

**SPECIFICATION - HEAT EXCHANGER**

**GENERAL**

ITEM NO.:	E-520	SERVICE:	FINAL CONDENSER
TYPE:	SHELL & TUBE TYPE NEN		
CODE:	TEMA B - ASME SECTION VIII	STAMP:	IF REQUIRED
DESIGN PRESS.:	PSIG (kPa)	SHELL:	80 (552) / FULL VAC. TUBES: 100 (690)
DESIGN TEMP.:	°F (°C)	SHELL:	300 (149) TUBES: 300 (149)
TUBES:	No., IN (mm), BWG (mm)	No:	380 SIZE: 1 (25) O.D. GAUGE: # 18 BWG (1.24)
	FT-IN (mm), IN (mm)	LENGTH:	19' - 8" (6,000) PITCH: 1.5 (38.1) Triangular

**PROCESS DATA**

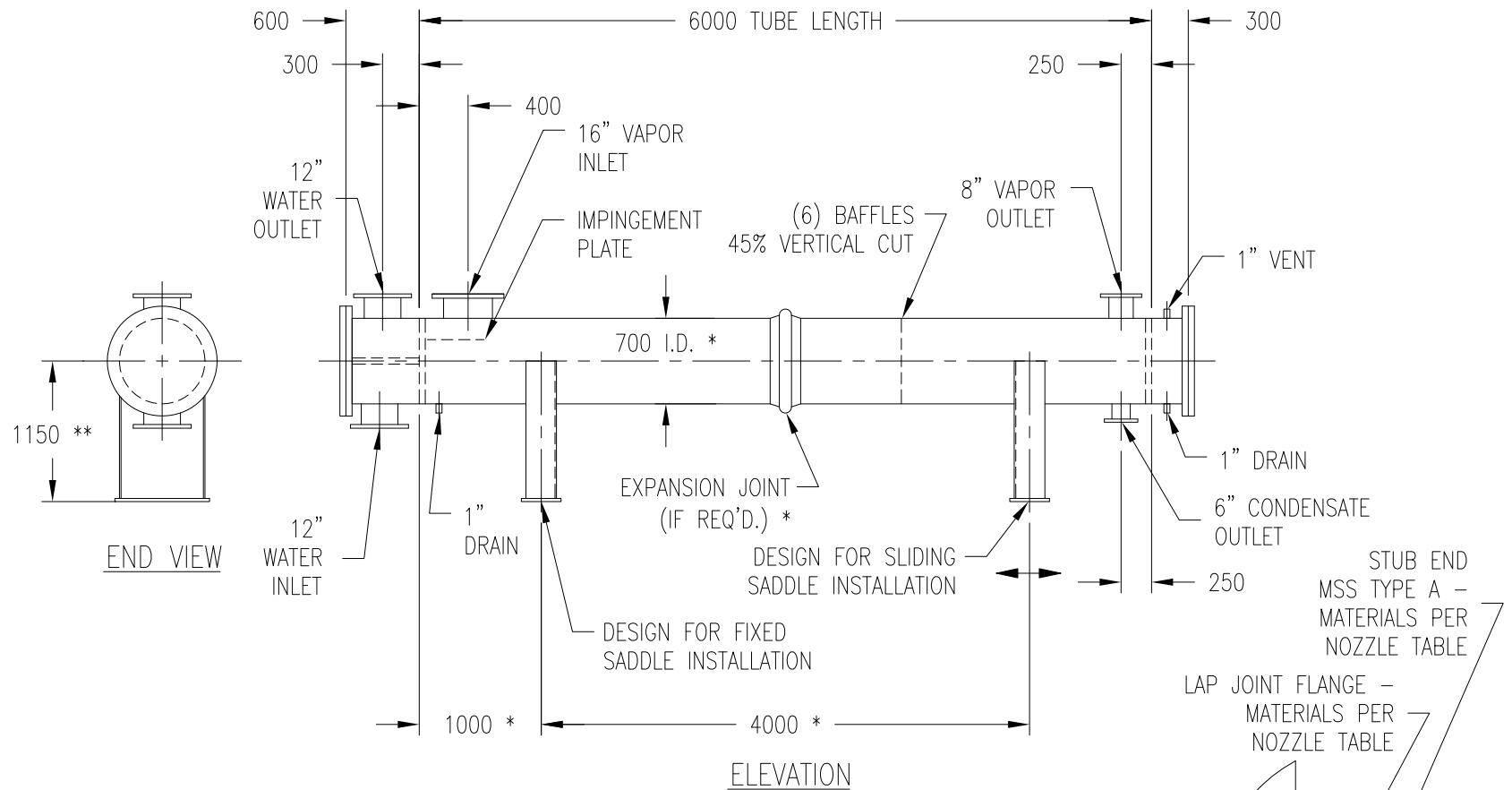
	SHELL SIDE	TUBE SIDE
FLUID CIRCULATED	ETHANOL/WATER VAPOR	COOLING WATER
ENTERING VAPOR	LB/HR (kg/HR)	
ENTERING LIQUID	LB/HR (kg/HR)	1,318,950 (598,266)
ENTERING STEAM	LB/HR (kg/HR)	
ENTER. NON-CONDEN.	LB/HR (kg/HR)	
FLUID VAPOR. OR CONDEN.	LB/HR (kg/HR)	15,198 (6,894)
STEAM CONDENSED	LB/HR (kg/HR)	
DENSITY	LB/FT <sup>3</sup> (kg/m <sup>3</sup> )	62.0 (993)
VISCOSITY-LIQUID/VAPOR	cp (Pa x SEC)	0.70 (0.00070)
MOL. WT.-VAPORS		
SPECIFIC HEAT	Btu / (LB x °F) [kJ / (kg x K)]	1.00 (4)
LATENT HEAT-VAPOR	Btu/LB (kJ/kg)	758 (1,764)
TEMP. IN	°F (°C)	137 (58)
TEMP. OUT	°F (°C)	119 (48)
OPERATING PRESSURE	PSIA (kPa)	
NO. OF PASSES		1 / 2
VELOCITY	FT/SEC (m/SEC)	159 (48.5) / 7.0 (2.1)
PRESS. DROP	PSI (kPa)	0.57 (3.9) / 6.6 (45.5)

SURFACE:	SQ. FT. (SQ. m)	1,958 (182)	SHELLS / UNIT:	1
HEAT EXCHANGED:	Btu/HR (kJ/HR)	11,524,000 (12,157,000)	MTD, °F (°C):	22.82 (12.68)
TRANSFER RATES:	Btu/(HR x FT <sup>2</sup> x °F)	DESIGN: 258 (5269)	CORRECTED	
	[kJ/(HR x M <sup>2</sup> x K)]	SERVICE: 261 (5322)	CLEAN: 428 (8734)	

**MATERIALS**

SHELL:	A240 TP-304L STAINLESS STEEL
TUBES:	A249 TP-304L STAINLESS STEEL - AVERAGE WALL
CHANNEL:	A516 GR. 70 CARBON STEEL
CHANNEL COVER:	A516 GR. 70 CARBON STEEL LINER: ---
TUBE SHEETS - STAT.:	A240 TP-304L STAINLESS STEEL
TUBE SHEETS - FLOATING:	---
FLOATING HEAD COVER:	---
TUBE SUPPORTS:	---
BAFFLES:	STAINLESS STEEL (6 REQUIRED) - 45 % VERTICAL CUT
TIE RODS & SPACERS:	STAINLESS STEEL
SUPPORTS:	CARBON STEEL W/ STAINLESS STEEL ISOLATION PADS
EXPANSION JOINT:	IF REQUIRED
GASKETS, IN (mm):	1/16" (2mm) NON-ASBESTOS
BOLTING:	A193 B7 WITH A194 2H HEX NUTS

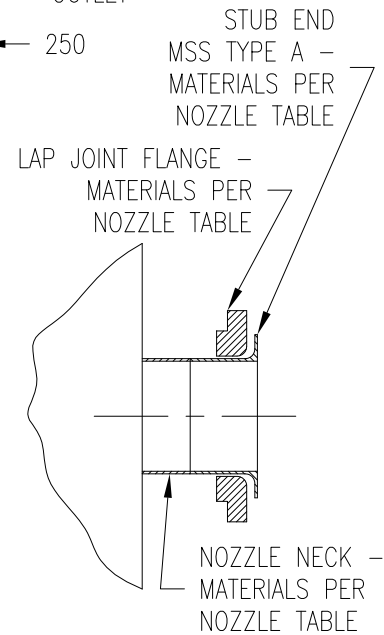
	SHELL SIDE	TUBE SIDE
NOZZLES:		
NECK:	A312 TP-304L S. STL. PIPE	A106 GR. B. CARBON STEEL PIPE
FLANGE:	A105 FORGED STEEL 150# LAP JOINT	A105 FORGED STEEL 150# SLIP-ON
COUPLING:	A182 F-304L S. STL. 3000# THR'D FULL	A105 FORGED STEEL 3000# THR'D FULL
CORROSION ALLOWANCE:	IN (mm)	NONE / 1/16" (2mm) (EXCEPT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



- NOTES:**
- \* - VENDOR TO SPECIFY/VERIFY.
  - \*\* - FINAL ELEVATION TO BE DETERMINED PER PIPING DESIGN.
  - 1. MAXIMUM TEMPERATURE ΔT FOR EXPANSION IS 300° F (149° C) SHELLSIDE AND 32° F (0° 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. TUBESIDE - TWO PASSES.
  - 4. DAVITS REQUIRED ON EACH END.
  - 5. PROCESS DATA SHOWN FOR PEAK CONDITIONS.
  - 6. 304L SS MAY BE SUBSTITUTED WITH DUAL GRADE 304/304L SS.

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

\*\* - UNLESS OTHERWISE SPECIFIED



**TYPICAL NOZZLE DETAIL**  
WHERE LAP JOINT FLANGES ARE CALLED FOR IN NOZZLE TABLE

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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	Nº Plano: 0003-PLN-KAT-05-62-0213 Sheets: 1 Sheet Nº: 1
0	3/1/13	REV. 0 ISSUE	WLB	JDC	JDC	ITEM: E-520	FINAL CONDENSER
Rev.	Date	Description	Dwn By	Ckd By	Appd By	Origin: JDC	Client Nº: 1132-01 Dwg Nº: 05-213