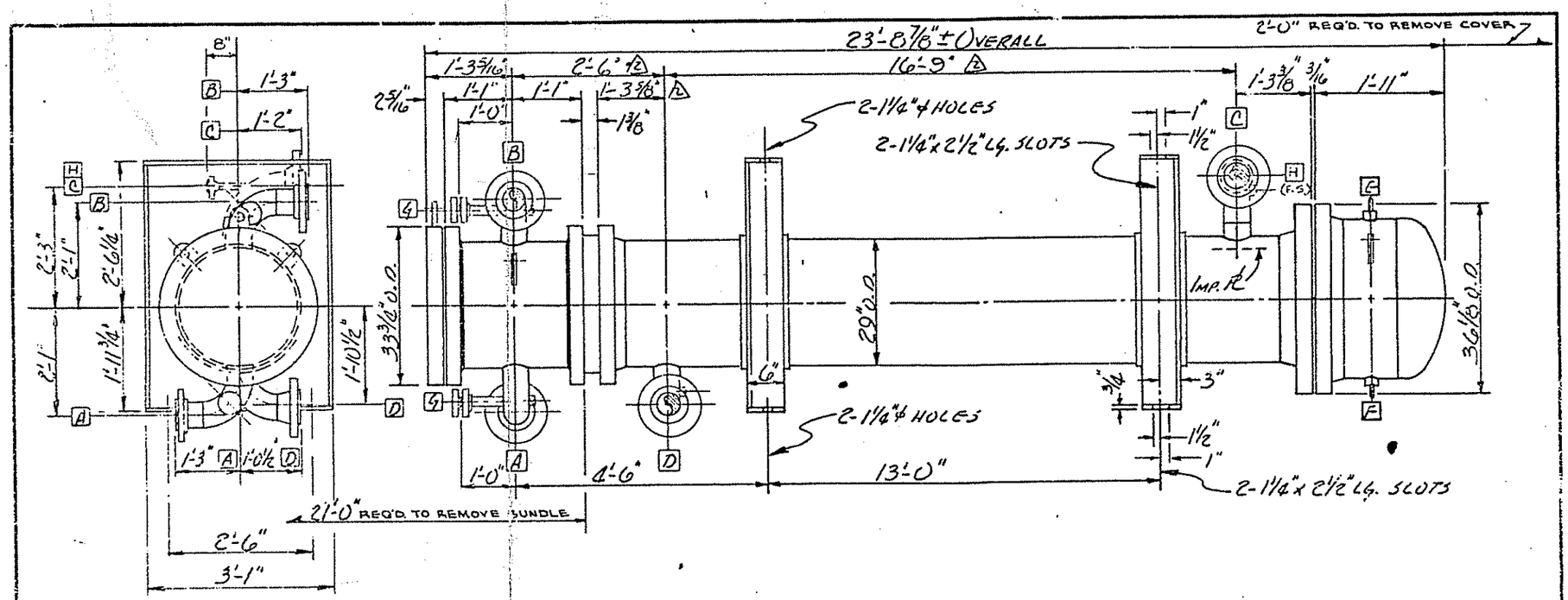


DESIGN DATA	SHELL	TUBES
DESIGN PRESSURE	150 PSI	75 PSI
TEST PRESS.	225 PSI	115 PSI
DESIGN TEMPERATURE	350 °F	150 °F
CORROSION ALLOWANCE	1/8"	1/16"
NUMBER OF PASSES	1	4
TUBE SURFACE (EFF.)	1829 SQ. FT.	
TUBES: 473 -3/4" ϕ x .185 Wg. 14 BWG SB-338-Gr 2		

ESTIMATED WEIGHT EACH		
DRY	INST	BUNDLE
9600 LBS	13 200 LBS	3,700 LBS

* MIN. TEST WATER TEMP. = 60°F.

** TITANIUM TUBES TO BE ANODIZED ON OUTSIDE SURFACE.

NOZZLE DATA					
MARK	SIZE	RATING	FACING	SERVICE
A	8"	150#	R.F.	INLET
B	6"	150#	R.F.	OUTLET
C	10"	150#	R.F.	INLET
D	6"	150#	R.F.	OUTLET
E	3/4"	6,000#	CPLG.	VENT W/6" NIPPLE
F	3/4"	6,000#	CPLG.	DRAIN W/6" NIPPLE
G(2)	2"	150#	R.F.	CHEM. CLEAN/FLUSH
H	2"	150#	RF	RELIEF VALVE

2 EACH NOZZLE TO HAVE 1-3/4"-6,000# CPLG. AS SHOWN (PLUGGED).

GENERAL NOTES

1. DESIGN & CONSTRUCTION SHALL BE IN ACCORDANCE WITH: 2
   (A) SECTION VIII 1980 EDITION OF THE ASME CODE, DIV. 1 & SO STAMPED BY NATIONAL BOARD.
   (B) TEMA "R".
   (C) CUST. SPEC'S.
2. ALL BOLT HOLES TO STRADDLE C.S.
3. SPOT RADIOGRAPH CHAN, SHELL & SHELL COV.
4. FURNISH ONE SET OF SPARE GASKETS.
5. FURNISH TEST RING.
6. COMMERCIAL BLAST (SSPC-SP6 & PAINT C-STL. PARTS ONLY WITH 1-COAT OF CARBOZINC #11 3 MILS D.F.T.

CERTIFIED CORRECT FOR FABRICATION
BY: J. D. Harrison DATE: 9/23/80

CUST.: AMOCO OIL COMPANY
DEST.: YORKTOWN, VIRGINIA
CUST. P.O.: 81-3-9706 | PROJECT Nº 7720
ITEM: C-112 | APPN. Nº 0059
SERVICE: E-110 PFT OVHD. CONDENSER
SERIAL: 3725
FILE: 450-80

HUGHES-ANDERSON ENGINEERING CORP.
TULSA, OKLAHOMA

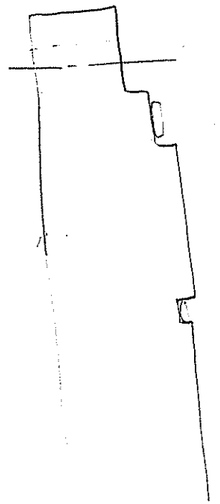
DRAWING TITLE	OUTLINE DIMENSIONAL		
WORK ORDER 3725		NUMBER REQ'D. ONE	
DR. KEN	DATE 9/23/80	SIZE 28"x20"	DRAWING NUMBER 3725-01
CK JIM	SCALE NONE	TYPE AES	

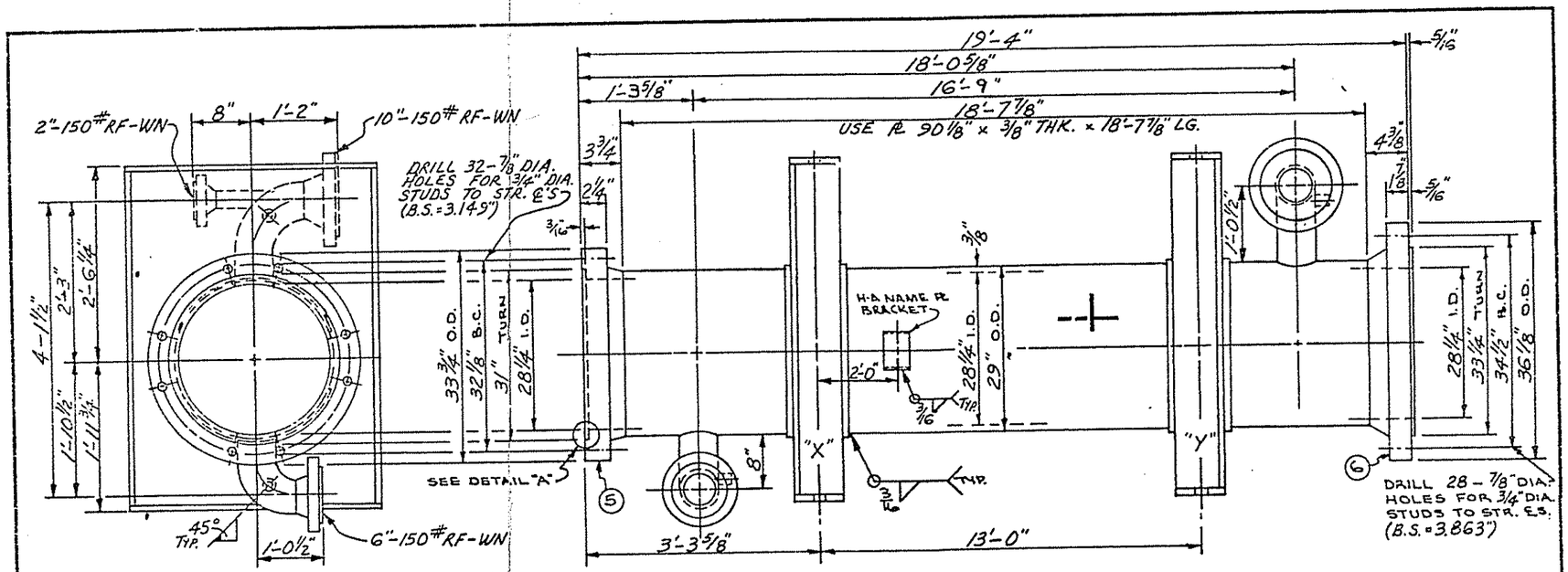
1 ADDED 1" RELIEF VALVE BY GDP 10-3-80 2 11/13/80 JIM

C-112

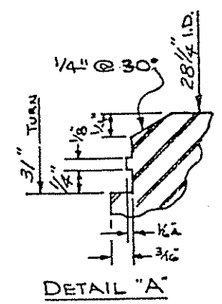
05

3/4





NOTES:
1. SEE DWG. STD-1 FOR WELD DETAILS.
2. ALL BOLT HOLES TO STRADDLE ℄'S.
3. FULL RADIOGRAPH ALL MANUAL WELDS.
4. ALL WELDING TO BE IN ACCORDANCE W/ PROCEDURES MA-1A AND SAM-1A.
5. SPOT RADIOGRAPH SHELL & NOZ NECK TO FLG., STOPS, START, BURN-THROUGHS, & INTERSECTIONS PLUS ONE RANDOM SPOT @ INSPECTORS OPTION.
6. MAGNETIC PARTICLE EXAMINE NOZ. WELD AT BACK-CHIPPED SURFACE OF ROOT PASS & ALL FINISHED WELDS.
7. ONE BHN TEST REQUIRED ON EACH LONG. & CIRC. SEAM (MAX. BHN = 225)
8. FLATNESS TOLERANCE ON PERIPHERAL GASKET SURFACES SHALL BE ± 1/32" & NOT OCCURRING IN LESS THAN 20°.
9. LOCATE 1-3/4"-6000# CPLG. IN EACH ELBOW AS SHOWN.
10. STENCIL PAINT ON SIDE OF SHELL IN 4" HIGH LETTERS:
    P.O. NO.: 813-3-9706
    ITEM NO.: C-112
    SHIPPING WT.: 9600#



DETAIL "A"

AMOCO OIL COMPANY
YORKTOWN REFINERY
PROJECT NO. 7720
APPN. NO. 0059
P.O. NO. 813-3-9706
W.O. NO. 3725
ITEM NO. C-112

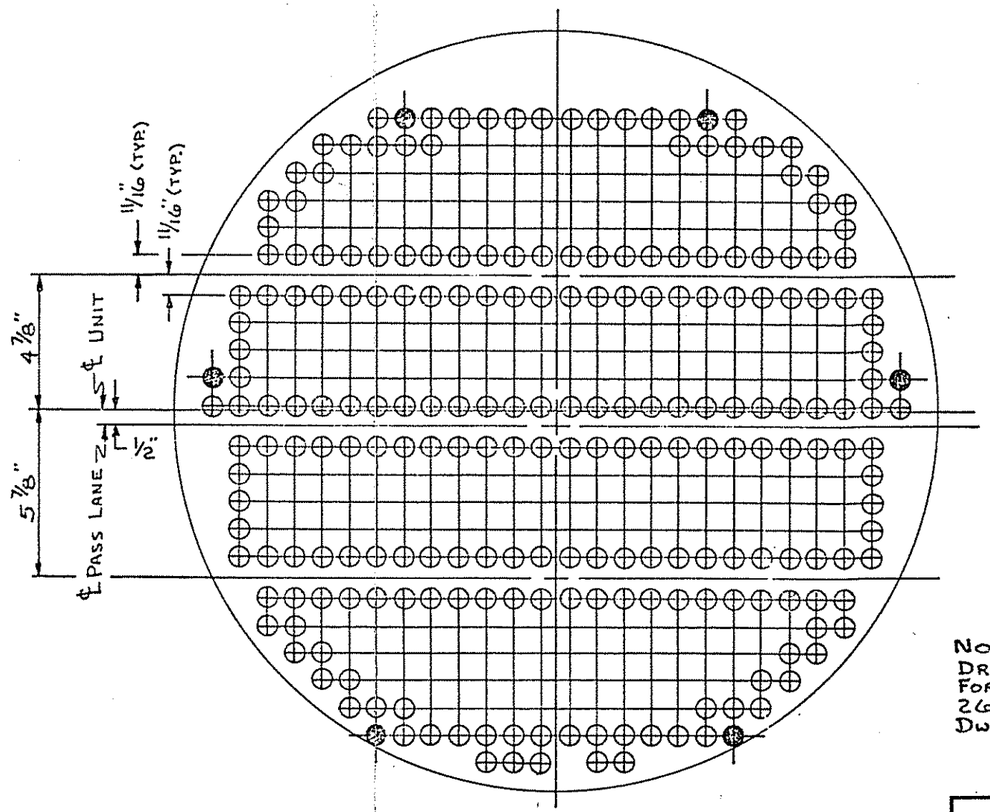
HUGHES-ANDERSON ENGINEERING CORP. TULSA, OKLAHOMA			
DRAWING TITLE SHELL DETAILS			
WORK ORDER 3725		NUMBER REQ'D. ONE	
DR. R.F.	DATE 12-19-80	SIZE 28" x 20"	DRAWING NUMBER 3725-1-03
CK MP	SCALE ~	TYPE AES	

C-112

S-13

69

⊕ DENOTES TIE ROD LOCATIONS



TUBES / PASS
116
122
120
115

AMOCO OIL COMPANY
YORKTOWN REFINERY
PROJECT Nº. 7720
APPN. Nº. 0059
P.O. Nº. 813-3-9706
W.O. Nº. 3725
ITEM Nº. C-112

NOTE!
DRILL & REAM TUBE HOLES TO .758" ± .002" FOR 473-3/4" O.D. TUBES ON 1" □ PITCH & 26 11/16" T.C. GROOVE TUBE HL'S PER DET. "A" DWG. 3725-06

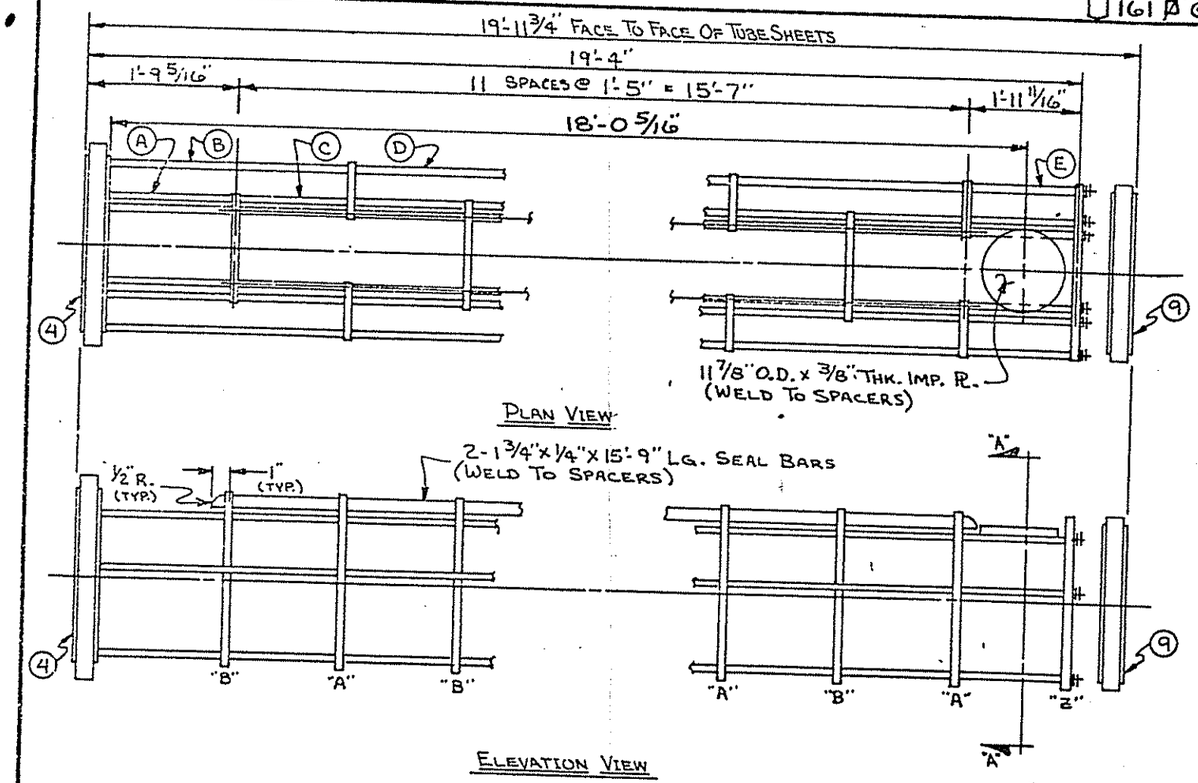
VIEW LOOKING @ SHELL SIDE OF # 4 TUBE SHT.

HUGHES-ANDERSON ENGINEERING CORP.
TULSA, OKLAHOMA

DRAWING TITLE TUBE LAYOUT			
WORK ORDER 3725		NUMBER REQ'D. ONE	
DR. GDS	DATE 12/18/80	SIZE 28"X20"	DRAWING NUMBER
CK MP	SCALE 1/4	TYPE AES	3725-05

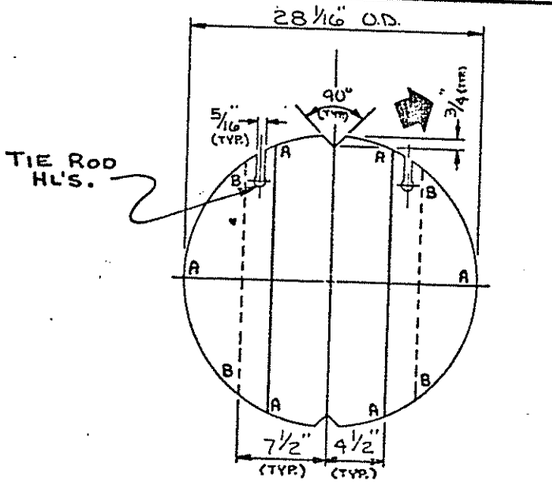
C-112

○ 161 Ø" @ 38.5% ◐ 160.6 Ø" @ 38.5%



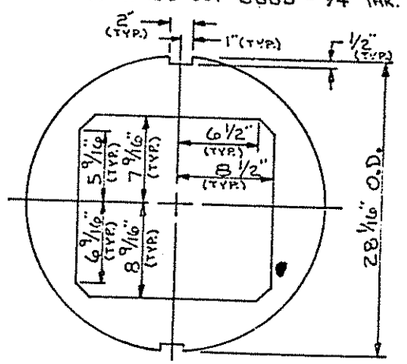
PLAN VIEW

ELEVATION VIEW

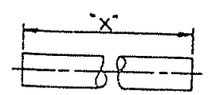


VIEW "A-A" (BAFFLES)

6- REQ'D CUT "AAA-AAA" ~ 1/4" THK.
6- REQ'D CUT "BBBB" ~ 1/4" THK.

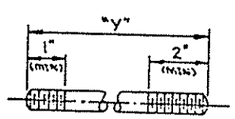


"Z" R ~ 1-REQ'D. ~ 1/2" THK.



3/4" O.D. SPACER TUBING

MK	No.	"X"
(A)	4	1'-7 3/16"
(B)	2	3'-0 3/16"
(C)	44	1'-4 3/4"
(D)	10	2'-9 3/4"
(E)	6	1'-11 5/16"



1/2" DIA. TIE ROD

No.	"Y"
6	19'-4 5/8"

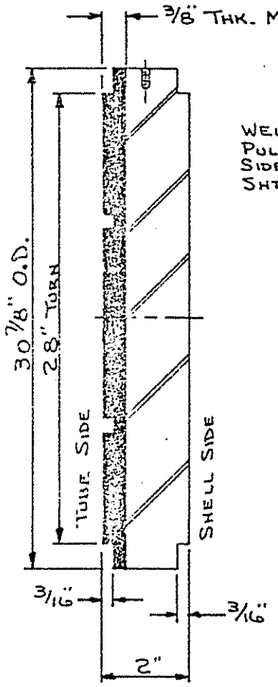
AMOCO OIL COMPANY
YORKTOWN REFINERY
PROJECT NO. 0059
P.O. NO. 813-3-9706
W.O. NO. 3725
ITEM NO. C-112

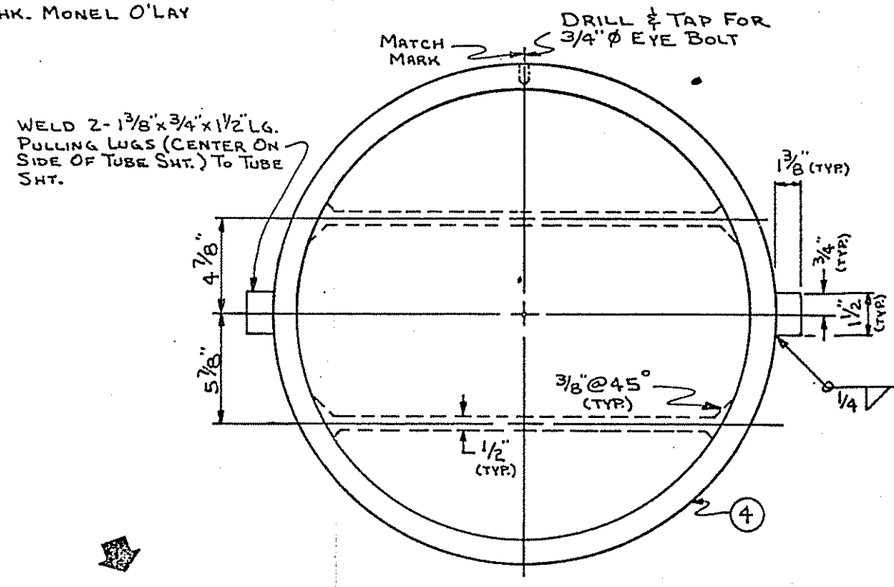
NOTES!
1. DRILL 49/64" DIA. HOLES IN BAFFLES FOR TUBES. +.005" -.000"
2. DRILL 9/16" DIA. HOLES IN BAFFLES FOR TIE RODS.
3. DEBURR ALL TUBE HOLES AND REMOVE ALL SHARP CORNERS.

HUGHES-ANDERSON ENGINEERING CORP. TULSA, OKLAHOMA			
DRAWING TITLE BUNDLE DETAILS			
WORK ORDER 3725		NUMBER REQ'D. ONE	
DR. GDS	DATE 12/18/80	SIZE 28"x20'	DRAWING NUMBER
CK MP	SCALE ¼	TYPE AES	3725-07

C-112 T6

DRILL 3/4 DEEP & BOTTOM TAP FOR 6 - 1½ ø TIE RODS ON SHELL SIDE ONLY. DO NOT DRILL THRU!
SEE TUBE LAYOUT FOR LOCATIONS.

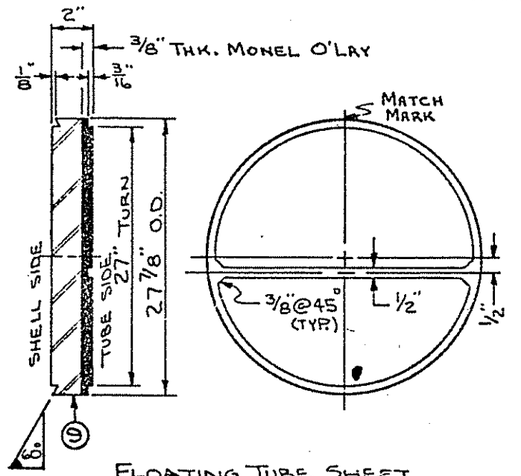




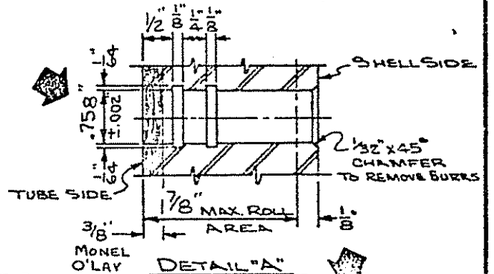
Flatness tolerance on peripheral gasket surfaces shall be ± 1/32" not occurring in less than 20°.

NOTE:
1. ALL O'LAY TO BE MONEL IN ACCORDANCE W/ WELD PROCEDURES UCL-43(SS-42-H)
2. HEAT TREAT FOR 1 3/4 HR'S @ 1100°F.

STATIONARY TUBE SHEET



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



NOTE:
DRILL & REAM TUBE HOLES TO .758" ± .002" FOR 473 - 3/4" O.D. TUBES ON 1" □ PITCH & 26 11/16" T.C.. GROOVE TUBE HOLES PER DETAIL "A".

AMOCO OIL COMPANY
YORKTOWN REFINERY
PROJECT NO. 7720
APPN. NO. 0059
P.O. NO. 813-3-9706
W.O. NO. 3725
ITEM NO. C-112

HUGHES-ANDERSON ENGINEERING CORP. TULSA, OKLAHOMA			
DRAWING TITLE TUBE SHEET DETAILS			
WORK ORDER 3725		NUMBER REQ'D. ONE	
DR. GDS	DATE 12/18/80	SIZE 28"X20'	DRAWING NUMBER
CK MP	SCALE 1/4	TYPE AES	3725-06

C-112 T2

T2

C-112

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 Hughes-Anderson Engr. Corp. Tulsa, Oklahoma (Name and address of manufacturer)

2. Manufacturer for Standard Oil Company (Indiana) Chicago, Illinois (Name and address of purchaser)

3. Location of installation Amoco Oil Company Yorktown, Virginia (Name and address)

4. Type Horiz. (Horiz., or ver. tank) Vessel No. 3725 (Mfgr's Serial No.) (CRN) 3725-01-14 1190 (Drawing) (Nat'l Brd No.) Year Built 1981

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 (Year) and Addenda to Summer 80 (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, mfgr'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-516-70 (Spec. No., Grade) Nominal Thickness 3/8 in. Corrosion Allowance 1/8 in. Diam. 2 ft 5 in. Length 18 ft 7-7/8 in.

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

Time Girth Dbl. Butt (Welded Dbl., Sngl., Lap, Butt) R.T. Spot (Spot, Partial or Full) No. of Courses 2

8. Heads: (a) Material SA-516-70 (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)	End	3/8"	1/8"			2:1
(b)	Cvr. Cyl.	32" OD x 7/16" x 9" Lg R & W Cyl.				

	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure (Convex or Concave)
(a)				Concave
(b)				

If removable, bolts used (describe other fastenings) SA-193-B7 3/4" Ø, 28 (Material, Spec. No., Gr., Size, No.)

9. Type of Jacket Proof Test If bolted, describe or sketch.

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

11. Constructed for max. allowable working pressure 150 psi at max. temp. 350 F Min. temp. (when less than −20 F) F.

Hydrostatic, ~~pneumatic~~ test pressure 225 psi

Items 12 and 13 to be completed for tube sections.

12. Tubesheets: Stationary—Material SA-516-70* (Spec. No. Gr.) Diam. 30-3/8 (Subject to pressure) in. Nominal Thickness 2 in. Corrosion Allowance 1/2 in. Attachment Bolted (Welded, Bolted)

Floating—Material SA-516-70* (Spec. No., Grade) Diam. 27-1/2 in. Nominal Thickness 2 in. Corrosion Allowance 1/2 in. Attachment Bolted

13. Tubes: Material SB-338-Gr.2 (Spec. No., Gr.) O.D. 3/4 in. Nominal Thickness 18 ~~xx~~ or gauge Number 473 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-240-316 (Spec. No., Gr.) Nominal Thickness 3/8 in. Corrosion Allowance 1/16 in. Diam. 2 ft 5 in. Length 2 ft 2 in.

15. Seams: Longitudinal Dbl. Butt (Welded, Dbl., Sngl. Lap, Butt) R.T. Spot (Spot or Full) Efficiency 85 % H.T. Temp F Time No. of courses 1

Girth Dbl. Butt (Welded, Dbl., Sngl., Lap, Butt) R.T. Spot (Spot, Partial, or Full)

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

	Location (Top, Bottom, Ends)	Minimum Thickness	Corrosion Allowance	Crown Radius	Knuckle Radius	Elliptical Ratio
(a)	End	2-5/8"	3/8"			
(b)	SA-516-70	2-1/8"	3/8"			

	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure (Convex or Concave)
(a)			30-3/8"	Flat
(b)			27-1/2	Hogged Out

If removable, bolts used (describe other fastenings) SA-193-B7 3/4" Ø, 32 SA-193-B7 - 5/8" Ø, 32 (Material, Spec. No., Gr., Size, No.)

3725

Constructed for max. allowable working pressure 115 psi at max temp. 450 F. Min. temp. (when less than -20 F) _____ F.

Hydrostatic, ~~pneumatic or combination~~ test pressure 115 psi.

Items below to be completed for all vessels where applicable

4. Safety Valve Outlets: Number 1 Size 2"-150# - RF Location Shell side

5. Nozzles:

Purpose (Inlet, Outlet, Drain)	Number	Diam. or Size	Type	Material	Nominal Thickness	Reinforcement Material	How Attached
Chan. in-out	1-1	8"-150#	RF-SO	SA403WP316L	Sch. 80S	none	Welded
Shell in	1	10"-150#	RF-WN	SA-234WPB	X-Stg	none	Welded
Shell out	1	6"-150#	RF-WN	SA-234WPB	Sch. 80	none	Welded

6. Inspection Openings:

Manholes No. _____ Size _____ Location _____

Handholes No. _____ Size _____ Location _____

Threaded No. _____ Size _____ Location _____

7. Supports: Skirt (Yes or no) _____ Lugs (No.) _____ Legs (No.) _____ Other 2 Saddles (Describe) _____ Attached Welded to shell (Where and how)

8. Remarks: E-110 PFT OVHD CONDENSER *- INCLUDES 3/8" thk. monel o'lay **-includes 3/8" thk Stn. Stl o'lay

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 3-18-81 Signed Hughes-Anderson Engr. Corp. (Manufacturer) by Gary Lee (Representative)

"U" Certificate of Authorization No. 11979 expires December 31, 1982.

CERTIFICATE OF SHOP INSPECTION

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

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 Illinois and employed by Comm. Union Ins. Co. of Boston, Mass. have inspected the pressure vessel described in this Manufacturers' Data Report on 3-18- 1981, 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 3-19-81

Signed [signature] (Inspector) Commissions N.B. #5745 (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 _____ (Manufacturer) by _____ (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 _____ (Authorized Inspector) Commisisons _____ (Nat'l Board, State, Province and No.)

E-110 PFT OVHD. CONDENSER

1190 C-112

U W RT-3 CU

813-3-9706 3725

28" X 20' AES 1829 Sq. Ft.

SPOT CHAN. SHELL & SHELL COV

3-1991 225 115

150 350 225

75 150 115

473-3/4" O.D. X 18 B.W.G. AVG. X 20'-0" LG. SB-338-GR2