



**Mechanical Equipment Datasheet
Natural Gas Heater**

Service: Natural Gas Heater

Tag No.: BL-E-301

Datasheet No.: 06301-100-20-DST-143

Rev No.: 1

1	Issued for Purchase	18-Dec-12	WT	RT	LZ	RT	
0	Issued for Quotation	25-Oct-12	PC	ZQ	LZ	RT	
A	Issued for Quotation	27-Mar-12	RL	RG	AF	SS	OB
Rev	Description	Date	By	Checked	Process	Approved	Project

Project: 1083 - Bear Lake Battery Project

Job No.: 1083

Plant Location: Bear Lake

RFQ/P.O. No.: 1083-BC-4006

Client: Cenovus Energy


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Applicable to:

☐ Proposal

☒ Purchase

☐ As Built

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						06301-100-20-DST-143		BL-E-301		1	
1	Rev	SERVICE: Natural Gas Heater				JOB NO. 1083		PAGE NO.		2 OF 4	
2		Manufacturer				Sour Service		Sweet Service		Yes	
3	1	Size, Type Note 2 / Double-pipe Exchanger Arrang.: Horizontal				Shells per Unit 1		Connected in 1 parallel		1 series	
4	1	Surf. Area per unit(Gross/eff.) 8.321 m ²		Surf. area per shell(Gross/eff.) 8.30 m ²		CRN No.:		Note 2			
5	1	Model No. SH4K1-20-00-24UV-2B3C		Series No. Note 2		NB No.		Note 2			
PERFORMANCE OF ONE UNIT											
7		Process Unit				Shell Side				Tube Side	
8		Fluid Name				Ethylene Glycol (50 wt%) / H ₂ O (Note 1)				Natural Gas	
9		Fluid Quantity Total		kg / h		3,591				7,926	
10						In Out		In Out			
11		Vapor		kg / h		- -		7,926 7,926			
12		Liquid		kg / h		3,591 3,591					
13		Steam		kg / h		- -		- -			
14		Water		kg / h		- -		- -			
15		Non condensable.		kg / h		- -		- -			
16		Temperature		°C		150.0 100.0		5.0 35.0			
17		Density, (L / V)		kg / m ³		990.4 - 1,034.1 -		63.90 53.19			
18		Viscosity, (L / V)		cP		0.364 - 0.710 -		0.0128 0.013			
19		Molecular Weight, (Vapor / Noncondensables)						17.16			
20		Specific Heat Capacity (L / V)		kJ / kg-K		3.740 - 3.540 -		2.84 2.67			
21		Thermal Conductivity (L / V)		W / m -K		0.3904 - 0.3914 -		0.0381 0.0410			
22		Surface Tension		Dyn/cm							
23		Pcrit, Tcrit		kPa absolute, °C							
24		Latent Heat		kJ / kg-K							
25		Inlet Pressure		kPag		896		6,887			
26		Clean Pressure Drop, (Allow. / Calc.)		kPa		note 2		note 2			
27	1	Fouled Pressure Drop, (Allow. / Calc.)		kPa		70 2.571		70 14.945			
28	1	Velocity		m / s		0.32		11.82			
29		Fouling Resistance		m ² -K / W		0.00018		0.00018			
30		Average Film Coefficient		W / m ² -K		Note 2		Note 2			
31	1	Heat Exchanged per Unit		0.1815 MW		LMTD, Corrected		104.8 °C			
32	1	Transfer Rate, Service		209.7 W / m ² -K		Clean		297.66 W / m ² -K			
CONSTRUCTION OF ONE SHELL											
34				SHELL SIDE		TUBE SIDE		Sketch (Bundle / Nozzle Orientation)			
35		Design / Test Pressure		kPa gauge		7,650 Per Code		9930 / Per Code			
36		Design Temperature / MDMT		°C		178 / -29		150 / -29			
37		No. Passes per Shell				1		1			
38	1	Corrosion Allowance		mm		1.6		1.6 (Tube: 0)			
39	1	Connections: Size & Rating		In		2" 600# RFWN		3" 900# RFWN			
40	1			Out		2" 600# RFWN		3" 900# RFWN			
41	1			Vent		-		-			
42				Drain		-		-			
43	1	Tube No. 1		OD 73.025 mm		Thk., (min./avg.): mm 5.156		Length 6.096 m		Pitch N/A mm	
44		Tube type		Longitudinal Fin		Material SA-106-B/C		Tube Layout:		N/A	
45	1	Shell material		SA-106-B/C		ID (mm) Note 2		Shell cover material		SA-352 LCB	
46	1	Channel or bonnet material		SA-516-70		Channel closure material		Note 2			
47	1	Stationery tubesheet material		SA-516-70		Floating tubesheet material		N/A			
48		Floating head cover material		N/A		Impingement protection		N/A		Type N/A	
49		Cross baffles: No. / Material		N/A		Type: N/A		% Cut, (dia. / area)		N/A	
50		Long. baffles material		N/A		Seal type		N/A			
51		Supports - Tube:		CS		U-Bend		N/A		Type N/A	
52	1	Bypass seal Arrangement:		N/A		Tube-tubesheet joint		welded			
53		Expansion joint		N/A		Material N/A		Type N/A		Avg. Metal Temp, Shell / Tube: Note 2 °C	
54	1	Rho-v ² (kg/m-s ²) : Inlet nozzle		Note 2		Bundle entrance		N/A		Outlet Nozzle Note 2	
55	1	Gaskets: Shell side		Kampro type		Tube side		Kampro type		Floating Head N/A	
56		Tube Closure Type		Separated Through-Bolted Flanged		Shell Return Cover Type		Through-Bolted Flanged			
57	1	Code:		ASME VIII Div. 1		Stamp Required: Yes		Nat'l Board Reg. Yes		TEMA class N/A	
58	1	Weight per Shell		Dry 493.42 kg		Flooded: 577.44 kg		Bundle		113.82 kg	
59		Remarks: See page 4 for notes.									
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BL-E-301

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SERVICE:

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1		Rev		Notes								
2		1. 50 wt% Ethylene Glycol Dowtherm 4000 shall be used as the heating medium. The maximum flow rate for design case is 3,591 kg/h and the normal flow rate is 1,638 kg/h.										
3		2. Seller to provide these information.										
4		3. The maximum natural gas flow rate for design case is 7,926 kg/h and the normal flow rate is 3,616 kg/h. The natural gas molecular Weight (MW) is 17.16.										
5		Natural gas composition (Mole Fraction):										
6		C1 0.9680										
7		C2 0.0037										
8		C3 0.001										
9		i-C4 0.0023										
10		n-C4 0.0024										
11		i-C5 0.0022										
13		n-C5 0.0014										
14		C6 0.0016										
15		C7+ 0.0011										
16		CO ₂ 0.0149										
17		H ₂ 0.0000										
18		N ₂ 0.0014										
19		He 0.0000										
20		H ₂ O 0.0000										
21		H ₂ S 0.0000										
22		Total: 1.0000										
23		4. The natural gas might flow at 25% of the design case flow rate due to the turn down running of the process system. Seller need to ensure that the outlet temperature at										
24		the natural gas side would be still able to be met even at this turn down duty case.										
25		5. The Seller shall provide thermal and mechanical guarantee for the exchanger supplied.										
26		6. Heat exchanger shall be designed in accordance with the latest revisions of ASME Section VIII Div. 1, ASME B31.3, and shall be registered with ABSA c/w CRN No. If heat										
27		exchanger manufactured outside of Canada, registration with National Board is also required.										
28		7. The exchanger supports and lifting lugs design shall be based on MDMT of -45°C.										
29		8. The lifting lug design shall be stamped by a registered professional engineer.										
30		9. The supports shall be designed to carry 2 times of the weight of entire unit full of water.										
31		10. Grounding lugs shall be provided.										
32		11. All NDE tests shall be as per ASME Code and project Specifications.										
33		12. The natural gas heater shall be insulated as per Specification TR-43-SPC-00-021-02 Rev 6 Insulation.										
34		13. Surface preparation and priming shall be as per Specification TR-43-SPC-00-019-01.										
35		1		14. Lifting & grounding lugs are required.								
36		1		15. Insulation shall be supplied and installed by the seller. Insulation protective packing shall be supplied and installed by the seller to protect the								
37				insulation during transportation.								
38		1		16. Seller is providing their standard separated head double pipe hairpin design with independant bolting.								
39		1		17. Hydrotest at minimum 1 hour with chart.								
40		1		18. Due to manufacturing restrictions on finned pipe the inner pipe will be fabricated using a return bend and straight pipes with two circumferential welds.								
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