

**API 661 Air-Cooled Heat Exchanger - Specification Sheet**

**APPROVED**

*By Todd Harvey at 11:36 am, Sep 30, 2013*

Job No. 18680-2  
 Page Page 1  
 Date 9/24/2013  
 Proposal No. \_\_\_\_\_  
 Inquiry No. \_\_\_\_\_

Item No. HE-2500  
 By D.HOLK  
 Revision 2  
 Contract No. \_\_\_\_\_  
 Order No. \_\_\_\_\_

Manufacturer	<u>TEX-FIN</u>	Heat exchanged	(Btu/hr)	<u>2801026</u>
Model no.	<u>10-26-D8-H15-FVD</u>	Surface/Item-Finned tube	(ft2)	<u>28922</u>
Customer	<u>OBERON FUELS</u>	Bare tube	(ft2)	<u>1345.2</u>
Plant location	_____	MTD, Eff.	(Deg. F)	<u>51.6</u>
Service	<u>METHANOL CONDENSER</u>	Transfer rate-Finned	(Btu/ft2-hr-F)	<u>2.310</u>
Type draft	<u>FORCED</u>	Bare tube, service	(Btu/ft2-hr-F)	<u>49.66</u>
Bay size (WxL)	(ft) <u>10.211 x 26.000</u>	Bare tube, clean	(Btu/ft2-hr-F)	<u>56.06</u>
No. of bays/Items	<u>1</u>			

**Basic design data**

Pressure design code	<u>ASME</u>	Structural code	<u>UBC/AISC</u>
Tube bundle code stamped	<u>YES</u>	Flammable service	<u>NO</u>
Heating coil code stamped	<u>N/A</u>	Lethal/toxic service	<u>NO</u>

**Performance Data - Tube Side**

Fluid name	<u>Methanol</u>							
Total fluid entering	(lb/hr)	<u>23041</u>	Total flow rate (Liq/Vap)	(lb/hr)	<u>345.6 / 22696</u>	<u>3414.1 / 19627</u>		
Dew/bubble point	(Deg. F)	<u>/</u>	Water/Steam	(lb/hr)	<u>0.0 / 0.0</u>	<u>0.0 / 0.0</u>		
	(Deg. F)	<u>/</u>	Noncondensables	(lb/hr)	<u>0.0</u>	<u>0.0</u>		
Latent heat	(Btu/lb)	<u>/</u>	Molecular Wt. (Vap/Non-cond)		<u>/</u>	<u>/</u>		
Inlet pressure	(psia)	<u>994.70</u>	Density (Liq/Vap)	(lb/ft3)	<u>44.920 / 1.8500</u>	<u>46.720 / 1.9748</u>		
Pressure drop (All/Calc)	(psi)	<u>5.000 / 0.292</u>	Specific heat (Liq/Vap)	(Btu/lb-F)	<u>0.8590 / 0.5900</u>	<u>0.7521 / 0.6060</u>		
Velocity (Allow/Calc)	(ft/sec)	<u>/ 3.68</u>	Thermal cond. (Liq/Vap)	(Btu/hr-ft-F)	<u>0.2839 / 0.0380</u>	<u>0.1378 / 0.0362</u>		
Inside fouling resistance (ft2-hr-F/Btu)		<u>0.00200</u>	Viscosity (Liq/Vap)	(cP)	<u>0.3830 / 0.0170</u>	<u>0.8542 / 0.0117</u>		
Temperature	(Deg. F)	<u>In 230.02 / Out 132.00</u>						

**Performance Data - Air Side**

Air inlet temperature	(Deg. F)	<u>112.00</u>	Face velocity	(SFPM)	<u>560.10</u>
Air flow rate/item	(SCFM)	<u>145361</u>	Minimum design ambient temp.	(Deg. F)	<u>10.02</u>
Mass velocity	(lb/hr-ft2)	<u>/</u>	Altitude	(ft)	<u>0.000</u>
Air outlet temperature	(Deg. F)	<u>129.80</u>	Static pressure	(inH2O)	<u>0.544</u>
Air flow rate/fan	(ACFM)	<u>78553</u>			

**Design, Material, and Construction**

Design pressure	(psig)	<u>1200.0</u>	<b>Heating Coil</b>		
Test pressure	(psig)	<u>TempCorr 1650.00</u>	No. of tubes		<u>N/A</u>
Design temperature	(Deg. F)	<u>300.02</u>	Tube outside diameter	(inch)	<u>/</u>
Min. design metal temp.	(Deg. F)	<u>/</u>	Tube material		<u>/</u>
<b>Tube bundle</b>			Fin material and type		<u>/</u>
Size (WxL)	(ft)	<u>9.982 X 26.000</u>	Fin thickness	(inch)	<u>/</u>
No./Bay		<u>1</u>	ASME Code, Sec. VIII, Div. 1		<u>/</u>
Number of tube rows		<u>4</u>	Heating fluid		<u>/</u>
Bundles in parallel		<u>1</u>	Heating fluid flow rate	(lb/hr)	<u>/</u>
Bundles in series		<u>/</u>	Temperature (In/Out)	(Deg. F)	<u>/</u>
Structure mounting		<u>Above Grade</u>	Inlet pressure	(psia)	<u>/</u>
Pipe rack beams		<u>NONE</u>	Pressure drop (All/Calc)	(psi)	<u>/</u>
Ladders, walkways, platforms		<u>NONE</u>	Design temperature	(Deg. F)	<u>/</u>
Structure surface prep.		<u>GALV</u>	Design pressure	(psia)	<u>/</u>
Header surface prep.		<u>NONE</u>	Inlet/Outlet nozzle		<u>/</u>
<b>Louver</b>			<b>Header</b>		
Material		<u>Alum</u>	Type		<u>WELDED BOX</u>
Action control		<u>Manual</u>	Material		<u>SA240-304/304L</u>
Action type		<u>/</u>	Corrosion Allowance	(inch)	<u>0.0313</u>
			No. of passes		<u>1</u>

**API 661 Air-Cooled Heat Exchanger - Specification Sheet**

**APPROVED**

*By Todd Harvey at 11:48 am, Sep 30, 2013*

Job No.	18680-2	Item No.	HE-2500
Page	Page 2	By	D.HOLK
Date	9/24/2013	Revision	2
Proposal No.		Contract No.	
Inquiry No.		Order No.	

**Design, Material, and Construction (continued)**

<b>Header (continued)</b>				No./Bundle	204
Slope		NO		Length (ft)	26.000
Plug material		304SS		Pitch (inch)	2.3125
Gasket material		3SS		Layout	Triangular
<b>Nozzle</b>				<b>Fin</b>	
Inlet	No.	Size, (inch)	Rating/Facing	Type	L-FOOTED
Outlet	1	6.0000	900# RTJWN	Material	Aluminum 1060 - H14
Vent	1	4.0000	900# RTJWN	Thickness (inch)	0.0150
Drain	1	1.0000	6000# CPLG	Selection temp. (F)	
Chemical Cleaning				Outside diameter (inch)	2.2500
Min. Wall Thk.				Fin density (fin/inch)	10.0
<b>Tube</b>				ASME Code, Sec. VIII, Div. 1	YES
Material		SA249-304/304L		Customer Specifications	NONE
Tube outside diameter (inch)		1.0000			
Average wall thickness (inch)		0.0650			

**Mechanical Equipment**

<b>Fan</b>				RPM	1750
Manufacturer		MOORE		Service factor	1.15
No./Bay		2		Enclosure	TEFC
RPM (Revs/min.)		424		Voltage	460
Diameter (ft)		7.000		Phase	3
No. of blades		5		Cycle	60
Angle (degrees)		17		Fan noise level (dB)	79.3
Pitch adjustment		MANUAL		<b>Speed Reducer</b>	
Blade material		ALUM		Type	V-BELT
Hub material		ALUM		Manufacturer	
BHP@design temp		11.44		No./Bay	2
BHP@min. ambient temp				Service factor	1.4
Tip speed		10656		Speed ratio	4.1:1
<b>Driver</b>				Support	
Type		ELEC MOTOR		Vib. switch	MURPHY
Manufacturer				Enclosure	2VSEX
No./Bay		2			
Driver (hp)		15			

**Controls - Air Side**

Air recirculation	NONE	Louvers	
Degree control of outlet process temp. (Max. Cooling), +/-	/	Positioner	
Action on control signal failure		Signal air pressure (psia)	
Fan pitch		From	To
Louvers		From	To
Actuator air supply		Supply air pressure (psia)	
Fan		From	To
		From	To

**Shipping**

Plot area (WxL) (ft)	10.211 x 26.000	Total (lb)	27325
Bundle weight (lb)	13852	Shipping (lb)	
Bay			

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A.S.M.E. M E C H A N I C A L D E S I G N C A L C U L A T I O N S

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All calculations in complete accordance with  
ASME, Section VIII, Div 1, 2010 Edition, 2011 Addenda

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Impact Testing is exempt to -20 DegF per UHA-51  
All Loadings Per UG-22 Have Been Considered and Included Where Applicable

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**CUSTOMER** : OBERON FUELS

**P.O. NUMBER** : TEX-16SEP13

**ITEM NUMBER** : HE-2500

**JOB NUMBER** : 18680-2

**SIZE & TYPE** : 10-28-D8-H15-FVD

**QUANTITY** : ONE

**APPROVED**

*By Todd Harvey at 11:26 am, Sep 30, 2013*

Please provide column loading calcu

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19115 ALDINE WESTFIELD / HOUSTON, TEXAS 77073 / PHONE: 281-821-7150 / WWW.TEX-FIN.COM

Header Calculations per Appendix 13			
Calculations per Fig. 13-2(a) Sketch (7)			
PRESSURE (P) =	1,200	ALLW. STRESS =	18900
TUBE DIA =	1	TUBE PITCH (p) =	2.3125
CORR. ALLW. =	0.03125		
h SPAN (h) =	3.6875	H Span (H) =	4
<b>Top and Bottom Wrapper Calculations</b>		SA240-304/304L	T1 = 0.625
alpha = a =	(H / h)		1.084
K =	a * (t2 * t2 * t2) / (t1 * t1 * t1)		4.539
<b>Membrane Stress</b>			
Sm =	$\frac{(P * h)}{(4 * t1)} \left[ \frac{2 + K * (5 - a^2)}{1 + 2 * K} \right]$		3776
(Sb)N =	$\frac{P}{(2 * t1^2)} \left[ \frac{(3 * H^2) - h^2 * 2 * \left[ \frac{(1 + (2 * a^2 * K))}{(1 + 2 * K)} \right]}{(1 + (2 * a^2 * K))} \right]$		766
(Sb)Q =	$\frac{(P * h^2 * t1)}{(2 * t1^3)} \left( \frac{(1 + (2 * a^2 * K))}{(1 + 2 * K)} \right)$		25472
<b>Total Stress</b>			
(ST)N =	Eq.(1) + Eq.(3)		4542 28350
(ST)Q =	Eq.(1) + Eq. (4)		29248 28350
<b>TubeSheet &amp; PlugSheet Calculations</b>		SA240-304/304L	T2 = 1
LIG Effic= e =	(p - d) / p		0.537
alpha = a =	(H / h)		1.084
K =	a * (t2 * t2 * t2) / (t1 * t1 * t1)		4.539
<b>Membrane Stress</b>			
Sm =	(P * H) / (2 * t2 * e)		4551
<b>Bending Stress</b>			
(Sb)M =	$\frac{(P * h^2)}{(e * 2 * t2^3)} \left[ \frac{(1 + K * (3 - a^2))}{(1 + 2 * K)} \right]$		21078
(Sb)Q =	$\frac{(P * h^2)}{(2 * t2^3)} \left( \frac{(1 + (2 * a^2 * K))}{(1 + 2 * K)} \right)$		9925
<b>Total Stress</b>			
(ST)M =	Eq.(2) + Eq.(5)		25630 28350
(ST)Q =	Eq.(2) + Eq. (6)		14476 28350
<b>End Plate Calculations</b>		SA240-304/304L	T5 = 0.5
alpha = a =	(H / h)		1.084
K =	a * (t2 * t2 * t2) / (t1 * t1 * t1)		4.539
Z (2.5 max) = 3.4 - 2.4 * (Short Span / Big Span) =			0.798
S =	$\frac{\text{Short Span}^2 * Z * .2 * P}{t5^2}$		13021 20000
<b>Stay Plate Calculations</b>		SA240-304/304L	T3 = 0.375
Sm =	$\frac{(P * h)}{(e * 2 * t3)} \left[ \frac{(2 + K * (5 - a^2))}{(1 + 2 * K)} \right]$		27421 28350

APPROVED  
By Todd Harvey at 11:51 am, Sep 30, 2013

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<u>Nozzle Calculations per UG-27/Appendix 1, 1-1</u>				
Pressure (P)	<b>1,200</b>	Allow Stress (S)	<b>18900</b>	
Nozzle O.D. (D)	<b>6.625</b>	Nozzle Wall (T)	<b>0.432</b>	
Corr Allow (CA)	<b>0.03125</b>	Joint Efficiency (E)	<b>0.7</b>	
Material	<b>SA312-304/304L</b>	Std Wt Pipe (SW)	<b>0.28</b>	
T Required (tr)	$\frac{P * (D/2)}{(S * E + .4 * P)}$		<b>0.2899</b>	
Mill Tolerance (MT)	.125 * T		<b>0.0540</b>	
Tmin	tr + MT + CA		<b>0.3752</b>	< <b>0.4320</b>

<u>Nozzle Calculations per UG-27/Appendix 1, 1-1</u>				
Pressure (P)	<b>1,200</b>	Allow Stress (S)	<b>18900</b>	
Nozzle O.D. (D)	<b>4.5</b>	Nozzle Wall (T)	<b>0.337</b>	
Corr Allow (CA)	<b>0.03125</b>	Joint Efficiency (E)	<b>0.7</b>	
Material	<b>SA312-304/304L</b>	Std Wt Pipe (SW)	<b>0.237</b>	
T Required (tr)	$\frac{P * (D/2)}{(S * E + .4 * P)}$		<b>0.1969</b>	
Mill Tolerance (MT)	.125 * T		<b>0.0421</b>	
Tmin	tr + MT + CA		<b>0.2703</b>	< <b>0.3370</b>

**APPROVED**  
By Todd Harvey at 11:52 am, Sep 30, 2013

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<u>Tube Calculations per UG-27 / Appendix 1, 1-1</u>			
Pressure (P)	1,200	Allow Stress (S)	16100
Tube O.D. (D)	1	Tube Wall (T)	0.06
Corr Allow (CA)	0	Joint Efficiency (E)	1
Material	SA249-304/304L		
T Required (tr)	$\frac{P * (D/2)}{(S * E + .4 * P)}$	0.0362	< 0.0600

**APPROVED**

*By Todd Harvey at 11:53 am, Sep 30, 2013*

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STRESSES DUE TO NOZZLE LOADINGS/WRC BULLETIN 107

(ALL LOADS ARE IN LBS.; ALL MOMENTS ARE IN FT-LBS.; ALL STRESSES ARE IN PSI)

HEADER WIDTH. = 6.0000 WRAPPER THICKNESS = 0.6250 CA=0.03120  
 NOZZLE O.D. = 6.6250 PAD THICKNESS = 0.0000 P=1200.00  
 RADIAL LOAD P = 2800. SHEAR LOAD VC = 2300. SHEAR LOAD VL = 2800.  
 CIRC. MOMENT MC= 3700. LONG MOMENT ML= 2800. TORSIONAL MOMENT MT= 4900.  
 STRESS CONCENTRATION FACTORS: MEMBRANE LOAD = 1.0000 BENDING LOAD = 1.0000  
 GEOMETRIC PARAMETERS; GAMMA = 5.2831 BETA = 1.0576

VALUE  
 AU AL BU BL CU CL DU DL FROM CURVE  
 1106. 1106. 1106. 1106. 289. 289. 289. 289. 0.561/ 0.147  
 2267. -2267. 2267. -2267. 3362. -3362. 3362. -3362. 0.036/ 0.054  
 0. 0. 0. 0. 156. 156. -156. -156. 0.0145  
 0. 0. 0. 0. 17103. -17103. -17103. 17103. 0.0501  
 -29. -29. 29. 29. 0. 0. 0. 0. 0.0035  
 -599. 599. 599. -599. 0. 0. 0. 0. 0.0023

\*\*\*\*\*  
 SUMMATION  
 2745. -592. 4001. -1732. 20910. -20020. -13607. 13873. CIRC. STRESSES  
 \*\*\*\*\*

289. 289. 289. 289. 1106. 1106. 1106. 1106. 0.147/ 0.561  
 3362. -3362. 3362. -3362. 2267. -2267. 2267. -2267. 0.054/ 0.036  
 0. 0. 0. 0. 1238. 1238. -1238. -1238. 0.1149  
 0. 0. 0. 0. 4647. -4647. -4647. 4647. 0.0136  
 -28. -28. 28. 28. 0. 0. 0. 0. 0.0035  
 -4135. 4135. 4135. -4135. 0. 0. 0. 0. 0.0160

\*\*\*\*\*  
 SUMMATION  
 -512. 1034. 7814. -7180. 9258. -4570. -2512. 2247. LONG. STRESSES  
 \*\*\*\*\*

1644. 1644. 1644. 1644. 1644. 1644. 1644. 1644.  
 426. 426. -426. -426. 0. 0. 0. 0.  
 0. 0. 0. 0. -519. -519. 519. 519.

\*\*\*\*\*  
 SUMMATION  
 2070. 2070. 1218. 1218. 1125. 1125. 2163. 2163. SHEAR STRESSES  
 \*\*\*\*\*

COMBINED STRS.  
 5268. 4448. 8170. 7440. 21018. 20101. 14014. 14263. INTENSITY  
 \*\*\*\*\*

MAXIMUM STRESS = 21018.  
 YIELD = 30000.  
 YIELD FACTOR = 0.8000  
 ALLOWABLE STRESS = 24000.

**APPROVED**  
 By Todd Harvey at 11:53 am, Sep 30, 2013

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STRESSES DUE TO NOZZLE LOADINGS/WRC BULLETIN 107

(ALL LOADS ARE IN LBS.; ALL MOMENTS ARE IN FT-LBS.; ALL STRESSES ARE IN PSI)

HEADER WIDTH. = 6.0000 WRAPPER THICKNESS = 0.6250 CA=0.03120  
 NOZZLE O.D. = 4.5000 PAD THICKNESS = 0.0000 P=1200.00  
 RADIAL LOAD P = 1900. SHEAR LOAD VC = 2200. SHEAR LOAD VL = 2200.  
 CIRC. MOMENT MC= 1900. LONG MOMENT ML= 1900. TORSIONAL MOMENT MT= 1600.  
 STRESS CONCENTRATION FACTORS: MEMBRANE LOAD = 1.0000 BENDING LOAD = 1.0000  
 GEOMETRIC PARAMETERS; GAMMA = 5.6381 BETA = 0.7343

VALUE  
 AU AL BU BL CU CL DU DL FROM CURVE  
 991. 991. 991. 991. 539. 539. 539. 539. 0.702/ 0.382  
 1273. -1273. 1273. -1273. 2079. -2079. 2079. -2079. 0.027/ 0.044  
 0. 0. 0. 0. 1376. 1376. -1376. -1376. 0.1644  
 0. 0. 0. 0. 19676. -19676. -19676. 19676. 0.0695  
 -1496. -1496. 1496. 1496. 0. 0. 0. 0. 0.1788  
 -3304. 3304. 3304. -3304. 0. 0. 0. 0. 0.0117

\*\*\*\*\*  
 SUMMATION  
 -2537. 1526. 7064. -2090. 23670. -19840. -18434. 16761. CIRC. STRESSES  
 \*\*\*\*\*

539. 539. 539. 539. 991. 991. 991. 991. 0.382/ 0.702  
 2079. -2079. 2079. -2079. 1273. -1273. 1273. -1273. 0.044/ 0.027  
 0. 0. 0. 0. 4232. 4232. -4232. -4232. 0.5058  
 0. 0. 0. 0. 9025. -9025. -9025. 9025. 0.0319  
 -882. -882. 882. 882. 0. 0. 0. 0. 0.1054  
 -8474. 8474. 8474. -8474. 0. 0. 0. 0. 0.0299

\*\*\*\*\*  
 SUMMATION  
 -6737. 6052. 11973. -9131. 15521. -5075. -10993. 4511. LONG.STRESSES  
 \*\*\*\*\*

1169. 1169. 1169. 1169. 1169. 1169. 1169. 1169. 1169.  
 620. 620. -620. -620. 0. 0. 0. 0. 0.  
 0. 0. 0. 0. -620. -620. 620. 620.

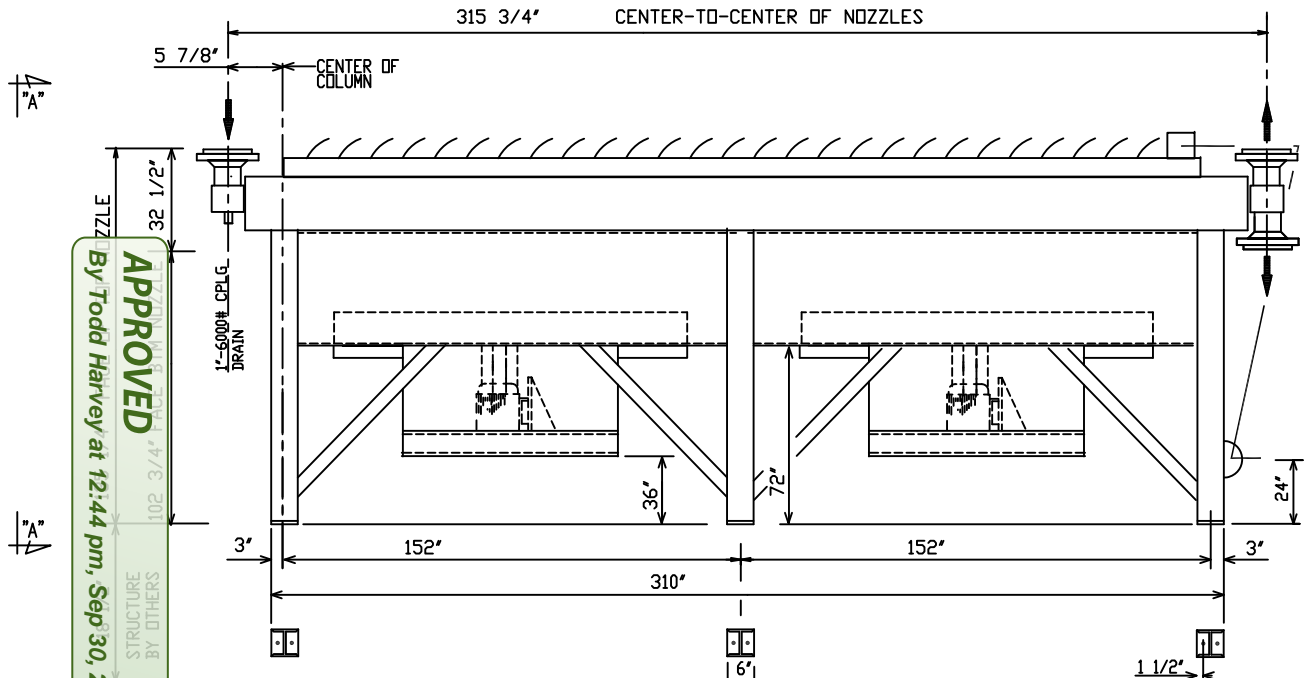
\*\*\*\*\*  
 SUMMATION  
 1789. 1789. 550. 550. 550. 550. 1789. 1789. SHEAR STRESSES  
 \*\*\*\*\*

COMBINED STRS.  
 7396. 6674. 12034. 9174. 23707. 19860. 18842. 17017. INTENSITY  
 \*\*\*\*\*

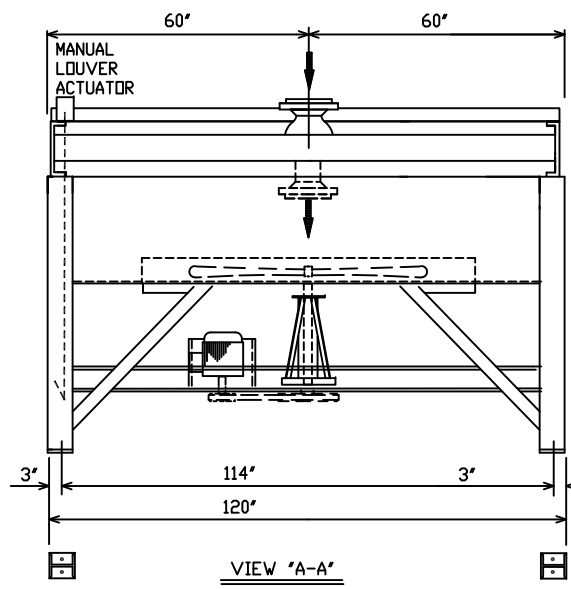
MAXIMUM STRESS = 23707.  
 YIELD = 30000.  
 YIELD FACTOR = 0.8000  
 ALLOWABLE STRESS = 24000.

**APPROVED**  
 By Todd Harvey at 11:53 am, Sep 30, 2013





**APPROVED**  
 By Todd Harvey at 12:44 pm, Sep 30, 2013  
 STRUCTURE BY OTHERS  
 102 3/4"



DESIGN DATA		HE-2500	
DESIGN PRESSURE P.S.I.G.	1200		
VACUUM PRESSURE P.S.I.G.	15 (F.V.)		
TEST PRESSURE P.S.I.G.	1651 (temp.corrected)		
DESIGN TEMP. Deg.F.	300		
MDMT Deg. F.	-20		
CORROSION ALLOWANCE	.03125" (EXCEPT TUBES)		
NUMBER OF ROWS/PASSES	4 / 1		
NUMBER OF TUBES	204		
TUBE O.D.	1"		
TUBE WALL	16bwg		
TUBE LENGTH	26'-0"		
FIN HEIGHT	5/8"		
FINS/INCH	10		
FIN TYPE	L-FOOTED		
TUBE PITCH	2 5/16" TRI		
SURFACE (FIN/BARE) SQFT	28921 / 1345		
TUBE MATL	SA-249-304/304L		
HEADER MATL	SA-240-304/304L		
HEADER TYPE	WELDED BOX W/ PLUGS		
INLET NOZZLE	(1) 6"		
OUTLET NOZZLE	(2) 4"		
FLANGE RATING	900# RTJ WN		
VENT/DRAIN	1"-6000# CPLG		
RADIOGRAPHY	100%		
HEAT TREAT REQUIRED	NONE		
LOUVERS	MANUAL		
BUNDLE WEIGHT, LBS	13,800		

ESTIMATED WEIGHTS, LBS. (EACH)	
DRY: 27,400	WET: 28,800

SPECIFICATIONS  
 ASME CODE SECT. VIII DIV.1, 2010 EDD, 2011a ADD (STAMP YES)  
 WIND SPEED : 163MPH  
 SEISMIC ZONE : 4

DRIVE SYSTEM	GENERAL NOTES
<b>FANS:</b> (2) 8'-5 BLADE, MANUAL ADJUST 424 RPM / 10500FPM TIP SPEED 2 7/16' SHAFT <b>MOTORS:</b> (2) 15HP, TEFC, 254T FRAME ELECTRIC, 460V/3P/60C 1 SPEED, 1750 RPM, 1.15 S.F. <b>DRIVE:</b> V-BELT, 4.1:1 REDUCTION RATIO 1.4 S.F. <b>VIBRATION SWITCH</b> (2) MURPHY 2-VS-EX 2 SPDT	ALL BOLT HOLES TO STRADDLE NATURAL CENTER LINES. PAINT: HEADERS - NONE STRUCTURE - GALVANIZE TUBE-TO-TUBESHEET JOINT: GROOVED & EXPANDED & SEAL WELDED
<b>CUST:</b> OBERON FUELS  <b>P.O. NO.:</b> TEX-16SEP13 <b>ITEM NO.:</b> HE-2500 <b>SERVICE:</b> METHANOL CONDENSER	

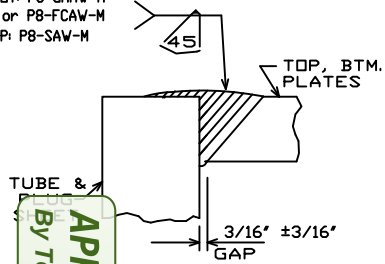
MAX NOZZLE LOADS		
	6"	4"
P (LB)	2800	1900
VC (LB)	2300	2200
VL (LB)	2800	2200
MC (FT.LB)	3700	1900
ML (FT.LB)	2800	1900
MT (FT.LB)	4900	1600

ASSEMBLY AND SPECIFICATIONS FOR  
 ONE 10-26-D8-H15-FVD

DWN. BY Eng	 <b>TEX-FIN, INC.</b> HOUSTON, TEXAS 281-821-1750 www.tex-fin.com
DATE 9-24-13	
CKD. BY sdf	
DWG.NO. 18680-2-A	

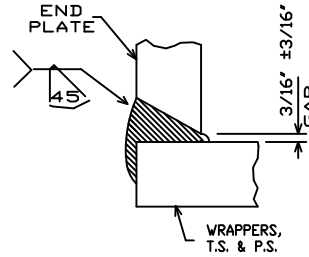
NO.	DATE	REVISIONS

ROOT: P8-GMAW-M  
or P8-FCAW-M  
CAP: P8-SAW-M



BTM WRAPPER  
ES TO TUBE &  
LUG SHEETS

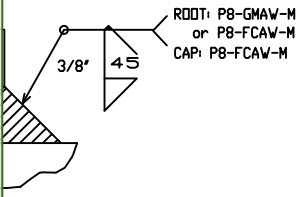
ROOT: P8-GMAW-M  
or P8-FCAW-M  
CAP: P8-FCAW-M



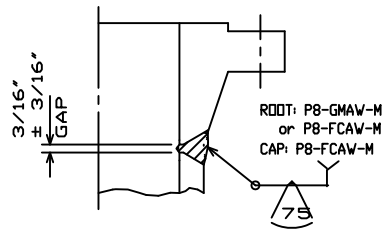
END PLATES TO  
WRAPPERS, T.S., & P.S.

NOZZLE  
PIPE

3/16\"  
± 3/16\"  
GAP

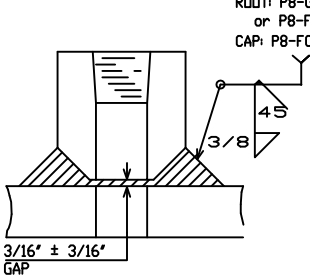


NOZZLE PIPE  
TO BOX HEADER



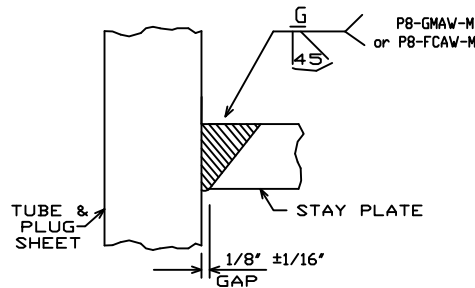
WELD-NECK NOZZLE  
FLANGE TO NOZZLE PIPE

ROOT: P8-GMAW-M  
or P8-FCAW-M  
CAP: P8-FCAW-M



CPLG. TO HEADER

P8-GMAW-M  
or P8-FCAW-M




STAY PLATE WELD

CERTIFIED BY

ASME

UW

RT-1



**TEX-FIN, INC.**  
HOUSTON, TEXAS  
281-821-7150

MAWP PSI @ TEMP.°F		MDMT °F @ PSI		TEST PSI
S	NA @ NA	NA @ NA	NA	NA
T	1200 @ 300	-20 @ 1200	1651	
SERIAL NO.		ITEM NO.		YEAR
18680-2		HE-2500		2013
OBERON FUELS / PD TEX-16SEP13				
METHANOL CONDENSER				

MAWEP: 15PSI @ 300DEG F

## NAME PLATE DETAIL

### NOTES

- 1) ALL WELDS TO BE SEAL WELDED, UNLESS NOTED
- 2) UNLESS OTHERWISE NOTED, ALL WELD GAPS +/- 1/16"
- 3) UNLESS OTHERWISE NOTED, ALL WELD BEVELS +/- 5 DEGS

### WELD / BEVEL DETAILS NAME PLATE DETAILS

DWN. BY  
PLT  
DATE  
9-24-13



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HOUSTON, TEXAS  
281-821-1750  
www.tex-fin.com

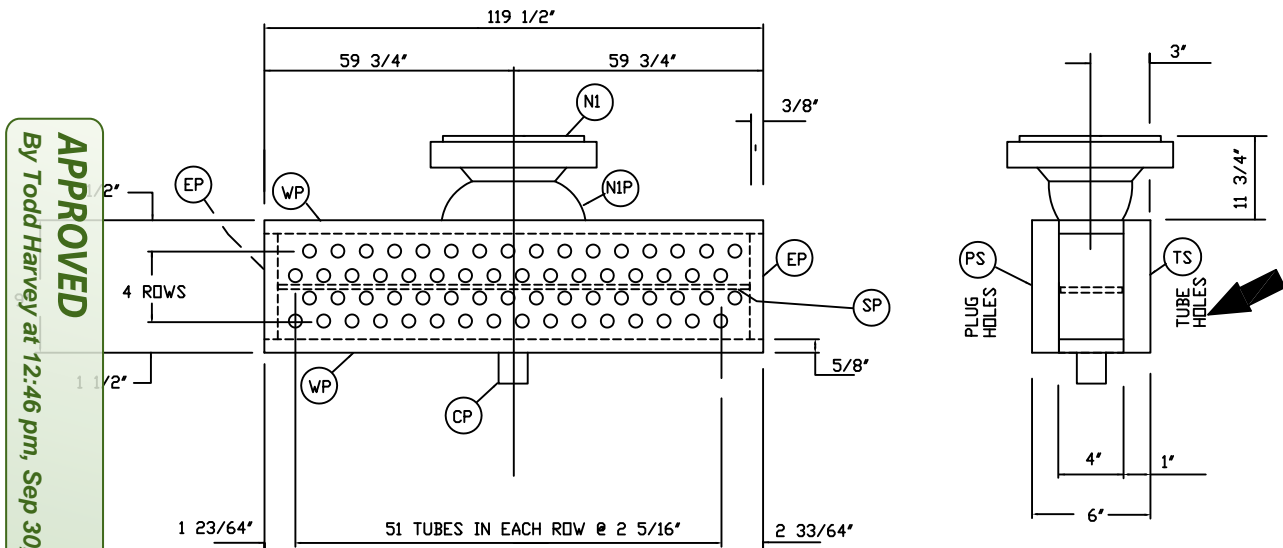
CKD. BY  
D.HOLK

DWG.NO.

18680-2-B

NO. DATE REVISIONS

NOTE: TUBE SEAL WELD TO TUBESHEETS



**APPROVED**  
 By Todd Harvey at 12:46 pm, Sep 30, 2013



BURN (15) 3" DIA HOLES EQUALLY SPACED IN STAY PLATE

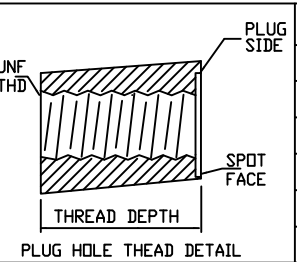
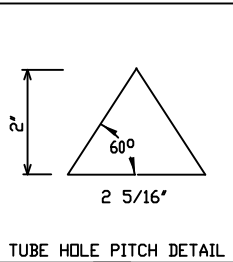
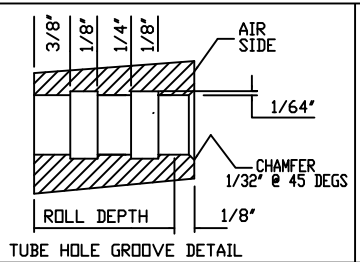
STAY PLATE (SP) REQUIRES FULL PENETRATION WELD

SEE DWG 'A' FOR NOZZLE LOADINGS

DESIGN DATA	
TUBES: (204) 1" OD	RADIOGRAPH: 100%
PLUGS: 1 3/8" SHOULDER	HEAT TREAT: ND
ROWS: 4	IMPACT TEST: NONE
PASSES: 2	FINISH: NONE

- NOTES**
- 1) STAMP TS WITH SERIAL NUMBER
  - 2) EXAMINE ALL MATERIAL BEFORE AND DURING FABRICATION IN ACCORDANCE WITH UG-93(d)
  - 3) L.P.T. ALL PLATES FOR LAMINATION BEFORE AND AFTER WELDING AS REQUIRED BY A.S.M.E.
  - 4) L.P.T. NOZZLE HOLE CUT-OUTS AS REQUIRED BY A.S.M.E.
  - 5) L.P.T. ALL WELDS AS REQUIRED BY A.S.M.E.
  - 6) ALL BOLT HOLES TO STRADDLE NATURAL CENTERLINES
  - 7) REAM TUBE HOLES 1.012" (+/-0.002") & GROOVE PER DETAIL
  - 8) TAP PLUG HOLES FOR 1 3/8" DIA - 12UNF THD SHOULDER PLUG PER DETAIL AND SPOTFACE 1 3/4" DIA X 1/32" DEEP
  - 9) SEE DRAWING 'B' FOR WELD AND BEVEL DETAILS
  - 10) CENTER PASS PLATES BETWEEN TUBE ROWS

BILL OF MATERIALS			
PART	QTY	DESCRIPTION	MATERIAL
TS	1	1" X 9" X 119 1/2"	SA240-304/304L
PS	1	1" X 9" X 119 1/2"	SA240-304/304L
WP	2	5/8" X 4" X 119 1/2"	SA240-304/304L
EP	2	3/8" X 4" X 7 1/2"	SA240-304/304L
SP	1	3/8" X 4" X 118 3/4"	SA240-304/304L
NI	1	6" - 900# RTJ WN W/ SCH80 BORE	SA182-304/304L
NIP	1	6" - SCH80 TRANSITION SWAGE	SA420-304/304L
CP	1	1" - 6000# CPLG W/ PLUG	SA182-304/304L
PLG	204	1 3/8"-12UNF-1" LG SHLD PLUG	SA182-304/304L
GSK	204	FOR 1 3/8" SHOULDER PLUG	304 SS

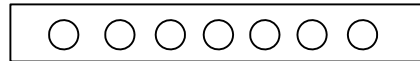
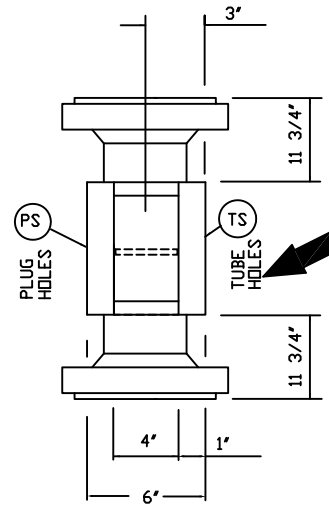
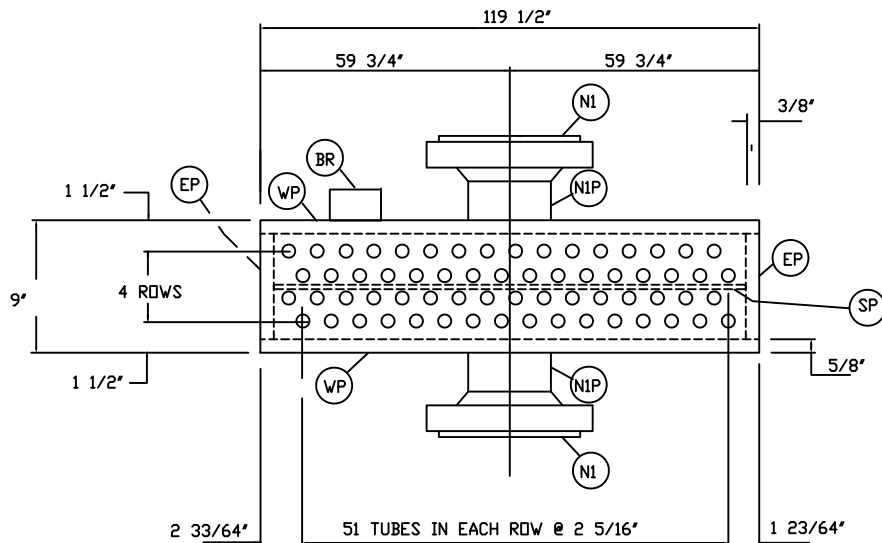


NO.	DATE	REVISIONS

**FRONT HEADER DETAIL**

DWN. BY PLT	<b>TEX-FIN, INC.</b> HOUSTON, TEXAS 281-821-1750 www.tex-fin.com
DATE 9-24-13	
CKD. BY D.HOLK	DWG.NO. 18680-2-C

NOTE: TUBE SEAL WELD TO TUBESHEETS



BURN (15) 3" DIA HOLES EQUALLY SPACED IN STAY PLATE

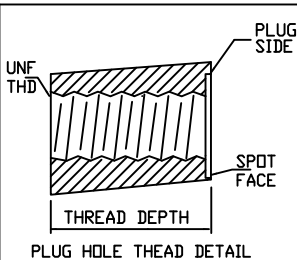
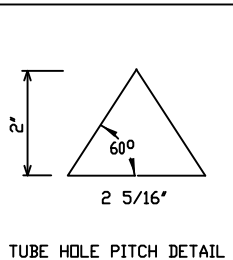
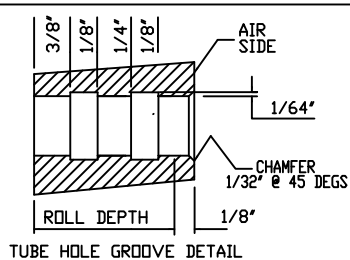
STAY PLATE (SP) REQUIRES FULL PENETRATION WELD

SEE DWG 'A' FOR NOZZLE LOADINGS

DESIGN DATA	
TUBES: (204) 1" OD	RADIOGRAPH: 100%
PLUGS: 1 3/8" SHOULDER	HEAT TREAT: ND
ROWS: 4	IMPACT TEST: NONE
PASSES: 1	FINISH: NONE

- NOTES
- 1) STAMP TS WITH SERIAL NUMBER
  - 2) EXAMINE ALL MATERIAL BEFORE AND DURING FABRICATION IN ACCORDANCE WITH UG-93(d)
  - 3) L.P.T. ALL PLATES FOR LAMINATION BEFORE AND AFTER WELDING AS REQUIRED BY A.S.M.E.
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SP	1	3/8" X 4" X 118 3/4"	SA240-304/304L
NI	2	4" - 900# RTJ WN W/ SCH80 BORE	SA182-304/304L
NIP	2	4" - SCH80 PIPE X 7' LONG	SA312-304/304L
PLG	204	1 3/8"-12UNF-1" LG SHLD PLUG	SA182-304/304L
GSK	204	FOR 3 1/8" SHOULDER PLUG	304 SS
BR	1	3/16" X 4" X 6"	SA240-304/304L



NO.	DATE	REVISIONS

REAR HEADER DETAIL

DWN. BY  
PLT

DATE  
9-24-13

CKD. BY  
D.HOLK

DWG.NO.  
18680-2-D

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