



AIR COOLED HEAT EXCHANGER SPECIFICATION SHEET - Imperial Units

1	0	CUSTOMER	CANADIAN NATURAL RESOURCES LTD.				PROP. NO. :	Q-16-3048					
2	0	ADDRESS	Calgary, Alberta				DATE :	May 3, 2016					
3	0	PLANT LOCATION	Gold Creek Gas Plant				REF. NO. :	Q-16-3048 A-100 R0					
4	0	SERVICE OF UNIT	Glycol Cooler				ITEM NO. :	A-100					
5	0	SIZE & TYPE:	9.55 x 28.0 x 5RF		DRAFT TYPE:	FORCED		No. of BAYS :	1				
6	0	SURF./ UNIT ; FINNED TUBE	36578		FT ² ,	SURF./ UNIT; BARE TUBE	1744.6		FT ²				
7	0	HEAT EXCHANGED	19,900,000.0		BTU/HR	MTD (Corr.)	106.1		°F				
8	0	TRANS. RATE Service; FINNED/BARE	5.640	/	118.26	BTU/HR FT ² °F	TRANS. RATE Clean; FINNED/BARE	6.60	/	138.36	BTU/HR FT ² °F		
PERFORMANCE DATA - TUBE SIDE													
10	0	FLUID NAME	50/50 EG		VAPOR REF. TEMP. (in/out)	°F		/					
11	0	TOTAL FLUID ENTERING	LB/HR	606807.0		SPECIFIC HEAT	BTU / LB °F		/				
12	0	VAPOR	LB/HR	0.0		VISCOSITY	Cp		/				
13	0	LIQUID	LB/HR	606807.0		THERMAL COND.	BTU/HR FT °F		/				
14	0	NON-COND.	LB/HR	0.0		DENSITY	LB/FT ³		/				
15	0	STEAM	LB/HR	0.0		LIQUID REF. TEMP. (in/out)	°F		284.00 / 248.00				
16	0	WATER	LB/HR	0.0		SPECIFIC HEAT	BTU / LB °F		0.9174 / 0.9027				
17	0	FLUID Condensed or Vaporized	LB/HR	0.0		VISCOSITY	Cp		0.4211 / 0.5214				
18	0	TEMPERATURE (In / Out)	°F		284.0 / 248.0	THERMAL COND.	BTU/HR FT °F		0.2226 / 0.2315				
19	0	OPERATING PRESSURE	PSIA		100.00	DENSITY	LB/FT ³		60.818 / 61.916				
20	0	VELOCITY (In / Out)	FT / SEC		6.14 / 6.03	FOULING RESIS. Air	HR FT ² °F/BTU		0				
21	0	PRESS. DROP (Allow / Calc.)	PSI		10.000 / 5.409	FOULING RESIS. Process	HR FT ² °F/BTU		0.00100				
PERFORMANCE DATA - AIR SIDE													
23	0	AIR QUANTITY, TOTAL	LB/HR	659552.246		ALTITUDE ABOVE SEA LEVEL	FT		2800.0				
24	0	AIR QUANTITY / FAN	ACFM	84291.5		TEMPERATURE IN (Dry Bulb)	°F		89.60				
25	0	ACTUAL STATIC PRESSURE	IN H2O	0.674		TEMPERATURE OUT	°F		214.74				
26	0	FACE VELOCITY	SFM	548.00		MN. DESIGN AMBIENT	°F		-40.0				
27	0	MAX MASS VELOCITY	LB/HR*FT ²	4975.2		FAN AIR TEMPERATURE	°F		89.60				
DESIGN - MATERIALS - CONSTRUCTION													
29	0	DESIGN PRESSURE	230	/	--	PSI	TEST PRESSURE	CODE	PSI	DESIGN TEMP.	-49 / 351	°F	
TUBE BUNDLE													
31	0	SIZE	9.55 x 28.0		MATERIAL	SA-516-70N		MATERIAL	SA-179				
32	0	No./Bay	1	No. Rows	5	No. OF PASSES	2		OD	1.0000	THK.	0.0830	in.
33	0	ARRANGEMENT	Counter		SLOPE	1° to exit		NO/BUNDLE	238				
34	0	BUNDLES	1 Parallel		PLUG MATERIAL (ext/int)	SA-350-LF2		LENGTH	28.000		FT.		
35	0	BAYS	1 Parallel		GASKET MATERIAL *	Soft Iron		PITCH	2.3750		in.		
36	0	BUNDLE FRAME	G-44W		CORROSION ALLOWANCE	0.0625 in		FINNING, TYPE	L-footed				
37	0	MISCELLANEOUS			NO./SIZE INLET NOZZLE (2)	6		MATERIAL	Aluminum 1100				
38	0	STRUCT. MOUNT			NO./SIZE OUTLET NOZZLE (2)	6		OD	2.2500	THK.	0.0160	in.	
39	0	SURFACE PREP.	SSPC SP6		Vent /Drain NOZZLES	(2) 2" - 300#RFWN		NO./IN.	10.0	FIN DES. TEMP.	270.0 °F		
40	0	LOUVRES TOP	Manual		RATING / FACING	Class 300# RFWN		CODE-	ASME sec. 8, Div. 1 2015				
41	0	SIDES	None		Ti:	n/a	Pi	n/a	STAMP	U-stamp			
42	0	VIBRATION SWITCH	Murphy XP		CHEM. CLEANING CONN.	N/A		SPEC.S	API 661/CNRL specs/Manu. STD.'s				
MECHANICAL EQUIPMENT													
FAN DATA													
45	0	MFG. & MODEL	Moore 10K Series 30		TYPE	ELEC. (VFD Comp. 10:1 VT)		TYPE	V-Belt Drive				
46	0	No./Bay	2	RPM	360	MFG.	Teco Westinghouse OPTIM TEFC		MANUFACTURER	WOODS OR EQ			
47	0	DIA.	8.500	No. Blades	5	No./Bay	2		MODEL	TBD			
48	0	PITCH	1.75	ANGLE	7.07°	HP / DRIVER	10	x	1.15	SF	No./Bay	2	
49	0	MATL.; Blades/Hub:	Alum. / Alum.		RPM	1800		AGMA min. RATING	18		HP		
50	0	Blade Adjustment:	Manual		ENCLOSURE	TEFC CL.1, ZN. 2, GP Ila., T3		RATIO	5.000		(driver/fan)		
51	0	HP/Fan. D.	14.14	Min Amb. °F	-40	VOLT/PHASE/CYCLE	460/3/60		SUPPORT	C.Steel Structure			
52	0	HP/Fan. D. @ min Amb	18.5	Blade type/Tip =	EC / VE			LOUVRE FAILURE - TOP:	Open	RECIRC.:	N/A		
53	0	CONTROL OF PROCESS OUTLET TEMPERATURE:						°F		HEATING COIL: none			
54	0	RECIRCULATION:	None		BUG SCREENS & HAIL GUARD:	Yes,		LADDER & PLATFORM:			Yes, front end only		
55	0	REMARKS:	THERMAL DESIGN BY HTRI version 7.0 SP2				Registered in :		AB				
56	0	Design includes 10.11% Excess surface area											
57	0	Sweet Service											
58	0	Fan Noise Rating 3 ft below = 80.18dB, 3 ft to the side = 74.67dB. Fan Tip Speed 9613.296FPM (48.84m/s)											
59	0	Fan deck at 7.5 ft from Base plates for airflow											
60	0												
61	0												
62	0												
63	0												
64	0												



LINE NO.	REV NO.	AIR COOLED HEAT EXCHANGER SPECIFICATION SHEET - SI units										
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2	0	ADDRESS	Calgary, Alberta							DATE :	May 3, 2016	
3	0	PLANT LOCATION	Gold Creek Gas Plant							REF. NO. :	Q-16-3048 A-100 R0	
4	0	SERVICE OF UNIT	Glycol Cooler							ITEM NO. :	A-100	
5	0	SIZE & TYPE:	2.91 x 8.53 x 5RF			DRAFT TYPE:	FORCED			No. of BAYS :	1	
6	0	SURF./ UNIT ; FINNED TUBE	3398.2			m ²	SURF./ UNIT; BARE TUBE	162.1			m ²	
7	0	HEAT EXCHANGED	5832.1			KW	MTD (Corr.)	58.9			°C	
8	0	TRANS. RATE Service; FINNED/BARE	32.0	/	671.5	W / m ² •°C	TRANS. RATE Clean; FINNED/BARE	37.5	/	785.6	W / m ² •°C	
PERFORMANCE DATA - TUBE SIDE												
10	0	FLUID NAME	50/50 EG				VAPOR REF. TEMP. (in/out)	/				
11	0	TOTAL FLUID ENTERING	Kg/HR	275247.7			SPECIFIC HEAT	KJ/Kg °C	/			
12	0	VAPOR	Kg/HR	0.0			VISCOSITY	Cp	/			
13	0	LIQUID	Kg/HR	275247.7			THERMAL COND.	W/m °C	/			
14	0	NON-COND.	Kg/HR	0.0			DENSITY	Kg/m3	/			
15	0	STEAM	Kg/HR	0.0			LIQUID REF. TEMP. (in/out)	140.0		/	120.0	
16	0	WATER	Kg/HR	0.0			SPECIFIC HEAT	KJ/Kg °C	3.841	/	3.779	
17	0	FLUID Condensed or Vaporized	Kg/HR	0.0			VISCOSITY	Cp	0.4211	/	0.5214	
18	0	TEMPERATURE (In / Out)	°C	140.0	/	120.0	THERMAL COND.	W/m °C	0.385	/	0.401	
19	0	OPERATING PRESSURE	KPa (abs)	689.5			DENSITY	Kg/m3	974.2	/	991.8	
20	0	VELOCITY	m / SEC	1.871	/	1.838	FOULING RESIS. Air	m ² •°C/W	0.000000			
21	0	PRESS. DROP (Allow / Calc.)	KPa	68.9	/	37.3	FOULING RESIS. Process	m ² •°C/W	0.000176			
PERFORMANCE DATA - AIR SIDE												
23	0	AIR QUANTITY, TOTAL	Kg/HR	299172.9			ALTITUDE ABOVE SEA LEVEL	m	853.4			
24	0	AIR QUANTITY / FAN	A m3/S	39.78			TEMPERATURE IN (Dry Bulb)	°C	32.0			
25	0	ACTUAL STATIC PRESSURE	KPa	0.1679			TEMPERATURE OUT	°C	101.5			
26	0	FACE VELOCITY	S m/S	2.7838			MN. DESIGN AMBIENT	°C	-40.0			
27	0	MAX MASS VELOCITY	Kg/m ² s	6.7474			FAN AIR TEMPERATURE	°C	32.0			
DESIGN - MATERIALS - CONSTRUCTION PER BUNDLE												
29	0	DESIGN PRESSURE	1586	/	--	Kpag	TEST PRESSURE	CODE	Kpag	DESIGN TEMP.	-45 / 177 °C	
30	0	TUBE BUNDLE	HEADER			TYPE	BOX- PLUG	TUBE SIDE				
31	0	SIZE	2.91 x 8.53			MATERIAL	SA-516-70N		MATERIAL	SA-179		
32	0	No./Bay	1	No. Rows	5	No. OF PASSES	2		OD	25.40	THK. 2.108 mm	
33	0	ARRANGEMENT	Counter			SLOPE	1° to exit		NO/BUNDLE	238		
34	0	BUNDLES	1 Parallel			PLUG MATERIAL (ext/int)	SA-350-LF2		LENGTH	8.53 m		
35	0	BAYS	1 Parallel			GASKET MATERIAL *	Soft Iron		PITCH	60.3 mm		
36	0	BUNDLE FRAME	G-44W			CORROSION ALLOWANCE	1.6 mm		FINNING, TYPE	L-footed		
37	0	MISCELLANEOUS				NO. SIZE INLET NOZZLE (2)	6		MATERIAL	Aluminum 1100		
38	0	STRUCT. MOUNT				NO. SIZE OUTLET NOZZLE (2)	6		OD	57.2	THK. 0.4064 mm	
39	0	SURFACE PREP.	SSPC SP6			Vent /Drain NOZZLES	(2) 2" - 300#RFWN		NO./mm	0.394	FIN DES. TEMP. 130 °C	
40	0	LOUVRES TOP	Manual			RATING / FACING	Class 300# RFWN		CODE-	ASME sec. 8, Div. 1 2015		
41	0	SIDES	None			Ti:	n/a		Pi:	n/a		
42	0	VIBRATION SWITCH	Murphy XP			CHEM. CLEANING CONN.	N/A		SPEC.S	API 661/CNRL specs/Manu. STD.'s		
MECHANICAL EQUIPMENT												
FAN DATA				DRIVER DATA				SPEED REDUCER DATA				
45	0	MFG. & MODEL	Moore 10K Series 30			TYPE	ELEC. (VFD Comp. 10:1 VT)		TYPE	V-Belt Drive		
46	0	No./Bay	2	RPM	360	MFG.	Teco Westinghouse OPTIM TEFC		MANUFACTURER	WOODS OR EQ		
47	0	DIA.	2.6	No. Blades	5	No./Bay	2		MODEL	TBD		
48	0	PITCH	1.8	ANGLE	7.07°	KW / DRIVER	7.46	x	1.15	SF	No./Bay 2	
49	0	MATL.; Blades/Hub:	Alum. / Alum.			RPM	1800		min. AGMA Rating	13.423 KW		
50	0	Blade Adjustment:	Manual			ENCLOSURE	TEFC CL.1, ZN. 2, GP Ila., T3		RATIO	5.000 (driver/fan)		
51	0	KW/Fan. D.	10.54	Min Amb. °C	-40	VOLT/PHASE/CYCLE	460/3/60		SUPPORT	C.Steel Structure		
52	0	KW/Fan. D. @ min Amb	13.795	Blade Tip =	FALSE	LOUVRE FAILURE -	TOP:	Open	RECIRC.:	N/A		
53	0	CONTROL OF PROCESS OUTLET TEMPERATURE:						°C		HEATING COIL:		none
54	0	RECIRCULATION:	None			BUG SCREENS & HAIL GUARD:	Yes,		LADDER & PLATFORM:	Yes, front end only		
55	0	REMARKS:	THERMAL DESIGN BY HTRI version 7.0 SP2				Registered in :	AB				
56	0	Design includes 10.11% Excess surface area										
57	0	Sweet Service										
58	0	Fan Noise Rating 3 ft below = 80.18dB, 3 ft to the side = 74.67dB. Fan Tip Speed 9613.296FPM (48.84m/s)										
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