



**ELLETT
Industries Ltd.**

HEAT EXCHANGER SPECIFICATION SHEET

Page 1
US Units

Job No.

Reference No.

Proposal No.

Date 11/10/2005 Rev

Item No.

Customer Geneva Nitrogen

Address

Plant Location

Service of Unit Nitric Acid Condenser

Size 54.6250 x 157.992 inch

Type BEP

Vert.

Connected In

1 Parallel

1 Series

Surf/Unit (Gross/Eff) 2908.28 / 2834.15 ft2

Shell/Unit

1

Surf/Shell (Gross/Eff) 2908.28 / 2834.15 ft2

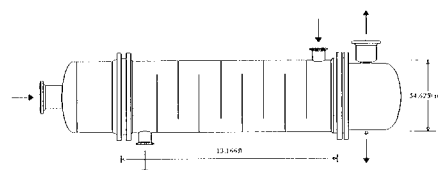
PERFORMANCE OF ONE UNIT

Fluid Allocation		Shell Side		Tube Side	
Fluid Name		Cooling Water		Process Gas	
Fluid Quantity, Total lb/hr		880882		79333.0	
Vapor (In/Out)				79333.0	70407.4
Liquid		880882	880882		8925.60
Steam					
Water		880882	880882		
Noncondensables					
Temperature (In/Out) F		59.00	72.00	197.00	102.00
Specific Gravity		0.9997	0.9983		0.9991
Viscosity cP		1.1370	0.9490	0.0190	0.0180 V/L 0.6625
Molecular Weight, Vapor					
Molecular Weight, Noncondensables					
Specific Heat Btu/lb-F		1.0009	0.9996	0.2734	0.2481 V/L 1.002
Thermal Conductivity Btu/hr-ft-F		0.3418	0.3488	0.0164	0.0147 V/L 0.357
Latent Heat Btu/lb				990.197	950.341
Inlet Pressure psia		66.700		52.800	
Velocity ft/sec		0.98		37.13	
Pressure Drop, Allow/Calc psi		3.000	1.910	0.400	0.645
Fouling Resistance (min) ft2-hr-F/Btu		0.00200		0.00100	
Heat Exchanged Btu/hr		11319258		MTD (Corrected) 86.8 F	
Transfer Rate, Service		46.01 Btu/ft2-hr-F	Clean	92.15 Btu/ft2-hr-F	Actual 71.11 Btu/ft2-hr-F

CONSTRUCTION OF ONE SHELL

Sketch (Bundle/Nozzle Orientation)

		Shell Side	Tube Side
Design/Test Pressure psig		75.000 /	40.000 /
Design Temperature F		100.00	400.00
No Passes per Shell		1	1
Corrosion Allowance inch			
Connections Size & Rating	In inch	1 @ 10.0000	1 @ 18.0000
	Out inch	1 @ 10.0000	1 @ 16.0000
	Intermediate	@	@



Tube No.	1125	OD 0.7500 inch	Thk(Avg) 0.0650 inch	Length 13.166 ft	Pitch 1.3750 inch	Layout 30
Tube Type	Plain			Material ZIRCONIUM (R60702)		
Shell	ID 54.6250 inch	OD	inch	Shell Cover		
Channel or Bonnet				Channel Cover		
Tubesheet-Stationary				Tubesheet-Floating		
Floating Head Cover				Impingement Plate None		
Baffles-Cross	Type SINGLE-SEG.	%Cut (Diam) 18.4	Spacing(c/c) 16.5000	Inlet 19.2325 inch		
Baffles-Long		Seal Type				
Supports-Tube		U-Bend	Type			
Bypass Seal Arrangement		Tube-Tubesheet Joint				
Expansion Joint		Type				
Rho-V2-Inlet Nozzle	3226.36 lb/ft-sec2	Bundle Entrance	529.57	Bundle Exit	530.30 lb/ft-sec2	
Gaskets-Shell Side		Tube Side				
-Floating Head						
Code Requirements				TEMA Class		
Weight/Shell	26337.7	Filled with Water	46344.0	Bundle	10769.3 lb	
Remarks:						

Remarks:

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Output Summary

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Released to the following HTRI Member Company:

Ellett Industries Ltd

Allen

Xist Ver. 4.00 SP2 11/10/2005 12:42 SN: 1500210850

US Units

Nitric Acid Condenser

Geneva Nitrogen

Rating - Vertical Countercurrent Flow TEMA BEP Shell With Single-Segmental Baffles

No Data Check Messages.

See Runtime Message Report for Warning Messages.

Process Conditions		Cold Shellside		Hot Tubeside	
Fluid name		Cooling Water		Process Gas	
Flow rate	(1000-lb/hr)		880.882		79.3330
Inlet/Outlet Y	(Wt. frac vap.)	0.000	0.000	1.000 *	0.887 *
Inlet/Outlet T	(Deg F)	59.00	72.00	197.00	102.00
Inlet P/Avg	(psia)	66.700	65.745	52.800	52.477
dP/Allow.	(psi)	1.910	3.000	0.645	0.400
Fouling	(ft2-hr-F/Btu)		0.00200		0.00100

Exchanger Performance					
Shell h	(Btu/ft2-hr-F)	711.36	Actual U	(Btu/ft2-hr-F)	71.11
Tube h	(Btu/ft2-hr-F)	134.41	Required U	(Btu/ft2-hr-F)	46.01
Hot regime	(--)	Shear	Duty	(MM Btu/hr)	11.3193
Cold regime	(--)	Sens. Liquid	Area	(ft2)	2834.15
EMTD	(Deg F)	86.8	Overdesign	(%)	54.57

Shell Geometry			Baffle Geometry		
TEMA type	(--)	BEP	Baffle type	(--)	Single-Seg.
Shell ID	(inch)	54.6250	Baffle cut	(Pct Dia.)	18.37
Series	(--)	1	Baffle orientation	(--)	PERPEND.
Parallel	(--)	1	Central spacing	(inch)	16.5000
Orientation	(deg)	90.00	Crosspasses	(--)	9

Tube Geometry			Nozzles		
Tube type	(--)	Plain	Shell inlet	(inch)	10.0000
Tube OD	(inch)	0.7500	Shell outlet	(inch)	10.0000
Length	(ft)	13.166	Inlet height	(inch)	3.1218
Pitch ratio	(--)	1.8333	Outlet height	(inch)	3.1218
Layout	(deg)	30	Tube inlet	(inch)	18.0000
Tubecount	(--)	1125	Tube outlet	(inch)	16.0000
Tube Pass	(--)	1			

Thermal Resistance, %		Velocities, ft/sec		Flow Fractions	
Shell	10.02	Shellside	0.98	A	0.144
Tube	63.98	Tubeside	37.13	B	0.561
Fouling	22.82	Crossflow	1.27	C	0.149
Metal	3.174	Window	2.24	E	0.146
				F	0.000