

Lynda
98859

ENERGY EXCHANGER COMPANY

SHELL AND TUBE EXCHANGER SPECIFICATION SHEET

1		Job No. X-4682
2	Customer KOCH NITROGEN COMPANY	Reference No. 330548
3	Address STERLINGTON, LOUISIANA	Proposal No. 92-9997
4	Plant Location STERLINGTON, LOUISIANA	Date 6/08/93 Rev. 3
5	Service of Unit PRIMARY SHIFT EFFLUENT WASTE HEAT BOILER	Item No. 103-C
6	Size 57-192 Type BHM (Hor/V) VXX	Connected in 1 Parallel 1 Series
7	Surf/Unit (Sqm/Eff.) 6027 Sq. Ft; Shells/Unit 1	Surf/Shell (Sqm/Eff.) 6027 Sq. Ft.
8	PERFORMANCE OF ONE UNIT	
9	Fluid Allocation	Shell Side Tube Side
10	Fluid Name	BOILER FEED WATER HTS GAS
11	Fluid Quantity, Total Lb/Hr	677835. 513500.
12	Vapor (In/Out)	513500. 513500.
13	Liquid	
14	Steam	89213.
15	Water	677835. 588622.
16	Noncondensable	
17	Temperature (In/Out) °F	609. 609. 804.2 630.
18	XXXXXXXXXX DENSITY #/CUFT	.5098 .5897
19	Viscosity, Liquid Cp	.0255 .0224
20	Molecular Weight, Vapor	18.0 16.07 16.07
21	Molecular Weight, Noncondensable	
22	Specific Heat Btu/Lb°F	.5349 .5392
23	Thermal Conductivity Btu Ft/Hr Sq. Ft. °F	.069 .061
24	Latent Heat Btu/Lb°F	528.0
25	Inlet Pressure Psig	1650.0 438.0
26	Velocity Ft/S	70.24 AVG.
27	Pressure Drop, Allow./Calc. Psi	.50 / .5 4.50 / 4.5
28	Fouling Resistance (Min.)	.0005 .00125
29	Heat Exchanged 47104000. Btu/Hr; MTD (Corrected)	78.06 °F
30	Transfer Rate, Service 100.12 Clean	Btu/Hr Sq Ft °F
31	CONSTRUCTION OF ONE SHELL	
32		Sketch (Bundle/Nozzle Orientation)
33	Design/Test Pressure Psig	Shell Side 1685/ CODE Tube Side 485 / CODE
34	Design Temperature °F	625 835
35	No. Passes per Shell	CROSS ONLY ONE
36	Corrosion Allowance In.	.1250 .1250
37	Connections In	2-8" STUB END 24" 600 RF
38	Size & Out	2-8" STUB END 24" 600 RF
39	Rating Intermediate	
40	Tube No. 1600 OD 1.0 In.; Thk (Min/Max) 8 MIN ; Length 16 Ft; Pitch 1.25 In. VXX 60 XXXXXX	
41	Tube Type BARE	Material 1.25CR SEAMLESS
42	Shell SA 516-70 ID 57. OXX In.	Shell Cover (Integ.) (Remov.)
43	Channel or Bonnet 1.25CR .5MO	Channel Cover 1.25CR .5MO
44	Tubesheet-Stationary NOTE 2	Tubesheet-Floating
45	Floating Head Cover	Impingement Protection PLATE ON BUNDLE
46	Baffles-Cross 8 STEEL Type SUPPORTS ONLY	% Cut (Diam/Area) Spacing: c/c Inlet In.
47	Baffles-Long PERFORATED STEEL	Seal Type NONE
48	Supports-Tube U-Band	Type
49	Bypass Seal Arrangement	Tube-Tubesheet Joint STR. WELD & LT ROLL
50	Expansion Joint	Type
51	pv ² - Inlet Nozzle	Bundle Entrance Bundle Exit
52	Gaskets-Shell Side	Tube Side
53	-Floating Head	
54	Code Requirements ASME SECTION I	TEMA Class R
55	Weight/Shell	Filled with Water Bundle
56	Remarks (1) SEE INQUIRY SPEC SHEET AND CUSTOMER DRAWINGS	
57	(2) 1.25CR .5MO WITH INCONEL 600 WELD OVERLAY (10 MM MIN THK)	
58	(3) EXCHANGER TO CONFORM TO KELLOGG SPEC C41-1E-84	

FORM P-4 MANUFACTURERS' PARTIAL DATA REPORT
as required by the provisions of the ASME Code rules

98859

1. Manufactured by ENERGY EXCHANGER COMPANY 1844 N. GARNETT TULSA, OKLAHOMA 74116
(name and address of manufacturer)
2. Manufactured for KOCH NITROGEN COMPANY STERLINGTON, LOUISIANA
(name and address of purchaser)

3. Identification of part(s)

Name of Part	Quantity	Line No.	Mfr's. Serial Nos.	Manufacturer's Drawing No.	CRN	Nat'l. Bd. No.	Year Built
①	1	6(a)	X-4682	X-4682-A		2809	1993

4. The chemical and physical properties of all parts meet the requirements of material specifications of the ASME BOILER AND PRESSURE VESSEL CODE. The construction and workmanship conform to ASME Code, Section I 1992 (year) and addenda to (None) (date)

6. (a) Drums:

No.	Inside Diameter, in.	Inside Length ft.	Shell Plates			Tubesheets		Tube Hole Ligament Efficiency	
			Mat'l. Spec. No., Grade	Thickness in.	Inside Radius in.	Thickness in.	Inside Radius in.	Longitudinal	Circumferential
1	57"	14'-0.75"	SA-516-70 (N)	3.25"	28.5"	7.4375" ②			
2	58"	2'-10.375"	SA387-11 CL.2 (N&T)	1"	29"				
3	58"		SA387-11 CL.2 (N&T)						
4									

No.	Longitudinal Joints		Circum. Joints		Heads					Hydrostatic Test, psi
	No. & Type*	Efficiency	No. & Type	Efficiency	Mat'l. Spec. No., Grade	Thickness, in.	Type**	Radius of Dish	Manholes No. & Size	
1	1	100	1	100						2530
2	1	100	1	100	SA-387-11 CL.2 (N & T)	.917"(min)	Ellip.	2:1		750
3			1	100	SA-387-11 CL.2 (N & T)	.917"(min)	Ellip.	2:1		750
4										

*Indicate if (1) seamless; (2) fusion welded.

**Indicate if (1) flat; (2) dished; (3) ellipsoidal; (4) hemispherical.

6. (b) Boiler tubes:

Diameter	Thickness	Mat'l. Spec. No., Grade
1"OD	8(min) BWG	SA-213-T11

6. (c) Headers no.: _____
(box or sinuous or round; mat'l. spec. no.; thickness)

Heads or ends _____ Hydro. test _____
(shape; mat'l. spec. no.; thickness) (psi)

6. (d) Staybolts: _____
(mat'l. spec. no.; diameter; size tensile; net area)

Pitch _____ in. Net area _____ in.² MAWP _____ psi
(supported by one bolt)

6. (e) Mud drum: _____ Heads or ends _____ Hydro. test _____
(for sect. header boilers, state size; shape; mat'l. spec. no.; thickness) (shape; mat'l. spec. no.; thickness) (psi)

7. (a) Waterwall headers:

No.	Size and Shape	Material Spec. No.	Thickness in.	Heads or Ends		Material Spec. No.	Hydro. Test, psi	Diameter in.	Thickness in.	Material Spec. No.
				Shape	Thickness in.					

7. (b) Waterwall tubes:

No.	Size and Shape	Material Spec. No.	Thickness in.	Shape	Thickness in.	Material Spec. No.	Hydro. Test, psi	Diameter in.	Thickness in.	Material Spec. No.

FORM P-4 (back)

8. (a) Economizer headers:

8. (b) Economizer tubes:

Heads or Ends										
No.	Size and Shape	Material Spec. No.	Thickness in.	Shape	Thickness in.	Material Spec. No.	Hydro Test, psi	Diameter in.	Thickness in.	Material Spec. No.

9. (a) Superheater headers:

9. (b) Superheater tubes:

(4) Shell Inlet & Outlet (5) Shell Studding Outlet

10. (a) Other parts: (1) Chan. Inlet (2) Chan. Outlet (3) Chan. By-Pass

10. (b) Tubes for other parts:

No.	Size	Flg. Type	Nozzle Material	Nom. Thk.	Corr.	Reinf. Mat'l.	How Attached			
1	1 24" 600#	RF V3 LWN	SA-182-F11 (N&T)	4"	.125"	Weld	Welded			
2	1 18" 600#	RF V2 LWN	SA-182-F11 (N&T)	4.13"	.125"	Weld	Welded			
3	1 12" 600#	RF HB LWN	SA-182-F11 (N&T)	2.94"	.125"	Weld	Welded			
2/2	8"	Stub End	SA-266-GR2 (N)	2.53125"	.125"	Weld	Welded			
1	4" 1500#	Stud. Outlet	SA-105-N	4.125"	.125"	Weld	Welded			

11. Openings (1) Steam

(no., size, and type of nozzles or outlets)

(2) Safety Valve

(no., size, and type of nozzles or outlets)

(3) Blowoff

(no., size, and type of nozzles or outlets)

(4) Feed

(no., size, type, and location of connection)

12.

	Maximum Allowable Working Pressure	Code Par. and/or Formula on Which MAWP is Based	Shop Hydro. Test psi	Heating Surface sq. ft.
a Boiler				
b Waterwall				
c Economizer				
d Superheater				
e Other parts				

13.

Heating surface to be stamped on drum heads. This heating surface not to be used for determining minimum safety valve capacity.

Field Hydro. Test psi

14. Remarks: P.O.# 330548 Item # 103-C Service: Primary Shift Effluent Waste Heat Boiler

Size: 57" x 192" Type: BHM Tubes designed w/0" Corrosion Allowance

Lines 6a (2) includes: (1) Ring - 70.5"OD x 58"ID x 9.875" thk. SA-182-F11 (N & T)

Lines 6a (3) includes: (1) Ring - 70.5"OD x 58"ID x 9.875" thk. SA-182-F11 (N & T)

(1) Primary Shift Effluent Waste Heat Boiler

(2) Thickness includes .4375"(min) Inconel 600 overlay - Tubesheet material: SA-182-F11 (Q & T)

CERTIFICATE OF COMPLIANCE

We certify the statements in this Manufacturers' Partial Data Report to be correct and that all details of material, construction and workmanship of this boiler part conform to the ASME BOILER AND PRESSURE VESSEL CODE.

Certificate of Authorization no. 12,371 to use the (PP) or (S) S symbol expires 9-27 19 95

Date 9-8-93 Name Energy Exchanger Company

Signed Larry D. Smith (authorized representative)

CERTIFICATE OF SHOP INSPECTION

I, the undersigned, holding a valid commission issued by The National Board of Boiler and Pressure Vessel Inspectors and the state or province of Oklahoma and employed by Commercial Union Insurance Company of Boston, Mass.

have inspected the part of a boiler described in this Manufacturers' Partial Data Report on 9-9-93, 19 93, and state that to the best of my knowledge and belief, the manufacturer has constructed this part in accordance with the applicable sections of the ASME BOILER AND PRESSURE VESSEL CODE.

By signing this certificate neither the inspector nor his employer makes any warranty, expressed or implied, concerning the part described in this Manufacturers' Partial Data Report. Furthermore, neither the inspector nor his employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 9-9-93 Signed G. L. Cooney (Authorized Inspector)

Commissions N.B.# 5745 "A" Okla.# 251 (Nat'l. Bd. (incl. endorsements) state, prov. and no.)

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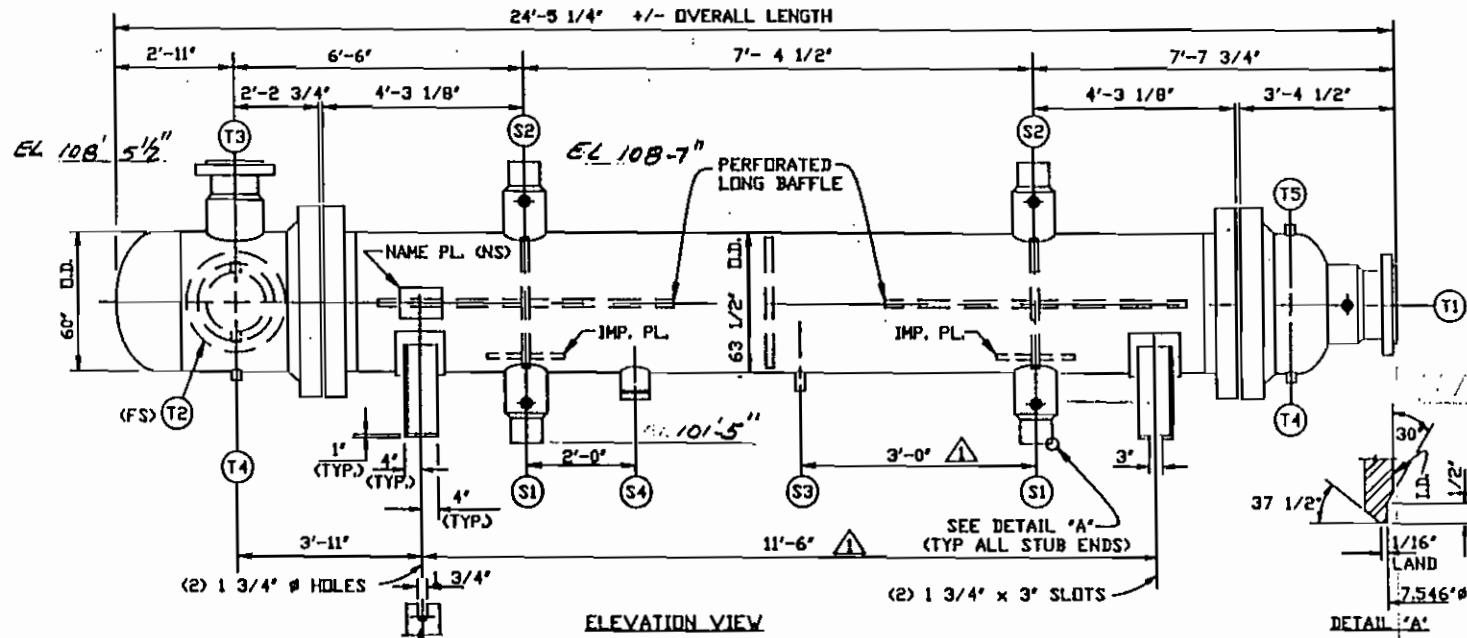
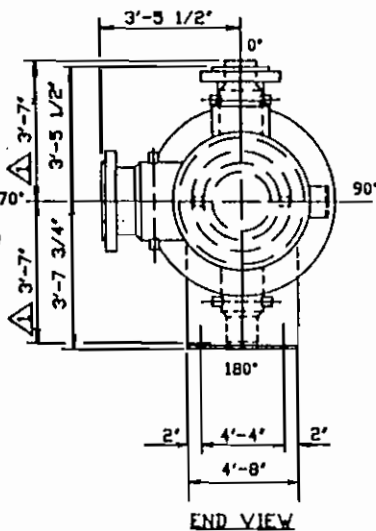
272-58

121-9 1/2 N

250-11 1/8 E

257-58 E

264-9 5/8



DETAIL 'A'

GENERAL NOTES

- DESIGNED & CONSTRUCTED IN ACCORDANCE W/ A. SECT. I 1992 EDIT. OF THE ASME BOILER & PRESSURE CODE & SO STAMPED WITH NATIONAL BOARD REGISTRATION.
- TEMA CLASS 'R'
- CUSTOMER SPECS
- API 660
- ALL BOLT HOLES TO STRADDLE Q'S.
- MIN. TEST METAL TEMP. = 70°F. (DRY W/ AIR AFTER HYDROTEST)
- TWO SPARE SETS OF GASKETS REQUIRED
- STRENGTH WELD TUBES TO TUBESHEET & LIGHT ROLL TO SEAL CREVICE.
- PAINT: SANDBLAST SUPPORTS PER SSPC-SP6 & PAINT W/ ONE COAT OF CARBOLINE CARBOZINC & 11 (3 MILS D.F.T.).

NOZZLE DATA

MK.	DESCRIPTION	SERVICE
T1	24"-600# RF	INLET
T2	18"-600# RF	OUTLET
T3	12"-600# RF	BY PASS
(2) S1	8" STUD END	INLET
(2) S2	8" STUD END	OUTLET
S3	1"-6000# CPLG.	DRAIN
S4	4"-1500# STUDDING	OUTLET
(2) T4	3/4"-6000# CPLG.	DRAIN
T5	3/4"-6000# CPLG.	VENT

DESIGN DATA

	SHELL SIDE	TUBE SIDE
DES. PRESS.	1685 PSIG	485 PSIG
TEST PRESS.	2530 PSIG	750 PSIG
DES. TEMP.	625 °F	835 °F
C. A.	.125"	.125"
NO. PASSES	DBL. SPLIT FLOW	1
HEAT TREAT	YES	YES
RADIOGRAPHY	FULL	FULL
INSUL. THK.	2 1/2"	3 1/4"
M.A.W.P.(H&C)	1685 PSIG	500 PSIG

CUSTOMER: KOCH NITROGEN COMPANY

DESTINATION: STERLINGTON, LOUISIANA

P.O. 330548

SERVICE: PRIMARY SHIFT EFFLUENT WASTE HEAT BOILER

TUBES: 1600 - 1" O.D. x 8 BWG (MIN) x 16'-0" LG. SA-213-T11

SURF: 6027

ITEM NO: 103-C

SIZE: 57-192

SERIAL NO: X-4682

TYPE: BHM

NO. REQ'D: ONE

WT: DRY 117600# WET 164700#

EQUIPPED WITH BLIND FLG.

⊗ DURING START-UP & SHUT-DOWN DO NOT EXCEED 50°F DIFFERENTIAL INLET TEMPERATURE TO PREVENT OVER STRESSING TUBES OR SHELL.

NUZ. MARKS T1, T2, S1 & S2 TO HAVE (2) 3/4"-6000# CPLG. AS SHOWN. ALL CPLG. TO BE PLUGGED.

NO.	DATE	REVISION	BY
1	6/14/93	REV PER CUST COMMENTS.	LS



Energy Exchanger Co.

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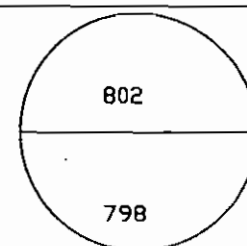
OUTLINE DIMENSIONAL DRAWING

DATE 5/24/93	DR: LS	APP: KEN	DRAWING NO: X-4682-A	REV: 1
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CERTIFIED CORRECT FOR FABRICATION

DATE 5/24/93 BY Ken Sully

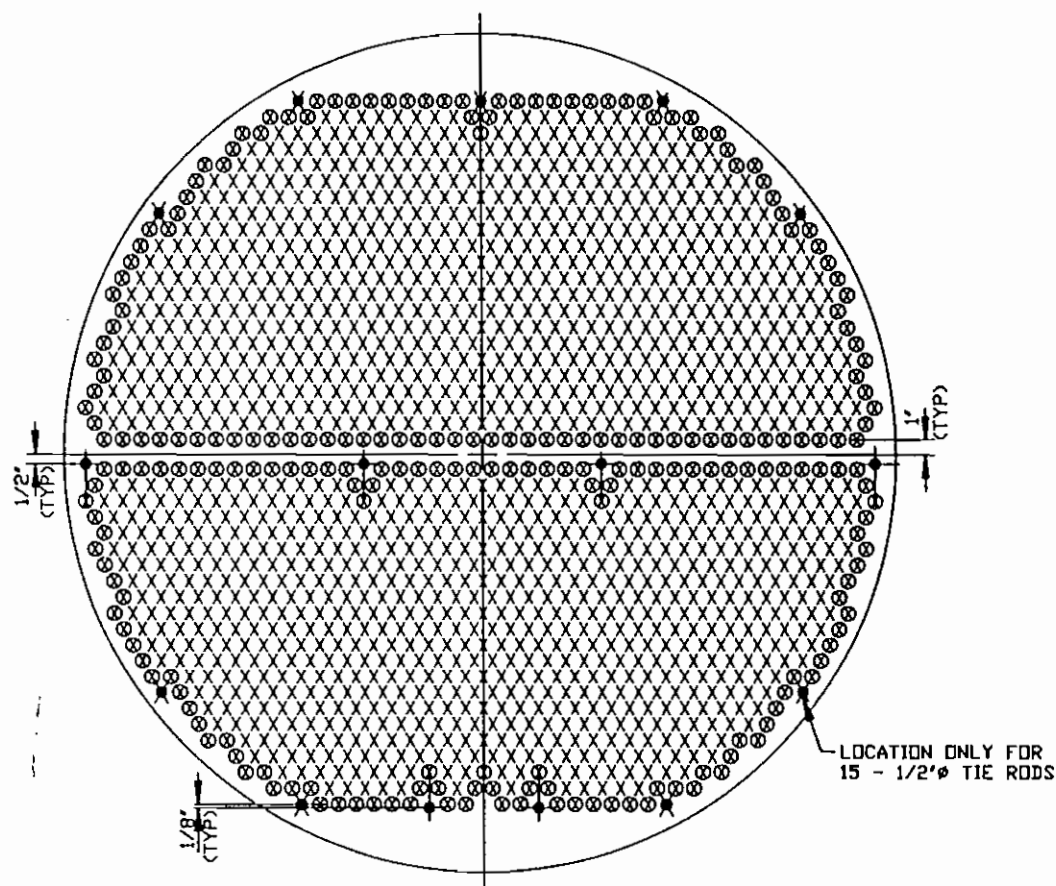
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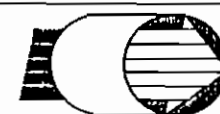
NO. OF HOLES PER PASS

NOTES:

- 1.) DRILL & REAM TUBE HOLES IN TUBESHEET TO 1.010" $\pm$ 0.002" DIA. FOR 1600 - 1" O.D. TUBES
- 2.) TUBE PITCH - 1.25" TRI.
- 3.) 55 7/16" TUBE CIRCLE.
- 4.) SEE DWG. X-4682-F FOR TUBE HOLE GROOVING DETAIL.



VIEW LOOKING AT SHELL SIDE OF #4 TUBESHEET



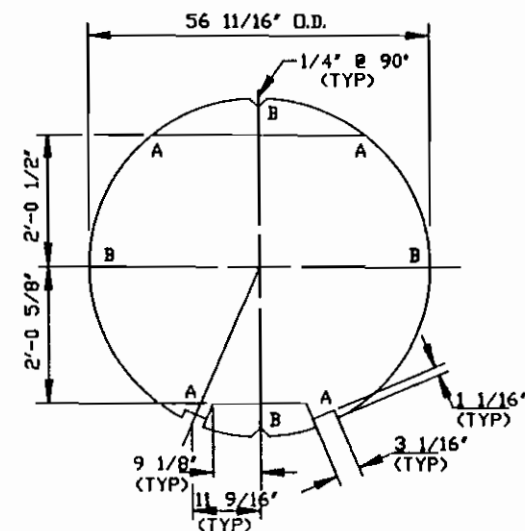
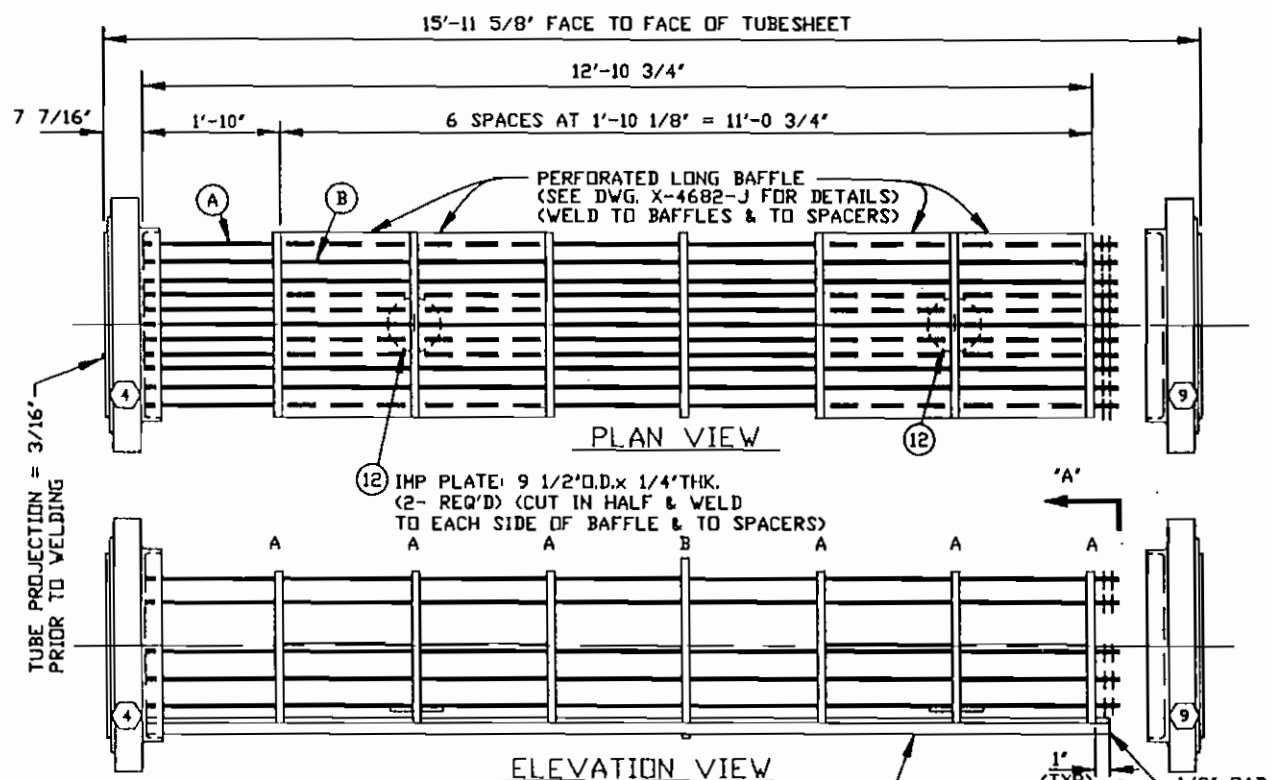
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TUBE LAYOUT

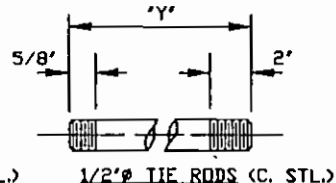
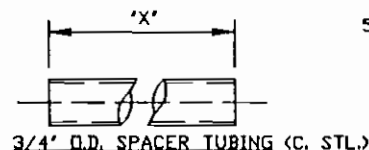
DATE 6/10/93	DRAWN BY: LS	DRAWING NO.	REV.
CHK'D BY: SK	APP'D BY: HM	X-4682-G	0

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VIEW 'A-A' BAFFLES

6 - REQ'D CUT 'AAAA'
1 - REQ'D SOLID MK'D 'BBBB'
1/2" THK. (23)



(11) SKID BAR: 3" x 1" THK. x 12'-11 3/4" LG.
(2- REQ'D) (WELD TO EACH BAFFLE & TO #4 TUBESHEET)

STRENGTH WELD TUBE TO TUBESHEET. REMOVE OIL & GREASE OR OTHER FOREIGN MATTER FROM TUBESHEET, TUBEHOLES & TUBE ENDS PRIOR TO WELDING OF TUBES. HELI-ARC WITH FILLER METAL. WELD EACH TUBE INDIVIDUALLY WITH (2) TWO OR MORE PASSES. W.P. = SW-5-3 BUBBLE TEST WELDS W/ 25 PSIG OF AIR PRIOR TO TUBE ROLLING. DYE CHECK TUBE TO TUBESHEET WELDS BEFORE & AFTER TUBE ROLLING.

MK'D	REQ'D	'X'	MK'D	REQ'D	'X'	REQ'D	'Y'
A	15	1'-9 1/2"				15	13'-0 7/8"
B	90	1'-9 5/8"					

7/9/93 ADDED W. P. NO. PER EEC / LS /

NOTES:

- 1.) DRILL 1 1/32" HOLES FOR TUBES.
- 2.) DRILL 9/16" HOLES FOR TIE RODS.
- 3.) DEBURR ALL TUBE HOLES.
- 4.) REMOVE ALL SHARP CORNERS ON BAFFLES.



Energy Exchanger Co.

1844 No. Cornett Rd. • Tulsa, Okla. 74116

BUNDLE DETAILS

DATE: 6/14/93	DRAWN BY: LS	DRAWING NO.	REV.
CHECK BY: SK	APP'D BY: HM	X-4682-H	1