

## SPECIFICATION - HEAT EXCHANGER

### GENERAL

ITEM NO.:	E-515	SERVICE:	BEER PREHEATER #3
TYPE:	SHELL & TUBE TYPE NEN		
CODE:	TEMA B - ASME SECTION VIII		STAMP: ASME
DESIGN PRESS.:	PSIG (kPa)	SHELL: 155 (1069) / FULL VAC.	TUBES: 200 (1379) / FULL VAC.
DESIGN TEMP.:	°F (°C)	SHELL: 300 (149)	TUBES: 300 (149)
TUBES:	No., IN (mm), BWG (mm)	No: 72 SIZE: 1.25 (32) O.D.	GAUGE: # 16 BWG (1.65)
	FT-IN (mm), IN (mm)	LENGTH: 32' - 10" (10,000)	PITCH: 1.875 (47.6) Triangular

### PROCESS DATA

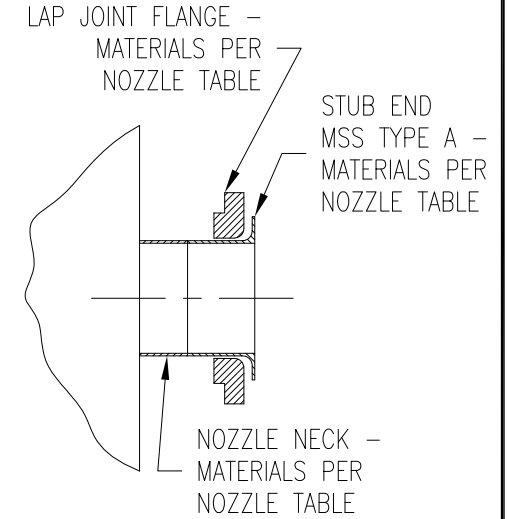
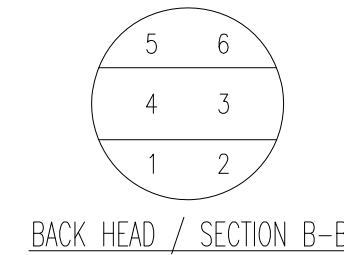
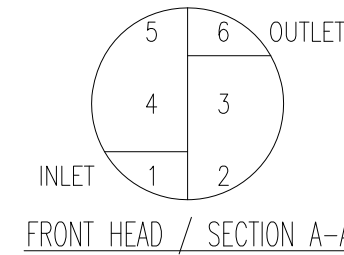
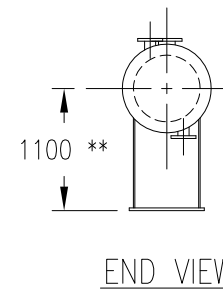
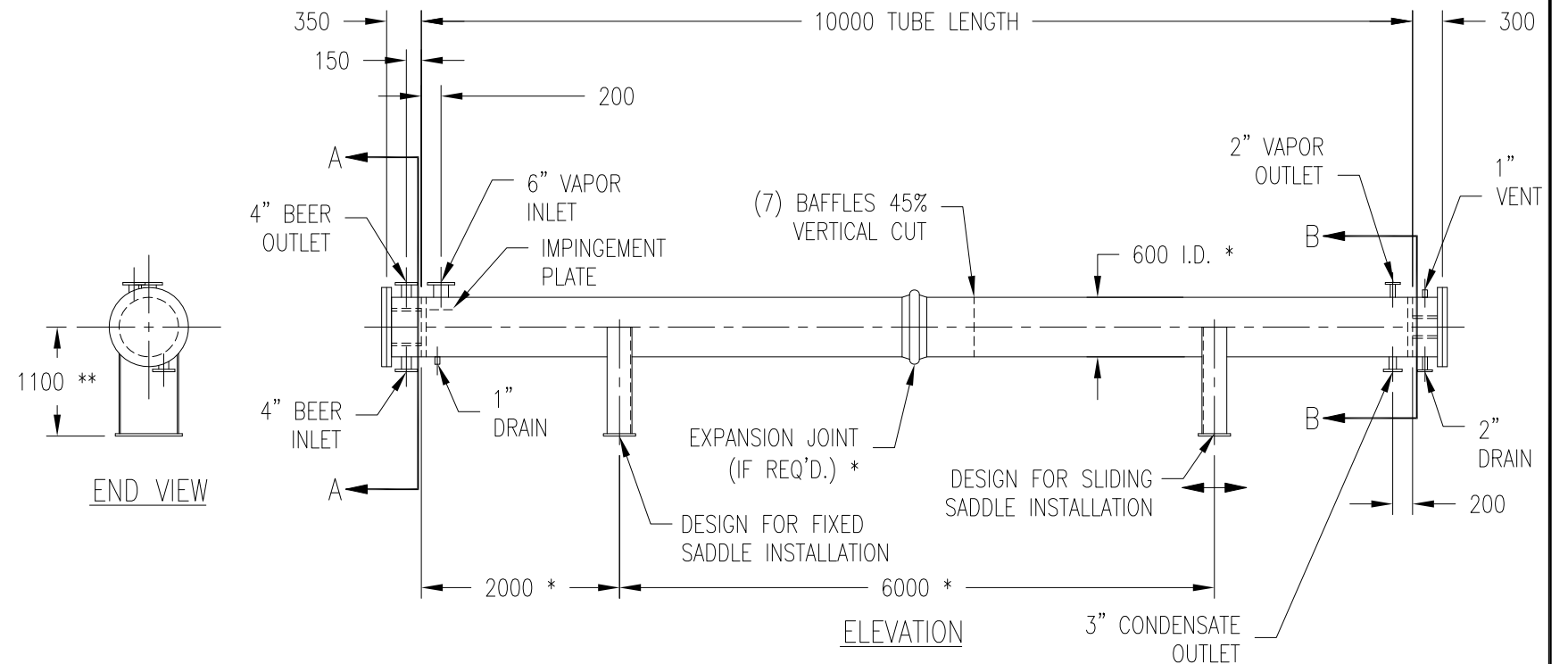
	SHELL SIDE	TUBE SIDE
FLUID CIRCULATED	STEAM	BEER
ENTERING VAPOR	LB/HR (kg/HR)	
ENTERING LIQUID	LB/HR (kg/HR)	88,575 (40,177)
ENTERING STEAM	LB/HR (kg/HR)	
ENTER. NON-CONDEN.	LB/HR (kg/HR)	
FLUID VAPOR. OR CONDEN.	LB/HR (kg/HR)	3,560 (1,615)
STEAM CONDENSED	LB/HR (kg/HR)	
DENSITY	LB/FT <sup>3</sup> (kg/m <sup>3</sup> )	61.6 (987)
VISCOSITY-LIQUID/VAPOR	cp (Pa x SEC)	2.0 (0.0020)
MOL. WT.-VAPORS		
SPECIFIC HEAT	Btu / (LB x °F) [kJ / (kg x K)]	0.89 (3.7)
LATENT HEAT-VAPOR	Btu/LB (kJ/kg)	970 (2,257)
TEMP. IN	°F (°C)	212 (100)
TEMP. OUT	°F (°C)	199 (92.5)
OPERATING PRESSURE	PSIA (kPa)	
NO. OF PASSES	1	6
VELOCITY	FT/SEC (m/SEC)	4.9 (1.5)
PRESS. DROP	PSI (kPa)	14.8 (102)

SURFACE:	SQ. FT. (SQ. m)	773 (72)	SHELLS / UNIT:	1
HEAT EXCHANGED:	Btu/HR (kJ/HR)	3,454,000 (3,644,000)	MTD, °F (°C):	30.31 (16.83)
TRANSFER RATES:	Btu/(HR x FT <sup>2</sup> x °F)	DESIGN: 148 (3014)	CORRECTED	
	[kJ/(HR x M <sup>2</sup> x K)]	SERVICE: 151 (3075)	CLEAN: 299 (6089)	

### MATERIALS

SHELL:	A106 GRADE B OR A516 GR. 70 CARBON STEEL		
TUBES:	A249 TP-304L STAINLESS STEEL - AVERAGE WALL		
CHANNEL:	A312 TP-304L OR A240 TP-304L STAINLESS STEEL		
CHANNEL COVER:	A516 GR. 70 CARBON STEEL	LINER:	A240 TP-304L STAINLESS STEEL
TUBE SHEETS - STAT.:	A240 TP-304L STAINLESS STEEL		
TUBE SHEETS - FLOATING:	---		
FLOATING HEAD COVER:	---		
TUBE SUPPORTS:	---		
BAFFLES:	CARBON STEEL (7 REQUIRED) - 45 % VERTICAL CUT		
TIE RODS & SPACERS:	CARBON STEEL		
SUPPORTS:	CARBON STEEL		
EXPANSION JOINT:	IF REQUIRED		
GASKETS, IN (mm):	1/16" (2mm) NON-ASBESTOS		
BOLTING:	A193 B7 WITH A194 2H HEX NUTS		

	SHELL SIDE	TUBE SIDE
NOZZLES:		
NECK:	A106 GR. B. CARBON STEEL PIPE	A312 TP-304L S. STL. PIPE
FLANGE:	A105 FORGED STEEL 150# SLIP-ON	A105 FORGED STEEL 150# LAP JOINT
COUPLING:	A105 FORGED STEEL 3000# THR'D FULL	A182 F-304L S. STL. 3000# THR'D FULL
CORROSION ALLOWANCE:	IN (mm)	
	1/16" (2mm)	NONE



NOZZLE SIZE	NOZZLE ** EXTENSION
1 1/4"-6"	150
8"-24"	200

\*\* - UNLESS OTHERWISE SPECIFIED

### NOTES:

- \* - VENDOR TO SPECIFY/VERIFY.
- \*\* - FINAL ELEVATION TO BE DETERMINED PER PIPING DESIGN.
- 1. MAXIMUM TEMPERATURE ΔT FOR EXPANSION IS 300° F (150° C) SHELLSIDE AND 60° F (16° C) TUBESIDE.
- 2. ALL EXTERNAL CARBON STEEL SURFACES TO BE CLEANED AND OTHERWISE PROPERLY PREPARED PRIOR TO APPLICATION OF ONE COAT OF CORROSION PROTECTION PRIMER PER SHOP STANDARD. FINAL PAINTING PER OWNER'S REQUIREMENTS.
- 3. TUBE SIDE - SIX PASSES.
- 4. PASS PARTITION TO WITHSTAND 175 PSI (1207 kPa) ΔP.
- 5. DAVITS REQUIRED ON EACH END.
- 6. 304L SS MAY BE SUBSTITUTED WITH DUAL GRADE 304/304L SS.
- 7. PROCESS DATA SHOWN FOR PEAK CONDITIONS.

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<b>BIOETANOL PAYSANDÚ</b>					
<b>UTE ABENER</b> <b>TEYMA PAYSANDÚ</b>					
<b>KATZEN INTERNATIONAL, INC.</b> TECHNOLOGY • ENGINEERING CINCINNATI, OHIO, U.S.A.					
Scale		NONE		211,200 LITERS/DAY MOTOR FUEL GRADE ETHANOL PLANT EQUIPMENT SPECIFICATION	
Rev. 0		3/1/13		REV. 0 ISSUE	
Rev.		Date		Description	
Dwn By		Ckd By		Appd By	
Origin: JDC		ITEM: E-515		BEER PREHEATER #3	
Nº Plano:		0003-PLN-KAT-05-62-0209		Client Nº:	
Sheets:		1		Sheet Nº:	
Dwg Nº:		1132-01		05-209	