HEAT EXCHANGER SPECIFICATION SHEET

US Jim Units

		Job No.	
Customer		Reference No.	
Address		Proposal No.	Enerquip Spec Sheet 52824
Plant Location		Date	2/18/2020 Rev R4
Service of Unit	350 gpm Water Cooler with Liquid Ammonia (Flooded Evaporator)	Item No.	HX 8 X 80 BJMH 316L 4 TC 1P HP
Size	8.329 x 80 inch Type BJM Horizontal	Connected In	1 Parallel 1 Series
Surf/Unit (Gross/Eff)	92.721 / 90.681 ft2 Shell/Unit 1	Surf/Shell (Gross/Eff)	92.721 / 90.681 ft2

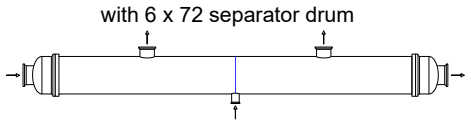
PERFORMANCE OF ONE UNIT

Fluid Allocation		Shell Side		Tube Side	
Fluid Name		Liquid Ammonia		Water @ 350 gpm	
Fluid Quantity, Total	lb/hr	246.47		175257	
Vapor (In/Out)			246.47		
Liquid		246.47		175257	175257
Steam					
Water				175257	175257
Noncondensables					
Temperature (In/Out)	F	29.54	29.49	34.77	34.00
Specific Gravity		0.6400		1.0005	1.0005
Viscosity	cP	0.1832	0.0097	1.6990	1.7238
Molecular Weight, Vapor					
Molecular Weight, Noncondensables					
Specific Heat	Btu/lb-F	1.1044	0.5642	1.0070	1.0073
Thermal Conductivity	Btu/hr-ft-F	0.3150	0.0132	0.3267	0.3262
Latent Heat	Btu/lb	551.41	551.46		
Inlet Pressure	psig	44.000		35.000	
Velocity	ft/sec	0.20		5.46	
Pressure Drop, Allow/Calc	psi		0.066		1.681
Fouling Resistance (min)	ft2-hr-F/Btu	0.00050			

Heat Exchanged	135907 Btu/hr			MTD (Corrected)	4.9 F
Transfer Rate, Service	307.84 Btu/ft2-hr-F	Clean	378.94 Btu/ft2-hr-F	Actual	318.58 Btu/ft2-hr-F

CONSTRUCTION OF ONE SHELL

Sketch (Bundle/Nozzle Orientation)



			Shell Side	Tube Side
Design/Test Pressure		psig	350.00 /	150.00 /
Design Temperature		F	200.00	375.00
No Passes per Shell			1	1
Corrosion Allowance		inch	0.0000	0.0000
Connections	In	inch	1 @ 1.5000	1 @ 4.0000
Size &	Out	inch	2 @ 3.0000	1 @ 4.0000
Rating	Intermediate		@	@

Tube No.	85	OD	0.6250	inch	Thk(Avg)	0.0350	inch	Length	6.667 ft	Pitch 0.7813 inch
Tube Type	Plain				Material	SA-249 TP316L Tube (W) S31603				Tube pattern 30

Shell	SA-312 TP316L Pipe (W) S31603	ID	8.3290	OD	8.6250	inch	Shell Cover SA-240 316L Pl. S31603
Channel or Bonnet	SA-240 316L Pl. S31603						Channel Cover SA-240 316L Pl. S31603
Tubesheet-Stationary	SA-240 316L Pl. S31603						Tubesheet-Floating
Floating Head Cover							Impingement Plate None

Baffles-Cross	304 Stainless steel (18 Cr, 8 Ni)	Type	Support	%Cut (Diam)		Spacing(c/c)	39.188 Inlet inch
Baffles-Long		Seal Type	None				
Supports-Tube		U-Bend					Type None
Bypass Seal Arrangement	pairs seal strips	Tube-Tubesheet Joint	Expanded and seal welded (1 groove)				
Expansion Joint		Type	None				
Rho-V2-Inlet Nozzle	0.86 lb/ft-sec2	Bundle Entrance	5.92e-4	Bundle Exit	5.70e-2	lb/ft-sec2	

Gaskets-Shell Side	N/A	Tube Side	O-Ring (EPDM)
- Floating Head	N/A		
Code Requirements			TEMA Class C
Weight/Shell	374.00 lb	Filled with Water	537.80 lb Bundle 145.18 lb

Remarks: Supports/baffle space = 1.

Please see reverse side for additional remarks.

Unit sized to cool 350 gpm of water from 34.77°F to 34.0°F using 246 lb/hr of 29.5°F (44 psig) liquid ammonia (135,907 Btu/hr).
Note: The cooling duty shown is the last pass with the lowest Btu/hr due due to the closest approach temperatures.
Note: This unit will cool 520 gallons of 75°F water to 34°F in 15 minutes when circulated at 350 gpm (avg 710,000 Btu/hr).
Note: Unit can meet the performance requirement when 10 gpm of make-up water is added at 55°F or 5 gpm make-up water at 75°F.

Industrial Finish: All surfaces are as-machined or mill finish with welds cleaned to remove discoloration where accessible.
All 316L components.
(85) 5/8" OD x 0.035" wall straight tubes.
Tubes are expanded and seal welded to tubesheets due to liquid ammonia being used in the shell.
4" tri-clamp tube side connections.
Removable bonnets both ends with 8" to 4" eccentric reducers and 8" tri-clamp gaskets and clamps.
Note code boundary is limited to welded pipe to inner tri-clamp joints as shown on the drawing.
1-1/2" 3000# FNPT coupling shell ammonia inlet.
3/4" 3000# FNPT coupling shell float connection.
3/4" 3000# FNPT coupling shell drain with sump.
6 NPS x 72" surge tank.
(2) 3" Schedule 80s pipe vapor outlets to surge tank.
3" Schedule 80s pipe surge suction pipe at top of surge tank.
Float, relief and purge connections in surge tank.
Control requirements by others.
Welded foot supports.
Unit certified to ASME Section VIII Division 1 with National Board Registration number - see code boundary note above.

Shell mean metal temperature = 27.94°F
Tube mean metal temperature = 31.90°F

Note: Water flow must be running prior to ammonia to avoid freezing water in tubing.

Spec sheet was updated on 1/22/2020 to a 350 gpm versus a 550 gpm water flow rate and added duty notes.
Spec sheet was updated on 2/18/2020 to correct material notes and connection sizes to match the approved unit drawing.