

FORM U-1 MANUFACTURERS' DATA REPORT FOR PRESSURE VESSELS
As Required by the Provisions of the ASME Code Rules, Section VIII, Division 1

1. Manufactured by Metalforms, Inc., Cheek, Texas
(Name and address of manufacturer)
2. Manufactured for Scientific Design Co., Two Park Ave, New York, N. Y. 10016
(Name and address of purchaser)
3. Location of Installation Houston Chemical Co., Gulf States Rd., Beaumont, Texas
(Name and address)
4. Type Horizontal Vessel No. 2038 --- 2038
(Horiz. or vert. tank) (Mfr's Serial No.) (CRN) (Drawing)
77 Year Built 1976
(Nat'l Brd No.)
5. The chemical and physical properties of all parts meet the requirements of material specifications of the ASME BOILER AND PRESSURE VESSEL CODE. The design, construction, and workmanship conform to ASME Rules, Section VIII, Division 1 1974 and Addenda to Winter 75 and Code Case no. _____
(Year) (Date)
Special service per UG-120(d) _____
Manufacturers' Partial Data Reports properly identified and signed by Commissioned Inspectors have been furnished for the following items of the report: _____

(Name of part, item number, mfr's name and identifying stamp)

Items 6-11 incl. to be completed for single wall vessels, jackets of jacketed vessels, or shells of heat exchangers
6. Shell: Material SA-516-70 Nominal Thickness 1/2 in. Corrosion Allowance 1/8 in.
(Spec. No., Grade)
Diam. 3 ft 10 in. Length 19 ft 7 5/8 in.

CERTIFICATE OF COMPLIANCE

We certify that the statements made in this report are correct and that all details of design, material, construction, and workmanship of this vessel conform to the ASME Code for Pressure Vessels, Section VIII, Division 1.
Date 8/20/76 Signed METALFORMS, INC. by L. E. Joley
(Manufacturer) (Representative)
"U" Certificate of Authorization No. 8870 expires February 28, 19 77

CERTIFICATE OF SHOP INSPECTION

Vessel made by METALFORMS, INC. at Cheek, Texas
I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Texas and employed by Hartford Steam Boiler of Insp. & Ins. Co. have inspected the pressure vessel described in this Manufacturers' Data Report on 8-24 19 76, and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel in accordance with ASME Code, Section VIII, Division 1.

By signing this certificate neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the pressure vessel described in the Manufacturers' 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 8-25-76
Signed L. A. BARNER Commissions National Board 7715
(Inspector) (Nat'l Board, State, Province and No.)

CERTIFICATE OF COMPLIANCE FOR FIELD WORK

We certify that the statements made in this report are correct and that all details of design, material, construction, and workmanship of this vessel conform to the ASME Code for Pressure Vessels, Section VIII, Division 1.

Date _____ Signed _____ by _____
(Manufacturer) (Representative)
"U" Certificate of Authorization No. _____ expires _____, 19 _____

CERTIFICATE OF FIELD ASSEMBLY INSPECTION

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of _____ and employed by _____ of _____ have compared the statements in this Manufacturers' Data Report with the described pressure vessel and state that parts referred to as data items _____, not included in the certificate of shop inspection, have been inspected by me and that, to the best of my knowledge and belief, the Manufacturer has constructed and assembled this pressure vessel in accordance with ASME Code, Section VIII, Division 1.

The described vessel was inspected and subjected to a hydrostatic test of _____ psi.

By signing this certificate neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the pressure vessel described in this Manufacturers' 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 _____
Signed _____ Commissions _____
(Authorized Inspector) (Nat'l Board, State, Province and No.)

FORM U-1 (BACK)

7. Seams: Longitudinal Welded D.B. R.T. Spot Efficiency 85 %
(Welded, Dbl. Sngl. Lap. Butt) (Spot or Full)

H.T. Temp --- F Time --- Girth Welded D.B.
(Welded, Dbl. Sngl. Lap. Butt)

R.T. Spot No. of Courses 3
(Spot, Partial, or Full)

8. Heads: (a) Material --- (Spec. No., Grade) --- (b) Material --- (Spec. No., Grade) ---

Location (Top, Bottom, Ends)	Minimum Thickness	Corrosion Allowance	Crown Radius	Knuckle Radius	Elliptical Ratio
(a) <u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>
(b) <u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>

Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure (Convex or Concave)
(a) <u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>
(b) <u>---</u>	<u>---</u>	<u>---</u>	<u>---</u>

If removable, bolts used (describe other fastenings) --- (Material, Spec. No., Gr., Size, No.) ---

9. Type of Jacket --- Proof Test ---

10. Jacket Closure --- (Describe as open & weld, bar, etc.) If bar, give dimensions ---

If bolted, describe or sketch. ---

11. Constructed for max. allowable working pressure 133 psi at max. temp. 400 F Min. temp. (when less than -20 F) --- F. Hydrostatic, ~~XXXXXX~~ test pressure 200 psi.

Items 12 and 13 to be completed for tube sections.

12. Tubesheets: Stationary—Material SA-515-70 (2) Diam. 45 7/8 in. (Subject to pressure) ---
 Nominal Thickness 2 1/4 in. Corrosion Allowance 1/8 in. Attachment Bolted (Welded, Bolted)
 Floating—Material --- (Spec. No., Gr.) --- Diam. --- in.
 Nominal Thickness --- in. Corrosion Allowance --- in.
 Attachment ---

13. Tubes: Material SA-214 O.D. 3/4 in. Nominal Thickness .083MW in. ~~XXXX~~
 (Spec. No., Gr.) --- Number 1998 Type Straight (Straight or "U") ---

Items 14-17 incl. to be completed for inner chambers of jacketed vessels or channels of heat exchangers.

14. Shell: Material SA-516-70 Nominal Thickness 1/2 in. Corrosion Allowance 1/8 in.
 (Spec. No., Gr.) --- Diam. 3 ft 10 in. Length 2 ft 8 3/4 in.

15. Seams: Longitudinal Welded D.B. R.T. Spot Efficiency 85 %
(Welded, Dbl. Sngl. Lap. Butt) (Spot or Full)

H.T. Temp --- F Time --- Girth Welded D.B.
(Welded, Dbl. Sngl. Lap. Butt)

R.T. Spot No. of courses 1
(Spot, Partial or Full)

16. Heads: (a) Material SA-515-70 (Spec. No., Grade) --- (b) Material SA-516-70 (Spec. No., Grade) ---

Location (Top, Bottom, Ends)	Minimum Thickness	Corrosion Allowance	Crown Radius	Knuckle Radius	Elliptical Ratio
(a) <u>End</u>	<u>2 1/4"</u>	<u>1/8"</u>	<u>---</u>	<u>---</u>	<u>---</u>
(b) <u>End</u>	<u>1/2" Nom.</u>	<u>1/8"</u>	<u>---</u>	<u>---</u>	<u>2:1</u>

Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure (Convex or Concave)
(a) <u>---</u>	<u>---</u>	<u>45 3/4"</u>	<u>---</u>
(b) <u>---</u>	<u>---</u>	<u>---</u>	<u>Concave</u>

If removable, bolts used (describe other fastenings) --- (Material, Spec. No., Gr., Size, No.) ---

17. Constructed for max. allowable working pressure 96 psi at max temp. 377 F Min. temp. (when less than -20 F) --- F. Hydrostatic, ~~XXXXXX~~ test pressure 144 psi.

Items below to be completed for all vessels where applicable

18. Safety Valve Outlets: Number --- Size --- Location In Line

19. Nozzles:

Purpose (Inlet, Outlet, Drain)	Number	Diam. or Size	Type	Material	Nominal Thickness	Reinforcement Material	How Attached
Ch. Inlet	1	8"150#	RFWN	SA-106-B	.500"	Integral	Welded
Ch. Outlet	1	16"150#	RFWN	SA-53-B	.500"	Integral	Welded
Sh. Inlet	1	8"150#	RFWN	SA-106-B	.500"	Integral	Welded
Sh. Outlet	1	6"150#	RFWN	SA-106-B	.432"	Integral	Welded

20. Inspection Openings:

Manholes No. --- Size --- Location ---

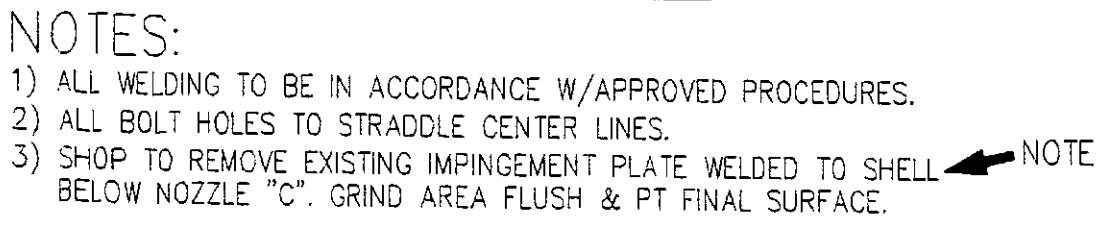
Handholes No. --- Size --- Location ---

Threaded No. --- Size --- Location ---

21. Supports: Skirt No Lugs None Legs None Other Saddles
(Yes or no) (No.) (No.) (Describe)

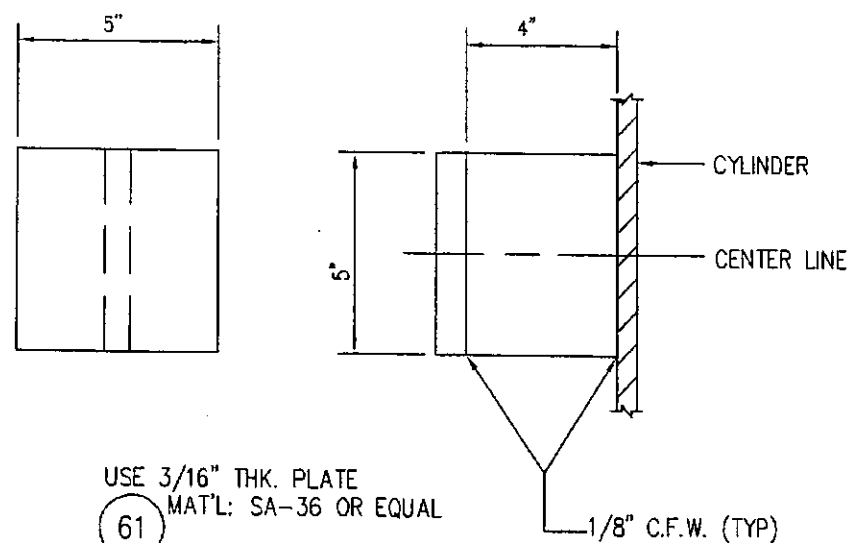
Attached Shell - Welded (Where and how) ---

22. Remarks: One (1) First Effect Reboiler (Item: E-1531) Built in accordance with ASME Code Section VIII, Div. I, 1974 Edition and all addenda thereto.



				SCOPE: STRIP & RETUBE		
				SHELL DETAILS		
2	05/27	AS NOTED / PER CUSTOMER	JL	OWN. BY J. LEBLANC	 Industrial Equipment & Engineering, Inc. Lake Charles, Louisiana	
1	05/17	PER CUSTOMER / FOR FABRICATION	JL	DATE 02-04-04		
0	02/04	CUSTOMER APPROVAL/FAB	JL			
NO.	DATE	REVISIONS	BY	CKD. BY J. HENNESSEY	DWG. NO. R46778-6	REV. 2

692001#



USE 3/16" THK. PLATE
MAT'L: SA-36 OR EQUAL

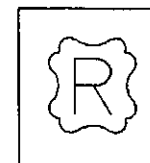
61

MATERIAL: 18-8 STN. STL. (16 GA) 60

NAT'L. BD. NO. REQUIRED

REPAIRED

BY



Industrial Equipment
& Engineering, Inc.

Lake Charles, Louisiana

2

MAWP 148 PSI

AT °F 400

S.N. R46778

DATE 2004

ITEM NO. E-1531

P.O. NO. 4400477201EQ

LOCATE NAME PLATE ON SHELL PER DWG. SHEET #6

CUST: EQUSTAR CHEMICALS
JOB NO.: R46778
P.O. NO.: 4400477201EQ
ITEM NO.: E-1531
SERVICE: 2nd EFFECT REBOILER
SCOPE: STRIP & RETUBE

NAME PLATE & BRACKET DETAILS

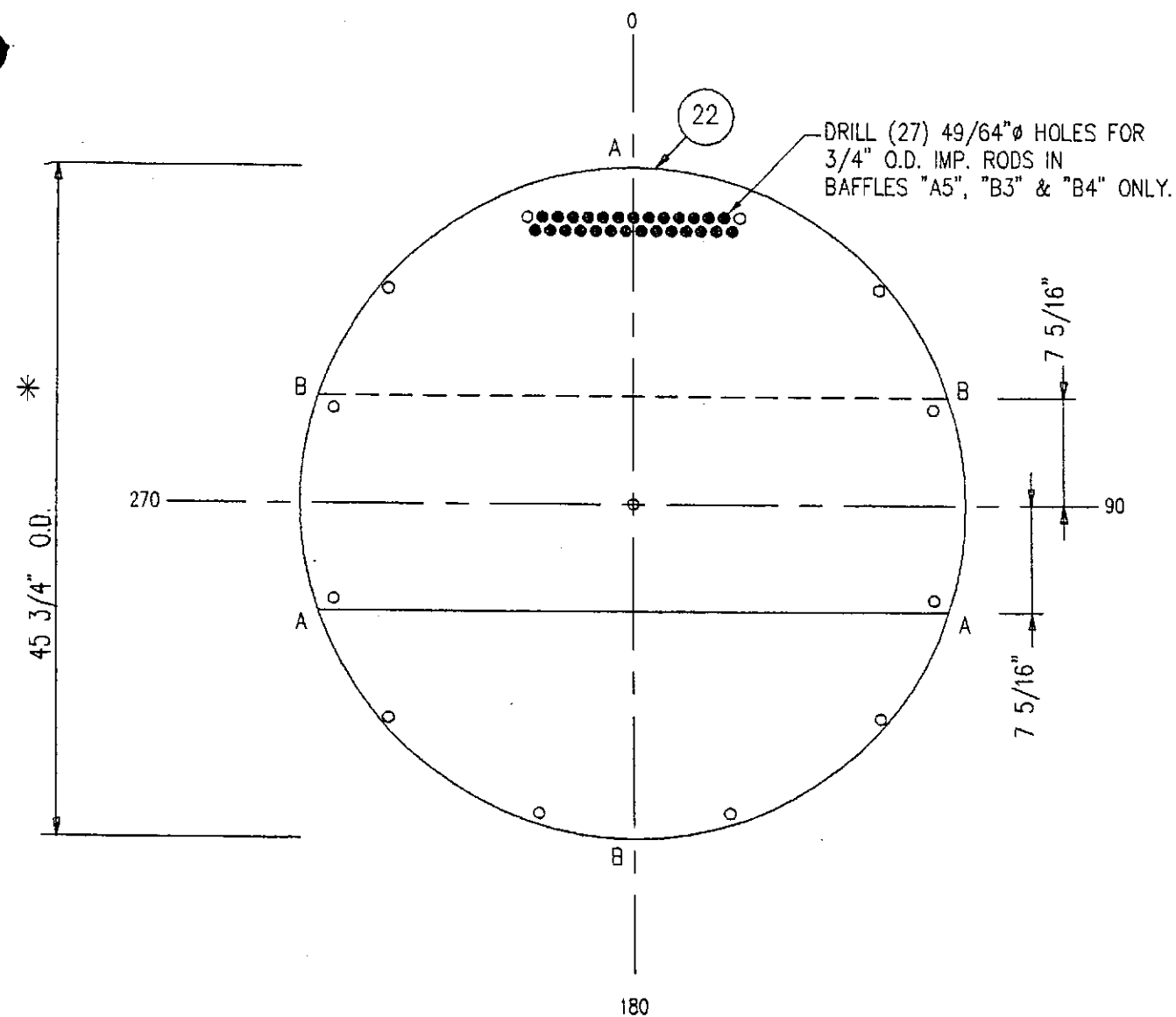
NO.	DATE	REVISIONS	DWN. BY	DATE	CKD. BY	DWG. NO.	REV.
2	06/07	REVISED MAWP AS NOTED	J. LEBLANC	02-04-04	J. HENNESSEY	R46778-7	2
1	05/17	PER CUSTOMER / FOR FABRICATION					
0	02/04	FOR CUSTOMER APPROVAL					



Industrial Equipment
& Engineering, Inc.

Lake Charles, Louisiana

#100269



VIEW ZZ OF BAFFLES

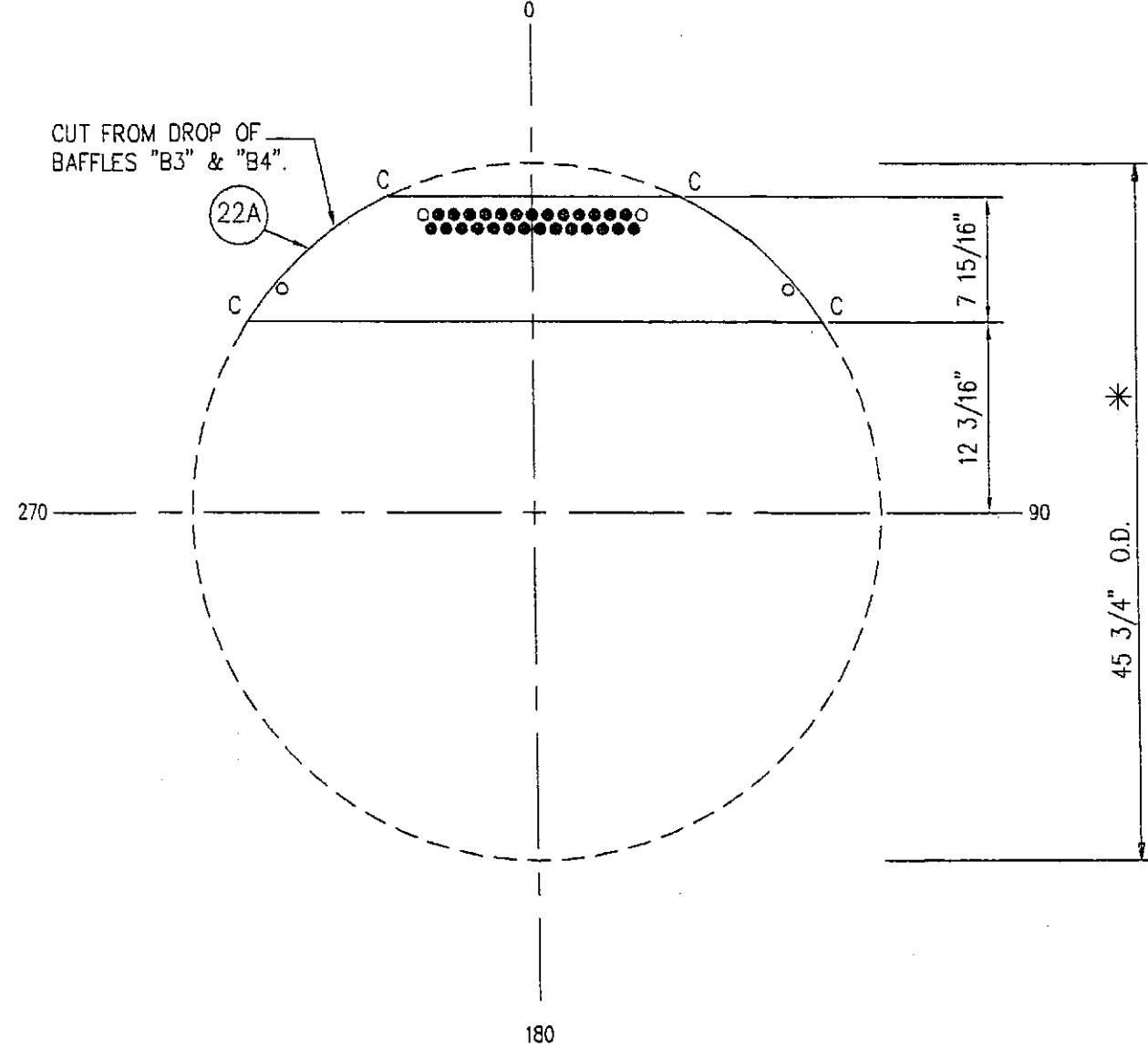
5/8" THK.

5 -REQD. CUT AAA

4 -REQD. CUT BBB

NOTES:

- 1) DRILL TUBE HOLES IN BAFFLES 49/64" DIA. & DEBURR.
- 2) DRILL TIE ROD HOLES 9/16" DIA.
SEE TUBE LAYOUT FOR LOCATION.
- 3) RADIUS ALL CORNERS ON BAFFLE CUTS.
- * 4) CHECK SHELL I.D. BEFORE MACHINING BAFFLE O.D.
- 5) MACHINE O.D. OF BAFFLES TO 250 RMS.



VIEW ZZ OF BAFFLES

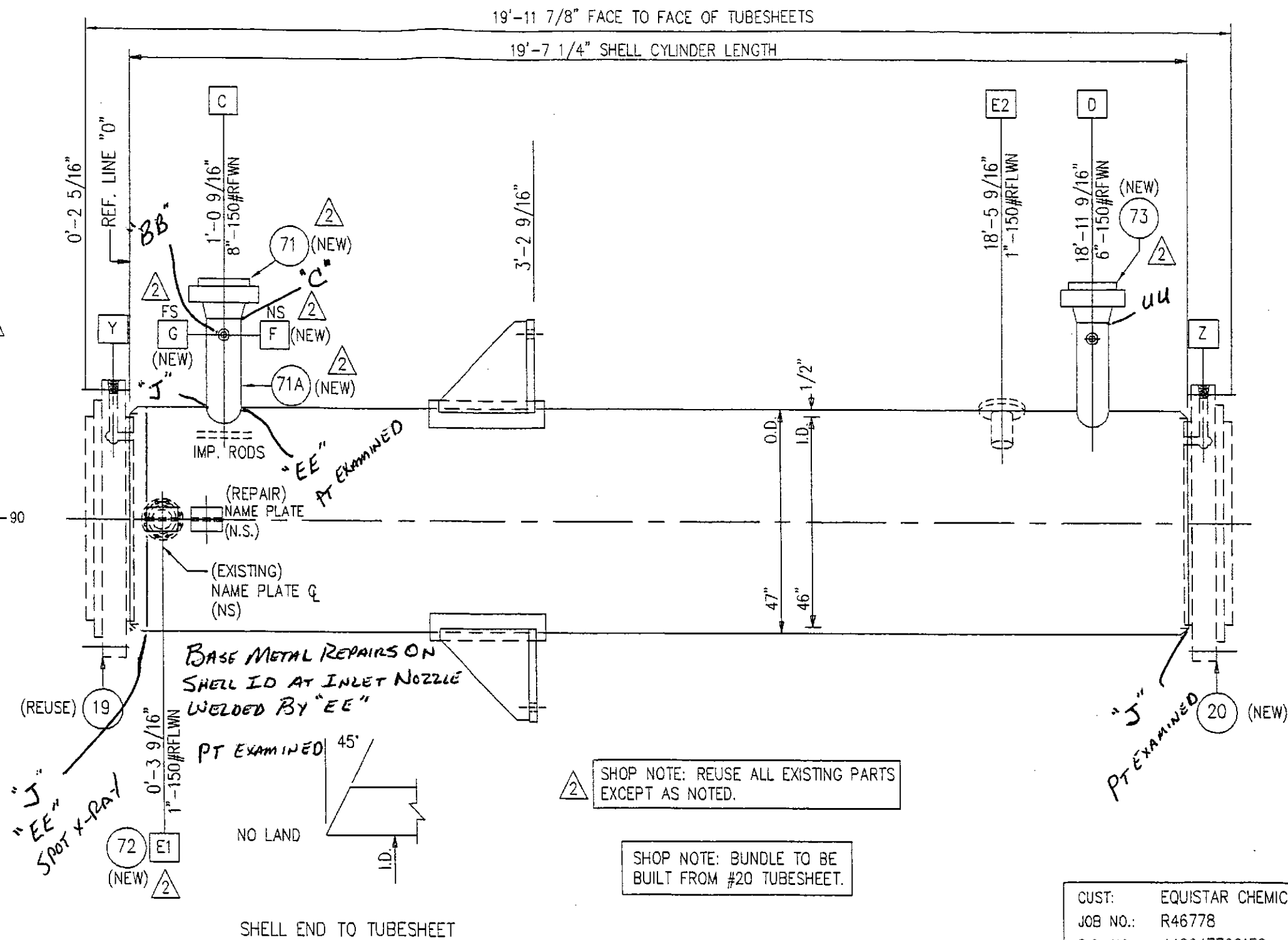
5/8" THK.

2 -REQD. CUT CCCC

CUST: EQUSTAR CHEMICALS
JOB NO.: R46778
P.O. NO.: 4400477201EQ
ITEM NO.: E-1531
SERVICE: 2nd EFFECT REBOILER
SCOPE: STRIP & RETUBE

BAFFLE DETAILS

				BAFFLE DETAILS				
				DWN. BY	 Industrial Equipment & Engineering, Inc. Lake Charles, Louisiana			
				J. LEBLANC				
				DATE				
1	05/17	PER CUSTOMER / FOR FABRICATION	JL	02-04-04				
0	02/04	CUSTOMER APPROVAL/FAB	JL	CKD. BY	DWG. NO.	REV.		
NO.	DATE	REVISIONS	BY	J. HENNESSEY	R46778-5	1		



- 1) ALL WELDING TO BE IN ACCORDANCE W/APPROVED PROCEDURES.
- 2) ALL BOLT HOLES TO STRADDLE CENTER LINES.
- 3) SHOP TO REMOVE EXISTING IMPINGEMENT PLATE WELDED TO SHELL BELOW NOZZLE "C". GRIND AREA FLUSH & PT FINAL SURFACE.

SHOP NOTE: BUNDLE TO BE
BUILT FROM #20 TUBESHEET.

CUST: EQUISTAR CHEMICALS
JOB NO.: R46778
P.O. NO.: 4400477201EQ
ITEM NO.: E-1531
SERVICE: 2nd EFFECT REBOILER
SCOPE: STRIP & RETUBE

SHELL DETAILS

				SCOPE, STRIP & RETOOL		
				SHELL DETAILS		
2	05/27	AS NOTED / PER CUSTOMER	JL	DWN. BY J. LEBLANC	 Industrial Equipment & Engineering, Inc. Lake Charles, Louisiana	
1	05/17	PER CUSTOMER / FOR FABRICATION	JL	DATE 02-04-04		
0	02/04	CUSTOMER APPROVAL/FAB	JL			
NO.	DATE	REVISIONS	BY	CKD. BY J. HENNESSEY	DWG. NO. R46778-6	REV. 2

#100269

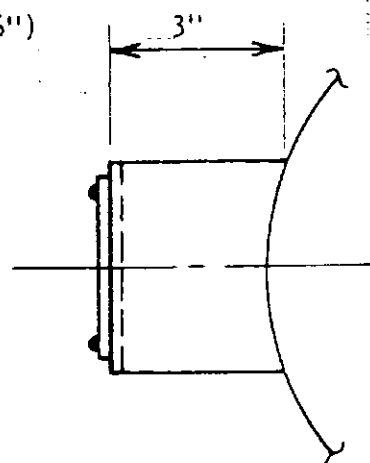
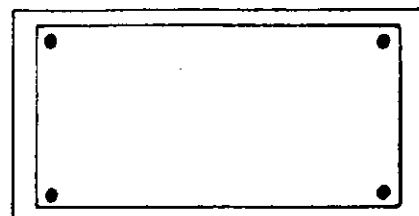
 W RT3	NATIONAL BOARD SERIAL NO. LATER	
	CERTIFIED BY:  BEAUMONT, TX	
	M.A.W.P. 100 P.S.I. AT 377 °F	TUBE SIDE
	M.A.W.P. 148 P.S.I. AT 400 °F	SHELL SIDE
MIN. DESIGN METAL TEMP. -20 °F AT 96 P.S.I.	TUBE SIDE	
MIN. DESIGN METAL TEMP. -20 °F AT 133 P.S.I.	SHELL SIDE	
MANUFACTURER'S SERIAL NO. 7840		
YEAR BUILT 1992	ITEM NO. E-1531	
PURCHASE ORDER NO. 16361 R		
SIZE 46-240	WEIGHT LBS. 38,000	
TEST PRESSURE P.S.I. 171 (NEW & COLD)	TUBE SIDE	
TEST PRESSURE P.S.I. 279 (NEW & COLD)	SHELL SIDE	

EXELL, INC. CODE NAME PLATE

NAME PL: TYPE 302 STLS. STL. (4"x6")

BRACKET: SA-3C

ALL BRACKET WELDS TO BE C.W.



NAME PL BRACKET

CERTIFIED



CUSTOMER: PD GLYCOL (OXYCHEM)

CUSTOMER'S PURCHASE ORDER NUMBER: 16361 R

SERVICE: SECOND EFFECT REBOILER

TUBE SURFACE PER EXCHANGER 1 7700 SQUARE FEET (EXTERNAL)

BOLT HOLES TO STRADDLE MAJOR CENTER LINES UNLESS OTHERWISE NOTED.

COAT ALL EXTERNAL BULGING WITH A WATERPROOF LUBRICANT (FULL LENGTH OF THREADS).

PROTECT FLANGE FACES FOR SHIPMENT AND PLUG ALL THREADED OPENINGS.

RADIOGRAPH: SPOT PER PARAGRAPH UW-52 ASME CODE SECTION VIII, DIV. 1 (SHELL & CHAN.)

POST WELD HEAT TREAT: NOT REQ'D

A.S.N.E. CODE INSPECTION BY: HARTFORD STEAM BOILER INSPECTION & INSURANCE COMPANY

SURFACE PREPARATION: COMMERCIAL SANDBLAST

PAINT: PRIME: DUPONT LFT1125P HIGH SOLIDS EPOXY MASTIC COATING RED OXIDE (5 MILS. MIN. D.F.T.)

INTERMEDIATE: DUPONT 25P HIGH SOLIDS EPOXY MASTIC (5 MILS. MIN. D.F.T.)

FINISH: DUPONT 326 SERIES IMRON POLYURETHANE ENAMEL (2 MILS. MIN. D.F.T.)

ALL LONGITUDINAL & CIRCUMFERENTIAL SEAMS TO BE WELDED PER WELD PROCEDURE: API-1-4 REV. 0
MPI-1-3 REV. 1

ALL NOZZLE & SUPPORT ATTACHMENTS TO BE WELDED PER WELD PROCEDURE: MPI-1-3 REV. 1

M.A.W.P. (TUBE SIDE) LIMITED BY: CHANNEL COVER (NEW & COLD)

M.A.W.P. (SHELL SIDE) LIMITED BY: TUBESHEETS (NEW & COLD)

M.A.W.P. (TUBE SIDE) LIMITED BY: CHANNEL COVER (HOT & CORRODED)

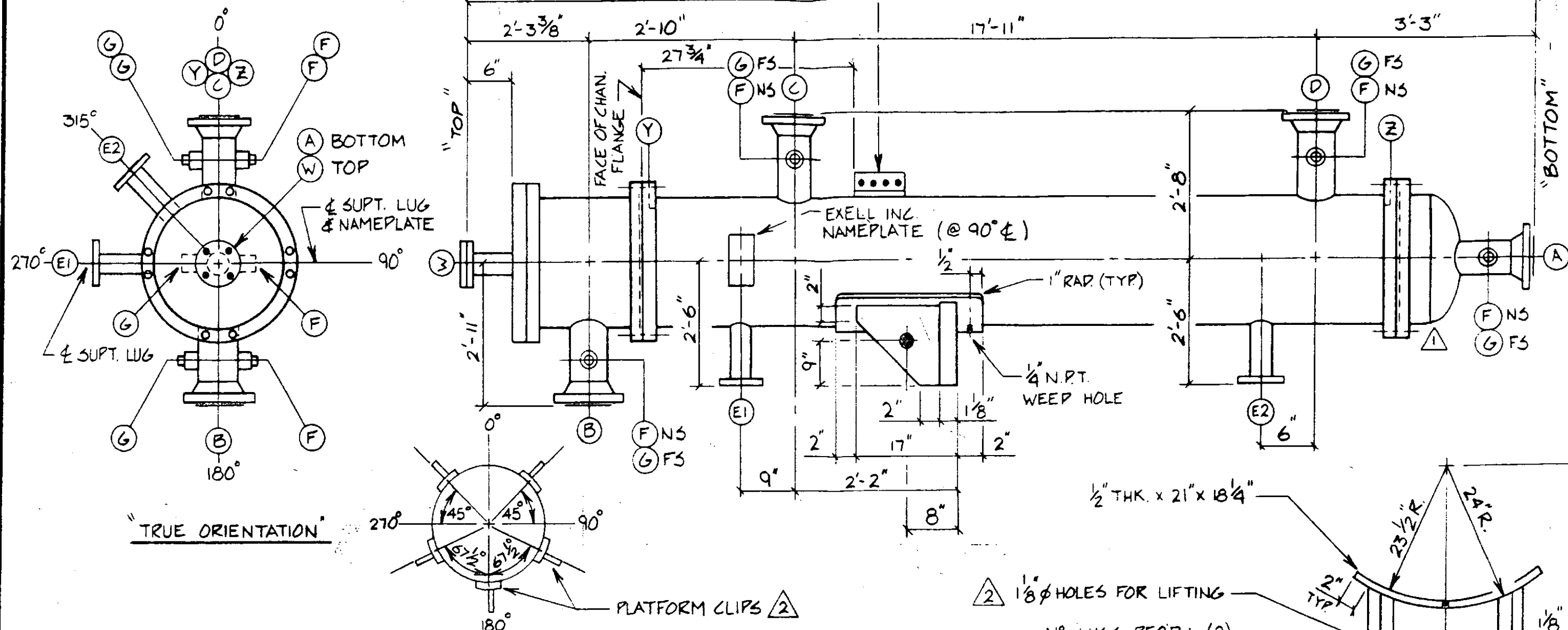
M.A.W.P. (SHELL SIDE) LIMITED BY: TUBESHEETS (HOT & CORRODED)

WEIGHT EACH EXCHANGER		DRY: 38,000	WET: 53,200	BUNDLE ONLY: —
DESIGN CONDITIONS			CODES AND STANDARDS	
DESIGN PRESSURE, P.S.I.	133	96	ASME SECT. VIII PRESSURE VESSELS DIV. 1 STAMP YES, TEMA CLASS B	
DESIGN TEMPERATURE, °F	400	377		
HYDRO TEST PRESSURE, P.S.I.	279	171	CUSTOMER SPECIFICATIONS:	
M.A.W.P. (NEW & COLD) P.S.I.	186	114		
M.A.W.P. (HOT & CORR.) P.S.I.	148	100		
CORROSION ALLOWANCE, IN	.125	.125		
NUMBER OF PASSES	ONE	ONE		
REVISION:				GENERAL NOTES AND NAME PL
△ FOR APPROVAL				
△ REV SERVICES & CERT. 2-11-92 LEF				
DR'N.	GRI	12-16-91	NO. REQ'D. ONE	TYPE: AEM
CHK'D.	PG	1-11-92	ITEM NO. E-1531	
APP'D.	LEF	1-11-92	DWG. NO. 7840 SHEET 1 OF 11	

#100269

2 (5) PLATFORM SUPT. CLIPS REQ'D.
SEE DETAILS ON SHEET 4

26'-3 7/8" OVERALL



G	4	1"	6000#	CPLG.	---	INST. CONN.	W/ 3" LG. PLUG
F	4	3/4"	6000#	CPLG.	---	INST. CONN.	W/ 3" LG. PLUG
Z	1	1/2"	---	N.P.T.	---	DRAIN	W/ 3" LG. PLUG
Y	1	1/2"	---	N.P.T.	---	VENT	W/ 3" LG. PLUG
W	1	1"	150#	RFLWN	AS SHOWN	VENT	W/ BLIND
E2	1	1"	150#	RFLWN	2'-6"	VENT	---
E1	1	1"	150#	RFLWN	2'-6"	VENT	---
D	1	6"	150#	RFWN	2'-8"	OUTLET	X- STG. BORE
C	1	8"	150#	RFWN	2'-8"	INLET	X- STG. BORE
B	1	16"	150#	RFWN	2'-11"	OUTLET	X- STG. BORE
A	1	8"	150#	RFWN	AS SHOWN	INLET	X- STG. BORE
MK.	NO. REQ'D.	SIZE	RATING	TYPE	PROJ. FROM C	SERVICE	REMARKS

SCHEDULE OF OPENINGS

REV.

△ FOR APPROVAL

△ ADD BTM. CHAN. CYL.

△ ADD LIFT HOLES & PLATFORM CLIPS 2-11-92 "CERTIFIED" LEF

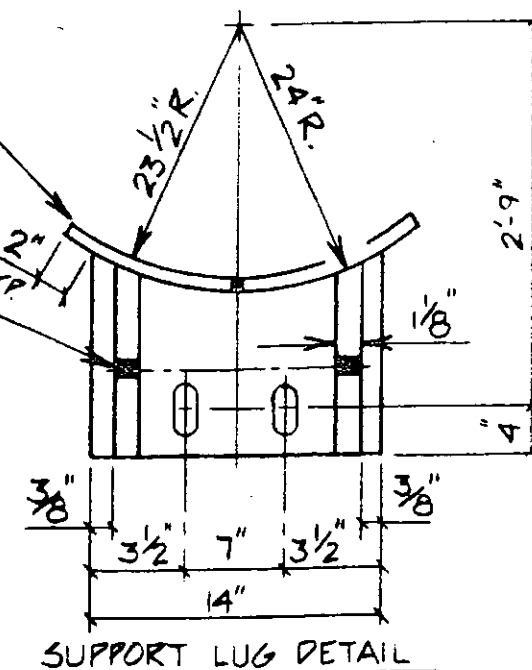
NO. LUGS REQ'D: (2)

LUG MAT'L.: 1/8" THK. SA-516-70

PAD MAT'L.: 1/2" THK. SA-516-70

WELD SIZE: 3/8" CONT. FILLET

SLOT SIZE: 1/8" x 2 1/4"



EXELL, INC.

OUTLINE

DRW'N.	GRI	12-10-91	NO. REQ'D. ONE	TYPE: AEM
CHK'D.	DG	1-11-92	ITEM NO. E-1531	
APV'D.	LEF	1-11-92	DWG. NO. 7840 SHT. 2 OF 11	

692001 # 100269

ALL TAIL DIMENSIONS ARE TO FACE OF TUBESHEET #9

FACE OF TUBESHEET #9

0°

315°

270°

225°

180°

90°

60°

20 1/8"

2'-6" (TYP. E2)

2'-8"

6/4"

4 LG. SM. #1

4 LG. SM. #2

4 SUPT. LUG

4 SUPT. LUG & NAMEPLATE

TYP. F"

3/8"

Y

Z

D

C

G

F

E2

E1

TYP.

"TRUE ORIENTATION"

19'-11 7/8" FACE TO FACE OF T.S.

2 5/16"

CYL. #1 = 9'-11" LG.

CYL. #2 = 9'-8 1/4"

*1'-2 7/8"

*19'-1 7/8"

END OF CYL.

CLOSING SEAM END OF CYL.

46 1/2" D x 1/2" R CYL. x 19'-7 1/4" LG. SA-516-70

6' 6"

1/4" x 12" x 2 1/8" IMP. R.

EXCELL INC. NAMEPLATE

9

5 7/8"

3'-4 7/8"

2'-4 1/16"

BTM. OF SUPT. LUGS

*18'-7 7/8"

5 1/16"

2"

2"

23 1/2" R.

10

5"

1/2"

10"

2 1/2"

2 1/2"

2 1/2"

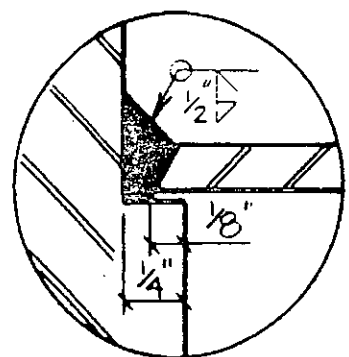
1 1/4"

1 1/4"

13/16" HOLES

1/2" R SA-36

(5) PLATFORM SUPT. CLIPS REQ'D SEE SHT. 2 FOR ORIENTATION



TUBESHEET WELD

G	1"-6000" FULL CPLG. W/ 3" LG. PLUG SA-105
F	3/4"- 6000" FULL CPLG. W/ 3" LG. PLUG SA-105
D	6"-150" RFWN W/ X-5TG BORE, SA-105 6" X-5TG. (.432") PIPE X 5 3/4" LG., SA-106-B
C	8"-150" RFWN W/ X-5TG BORE, SA-105 8" X-5TG. (.500") PIPE X 5 7/8" LG. SA-106-B
E1, E2	1"-150" RFLWN X 7" LG. SA-105

'SPOT X-RAY'

REV.

FOR APPROVAL

△ ADD PLATFORM CLIPS
"CERTIFIED" 2-11-92 LEF

EXELL INC.

SHELL DETAIL

DRW'N.	GRI	12-11-91	NO. REQ'D. ONE	TYPE: AEM
CHK'D.	DG	1-11-92	ITEM NO. E-1531	
APV'D.	LEF	1-11-92	DWG. NO. 7840	SHT. 4 OF 1

41-17

#100269