

**HEAT EXCHANGER SPECIFICATION SHEET**

Customer	KP ENGINEERING / HOLLY FRONTIER		Reference No.	PO#J1422-B-008	
Address			Steeltek Job No.:	15S-3222	
Plant Location	TULSA, OK	Date	9/24/2015	Rev	0
Service of Unit	UNIFINER STRIPPER BTMS / PENEX FEED PREHEAT EXCHAN		Item No.	004-E-500 ( CASE 3 )	
Size	26 x 240	inch	Type	AEU	Horizontal
Surf/Unit (Gross/Eff)	1256.6 / 1242.9	ft2	Shell/Unit	1	Surf/Shell (Gross/Eff) 1256.6 / 1242.9 ft2

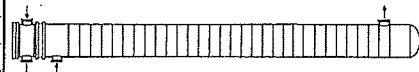
**PERFORMANCE OF ONE UNIT**

		Shell Side		Tube Side	
Fluid Allocation		PENEX FEED		UNIFINER STRIPPER BOTTOMS	
Fluid Name		PENEX FEED		UNIFINER STRIPPER BOTTOMS	
Fluid Quantity, Total	lb/hr	179735		140689	
Vapor (In/Out)					
Liquid		179735	179735	140689	140689
Steam					
Water					
Noncondensables					
Temperature (In/Out)	F	87.60	177.50	280.00	177.50
Specific Gravity		0.6609	0.6098	0.5707	0.6354
Viscosity	cP	0.2220	0.2220	0.1660	0.1660
Molecular Weight, Vapor					
Molecular Weight, Noncondensables					
Specific Heat	Btu/lb-F	0.5400	0.5400	0.6070	0.6070
Thermal Conductivity	Btu/hr-ft-F	0.0590	0.0590	0.0520	0.0520
Latent Heat	Btu/lb				
Inlet Pressure	psia	364.70		114.70	
Velocity	ft/sec	1.96		8.06	
Pressure Drop, Allow/Calc	psi	15.000	5.506	15.000	14.44
Fouling Resistance (min)	ft2-hr-F/Btu	0.00200		0.00200	
Heat Exchanged	8714093 Btu/hr	MTD (Corrected)		75.0	F
Transfer Rate, Service	93.43 Btu/ft2-hr-F	Clean	180.86	Btu/ft2-hr-F	Actual 92.25 Btu/ft2-hr-F

**CONSTRUCTION OF ONE SHELL**

Sketch (Bundle/Nozzle Orientation)

		Shell Side		Tube Side	
Design/Test Pressure	psig	400 / FV /		325 / FV /	
Design Temperature	F	325 / 300 / -20		350 / 300 / -20	
No Passes per Shell		1		6	
Corrosion Allowance	inch	0.1250		0.1250	
Connections	In	1 @ 6"-300# RF		1 @ 6"-300# RF	
Size & Rating	Out	1 @ 6"-300# RF		1 @ 6"-300# RF	
	Intermediate				



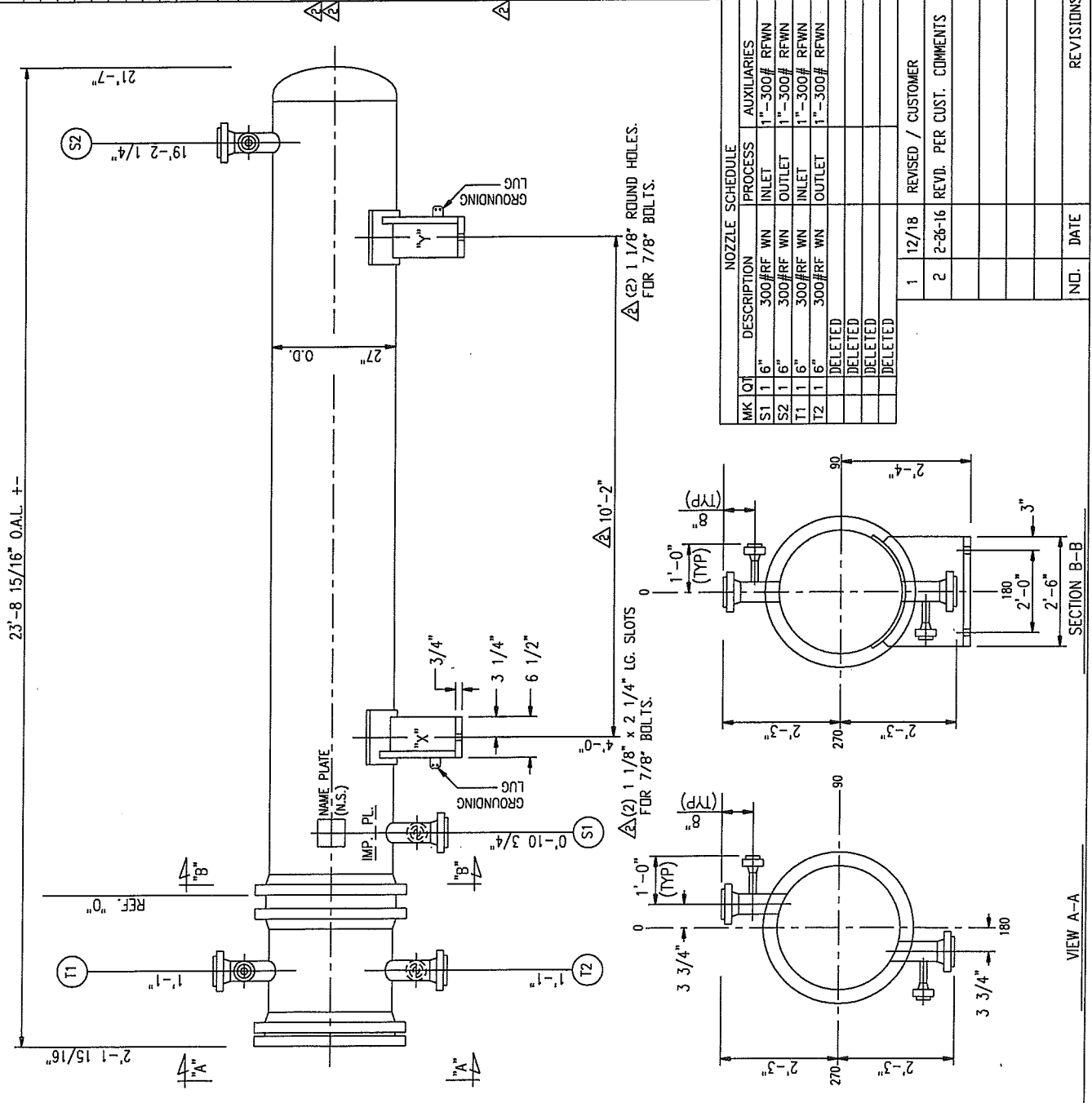
Tube No.	120U	OD	1.0000	inch	Thk(min)	0.109	inch	Length	20.000	ft	Pitch	1.2500	inch
Tube Type	Plain		Material SA-214				Tube pattern 45						
Shell	SA-516-70	ID	26.000	OD	inch		Shell Cover		(Integ.)				
Channel or Bonnet	SA-516-70	Channel Cover				Sa-516-70							
Tubesheet-Stationary	SA-516-70	Tubesheet-Floating											
Floating Head Cover	Impingement Plate				Circular plate								
Baffles-Cross	SA-36 (vert cut)	Type	Single-Seg.	%Cut (Diam)	17.03	Spacing(c/c)	7.3133	Inlet	17.975				
Baffles-Long	Seal Type				None								
Supports-Tube	U-Bend				Type Full support								
Bypass Seal Arrangement	1	pairs seal strips	Tube-Tubesheet Joint		Expanded (2 grooves)								
Expansion Joint	Type												
Rho-V2-Inlet Nozzle	1844.6	lb/ft-sec2	Bundle Entrance		199.27	Bundle Exit	2922.1	lb/ft-sec2					
Gaskets-Shell Side	Tube Side												
-Floating Head													
Code Requirements	ASME SECT VIII DIV I				TEMA Class R								
Weight/Shell	10528	lb	Filled with Water		15032	lb	Bundle	5597.6	lb				

1. REV 2 : FULL SUPPORT IN INCLUDED AT U-BENDS
2. CASE-3 : UNIT IS THERMALLY & MECHANICALLY GUARANTEED
3. FLOWS & DUTY INCREASED BY 15. PERC

# CERTIFIED AS BUILT

CERTIFIED FOR CONSTRUCTION  
 BY: SK DATE: 2/26/16

DESIGN DATA		SHELL		TUBE	
DESIGN PRESSURE P.S.I.G.	400	DESIGN PRESSURE P.S.I.G.	325	VACUUM PRESSURE P.S.I.G.	FV AT 300°F
TEST PRESSURE P.S.I.G.	SEE MAMP NOTE	TEST PRESSURE P.S.I.G.	SEE MAMP NOTE	TEST PRESSURE P.S.I.G.	SEE MAMP NOTE
DESIGN TEMP. Deg. F.	325	DESIGN TEMP. Deg. F.	350	DESIGN TEMP. Deg. F.	350
CORROSION ALLOWANCE	1/8"	CORROSION ALLOWANCE	1/8"	CORROSION ALLOWANCE	1/8"
NUMBER OF PASSES	1	NUMBER OF PASSES	1	NUMBER OF PASSES	1
RADIOGRAPHY	SPOT	RADIOGRAPHY	SPOT	RADIOGRAPHY	SPOT
HEAT TREAT REQUIRED	NO	HEAT TREAT REQUIRED	NO	HEAT TREAT REQUIRED	NO
ESTIMATED WEIGHTS, LBS.		ESTIMATED WEIGHTS, LBS.		ESTIMATED WEIGHTS, LBS.	
DRY:	13500	DRY:	13500	DRY:	13500
WET:	18500	WET:	18500	WET:	18500
SPECIFICATIONS					
ASME CODE SECT. VIII DIV.1, 2013 ED. (STAMP YES)					
TEMA CLASS R and API-660 APPLIES					
NATIONAL BOARD REGISTRATION REQUIRED					
HOLLY SPECS: EP7-1-1; EP7-1-4; EP7-1-5; EP7-1-7; EP8-1-1; EP8-1-8; EP8-1-9 & EPI0-3-1.					
MATERIAL					
CHANNEL:	SA-516-70	CHANNEL:	SA-516-70	CHANNEL:	SA-516-70
SHELL:	SA-516-70	SHELL:	SA-516-70	SHELL:	SA-516-70
TUBESHEETS:	SA-516-70N	TUBESHEETS:	SA-516-70N	TUBESHEETS:	SA-516-70N
BAFFLES:	SA-36	BAFFLES:	SA-36	BAFFLES:	SA-36
TUBES:	SA-214	TUBES:	SA-214	TUBES:	SA-214
( 120 )	1" O.D. X 0.109" (M.W.) X 20'-0"	( 120 )	1" O.D. X 0.109" (M.W.) X 20'-0"	( 120 )	1" O.D. X 0.109" (M.W.) X 20'-0"
TUBE PITCH	1 1/4"	TUBE PITCH	1 1/4"	TUBE PITCH	1 1/4"
SURFACE		SURFACE		SURFACE	
1312		1312		1312	
SQ.FT.		SQ.FT.		SQ.FT.	
GENERAL NOTES		GENERAL NOTES		GENERAL NOTES	
ALL BOLT HOLES TO STRADDLE NATURAL CENTER LINES.					
MAMP (HOT AND CORRODED):					
SHELLSIDE: 401 PSIG LIMITED BY BODY FLANGE					
TUBESIDE: 325 PSIG LIMITED BY BODY FLANGE					
MAMP (NEW AND COLD):					
SHELLSIDE: 459 PSIG LIMITED BY BODY FLANGE					
TUBESIDE: 390 PSIG LIMITED BY BODY FLANGE					
SHIP HYDROTEST PRESSURE: SHELLSIDE: 597 PSIG					
TUBESIDE: 507 PSIG					
FIELD HYDROTEST PRESSURE: SHELLSIDE: 522 PSIG					
TUBESIDE: 423 PSIG					
GASKETS: .1570" THK. 316 GMGC					
2 SETS OF SPARE GASKETS REQUIRED.					
PAINT: SEE PAINT MAP DRAWING PM					
INSULATION THK. (BY OTHERS): SHELL - NONE CHANNEL - NONE					
CUST: KP ENGINEERING/HOLLY FRONTIER					
P.O. NO.: J1422-B-008					
ITEM NO.: 004-E-500					
SERVICE: UNIFINER STRIPPER BTMS/PENEX FEED PREHEAT					



MK QTY	DESCRIPTION	PROCESS	AUXILIARIES
S1	1 6"	300#RF WN INLET	1"-300# RFWN
S2	1 6"	300#RF WN OUTLET	1"-300# RFWN
T1	1 6"	300#RF WN INLET	1"-300# RFWN
T2	1 6"	300#RF WN OUTLET	1"-300# RFWN
	DELETED		
	DELETED		
	DELETED		
	DELETED		

NO.	DATE	REVISIONS
1	12/18	REVISED / CUSTOMER
2	2-26-16	REV. PER CUST. COMMENTS

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1	12/18	REVISED / CUSTOMER
2	2-26-16	REV. PER CUST. COMMENTS

**Steeltek**  
 TULSA, OK.

DWG. NO. 155-3222-A