	460/3/60	AC
MACHINE	19XL4040424CL	0896J53050		RL AMPS	304	LR AMPS Y-
COMP'R	424	53050		DLT AMPS	328	LR AMPS D- 1707
COOLER	40	53050 4		MAX FUSE/CKT BKR		
CONDENSER	40	53050 5		MIN. CKT AMPACITY		
ECONOMIZER						
STORAGE TK						
STORAGE TK						
REFRIGERANT	1270	LBS.	576	KGS.		
R-22		FACTORY		CHARGED		
				TEST PRESSURE	375	2586 KPA
				DESIGN PRESSURE	300	2069 KPA
				CLR. WATER PRESSURE	150	1035 KPA
				COND. WATER PRESSURE	150	1035 KPA
<p>SAFETY CODE CERTIFICATION THIS UNIT IS DESIGNED, CONSTRUCTED, AND TESTED IN CONFORMANCE WITH ANSI/ASHRAE 15 (LATEST REVISION), SAFETY CODE FOR MECHANICAL REFRIGERATION. THE COMPRESSOR MOTOR CONTROLLER AND OVERLOAD PROTECTION MUST BE IN ACCORDANCE WITH CARRIER</p>						
				<p>57R9 LISTED LIQUID CHILLER SELF-CONTAINED UNIT</p>		







Carrier

REFRIGERATION LOG CARRIER 19XL HERMETIC CENTRIFUGAL REFRIGERATION MACHINE

Plant GSB MACHINE MODEL NO. 19XL MACHINE SERIAL NO. 0896J53050 REFRIGERANT TYPE R-22
 #1 #2 404042ACL #2 0896J53051

Date _____

DATE	COOLER				CONDENSER				COMPRESSOR			Motor	OPERATOR INITIALS	REMARKS		
	Refrigerant		Water		Refrigerant		Water		BEARING TEMP	Oil					FLA Amperage (or vane position)	
TIME	Press.	Temp	Pressure In Out	Temp GPM In Out	Press.	Temp	Pressure In Out	Temp GPM In Out			Press. Diff.	Temp (reservoir)	Level			
08-14-16 13:00	74.1	44.3	23	48	151.9	27.8	17	6	180	131.0	134.6	121.7	00	TS 2	UB	1870
08-15-16 12:00	74.1	44.3	23	48	151.9	27.8	17	6	180	131.0	134.6	121.7	00	82.4	UB	1870
08-15-16 11:00	74.1	44.3	23	48	151.9	27.8	17	6	180	131.0	134.6	121.7	00	100	UB	1870
08-15-16 8:00	74.1	44.3	23	48	151.9	27.8	17	6	180	131.0	134.6	121.7	00	176	UB	1870
08-15-16 7:00	74.1	44.3	23	48	151.9	27.8	17	6	180	131.0	134.6	121.7	00	176	UB	1870
08-01-16 11:15	75.7	44.6	43	46	151.2	28.9	18	6	180	132	135.1	121.7	00	177	UB	1870
6/15/16 8:00	75.8	44.5	38	43	150.3	28	18	6	180	126.4	129.3	121.7	00	177	UB	1870
6/12/16 3:00	75.2	44	34	40	146	26.5	19	6	180	128.7	129.2	121.7	00	2.2	UB	1870
6/10/16 10:30	78.7	44.5	17.2	26.4	151.5	28.8	19	6	180	126.4	129.3	121.7	00	2.7	UB	1870

REMARKS: Indicate shutdowns on safety controls, repairs made, etc.

2

REFRIGERATION MACHINE			COMPRESSOR MOTOR DATA		
MACHINE	MODEL NUMBER	SERIAL NO.	VOLTS/PHASE/HERTZ	460/3/60	AC
19XL404041200	0896J53051		RL AMPS	273	LR AMPS Y-
COMP'R	412	53051	DLT AMPS	294	LR AMPS D- 1519
COOLER	40	53051 4	MAX FUSE/CKT BKR		
CONDENSER	40	53051 5	MIN. CKT AMPACITY		
ECONOMIZER					
STORAGE TK					
STORAGE TK					
					HI TEMP
REFRIGERANT	1270 LBS.	576 KGS.	TEST PRESSURE	375 PSI	2586 KPA
R-22	FACTORY CHARGED		DESIGN PRESSURE	300 PSI	2069 KPA
			CLR. WATER PRESSURE	150 PSI	1035 KPA
			COND. WATER PRESSURE	150 PSI	1035 KPA
<p>SAFETY CODE CERTIFICATION THIS UNIT IS DESIGNED, CONSTRUCTED, AND TESTED IN CONFORMANCE WITH ANSI/ASHRAE 15 (LATEST REVISION), SAFETY CODE FOR MECHANICAL REFRIGERATION. THE COMPRESSOR MOTOR CONTROLLER AND OVERLOAD PROTECTION MUST BE IN ACCORDANCE WITH CARRIER SPECIFICATION Z-375.</p>			<p>UL 57R9 LISTED LIQUID CHILLER SELF-CONTAINED UNIT</p>		<p>SP 19DR501-1154 REV-D</p>















EVAPCO UNIT LUBRICATION INSTRUCTIONS

FAN SHAFT BEARINGS:
Lubricate induced draft unit fan shaft bearings every 1000 hours or every 3 months. Lubricate forced draft unit bearings every 2000 hours or every 6 months. Use any of the following waterproof greases:
Timken Fibrelock Grease Chevron: SPO
Exxon: Polymax EM

FAN SHAFT SLEEVE BEARINGS (forced draft units only):
Lubricate intermediate sleeve bearings with the oil provided in the rigging box every 1000 hours or every 3 months. Do not use a detergent based oil. Use any of the following oils:
Exxon: Tesesatic 220 Texaco: Regal 220 R&O

GEARBOX (when supplied):
Replace the original oil after 500 hours or 4 weeks of operation. Thereafter change the oil every 2500 hours or every 6 months. Use any of the following rust and oxidation inhibited gear oils:
Exxon: Tesesatic 320 Texaco: Regal 220 R&O
Mobil: DTE Oil 88 Chevron: A'W Machine oil 220

PUMP AND FAN MOTOR BEARINGS:
Refer to the motor manufacturer's lubrication instructions enclosed with the unit.
* FOR ADDITIONAL LUBRICATION INFORMATION REFER TO THE MAINTENANCE INSTRUCTION MANUAL ENCLOSED WITH THE UNIT. P/N 015-0005PA

THIS UNIT COMPLIES WITH THE ENERGY REQUIREMENTS OF ASHRAE STANDARD 90.1

evapco

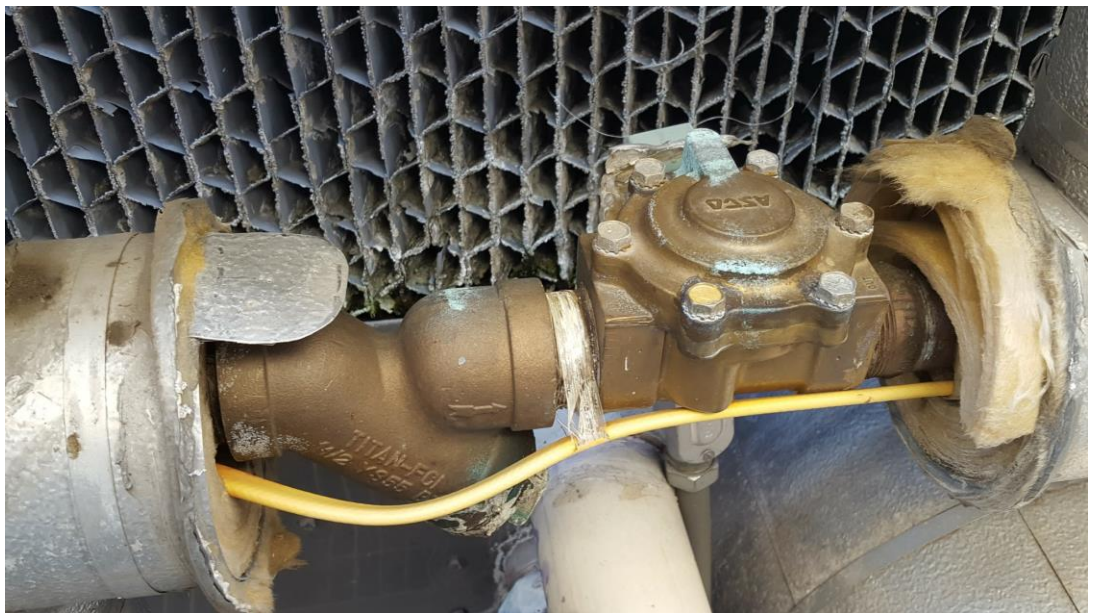
EVAPCO, INC.
5151 Allendale Lane Taneytown, MD, 21787
(410) 756-2600 Fax # (410) 756-6450
MFG. UNDER ONE OR MORE OF THE FOLLOWING U.S. PATENTS:
6602709, 6789566, 6743031, 0274697, 6317064 E3 MADE IN U.S.A.

MODEL NO.	SERIAL NO.
BELT NO.	COIL TEST PRESSURE P.S.I.G.

FOR EVAPCO AUTHORIZED PARTS AND SERVICE, CONTACT MR. GOODTOWER®

Mr. GoodTower®
CHESAPEAKE SYSTEMS, INC.
11800 N. Baltimore Avenue
Beltsville, MD 20705
Phone: (301) 913-2623
Fax: (301) 419-7411

CTI MANUFACTURER'S PUBLISHED THERMAL PERFORMANCE IS CERTIFIED BY THE COOLING TOWER INSTITUTE PROVISIONS OF STD-201 (02).
Certification Validation No. 99-13-01, 06-13-03, 06-13-04, 0







THIS UNIT COMPLIES WITH THE ENERGY REQUIREMENTS OF ASHRAE STANDARD 90.1

EVAPCO UNIT LUBRICATION INSTRUCTIONS

FAN SHAFT BEARINGS:
Lubricate induced draft fan shaft bearings every 1000 hours or every 3 months. Lubricate forced draft unit bearings every 2000 hours or every 6 months. Use any of the following waterproof greases:
Toskey Filterhouse Grease Chevron: 303
Exxon: Polyrex EM

FAN SHAFT SLEEVE BEARINGS (forced draft units only):
Lubricate intermediate sleeve bearings with the oil provided in the rigging box every 1000 hours or every 3 months. Do not use a detergent based oil. Use any of the following oils:
Exxon: Teresatic 220 Texaco: Regal 220 R&O

GEARBOX (when supplied):
Replace the original oil after 500 hours or 4 weeks of operation. Thereafter change the oil every 2500 hours or every 6 months. Use any of the following rust and oxidation inhibited gear oils:
Exxon: Teresatic 220 Texaco: Regal 220 R&O
Mobil: DTE Oil BB Chevron: A W Machine oil 220

PUMP AND FAN MOTOR BEARINGS:
Refer to the motor manufacturer's lubrication instructions enclosed with the unit.

* FOR ADDITIONAL LUBRICATION INFORMATION REFER TO THE MAINTENANCE INSTRUCTION MANUAL ENCLOSED WITH THE UNIT. PN 010-000597A

evapco

EVAPCO, INC.
5151 Allendale Lane Toneytown, MD. 21787
(410) 756-2600 Fax # (410) 756-6450
REG. UNDER ONE OR MORE OF THE FOLLOWING U.S. PATENTS:
400330, 437964, 470331, 574897, 620263, 63 MADE IN U.S.A.

MODEL NO.	SERIAL NO.
BELT NO.	COIL TEST PRESSURE P.S.I.G.

FOR EVAPCO AUTHORIZED PARTS AND SERVICE, CONTACT MR. GOODTOWER*
CHESAPEAKE SYSTEMS, INC.
11800 K Baltimore Avenue
Baltimore, MD 21158
Phone: (410) 813-2523
Fax: (301) 410-2417

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Certification Validation No. 98-12497, 06-13-03, 08-13-04, 09-

















