

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

106772

1. Manufactured by Hughes-Anderson Engr. Corp. 1001 N. Fulton Tulsa, Oklahoma
(Name and address of manufacturer)
2. Manufacturer for Clark Oil & Refining Corp. Blue Island Illinois
(Name and address of purchaser)
3. Location of installation Clark Oil & Refining Corp. Blue Island, Illinois
(Name and address)
4. Type Horiz. Vessel No. 4546 4546-01-12 1598 Year Built 1983
(Horiz. or vert. tank) (Mfr's Serial No.) (CRN) (Drawing) (Nat'l Bld 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 1980 and Addenda
Spring 82 (Date) and Code Case no. 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 walled vessels, jackets of jacketed vessels, or shells of heat exchangers

6. Shell: Material SA-240-304 Nominal Thickness $3/8$ in. Corrosion Allowance $1/16$ in. Diam. 2 ft 10 in. Length 9 ft 8 $\frac{1}{2}$ in.
(Spec No., Grade)
7. Seams: Longitudinal Db1. Butt R.T. Spot Efficiency 85 % H.T. Temp
(Welded, Db1., Sngl., Lap. Butt) (Spot or Full)
- Time Girth Db1. Butt R.T. Spot No. of Courses 1
(Welded Db1., Dngl., Lap. Butt) (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)						
(b)						
	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure (Convex or Concave)		
(a)						
(b)						

If removable, bolts used (describe other fastenings)

(Material, Spec. No., Gr., Size, No.)

9. Type of Jacket Proof Test
10. Jacket Closure (Describe as ogee & weld, bar, etc.) If bar, give dimensions: If bolted, describe or sketch
11. Constructed for max. allowable working pressure 75 psi at max. temp. 275 F Min. temp. (when less than -20 F)
Hydrostatic, pressure test pressure 125 psi

Items 12 and 13 to be completed for tube sections

12. Tubesheets: Stationary—Material SA-240-304 Diam. 35 in. Nominal Thickness $1-3/4$ in. Corrosion Allowance $1/4$ in. Attachment Welded Floating—Material SA-240-304 Diam. 35
(Spec. No., Gr.) (Subject to pressure) (Spec. No., Grade)
- Nominal Thickness $1-3/4$ in. Corrosion Allowance $1/4$ in. Attachment Welded
13. Tubes: Material SA-249-304 O.D. $3/4$ in. Nominal Thickness $1/16$ in. or gauge Number 855 Type Straight
(Spec. No., Gr.) (avg) (Straight or Curved)

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 $7/16$ in. Corrosion Allowance $1/16$ in. Diam. 2 ft 10 $\frac{1}{2}$ in. Length 0 ft 11 $\frac{3}{4}$ in.
(Spec. No., Gr.)
15. Seams: Longitudinal Db1. Butt R.T. Spot Efficiency 85 % H.T. Temp 1100 F Time 1 hr.
(Welded, Db1., Sngl., Lap. Butt) (Spot or Full)
- Girth Db1. Butt R.T. Spot No. of courses 1
(Welded, Db1., Sngl., Lap. Butt) (Spot, Partial, or Full)
16. Heads: (a) Material SA-516-70 (b) Material SA-516-70
(Spec. No., Grade) (Spec. No., Gr.)

	Location (Top, Bottom, Ends)	Minimum Thickness	Corrosion Allowance	Crown Radius	Knuckle Radius	Elliptical Ratio
(a)	End	$2-3/4$ "	$3/16$ "			
(b)	End	$3/8$ "	$1/16$ "			2:1
	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure (Convex or Concave)		
(a)			35"	Flat		
(b)				Concave		

If removable, bolts used (describe other fastenings) SA-193-B7 $3/4$ " ϕ 44 SA-193-B7 $3/4$ " ϕ 56
(Material, Spec. No., Gr., Size, No.)

4546

constructed for max. allowable working pressure 75 psi at max temp. 275 F. Min. temp. (when less than -20 F) _____ F.
 hydrostatic test pressure 115 psi.

below to be completed for all vessels where applicable

Safety Valve Outlets: Number _____ Size _____ Location _____

Nozzles:

Purpose (Inlet, Outlet, Drain)	Number	Diam. or Size	Type	Material	Nominal Thickness	Reinforcement Material	How Attached
Man in-out	1-1	6"-150#	RF-WN	SA-106-B	Sch. 80	none	Welded
Shell in	1	16"-150#	RF-WN	SA-240-304	3/8" thk	none	Welded
Shell out	1	2 1/2"-150#	RF-WN	SA-312-304	Sch. 80	none	Welded
Shell out	1	6"-150#	RF-WN	SA-312-304	Sch. 40	none	Welded

Inspection Openings:

Manholes No. _____ Size _____ Location _____

Handholes No. _____ Size _____ Location _____

Threaded No. _____ Size _____ Location _____

Supports: Skirt _____ Lugs _____ Legs _____ Other 2 saddles
 (Yes or no) (No.) (No.) (Describe)

Attached Welded to shell
 (Where and how)

Remarks: ACETONE COLUMN OVERHEAD CONDENSER

CERTIFICATE OF COMPLIANCE

I 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.

on 2-24-83 Signed Hughes-Anderson Engr. Corp.

(Manufacturer)
 11979

by

Gary Rae
 (Representative)

expires

December 31,

19 85

U-1 Certificate of Authorization No. _____

CERTIFICATE OF SHOP INSPECTION

Vessel made by Hughes-Anderson Engr. Corp. at Tulsa, Oklahoma

The undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Illinois and employed by Comm. Union Ins. Co.

Boston, Mass. have inspected the pressure vessel described in this Manufacturers' Data Report on 2-24-1983

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.

on 2-24-83
 signed L. L. Looney
 (Inspector)

Commissions

N.B. #5745

(Nat'l Board, State, Province and No.)

CERTIFICATE OF COMPLIANCE FOR FIELD WORK

I 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.

on _____ Signed _____ (Manufacturer) by _____ (Representative)

U-1 Certificate of Authorization No. _____

expires

19 _____

CERTIFICATE OF FIELD ASSEMBLY INSPECTION

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 _____

_____ 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.

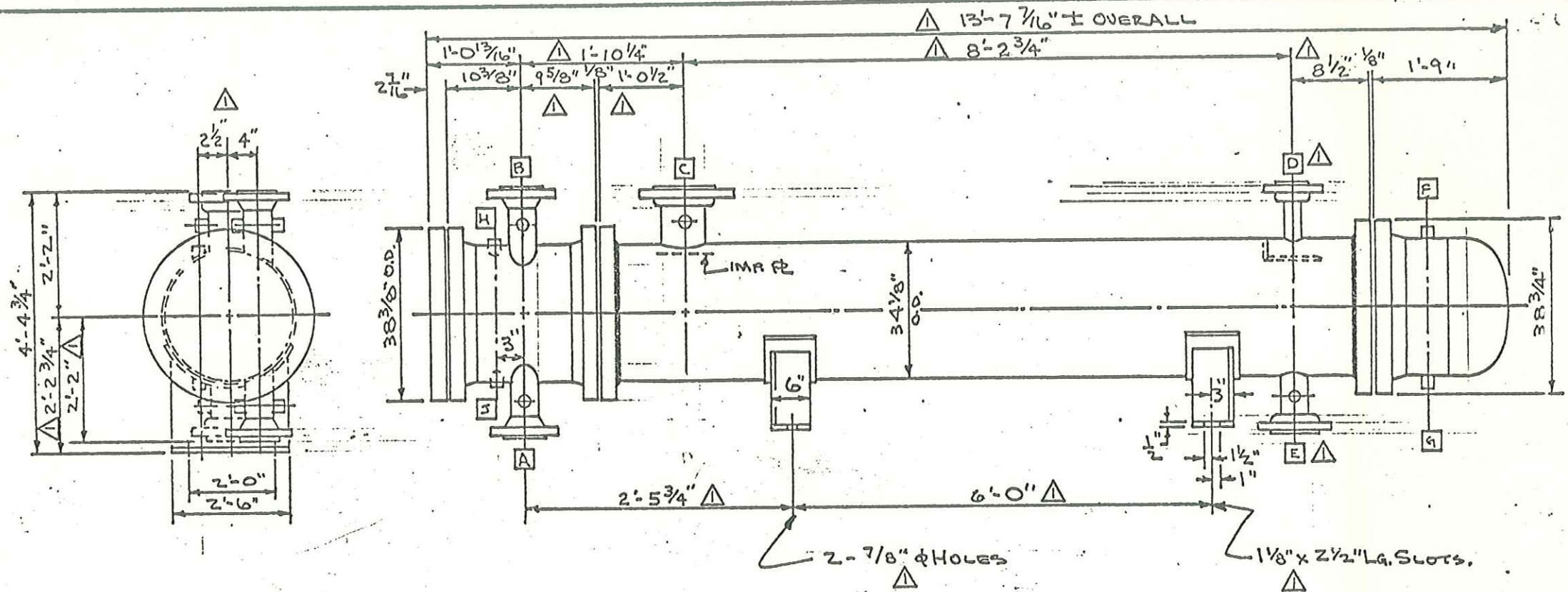
The described vessel was inspected and subjected to a hydrostatic test of _____ psi.

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 _____ (Authorized Inspector)

Commissions

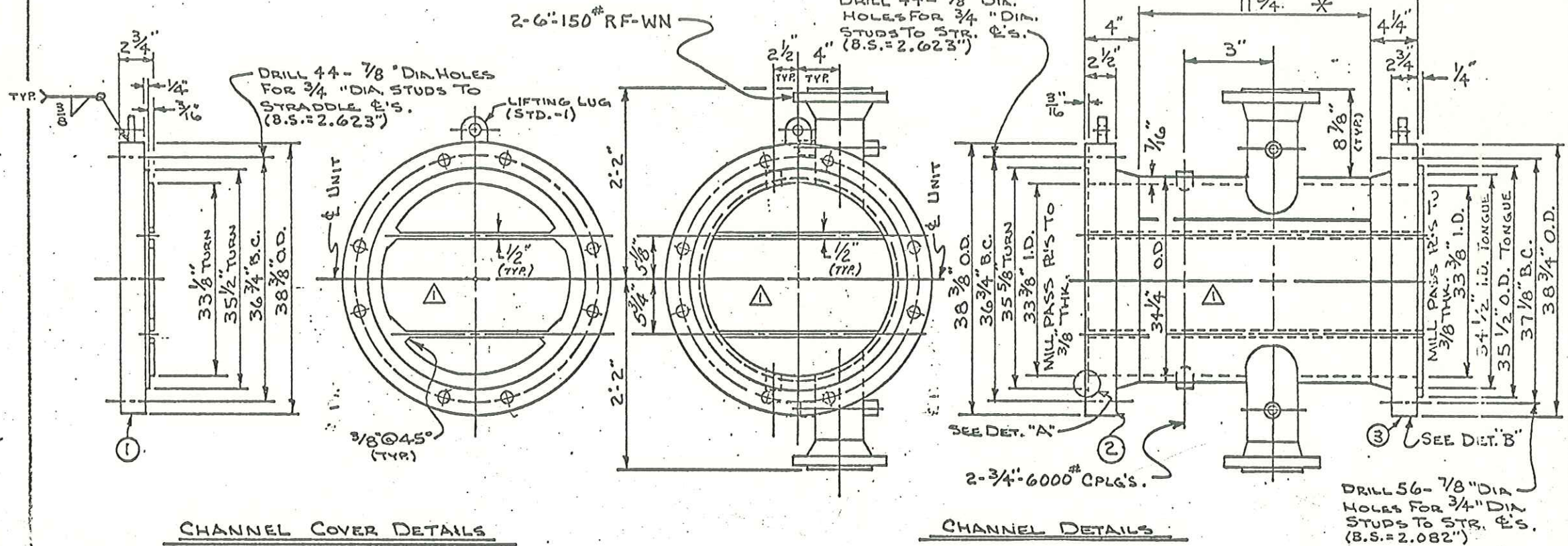
(Nat'l Board, State, Province and No.)



106772

DESIGN DATA			NOZZLE DATA					GENERAL NOTES	CERTIFIED CORRECT FOR FABRICATION			
	SHELL	TUBES	MARK	SIZE	RATING	FACING	SERVICE	1. DESIGN & CONSTRUCTION SHALL BE IN ACCORDANCE WITH: (A) SECTION VIII 1980 EDITION OF THE ASME CODE, DIV. I & SO STAMPED. (B) TEMA "C". BY NATIONAL B.O. 2. ALL BOLT HOLES TO STRADDLE ES. 3. SPOT RADIO GRAPH CHAN. & SHELL. 4. PAINT CARBON STL. PARTS WITH ONE COAT OF SHOP PRIMER. 5. HEAT TREAT CHANNELS.	BY: J. D. Henson	DATE: 10-11-82		
DESIGN PRESSURE	75 PSI	75 PSI	A	6"	150#	RF	INLET		CUST.: CLARK OIL & REFINING CORP.			
TEST PRESS.	125 PSI	115 PSI	B	6"	150#	RF	OUTLET		DEST.: BLUE ISLAND, ILLINOIS			
	PSI	PSI	C	16"	150#	RF	INLET		CUST. P.O.: B1-69837			
DESIGN TEMPERATURE	275 °F	275 °F	D	2 1/2"	150#	RF	OUTLET		ITEM: 19-E-203 R2 ⚠			
CORROSION ALLOWANCE	1/16"	1/16"	E	6"	150#	RF	OUTLET	4. PAINT CARBON STL. PARTS WITH ONE COAT OF SHOP PRIMER. 5. HEAT TREAT CHANNELS.	SERVICE: ACETONE COLUMN OVHD. CONDENSER			
NUMBER OF PASSES	1	4	F	3/4"	6000#	CPLG	VENT		SERIAL: 4546			
TUBE SURFACE (EFF.)	1635	SQ. FT.	G	3/4"	6000#	CPLG.	DRAIN		FILE: 528-82			
TUBES: 855 - 3/4" x 16 BWG (AVG) SA-249-304			H	3/4"	6000#	CPLG.	VENT		HUGHES-ANDERSON ENGINEERING CORP. TULSA, OKLAHOMA			
ESTIMATED WEIGHT EACH			J	3/4"	6000#	CPLG.	DRAIN					
DAY	10000 LBS	WET	NOZ. A, B, C & E EQUIPPED WITH 2-3/4" - 6000# CPLG'S. (ALL CPLG'S. ARE PLUGGED.)					DRAWING TITLE OUTLINE DIMENSIONAL				
								WORK ORDER 4546				NUMBER REQ'D. ONE
								DR. G.O.P.	DATE 10-11-82	SIZE 33"x10'	DRAWING NUMBER	
								CK JIM	SCALE NONE	TYPE AEM	4546-01	

* R. = 106 7/16" x 7/16" x 11 3/4" L.G.

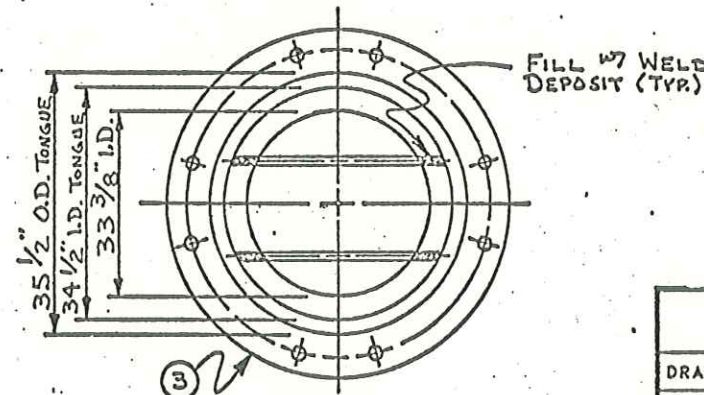


CHANNEL COVER DETAILS

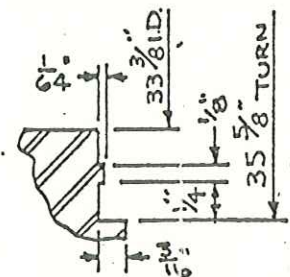
CHANNEL DETAILS

NOTES:

1. ALL BOLT HOLES TO STRADDLE P'S.
2. SPOT RADIOGRAPH CHAN.
3. SEE DWG. STD.-1 FOR WELD DETAILS.
4. LOCATE 2-3/4" 6000# CPLG'S. IN EA. NOZ.
5. WELDING TO BE IN ACCORDANCE W/ PROCEDURES SAM-1AH AND MA-1AH.
6. HEAT TREAT FOR 1-HR @ 1100°F.



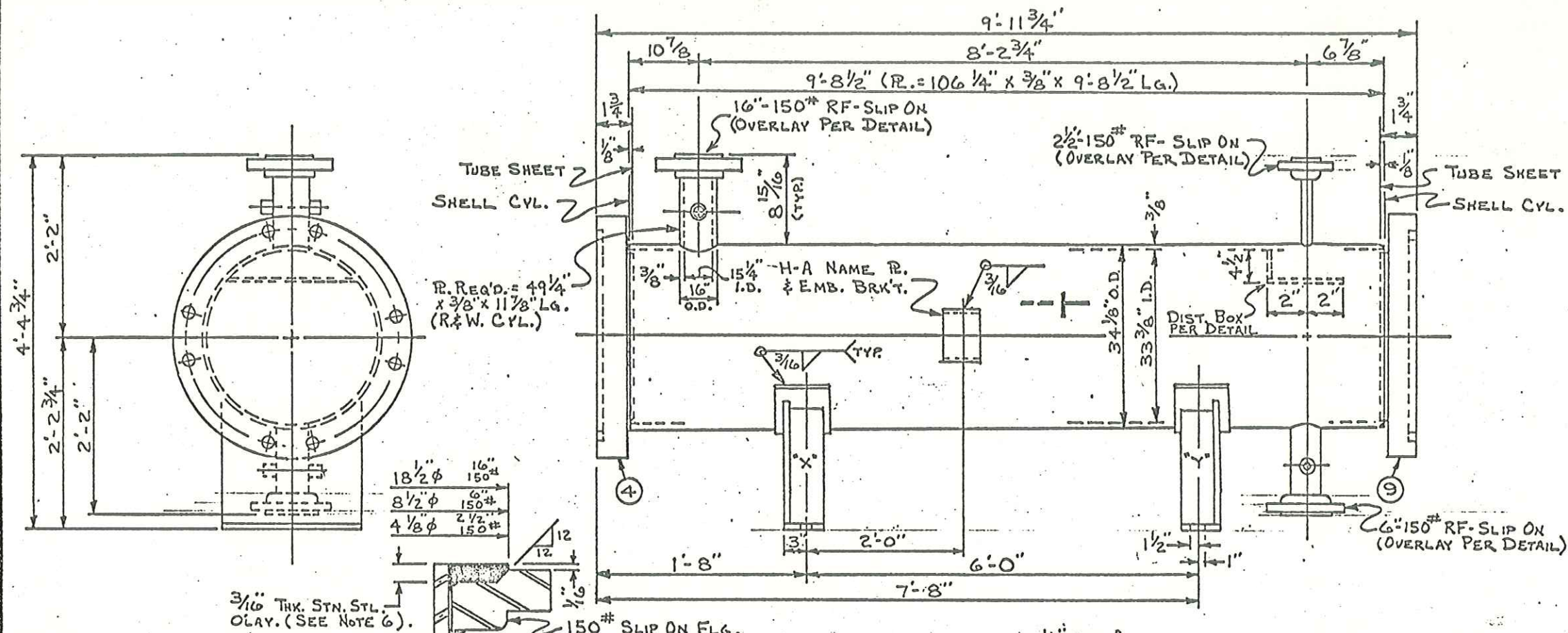
DETAIL "B"



DETAIL "A"

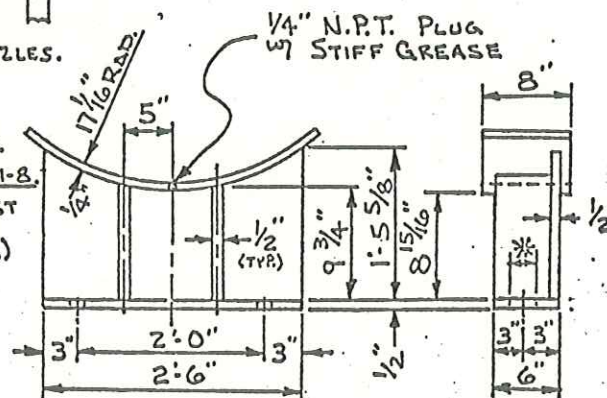
HUGHES-ANDERSON ENGINEERING CORP.			
TULSA, OKLAHOMA			
DRAWING TITLE CHANNEL DETAILS			
WORK ORDER	4546	NUMBER REQ'D.	ONE
DR. GDS	DATE 10-26-82	SIZE 33"X10"	DRAWING NUMBER
CK R.F.	SCALE 1/4"	TYPE AEM	4546-02

△ REV. PASS R'S / COST BY R.L.
11/17/82



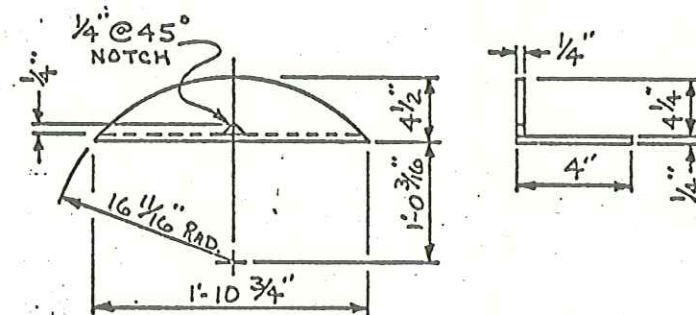
NOTES:

1. SEE DWG. STD.-1 FOR WELD DETAILS.
2. LOCATE 2-3/4"-6000# CPLG'S IN THE 6" & 16" NOZZLES.
3. SPOT RADIOGRAPH SHELL
4. ALL BOLT HOLES TO STR. & S.
5. ALL WELDING TO BE IN ACCORDANCE W/ PROC. SA-304-L, MA-304-L, MA-1-B, & SA-1-B.
6. ALL O'LAY TO BE 3/16" THK. STN. STL. (FIRST PASS 309L, REMAINDER 308L) IN ACCORDANCE W/ PROC. UCL-43 (308L-1A) & UCL-43 (308L-1M)
7. SEE DWG 4546-06 FOR TUBE SHEET DETAILS.



SUPPORT DETAILS

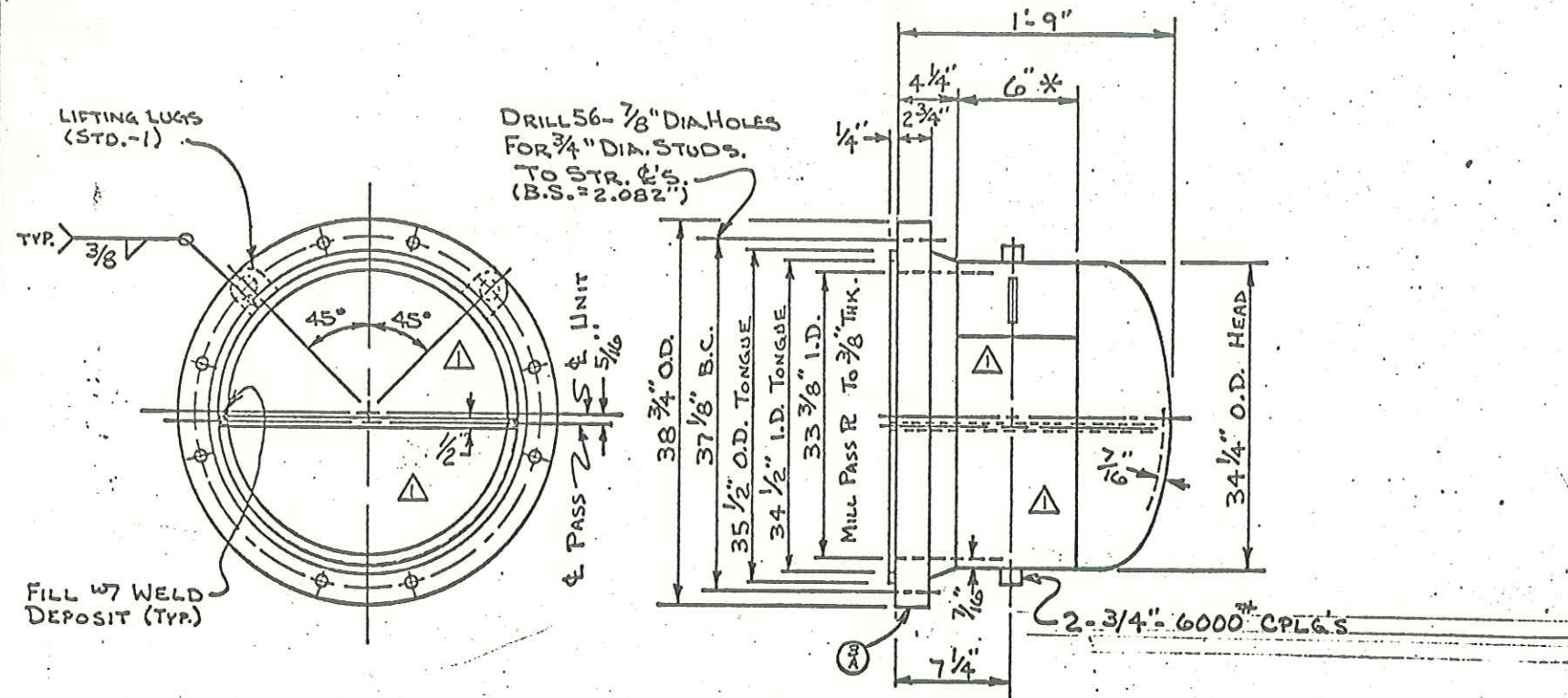
- * 1-REQ'D. W/ 2-7/8" Ø HOLES MK'D. (X).
* 1-REQ'D. W/ 2-1/8" x 2 1/2" SLOTS MK'D. (Y).



DIST. BOX DETAIL

HUGHES-ANDERSON ENGINEERING CORP.			
TULSA, OKLAHOMA			
DRAWING TITLE SHELL DETAILS			
WORK ORDER 4546		NUMBER REQ'D. ONE	
DR. G.D.S.	DATE 10-26-82	SIZE 33" x 10'	DRAWING NUMBER
CK R.F.	SCALE 1/4"	TYPE AEM	4546-03

* R. = 106 1/16" x 7/16" x 6" L.G.



SHELL COVER DETAIL

NOTES:

1. SPRT. RADIOGRAPH BACK CHAN.
2. SEE DWG. STD.-1 FOR WELD DETAILS.
3. BOLT HOLES TO STRADDLE R'S.
4. ALL WELDING TO BE IN ACCORDANCE W/ PROCEDURES SAM-1AH & MA-1AH.
5. HEAT TREAT FOR 1-HR @ 1100°F

HUGHES-ANDERSON ENGINEERING CORP.			
TULSA, OKLAHOMA			
DRAWING TITLE BACK CHAN. DETAILS			
WORK ORDER 4546		NUMBER REQ'D. ONE	
DR. GDS	DATE 10-27-82	SIZE 33"x10'	DRAWING NUMBER
CK R.F.	SCALE 1/4"	TYPE REM	4546-04

△ REV. PASS R'S / CUST
By R.L. 11/17/82

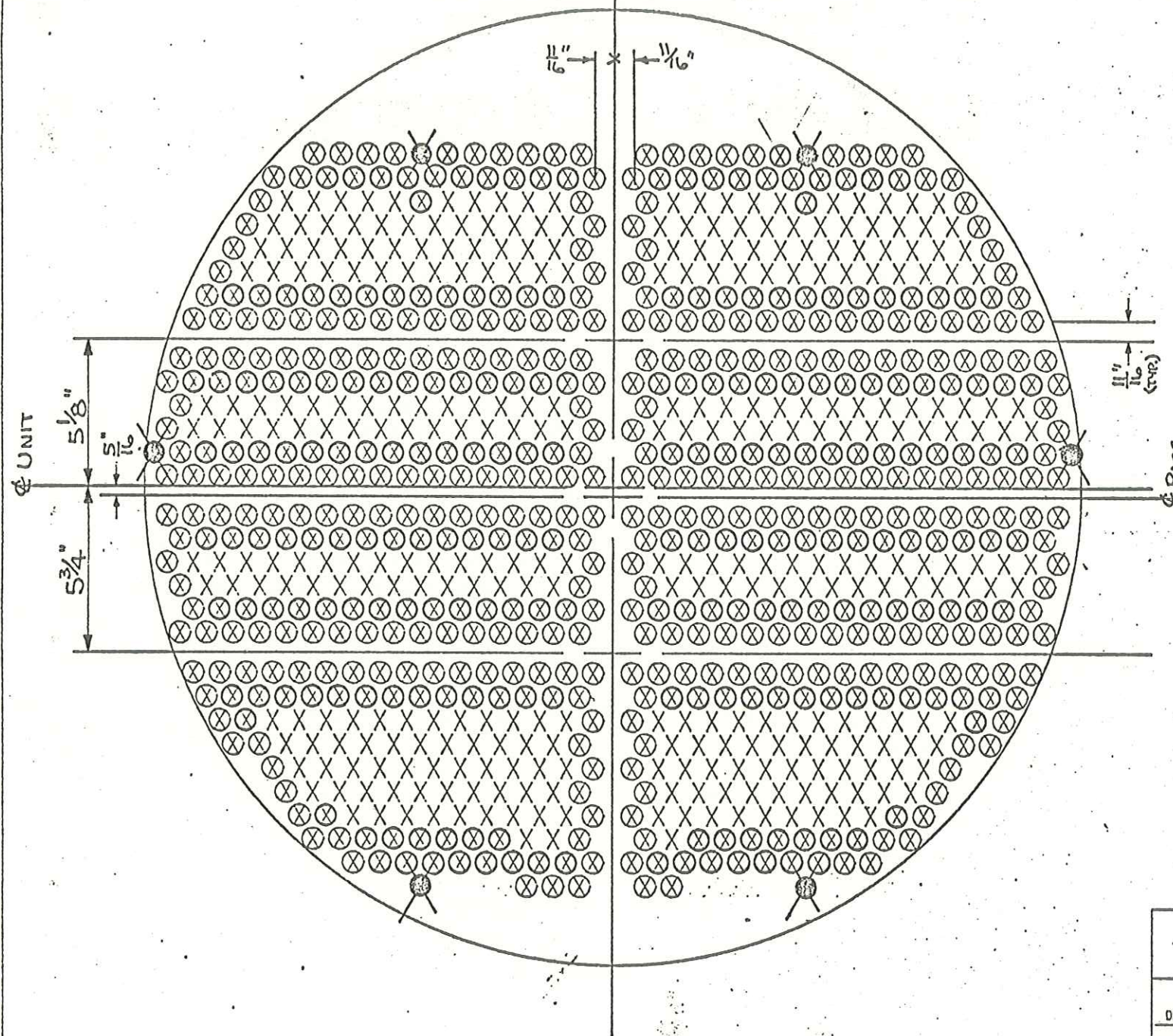
⊗ DENOTES TIE ROD LOCATIONS

110	110
99	99
98	98
121	120

NO. OF HOLES PER PASS

NOTES

- 1.) DRILL & REAM TUBE HOLES IN TUBE SHEETS TO $0.758" \pm .002"$ DIA. FOR 855-0.7500" O.D. TUBES
- 2.) TUBE PITCH-0.937" TRI
- 3.) $32\frac{15}{16}"$ TUBE CIRCLE
- 4.) SEE DWG. 4546-06 FOR TUBE HOLE GROOVING DETAIL



VIEW LOOKING AT SHELL SIDE OF # 4 TUBESHEET

HUGHES-ANDERSON ENGINEERING CORP.

TULSA, OKLAHOMA

DRAWING TITLE TUBE LAYOUT

WORK ORDER 4546

NUMBER REQ'D. ONE

DR GDS

DATE 10-21-82

SIZE 33"x 10"

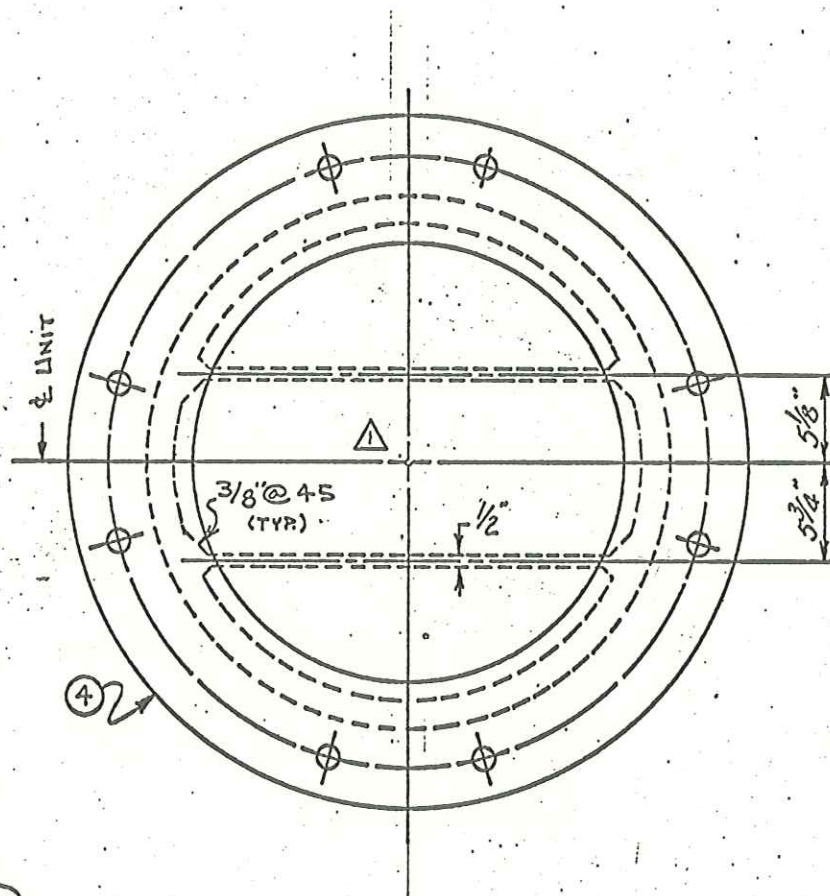
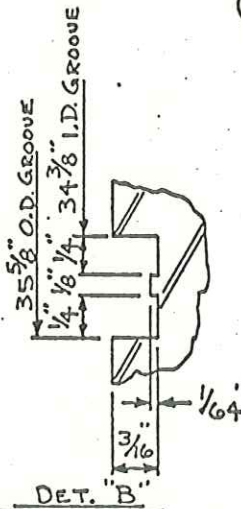
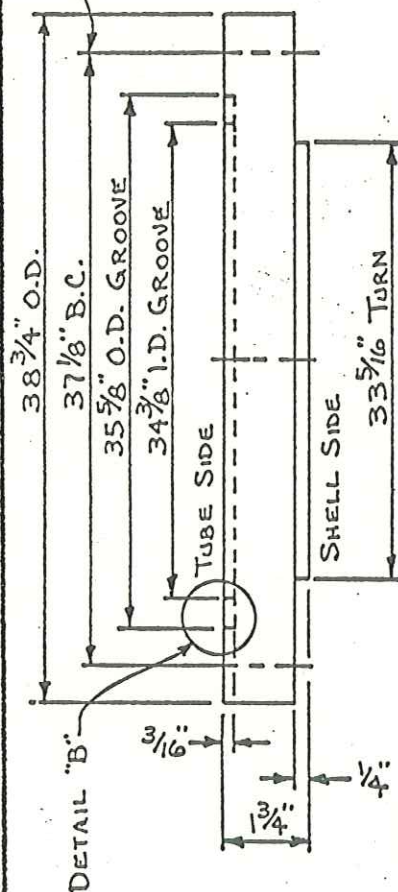
4546-05

CK R.F.

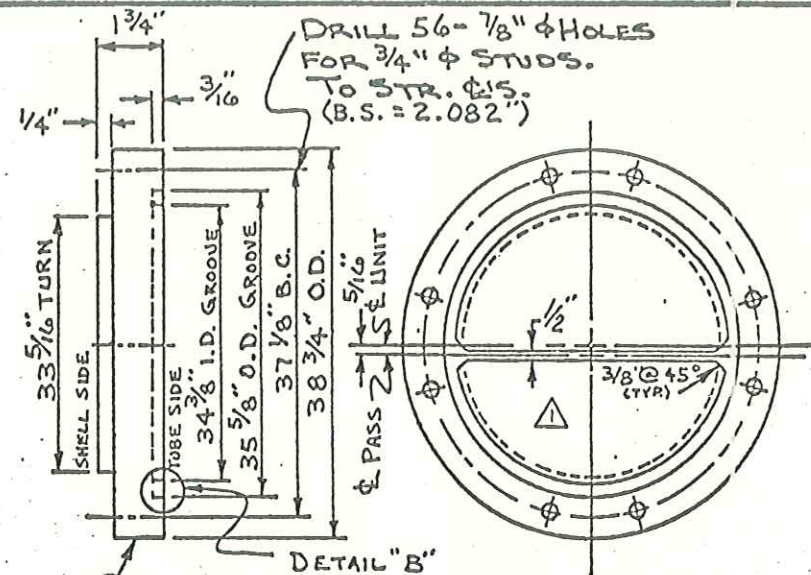
SCALE H

TYPE AEM

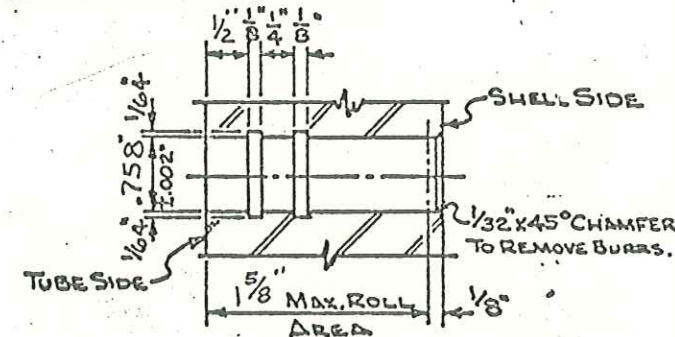
DRILL 56-7/8" Ø HOLES
FOR 3/4" Ø STUDS. TO STR.
E's (B.S.=2.082")



STATIONARY TUBE SHEET



FLOATING TUBE SHEET
TUBE LAYOUT IS SAME AS
STATIONARY TUBE SHEET.
(OMIT TIE RODS.)



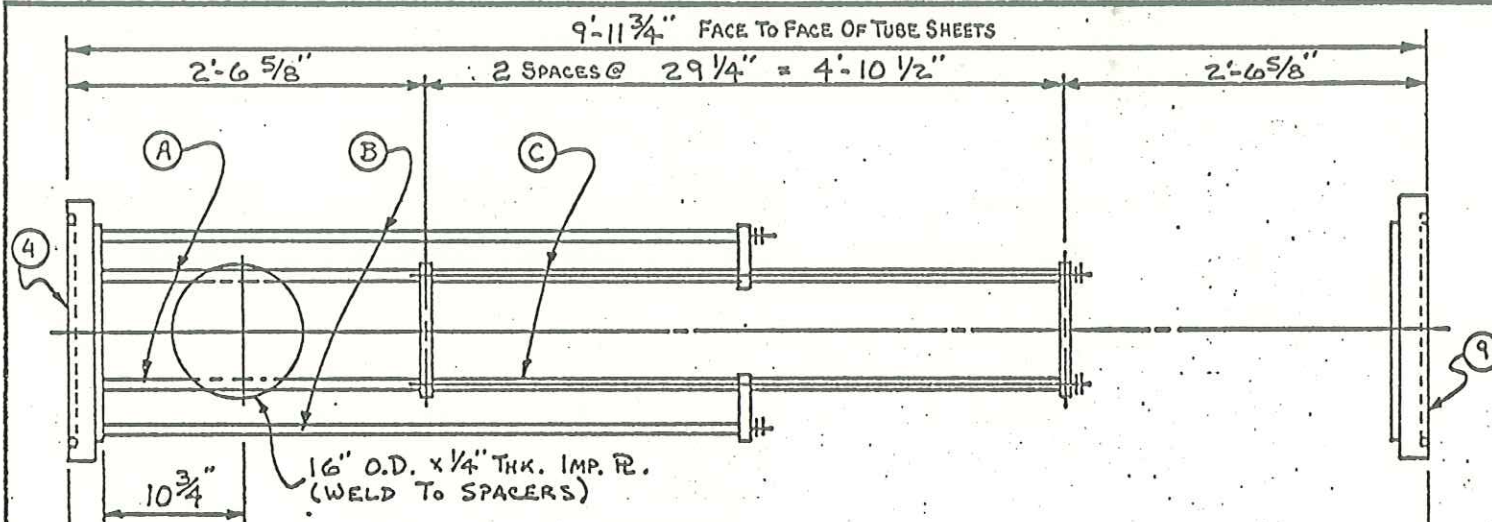
DETAIL "A"

NOTE:

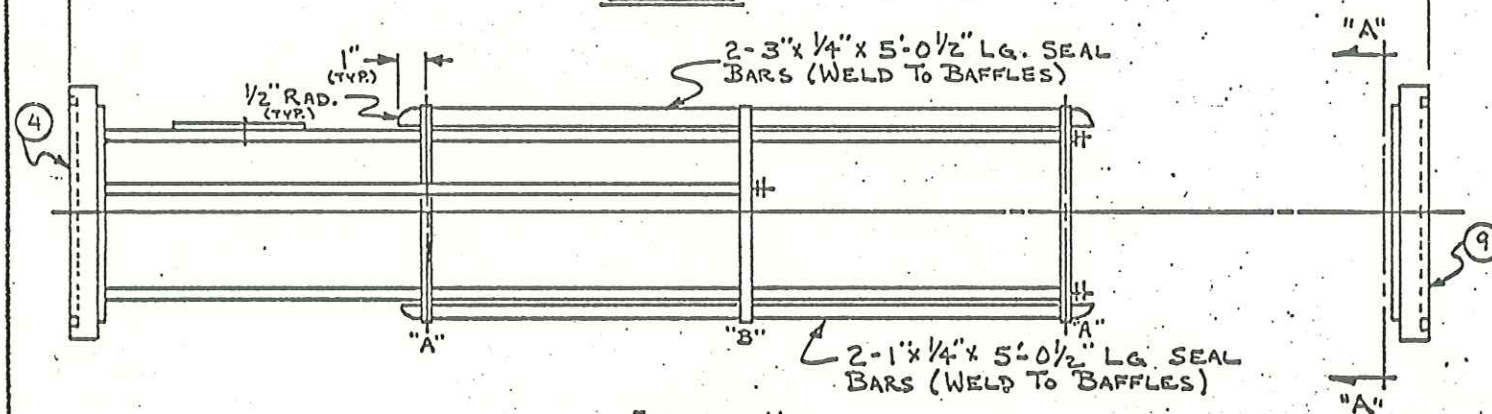
DRILL & REAM TUBE HOLES TO .758" $\pm$.002"
FOR 855 - $\frac{3}{4}$ " O.D. TUBES ON $\frac{15}{16}$ " TRI.
PITCH $\frac{1}{2}$ " $\frac{15}{16}$ " TUBE CIRCLE. GROOVE TUBE
HOLES PER DETAIL "A".

HUGHES-ANDERSON ENGINEERING CORP.			
TULSA, OKLAHOMA			
DRAWING TITLE <u>TUBE SHEET DETAILS</u>			
WORK ORDER <u>4546</u>		NUMBER REQ'D. <u>ONE</u>	
DR. <u>GDS</u>	DATE <u>10-22-82</u>	SIZE <u>33" x 10'</u>	DRAWING NUMBER
CK <u>P.F.</u>	SCALE <u>H</u>	TYPE <u>AEM</u>	<u>4546-06</u>

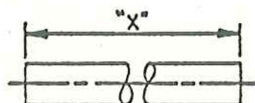
⚠ REV. PASS R GROOVES / CUST.
BY R.L. 11/17/82



PLAN VIEW

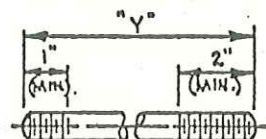


ELEVATION VIEW



$\frac{3}{4}$ " O.D. SPACER TUBING

NX.	Nº.	"X"
(A)	4	2'-4 $\frac{5}{8}$ "
(B)	2	4'-9 $\frac{7}{8}$ "
(C)	8	2'-4 $\frac{3}{4}$ "



$\frac{1}{2}$ " DIA. TIE ROD

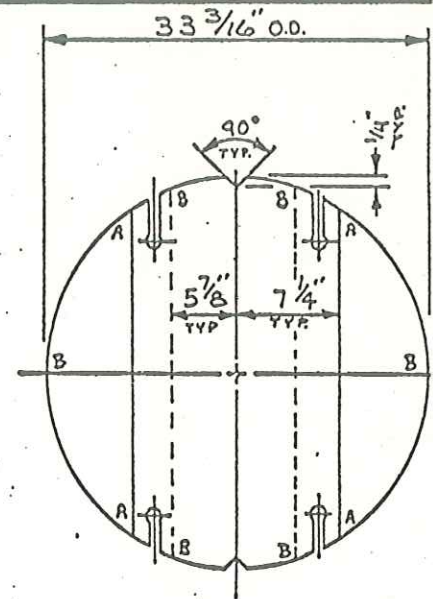
Nº	"Y"
2	5'-0 $\frac{3}{4}$ "
4	7'-6"

NOTES!

1) DRILL $\frac{49}{64}$ " DIA. HOLES IN BAFFLES FOR TUBES.

2) DRILL $\frac{9}{16}$ " DIA. HOLES IN BAFFLES FOR TIE RODS.

3) DEBURR ALL TUBE HOLES AND REMOVE ALL SHARP CORNERS.

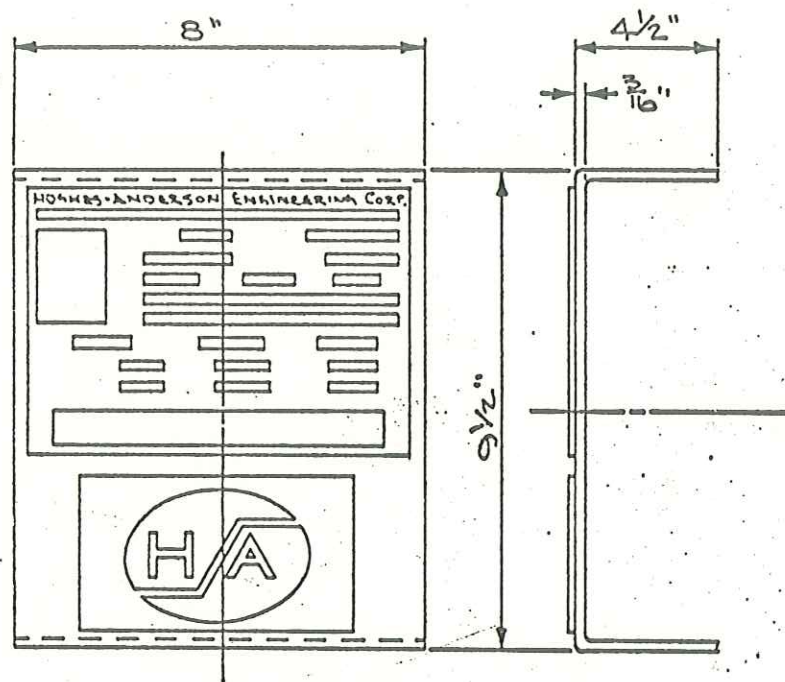


VIEW "A-A" (BAFFLES)

2 - REQ'D CUT "AAAA" - $\frac{1}{2}$ " THK.

1 - REQ'D CUT "BBB-BBB" - $\frac{1}{2}$ " THK.

HUGHES-ANDERSON ENGINEERING CORP.			
TULSA, OKLAHOMA			
DRAWING TITLE BUNDLE DETAILS			
WORK ORDER 4546		NUMBER REQ'D. ONE	
DR. GDS	DATE 10-22-82	SIZE 33" x 10'	DRAWING NUMBER
CK R.F.	SCALE $\frac{1}{4}$ "	TYPE AEM	4546-07



NAME R BRACKET DETAILS

* N.B. # REQ'D.

HUGHES-ANDERSON ENGINEERING CORP.

ACETONE COLUMN OVHD. CONDENSER

NAT'L BOARD No. ☐ * ☐ ITEM No.

RO. No. SERIAL No.

SIZE TYPE SURFACE SQ.FT.

R.T.

H.T.

DATE SHOPTEST SHELL P.S.I. TUBES P.S.I.

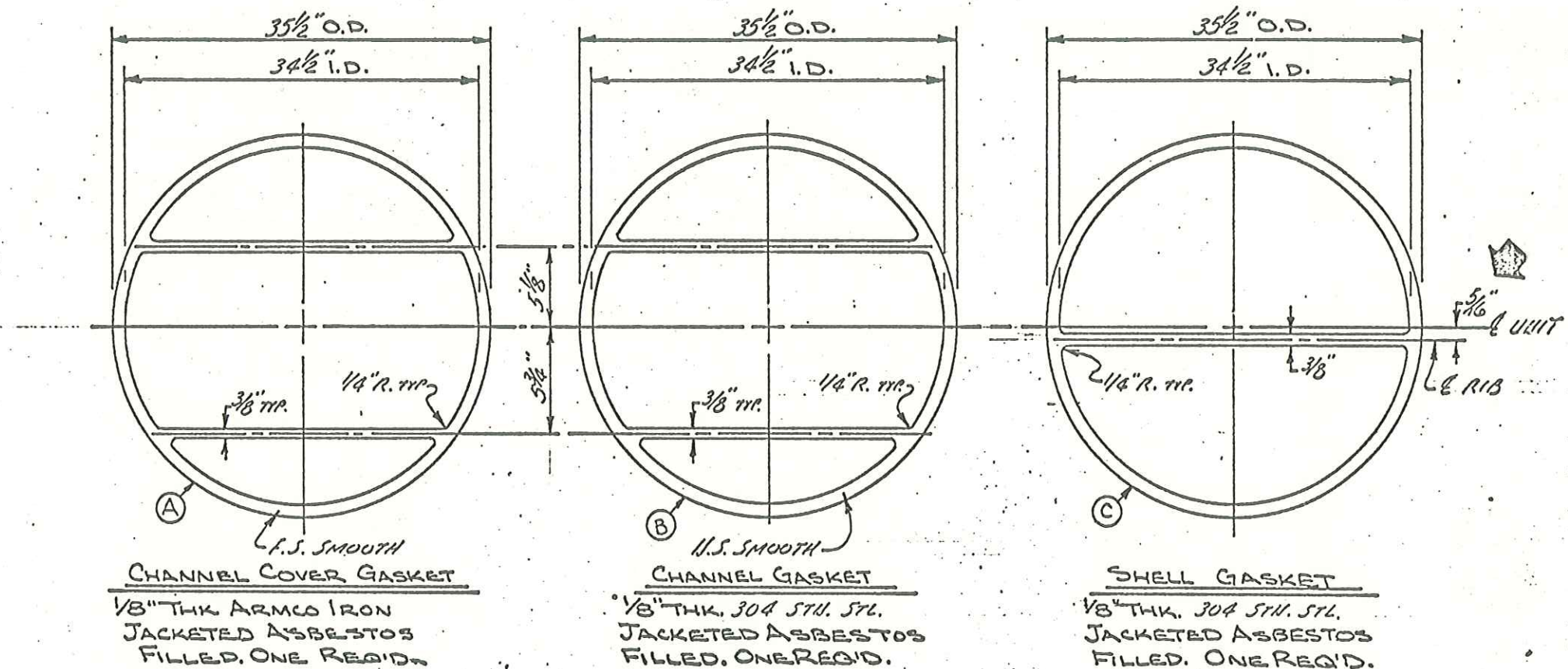
SHELL M.A.W.P. P.S.I. AT °F FIELD TEST P.S.I.

TUBES M.A.W.P. P.S.I. AT °F FIELD TEST P.S.I.

TUBES SA-249-304

NAME R DETAILS

HUGHES-ANDERSON ENGINEERING CORP.			
TULSA, OKLAHOMA			
DRAWING TITLE NAME RATE DETAILS			
WORK ORDER 4546		NUMBER REQ'D. ONE	
DR. GDS	DATE 10-27-82	SIZE 33'x10'	DRAWING NUMBER
CK P.F.	SCALE 1/4	TYPE AEM	4546-08



REQUIRED AS NOTED FOR ONE SET

HUGHES-ANDERSON ENGINEERING CORP.			
TULSA, OKLAHOMA			
DRAWING TITLE GASKET DETAILS			
WORK ORDER	4546	NUMBER REQ'D.	ONE
DR. R. L.	DATE 11/17/82	SIZE 33" x 10"	DRAWING NUMBER
CK	SCALE	TYPE ACM	4546-09

REDRAWN/CORR BY R.L.
11/17/82

BILL OF MATERIAL					CUSTOMER: CLARK OIL & REFINING CORP.	SCH. TO SHIP: /25-83	FILE NO.: 528-82	DATE: 10-11-82	No. UNITS: ONE			W.O.: 4546				
DWG. NO.	PART NO.	REQ'D FOR	TOTAL REQ'D	PART NAME	DESCRIPTION	MATERIAL	REV.	X-STK ← D.O.	REMARKS	P.O. NUMBER	ORDER DATE	DUE DATE	AGE'D DATE	EST. COST	PURCH COST	
	1	1	1	COVER	38 ³ / ₈ " I.D. x 2 ³ / ₄ " THK.	SA-516-70										
	2	1	1	FLG.	PER SKETCH	SA-105-N										
		1	1	CYL.	33 ³ / ₈ " I.D. x 7 ¹ / ₁₆ " THK. x 11 ³ / ₄ " LG. R&W CYL.	SA-516-70	①									
	3	1	1	FLG.	PER SKETCH.	SA-105-N										
		2	2	NOZ. FLG.	6"-150# RF-WN W/ SQ. 80 BORE	SA-105										
		2	2	NOZ PIPE	6" SCH. 80 SMLS PIPE X 8 ¹ / ₄ " LG.	SA-106-B	①									
		1	1	PASS R.	3 ¹ / ₄ " x 1/2" x 1'-8 ¹ / ₁₆ " LG.	SA-516-70	②									
							②									
		1	1	PASS R.	3 ¹ / ₈ " x 1/2" x 1'-8 ¹ / ₁₆ " LG.	SA-516-70	②									
							②									
	3A	1	1	COV.FLG.	PER SKETCH	SA-105										
		1	1	CYL.	33 ³ / ₈ " I.D. x 7 ¹ / ₁₆ " THK x 6" LG. R&W CYL.	SA-516-70										
		1	1	HEAD	34 ¹ / ₄ " O.D. x 7 ¹ / ₁₆ " Nom. 2:1 ELUP. HD. W/ 2"S.F.	SA-516-70										
		1	1	PASS R.	33 ¹ / ₄ " x 1/2" x 20 ¹ / ₁₆ " LG.	SA-516-70	①									
							②									
							②									
		1	1	SHELL CYL.	33 ³ / ₈ " I.D. x 3 ³ / ₈ " THK. x 9'-8 ¹ / ₂ " LG. R&W CYL.	SA-240-304										
		1	1	NOZ. FLG.	16"-150# FF-S.O. (TO BE OVERLAYED)	SA-105										
		1	1	NOZ FLG.	6"-150# F.F.-S.O. (TO BE OVERLAYED)	SA-105										
		1	1	NOZ FLG.	2 ¹ / ₂ "-150# F.F.-S.O. (TO BE OVERLAYED)	SA-105										
		1	1	NOZ PIPE	15 ¹ / ₄ " I.D. x 3 ³ / ₈ " THK. x 11 ⁷ / ₈ " LG. R&W CYL.	SA-240-304										
		1	1	NOZ PIPE	6" SCH 40S X 10 ¹ / ₈ " LG. SMLS. PIPE	SA-312-304										
		1	1	NOZ PIPE	2 ¹ / ₂ " SCH 80S X 10" LG. SMLS. PIPE	SA-312-304										
		4	4	CPLG'S	3/4" 6000#	SA-182F	①									
		4	4	PLUGS	3/4" N.P.T. X 3" LG.	SA-182F	①									
		2	2	SUPPORT SADDLES	7"x 1/4" THK. x 39" LG.	SA-240-304										
		1	1	NAME P. BRK'T.	8"x 3 ¹ / ₁₆ " x 18 ¹ / ₂ " LG. / BENT	STN.STL.	①									
		1	1	NAME P. SET	H-A NAME PL & EMBLEM	STN.STL.	①									
REV.	BY	DATE	AUTH. BY	REV.	BY	DATE	AUTH. BY	REV.	DATE	AUTH. BY	REV.	DATE	AUTH. BY	REV.	DATE	AUTH. BY
①	GDS	10/22/82	H-A	②	R.L.	11/18	H-A									
										HUGHES-ANDERSON ENGINEERING CORP. TULSA, OKLA. 74115			DRAWING No. 4546-10			

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