



**SPECIFICATION SHEET
SHELL AND TUBE EXCHANGER
(SI UNITS) API 660**

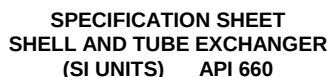
JOB NO. CE4160
PROJECT: KIRBY NORTH PHASE 1
P.O. NO.
INQUIRY NO.

ITEM NO. 104-E-135
DOC. NO. KNP-DS-M-104-E-135
REV. NO. 0
DATE: 1/31/2013

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1	Client	CONRL	Location	CONKLIN, AB	
2	Process Unit	CPF UNIT 4	Fabricator	Exchanger Industries	
3					
4	Service of Unit	SALES OIL TANK HEATER	No. of Units	1	
5	Size	381 - 6096	TEMA Type	BEU	Connected in 1 Parallel 1 Series 1
6	Surface/Unit (gross)	36.9 m ²	Shells/Unit	1	Surface/Shell (Eff.) 36.7 m ²
7	PERFORMANCE OF ONE UNIT				
8	Fluid Allocation	(Inlet)	SHELL SIDE	(Outlet)	(Inlet) TUBE SIDE (Outlet)
9	Fluid Name	SALES OIL		GLYCOL	
10	Fluid Quantity, Total	kg/h	56495		10527
11	Vapor (MW)	kg/h			
12	Liquid	kg/h	56495	56495	10527 10527
13	Steam	kg/h			
14	Water	kg/h			
15	Noncondensable / MW	kg/h	/		/
16	Temperature	°C	30	40	90 60
17	Density (Vapor/Liquid)	kg/m ³	920	915	1038.6 1062
18	Viscosity (Vapor/Liquid)	mPa.s	230	119	1.4113 2.743
19	Specific Heat (Vapor/Liquid)	kJ/(kg.K)	1.822	1.863	3.4057 3.272
20	Thermal Conductivity (Vapor/Liquid)	W/(m.K)	0.1425	0.1402	0.3364 0.3450
21	Latent Heat	kJ/kg @ °C	@		@
22	Inlet Pressure	kPa (ga)	220		1171
23	Velocity	m/s	0.58		0.62
24	Pressure Drop (Allowable/Calculated)	kPa	70	65.49	70 18.819
25	Fouling Resistance	m ² .K/W	0.000528		0.000176
26	Avg. Film Coefficient	W/(m ² .K)	588.73		1121.76
27	Heat Exchanged	292.47 kW	MTD (Corrected) (Weighted)		37.9 °C
28	Transfer Rate (Required/Fouled/Clean)	210.13	274.77	346.69	W/(m ² .K)
29	pV ² [kg.(m/s ²):]	Inlet Nozzle 4072.51	Bundle Entrance 39.5	Bundle Exit 102.93	
30	CONSTRUCTION PER SHELL				
31	Tube No. 102 U-legs	OD 19.05 mm	NOZZLES - No. Size & Rating		
32	Thickness 2.108 mm (Min./Avg.) Min		SHELL SIDE TUBE SIDE		
33	Pitch 25.4 mm Tube Pattern 45	Inlet			
34	Length 6.096 m Type Plain	Outlet	SEE PAGE 2 OF 5		
35	Tube-Tubesheet Joint Rolled 2 RG	Intermediate			
36	Shell Diameter (ID/OD 381 ID / mm	Vent			
37	Cross Baffle Type Single Segmental	Drain			
38	Spacing: c/c 206.3 mm No. of Crosspasses 25				
39	% Cut 36.1	Design Press. kPa (ga)	3500	3500	
40	Tube Support Type N/A	Vacuum Press. kPa (abs)	FV / 148 °C	FV / 148 °C	
41	Long Baffle Seal Type N/A	Design Temp(Max/MDMT) °C	150 / -29	150 / -29	
42	By-Pass Seal Type Seal Rod	No. of Passes per Shell	1	4	
43	Impingement Protection (Y/N) Y	Corrosion Allowance mm	3.2	3.2	
44	MATERIALS OF CONSTRUCTION: SEE PAGE 2 OF 5 FOR MORE DETAILS				
45	Shell SA-106-B	Tubes SA-179 ANNEALED	Gaskets:		
46	Shell Cover SA-234-WPB	Shell Side	316 SS core, flex graphite, Kammprofile		
47	Channel or Bonnet SA-106-B	Tube Side	316 SS core, flex graphite, Kammprofile		
48	Channel Cover SA-234-WPB	Floating Head	N/A		
49	Floating Head Cover/Bolts	Spare Sets Req'd	1 set of spare gaskets, 10% of bolting		
50	Tubesheet: Stat. SA-516-70N Floating	Test Ring Req'd (Y/N)	NO		
51	Baffles: Cross SA-36 Long	Insulation: Shell	64 mm mineral wool with aluminum jacket		
52	Tube Support Material	Channel Inlet/Exit	51 mm mineral wool with aluminum jacket		
53	Expansion Joint Type N/A	Expansion Joint Material N/A			
54	Code Requirements ASME Sec. VIII, Div. 1	Stamp Y	Calc. MAWP (Y/N) Y	TEMA Class R	
55	REMARKS: See notes on page 2				
56					
57					
REVISION LOG					
REV.	DESCRIPTION		DATE	BY	CHK'D APP'D
0	ISSUED FOR PURCHASE		1/31/2013	SS	DA HB



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ADDITIONAL REMARKS, SKETCHES, ETC. (Optional)

NOTES CONTINUED FROM PAGE 2 OF 5.

9. MINIMUM SPOT RT IS REQUIRED. 100% MT FOR WELDS OF LIFTING LUGS IS REQUIRED.
10. TWO GROUNDING LUGS ARE REQUIRED.
11. ELECTRICAL HEAT TRACING (EHT) IS REQUIRED FOR THE SHELL SIDE (SALES OIL) TO MAINTAIN A PROCESS TEMPERATURE OF 30 DEG C.
12. "*" DENOTES THAT VENDOR SHALL CONFIRM, MODIFY, OR PROVIDE THE INFORMATION.
13. LIFTING LUGS SHALL BE DESIGNED FOR A MINIMUM DESIGN METAL TEMPERATURE OF -45 DEG C.
14. VENDOR TO PROVIDE MECHANICAL DATA SPECIFIED IN SHEET 2 OF 5.
15. THE EXCHANGER SIZE, DUTY, AND DESIGN SHALL PREFERABLY BE IDENTICAL TO KIRBY SOUTH DESIGN AS SPECIFIED IN THIS DATA SHEET.
16. DESIGN OF ANCHOR BOLT DIAMETER SHALL BE BASED ON ASTM A325 BOLTS.



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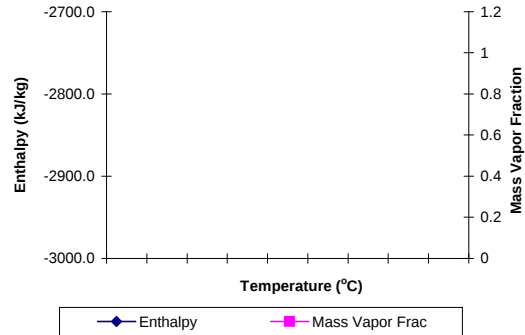
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Sales Oil Heat Curve

Fluid Name: GLYCOL Ref. Pressure 1: 12.64 bar (abs)

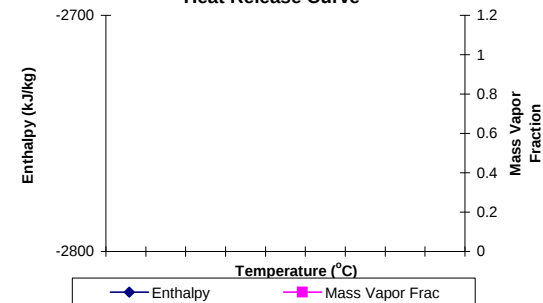
Pressure bar (abs)	Temp. °C	Enthalpy kJ/kg	Mass Vapor Fraction
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Heat Release Curve



Density Vapor kg/m ³	Density Liquid kg/m ³	Viscosity Vapor mPa·s	Viscosity Liquid mPa·s	Thermal Cond., Vapor W/m·K	Thermal Cond., Liquid W/m·K	Sp. Heat Vapor kJ/(kg·K)	Sp. Heat Liquid kJ/(kg·K)	Surface Tension N/m	Liquid Critical Press. bar (abs)	Liq. Crit. Temp. °C
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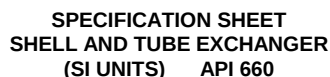
Heat Release Curve



Fluid Name: GLYCOL Ref. Pressure 2: 10.64 bar (abs)

Pressure bar (abs)	Temp. °C	Enthalpy kJ/kg	Mass Vapor Fraction
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Density Vapor kg/m ³	Density Liquid kg/m ³	Viscosity Vapor mPa·s	Viscosity Liquid mPa·s	Thermal Cond., Vapor W/m·K	Thermal Cond., Liquid W/m·K	Sp. Heat Vapor kJ/(kg·K)	Sp. Heat Liquid kJ/(kg·K)	Surface Tension N/m	Liquid Critical Press. bar (abs)	Liq. Crit. Temp. °C
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DESIGN CONDITIONS FOR EXPANSION JOINT (Optional)

		SHELL SIDE						TUBE SIDE			
	Case^a	Flow Condition^b	Fluid Temperature		Pressure ^d	Mean Metal Temp. ^e	Flow Condition^b	Fluid Temperature		Pressure ^d	Mean Metal Temp. ^e
			Inlet	Outlet ^c				Inlet	Outlet ^c		
			°C	°C	kPa (ga)	°C		°C	°C	kPa (ga)	°C
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17	Determine the mean shell and tube metal temperatures at the following operating conditions. Evaluate the need for an expansion joint based on the metal										
18	temperatures at these conditions with either or both sides clean or with specific fouling.										
19											
20	Unless otherwise specified, operation in accordance with the recommendations of the TEMA Standards, paragraph E3.2, "Operating Procedures", is assumed.										
21											
22											
23											
24	^a	Case = e.g. steam out, upset, etc., which may affect design.									
25	^b	F = Flowing (specify flow rate), S = Stagnant, E = Empty.									
26	^c	Outlet temperature = (if known), thermal designer determines for other conditions.									
27	^d	Pressure = Specify design pressure for operating conditions. Use maximum actual pressure at other conditions.									
28	^e	Mean metal temperature = To be provided by the thermal designer.									
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