



## Output Summary

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Released to the following company:

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Xist 8.0.1 4/8/2024 6:59 SN: 46639-9796905050

ali Units

Rating - Horizontal Multipass Flow TEMA BKU Shell With No Baffles

See Data Check Messages Report for Warning Messages.

See Runtime Message Report for Warning Messages.

Process Conditions		Cold Shellside		Hot Tubeside	
Fluid name		Propane		Styrene	
Flow rate	(kg/hr)		3104.1		40623 *
Inlet/Outlet Y	(Wt. frac vap.)	0.4337	1.0000	0.0000	0.0000
Inlet/Outlet T	(Deg C)	1.24	1.00	15.20	5.00
Inlet P/Avg	(bar)	4.813	4.795	3.000	2.941
dP/Allow.	(bar)	0.036	0.050	0.118	0.500
Fouling	(m2-K/W)		0.000170		0.000200

Exchanger Performance					
Shell h	(W/m2-K)	1760.0	Actual U	(W/m2-K)	431.04
Tube h	(W/m2-K)	926.99	Required U	(W/m2-K)	391.37
Hot regime	(--)	Sens. Liquid	Duty	(MegaWatts)	0.1832
Cold regime	(--)	Flow	Eff. area	(m2)	58.956
EMTD	(Deg C)	7.9	Overdesign	(%)	10.13

Shell Geometry			Baffle Geometry		
TEMA type	(--)	BKU	Baffle type		Support
Shell ID	(mm)	600.00	Baffle cut	(Pct Dia.)	
Series	(--)	1	Baffle orientation	(--)	
Parallel	(--)	1	Central spacing	(mm)	612.70
Orientation	(deg)	0.00	Crosspasses	(--)	1

Tube Geometry			Nozzles		
Tube type	(--)	Plain	Shell inlet	(mm)	92.050
Tube OD	(mm)	19.050	Shell outlet	(mm)	146.33
Length	(m)	2.500	Inlet height	(mm)	71.552
Pitch ratio	(--)	1.2500	Outlet height	(mm)	84.252
Layout	(deg)	30	Tube inlet	(mm)	77.927
Tubecount	(--)	376	Tube outlet	(mm)	77.927
Tube Pass	(--)	4			

Thermal Resistance, %		Velocities, m/s			Flow Fractions	
Shell	24.49		Min	Max	A	0.000
Tube	56.25	Tubeside	0.67	0.68	B	0.709
Fouling	17.76	Crossflow	0.14	0.29	C	0.000
Metal	1.51	Window	--	--	E	0.000
					F	0.291





**HEAT EXCHANGER SPECIFICATION SHEET**

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Customer	Job No.
Address	Reference No.
Plant Location	Proposal No.
Service of Unit Evaporator	Date 4/8/2024 Rev 0
Size 600 - 924.32 x 2500 mm Type BKU Horizontal	Item No.
Surf/Unit (Gross/Eff) 61.76 / 58.956 m2	Connected In 1 Parallel 1 Series
Shell/Unit 1	Surf/Shell (Gross/Eff) 61.76 / 58.956 m2

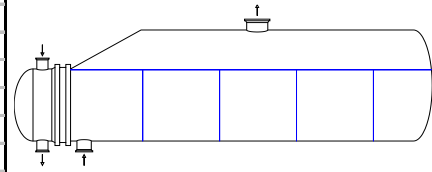
**PERFORMANCE OF ONE UNIT**

		Shell Side		Tube Side	
Fluid Allocation		Propane		Styrene	
Fluid Name		Propane		Styrene	
Fluid Quantity, Total kg/hr		3104.1		40623	
Vapor (In/Out)		1346.2	3104.1		
Liquid		1757.8		40623	40623
Steam					
Water					
Noncondensables					
Temperature (In/Out) C		1.24	1.00	15.20	5.00
Specific Gravity		0.5331		0.9100	0.9184
Viscosity mN-s/m2		0.0076 V/L 0.1294	0.0076	0.8200	0.9600
Molecular Weight, Vapor					
Molecular Weight, Noncondensables					
Specific Heat kJ/kg-C		1.7859 V/L 2.4339	1.7838	1.6040	1.5780
Thermal Conductivity W/m-C		0.0161 V/L 0.1090	0.0160	0.1500	0.1500
Latent Heat kJ/kg		375.43	375.75		
Inlet Pressure bar		4.813		3.000	
Velocity m/s		0.18		0.67	
Pressure Drop, Allow/Calc bar		0.050	0.036	0.500	0.118
Fouling Resistance (min) m2-K/W		0.000170		0.000200	
Heat Exchanged		0.1832 MegaWatts		MTD (Corrected) 7.9 C	
Transfer Rate, Service		391.37 W/m2-K		Clean 524.10 W/m2-K Actual 431.04 W/m2-K	

**CONSTRUCTION OF ONE SHELL**

Sketch (Bundle/Nozzle Orientation)

		Shell Side		Tube Side	
Design/Test Pressure barG		22.000 /		6.800 /	
Design Temperature C		120.00		85.00	
No Passes per Shell		1		4	
Corrosion Allowance mm		3		3	
Connections	In mm	1 @ 92.050		1 @ 77.927	
	Out mm	1 @ 146.33		1 @ 77.927	
	Intermediate	@		@	



Tube No. 188U	OD 19.050 mm	Thk(Avg) 1.651 mm	Length 2.500 m	Pitch 23.813 mm
Tube Type Plain	Material SA-334 6 Tube (S) K03006			Tube pattern 30
Shell SA-516 70 Pl. K02700	ID 600.00	OD 622.22 mm	Shell Cover SA-516 70 Pl. K02700	(Integ.)
Channel or Bonnet SA-516 70 Pl. K02700	Channel Cover SA-516 70 Pl. K02700			
Tubesheet-Stationary SA-105 Forgings K03504	Tubesheet-Floating			
Floating Head Cover	Impingement Plate Circular plate			
Baffles-Cross Carbon steel	Type Support	%Cut (Diam)	Spacing(c/c) 612.70	Inlet mm
Baffles-Long	Seal Type None			
Supports-Tube	U-Bend			Type Full support
Bypass Seal Arrangement	pairs seal strips	Tube-Tubesheet Joint	Expanded (2 grooves)	
Expansion Joint	Type None			
Rho-V2-Inlet Nozzle 714.96 kg/m-s2	Bundle Entrance		Bundle Exit	kg/m-s2
Gaskets-Shell Side Mach. Mtl. (Kammprofile/Flex. Face)	Tube Side	Mach. Mtl. (Kammprofile/Flex. Face)		
- Floating Head	Mach. Mtl. (Kammprofile/Flex. Face)			

Code Requirements TEMA Class R  
Weight/Shell 2077.4 kg Filled with Water 4053.1 kg Bundle 836.05 kg

Remarks: Supports/baffle space = 3.

Note: Reported duty and flow rates include a user-specified multiplier of 1.10.

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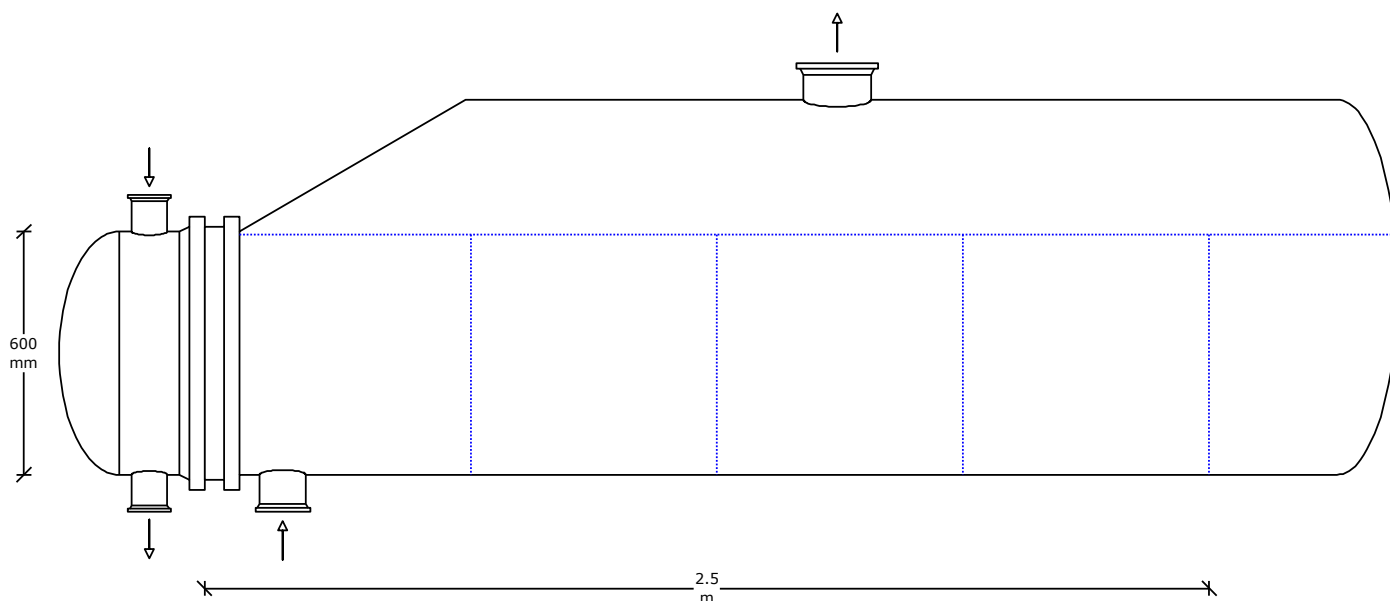
## Drawings

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TEMA type	BKU	Total tube inlet nozzles	1	Stream ID	Shellside	Tubeside
Shell diameter	600 mm	Total tube outlet nozzles	1	Stream name	Propane	Styrene
Kettle diameter	924.32 mm	Total shell inlet nozzles	1	Flow, kg/hr	3104.1	40623
Tube length	2.5 m	Total shell outlet nozzles	1	Pressure drop, bar	0.036	0.118
Dry weight	2077 kg/shell			Temperature, C	1.24	1.00
Wet weight	4053 kg/shell			Wt. fraction vapor	0.4337	1.0000
Bundle weight	836 kg/shell			Pressure, bar	4.813	4.777
						15.20
						0.0000
						3.000
						2.882

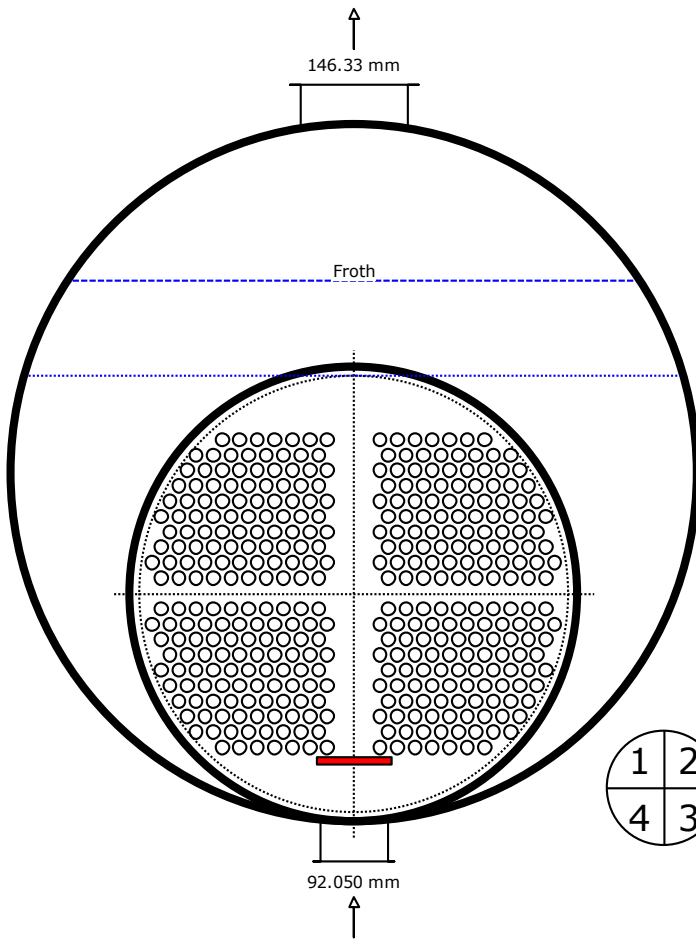
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TEMA type	BKU
Kettle ID	924.32 mm
Shell ID	600.00 mm
Actual OTL	586.07 mm
Height under inlet nozzle	71.552 mm
Height under outlet nozzle	84.252 mm
Tube type	Plain
Tube OD	19.050 mm
Tube pitch	23.813 mm
Tube layout angle	30 deg
Tubes	376
Tube positions available	376
Tie rods	6
Seal strip pairs	0
Passlane seal rods	18
Tube Passes	4
Parallel passlane width	52.387 mm
Perpendicular passlane width	22.194 mm

TUBEPASS DETAILS		
Pass	Rows	Tubes
1	10	94
2	10	94
3	10	94
4	10	94

SYMBOL LEGEND	
○	Tube
▲	Dummy Short Tube
▲	Dummy Long Tube
●	Plugged Tube
⊙	Tie Rod
⊙	Seal Rod
⊙	Impingement Rod