HEAT EXCHANGER DESIGN DATA

Client:	**Novomer, Inc.**	**Project No:**	**14308P**	**Item No: E-01004**
Unit:	**010 - Feed Purification**	**Location:**	**Adana, Turkey**	
Service :	**EO Feed Vessel Cooler**	**Manufacturer:**		**REV.**

Size:		**Type:**	BEU	**Hor/Vert:**	Horizontal	**Connected In:**	
Surface Area per Unit:	15.5 m^2	**Shells/Unit:**	1	**Surface Area per Shell:**		15.5 m^2	

PERFORMANCE OF ONE UNIT

Fluid Allocation:		**SHELL SIDE**		**TUBE SIDE**	
		INLET	**OUTLET**	**INLET**	**OUTLET**
Fluid Name:		Glycol		Process Liquid	
Total Fluid Quantity:		50620		37600	
Vapor:	**kg/hr**				
Liquid:	**kg/hr**	50620	50620	37600	37600
Steam:	**kg/hr**				
Noncondensables:	**kg/hr**				

		Liquid	**Vapor**	**Liquid**	**Vapor**	**Liquid**	**Vapor**	**Liquid**	**Vapor**
Density:	**kg/m^3**	1077		1075		873		887	
Viscosity:	**cP**	9.65		7.43		0.26		0.29	
Molecular Weight, Vapor:	**kg/kgmol**								
Molecular Weight, Noncondensables:	**kg/kgmol**								
Specific Heat:	**kJ/kg-°C**	3.40		3.42		2.30		2.23	
Thermal Conductivity:	**W/m-°C**	0.40		0.40		0.15		0.16	
Temperature:	**°C**	-10		-5		20		10	
Pressure:	**barg**	4.5				5.0			
Pressure Drop (Allowed/Calculated):	**bar**	1.00 / 0.47				0.50 / 0.010			
Latent Heat:	**kJ/kg**								
Velocity:	**m/s**			0.84				1.25	
Fouling Resistance (min):	**m^2-°C/W**	0.00017				0.00017			

Heat Exchanged:	240 **kW**	**MTD :** Corrected	22.0	**°C**
Transfer Rate - Service:	704 **W/m^2-°C**	**CLEAN:**		**W/m^2-°C**

CONSTRUCTION OF ONE SHELL

		SHELL SIDE	**TUBE SIDE**
Design Pressure:	**barg**	7.5	8.5
Design Temperature:	**°C**	-25/90	-10/90
No. of Passes:		1	2
Corrosion Allowance:	**mm**	3.0	1.0
Insulation:		Cold Conservation	Cold Conservation
Connections Size & Rating:	**In**	4" ANSI 150# RF WN	4" ANSI 150# RF WN
	Out	4" ANSI 150# RF WN	4" ANSI 150# RF WN

Pitch Selection

30 deg	
60 deg	
90 deg	
45 deg	

Tube OD, mm:	25.4	**Thk. mm:**	2.11	**Lgth, mm:**	3600 (Note 7)	**Pitch, mm:**	31.75	**Pitch dir.:** 30 degrees	see above
Tube Material:	SS304L	**No. of Us:**	27 (Note 8)	**Tube Type:**	Seamless				
Shell Material:	CS	**Shell ID, mm:**	350 Nominal	**Shell OD, mm:**		**Shell Cover:**			
Channel Material:	SS304L					**Channel Cover:**			
Tubesheet:	Stationary	**Floating Head Cover:**				**Impingement Protection:**		Circular Plate	
Baffles - Cross:	Horizontal Cut	**Type:**	Single Segmental			**% Cut:**	25	**Spacing, in:**	Note 3
Baffles - Long:						**Seal Type:**			
Supports - Tube:	Note 9	**Type:**				**Floating:**			
Expansion Joint:						**Tube - Tubesheet Joint:**	Note 2		
						Design Metal Temp. Shell:	**Shell:**	**°C**	
							Tube:	**°C**	
Gaskets Shell Side:						**Tube Side:**			
Code Requirements:		**ASME Sec. VIII, Div. 1**				**TEMA Class:**	R (Note 6)		
Weight per Unit:	**kg**	**Filled with Water:**	**kg**			**Tube Bundle Weight:**	**kg**		

REMARKS (special conditions, start-up, shutdown, regeneration,vibration, etc. that may affect the mechanical design):

Notes:

1) See Sheet 3 for tubesheet layout and Sheet 4 for equipment sketch.
2) Tubes to be seal welded to tubesheets.
3) Vendor to provide 19 crosspasses (18 baffles), at a central baffle spacing of 175 mm. Inlet/outlet baffle spacing to be specified by exchanger vendor.
4) Exchanger design shall be verified as free draining with notched baffles (if required).
5) Tubeside partition plates to include 6 mm weep holes to drain the unit completely.
6) Exchanger construction per TEMA R. Vents and drains not shown.
7) Heat transfer area is calculated based on an 3600 mm effective tube length between the tubesheet and the U-bend support baffle.
8) Based on U-bend radii and final tube layout, the final tube count may not equal the number of tubes specified. Technology provider should be consulted if the tube count varies more than 5% from that specified above.
9) Provide full support at U-bend.