

ALTEX
HEAT EXCHANGER LTD
EDMONTON, AB., CANADA

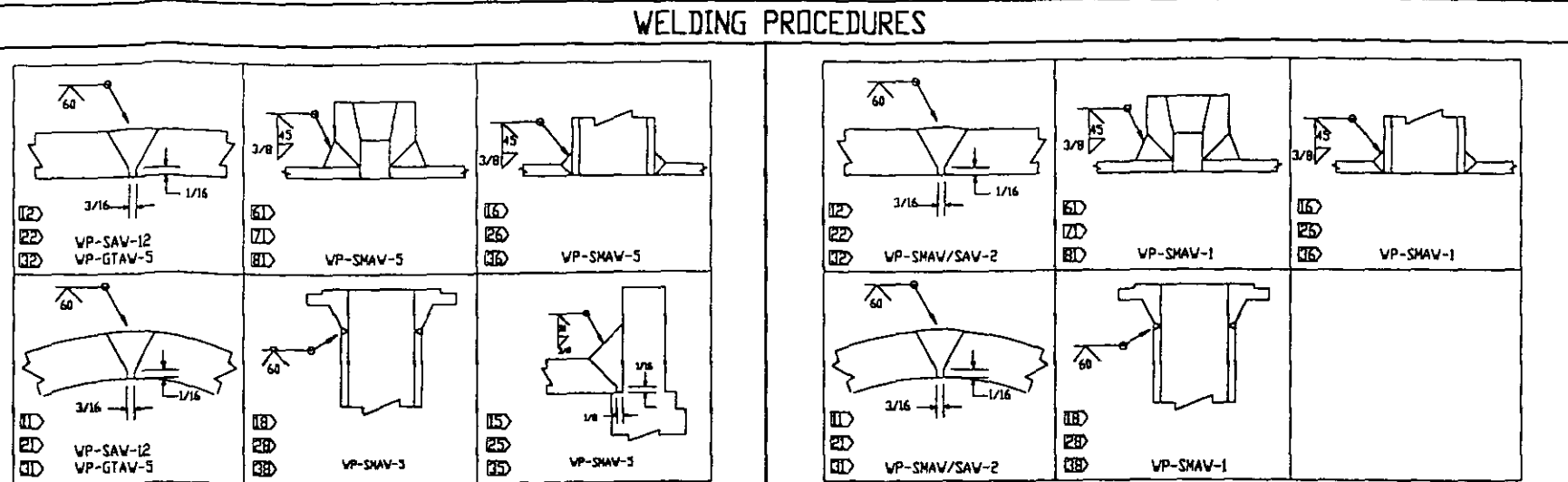
[illegible]

COUPLING SCHEDULE		
LABEL	SIZE	DESCRIPTION
C1	1	6000# CPLG c/w PLUG
C2	1	6000# CPLG c/w PLUG
C3	1	6000# CPLG c/w PLUG
C4	1	6000# CPLG c/w PLUG
C5	3/4	6000# CPLG c/w PLUG
C6	3/4	6000# CPLG c/w PLUG
C7	3/4	6000# CPLG c/w PLUG
C8	3/4	6000# CPLG c/w PLUG
C9	1	6000# CPLG c/w PLUG
C10	1	6000# CPLG c/w PLUG
C11	1	6000# CPLG c/w PLUG
C12	1	6000# CPLG VENT

SUPPORT SCHEDULE		
LABEL	MOUNT	PROJECTION (2)
VS1	(1) 1 1/8" BOLT HOLE	17 1/2
VS2	(1) 1 1/8" BOLT HOLE	17 1/2
VS3	(1) 1 1/8" BOLT HOLE	17 1/2
VS4	(1) 1 1/8" BOLT HOLE	17 1/2

					TITLE: UNIT OUTLINE				SCALE: NTS
2	REVISED NOZZLE PROJECTIONS	DRA	JAN 30/97	CAZ	JAN 30/97	DWN. BY: DRA	DATE: JAN 3/97	CHK. BY: CAZ	DATE: JAN 8
1	AS PER CUSTOMER MARKUPS	DRA	JAN 23/97	CAZ	JAN 24/97	APP. BY: C.A. ZAHARA	DATE: JAN 8/97		
REV	DESCRIPTION	BY	DATE	APP	DATE	DWG. NO.: 96-3697-01			REV. C

ITEM	QTY	DESCRIPTION	MATERIAL	P.O.#
1	1	SHELL COURSE (#1) 1/4"THK x 26"OD x 120"LG	SA-240-304L	
2	1	SHELL COURSE (#2) 1/4"THK x 26"OD x 115 7/8"LG	SA-240-304L	
3	1	FRONT TUBESHEET 2"THK x 30 3/8"OD	SA-240-304L	
4	1	REAR TUBESHEET 2"THK x 30 3/8"OD	SA-240-304L	
5	1	16"-150# ANSI RFWN FLG SCH STD	SA-182-304L	
6	1	16"-SCH STD WLD HI ALLOY PIPE x 10 3/8"LG	SA-312-TP304L	
7	1	6"-150# ANSI RFWN FLG SCH STD	SA-182-304L	
8	1	6"-SCH STD WLD HI ALLOY PIPE x 12"LG	SA-312-TP304L	
9	2	FLANGED ONLY HEAD 3/8"THK x 26"ID x 39 1/4"OD C/W 2 1/4"KR & 2"SF	SA-240-304L	
10	1	PLATE CYLINDER 1/4"THK x 39 1/4"OD x 23 1/2"LG	SA-240-304L	
11A	2	FULL CPLG 3/4"-6000# C/W PLUG	SA-182-304L	
11B	2	FULL CPLG 3/4"-6000# C/W PLUG	SA-350-LF2	
12A	3	FULL CPLG 1"-6000# C/W PLUG	SA-182-304L	
12B	5	FULL CPLG 1"-6000# C/W PLUG	SA-350-LF2	
13	1	SHELL LIFT LUG 3/4"THK x 4' x 6'	SA-240-304L	
14	8	GUSSET PLATE 1/2"THK x 8 3/4' x 15'	SA-516-70N	
15	4	REPAID 1/4"THK x 10' x 17' ROLLED TO 13'R ON 10" DIMENSION	SA-240-304L	
16	4	BASE PLATE 1/2"THK x 6' x 8 3/4'	SA-516-70N	
17	1	BOTTOM HD FLG AT TUBESHEET 30 3/8"OD x 25 1/2"ID x 3 5/16"LG HUB FLANGE	SA-105N	
18	1	TOP HD FLG AT TUBESHEET 30 3/8"OD x 25 1/2"ID x 3 5/16"LG HUB FLANGE	SA-105N	
19	1	BOTTOM HD CYLINDER 3/8"THK x 26 1/4"OD x 22 13/16"LG	SA-516-70N	
20	1	BOTTOM HD COVER 3/8"THK x 26 1/4"OD ELLIPSOIDAL COVER 2:1SE MIN THK 5/16"	SA-516-70N	
21	2	10"-SCH XH SML STL PIPE x 11"LG	SA-106B	
22	2	10"-150# ANSI RFWN FLG SCH XH	SA-105N	
23	1	PASS PLATE 1/2"THK x 25 1/2' x 34 11/16' (TRIM TO FIT)	SA-516-70N	
24	1	TOP HD COVER 3/8"THK x 26 1/4"OD ELLIPSOIDAL COVER 2:1SE MIN THK 5/16"	SA-516-70N	
25	3	HEAD LIFT LUG 1/2"THK x 3' x 4'	SA-516-70N	
26	2	BOTTOM HD GASKET AT TS 1/8"THK x 27 1/2"OD x 26 1/2"ID C/W (1) HORIZ RIB	GARLOCK BLUE GARD	
27	2	TOP HD GASKET AT TS 1/8"THK x 27 1/2"OD x 26 1/2"ID NO RIBS	GARLOCK BLUE GARD	
28	510	TUBES 3/4" x 16BWG x 240"LG WLD HI ALLOY PLAIN TUBE	SA-249-TP304L	
29	5	BAFFLE PLATE 3/8"THK x 25 5/16"OD	SA-240-304L	
30	4	BAFFLE PLATE 3/8"THK x 25 5/16"OD	SA-240-304L	
31	6	SPACER 3/4" x 16BWG x 29 1/16"LG	SA-240-TP304L	
32	8	SPACER 3/4" x 16BWG x 44 5/8"LG	SA-240-TP304L	
33	32	SPACER 3/4" x 16BWG x 22 1/8"LG	SA-240-TP304L	
34	2	TIE ROD 3/8" ROUND BAR x 211 3/4"LG C/W 3/8"-UNC x 2"LG BOTH ENDS	S.S.	
35	2	HEX NUTS 3/8"-UNC	S.S.	
36	64	STUDS 3/4"-UNC x 5 13/16"LG C/W (2) HEX NUTS EACH	SA-193-B7 ZINC PLATED	
37	6	JACK SCREWS 5/8"-UNC x 6"LG	C.S.	
99	1	ALTEX NAMEPLATE AND BRACKET ASSEMBLY	S.S.	



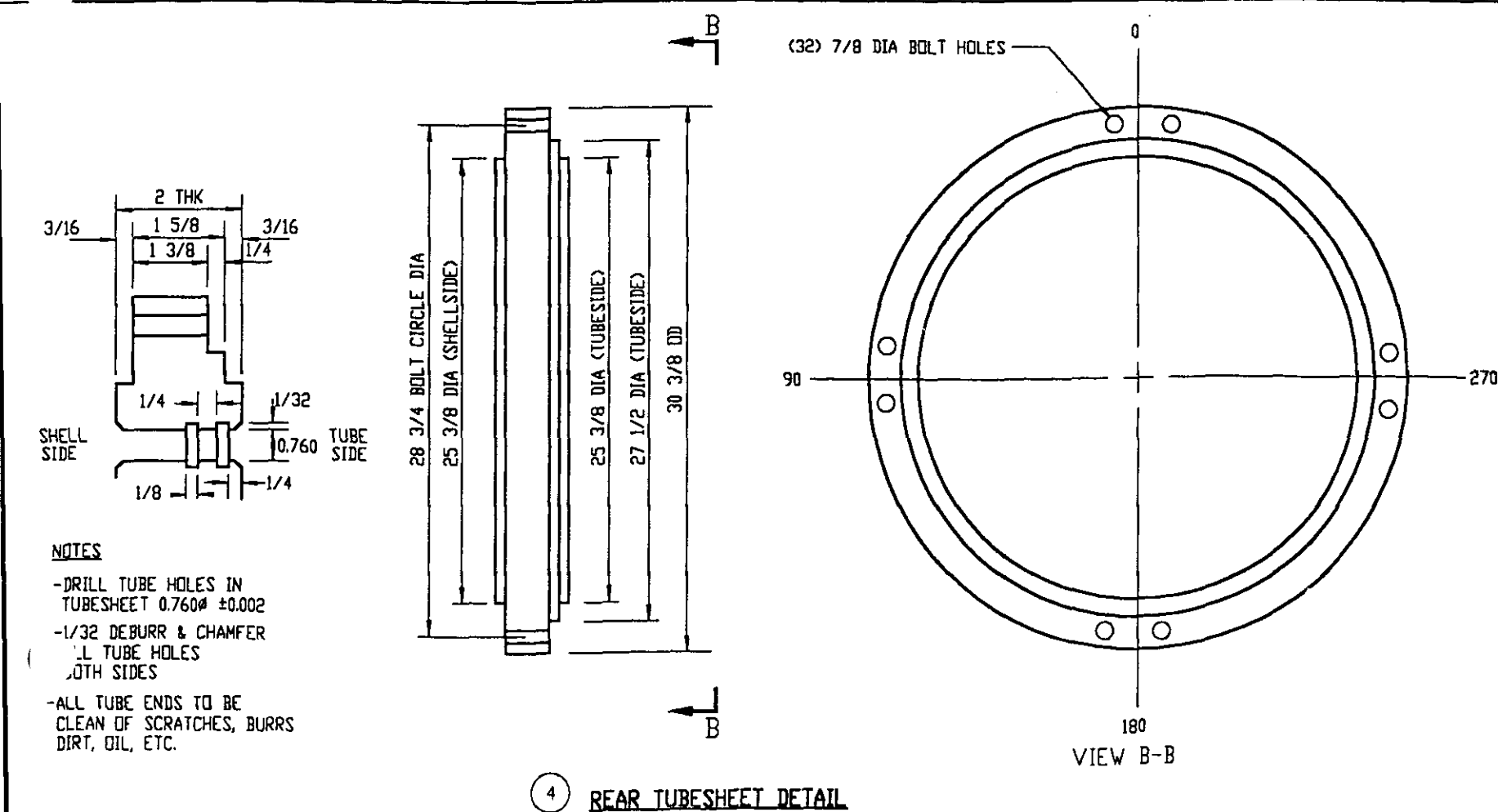
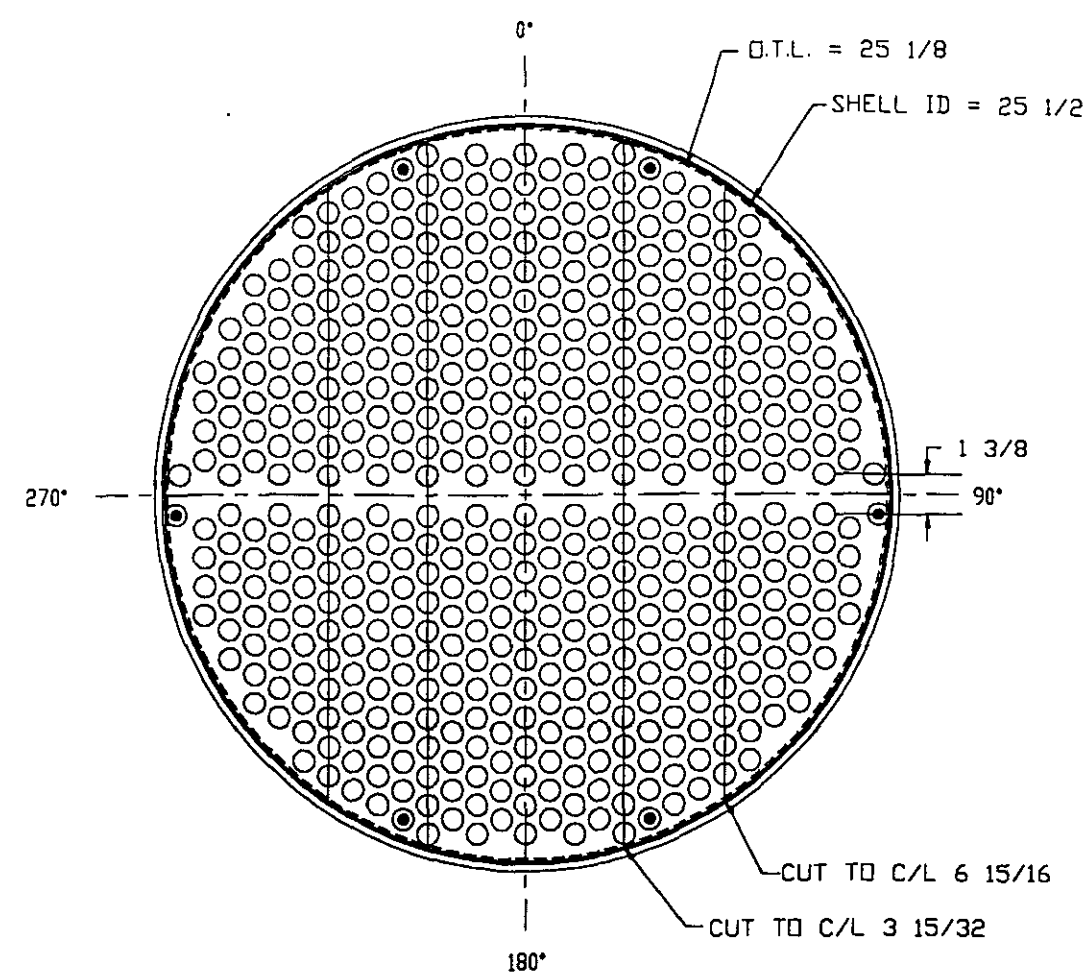
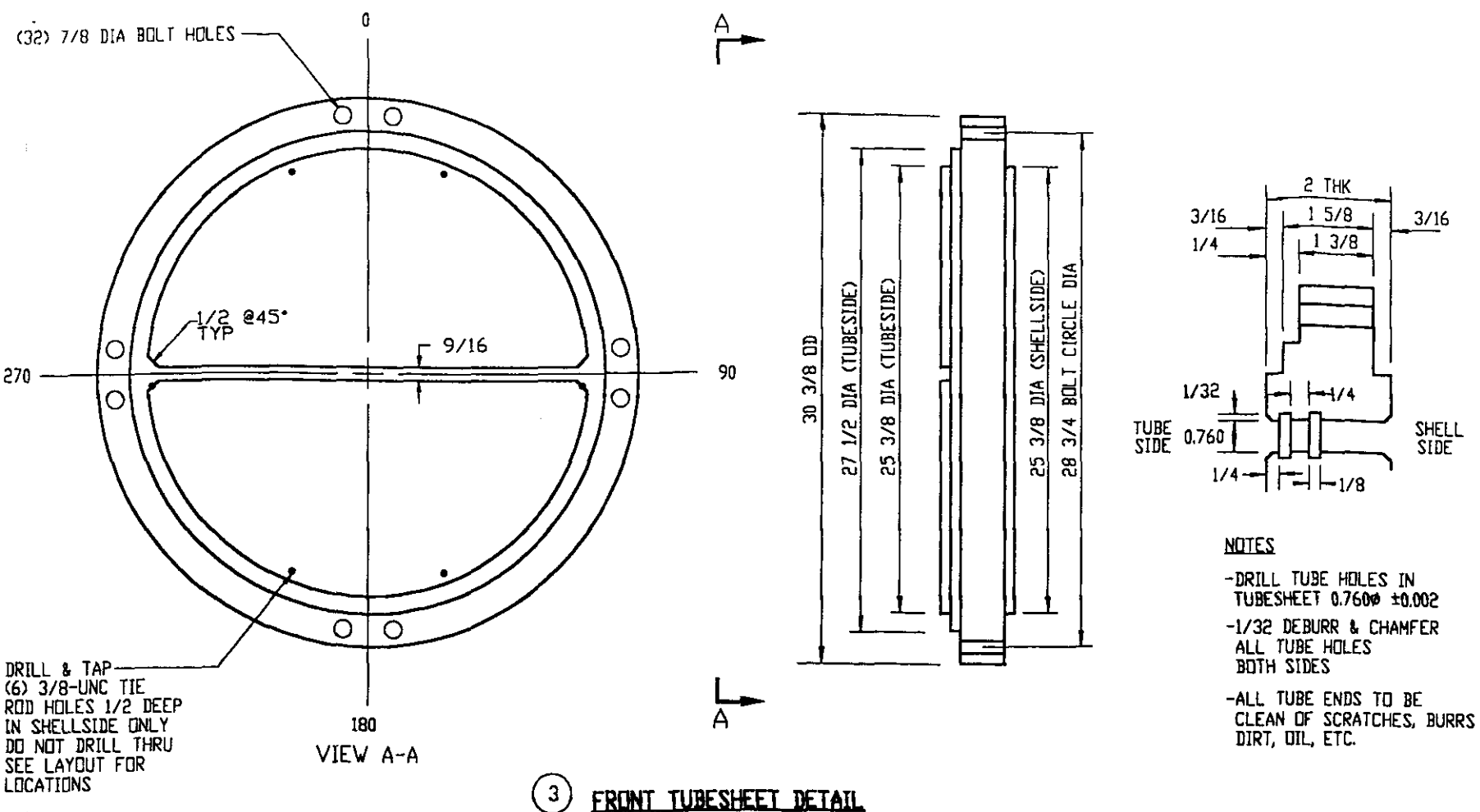
SHELLSIDE		TUBESIDE																																																										
CERTIFIED BY: ALTEX HEAT EXCHANGER LTD. EDMONTON, AB, CANADA																																																												
U W RT3	M.A.W.P. SHELL M.D.M.T. SHELL M.A.W.P. TUBE M.D.M.T. TUBE SERIAL No. 96-3697 TEST PRESS: SHELL 113 PSI TUBE 225 PSI ASME SEC. VIII, DIV.1 UW-11(b) TYPE BEM SIZE 25-240 TEMA B TAG # E-0543 P.O. # 96272-009 CUSTOMER MODULAR PROCESS SYSTEMS	75/FV PSI AT 300 °F -20 °F AT 75 PSI 150 PSI AT 300 °F -20 °F AT 150 PSI YEAR MFD 1997	SPECIFICATIONS <table border="1" style="width: 100%;"> <thead> <tr> <th></th> <th>SHELL SIDE</th> <th>TUBE SIDE</th> </tr> </thead> <tbody> <tr><td>MEAN METAL TEMP. °F</td><td>141</td><td>128</td></tr> <tr><td>NUMBER OF PASSES</td><td>1</td><td>1</td></tr> <tr><td>RADIOGRAPHY PER UW-11(b)</td><td>SPOT</td><td>SPOT</td></tr> <tr><td>PWHT</td><td>NONE</td><td>N/A</td></tr> <tr><td>VOLUME:</td><td colspan="2">69.75 CU FT</td></tr> <tr><td>TUBE TYPE:</td><td colspan="2">PLAIN</td></tr> <tr><td>TUBE HOLES:</td><td colspan="2">510</td></tr> <tr><td>TUBE LAYOUT:</td><td colspan="2">1' (30")</td></tr> <tr><td>TUBE / TUBESHEET JOINT:</td><td colspan="2">EXPANDED-2GRV</td></tr> <tr><td>BAFFLE TYPE:</td><td colspan="2">DOUBLE SEGMENTAL 27%V</td></tr> <tr><td>NUMBER OF BAFFLES:</td><td colspan="2">9</td></tr> <tr><td>BAFFLE SPACING (C TO C)</td><td colspan="2">22 1/2"</td></tr> <tr><td>IMPINGEMENT PROTECTION:</td><td colspan="2">NONE</td></tr> <tr><td>INLET SPACING:</td><td colspan="2">29 1/4"</td></tr> <tr><td>CODE:</td><td colspan="2">ASME SECT VIII DIV 1 95 ED 95 ADD</td></tr> <tr><td>ESTIMATED WEIGHT EMPTY:</td><td colspan="2">8742 LBS</td></tr> <tr><td>ESTIMATED WEIGHT FULL:</td><td colspan="2">13148 LBS</td></tr> <tr><td>ESTIMATED WEIGHT BUNDLE:</td><td colspan="2">5941 LBS</td></tr> </tbody> </table>		SHELL SIDE	TUBE SIDE	MEAN METAL TEMP. °F	141	128	NUMBER OF PASSES	1	1	RADIOGRAPHY PER UW-11(b)	SPOT	SPOT	PWHT	NONE	N/A	VOLUME:	69.75 CU FT		TUBE TYPE:	PLAIN		TUBE HOLES:	510		TUBE LAYOUT:	1' (30")		TUBE / TUBESHEET JOINT:	EXPANDED-2GRV		BAFFLE TYPE:	DOUBLE SEGMENTAL 27%V		NUMBER OF BAFFLES:	9		BAFFLE SPACING (C TO C)	22 1/2"		IMPINGEMENT PROTECTION:	NONE		INLET SPACING:	29 1/4"		CODE:	ASME SECT VIII DIV 1 95 ED 95 ADD		ESTIMATED WEIGHT EMPTY:	8742 LBS		ESTIMATED WEIGHT FULL:	13148 LBS		ESTIMATED WEIGHT BUNDLE:	5941 LBS	
	SHELL SIDE	TUBE SIDE																																																										
MEAN METAL TEMP. °F	141	128																																																										
NUMBER OF PASSES	1	1																																																										
RADIOGRAPHY PER UW-11(b)	SPOT	SPOT																																																										
PWHT	NONE	N/A																																																										
VOLUME:	69.75 CU FT																																																											
TUBE TYPE:	PLAIN																																																											
TUBE HOLES:	510																																																											
TUBE LAYOUT:	1' (30")																																																											
TUBE / TUBESHEET JOINT:	EXPANDED-2GRV																																																											
BAFFLE TYPE:	DOUBLE SEGMENTAL 27%V																																																											
NUMBER OF BAFFLES:	9																																																											
BAFFLE SPACING (C TO C)	22 1/2"																																																											
IMPINGEMENT PROTECTION:	NONE																																																											
INLET SPACING:	29 1/4"																																																											
CODE:	ASME SECT VIII DIV 1 95 ED 95 ADD																																																											
ESTIMATED WEIGHT EMPTY:	8742 LBS																																																											
ESTIMATED WEIGHT FULL:	13148 LBS																																																											
ESTIMATED WEIGHT BUNDLE:	5941 LBS																																																											
SHELLSIDE BODY SA-240-304L THK. 1/4" HEAD(S) - THK. - CA. 0" TUBESIDE BODY SA-516-70N THK. 3/8" HEAD(S) SA-516-70N THK. 3/8" CA. 1/16" TUBESHEETS SA-240-304L THK A 2" THK B 2" TUBES: MAT'L./QTY./DIA./GA./LG./S.A.(BARE) SA-240-TP304L/510/0.75"/16BWG/240"/2003ft2 FLG. HD: MAT'L./TYPE/D.D./THK. - C.R.N. ALBERTA CRN TO FOLLOW																																																												

NOTES

- INSULATION: NONE
- PRIMER COAT: CARBON STEEL ONLY TO SSPC-6 WITH (1) SHOP COAT PRIMER
- FINISH COAT: NONE
- STRESS RELIEVING: (TUBE SIDE): N/A
(SHELL SIDE): N/A
- IMPACT TESTING: (TUBE SIDE): EXEMPT PER UG-20(f)
(SHELL SIDE): EXEMPT PER UHA-51
- RADIOGRAPHY: (SHELL SIDE): PER UW-11(b) SPOT
(TUBE SIDE): PER UW-11(b) SPOT

MODULAR PROCESS SYSTEMS FOR
HOFFMANN - LA ROCHE
PROJECT NO: 2701
MPSI P.O. NO: 96272-009
POSITION NO: E0543
ASSET NO:
PLANT LOCATION: BELVIDERE, NJ

TITLE: BILL OF MATERIAL / SPECIFICATIONS		SCALE: NTS	
DWN. BY: DRA	DATE: JAN 6/97	CHK. BY: CAZ	DATE: JAN 8
1 REV'D PER CUSTOMER MARKUP	DRA JAN 24/97	APP. BY: C.A. ZAHARA	DATE: JAN 8/97
REV	DESCRIPTION	BY	DATE
			DATE
DWG. NO: 96-3697-02			REV. 1



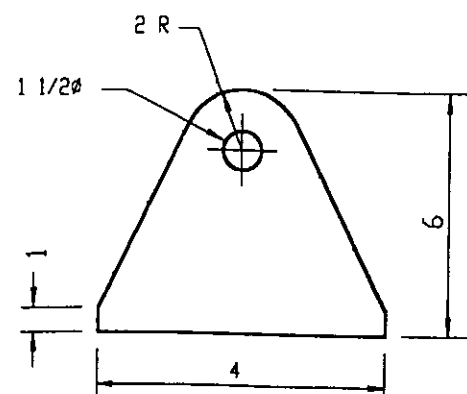
Design Specifications	
Number of Tube Holes	510
Tube Outside Diameter	3/4
Tube Pitch	1
Tube Pattern	Triangular 30
Tube Passes	2
Number of Tie Rods	6
Tie Rod Diameter	3/8
Baffle Diameter	25 5/16
Baffle Type	Double Segmental
Baffle Cut	27% V
O.T.L.	25 1/8

- NOTES:
- DIMENSIONS IN INCHES
 - BOLT HOLES TO STRADDLE CENTER LINES

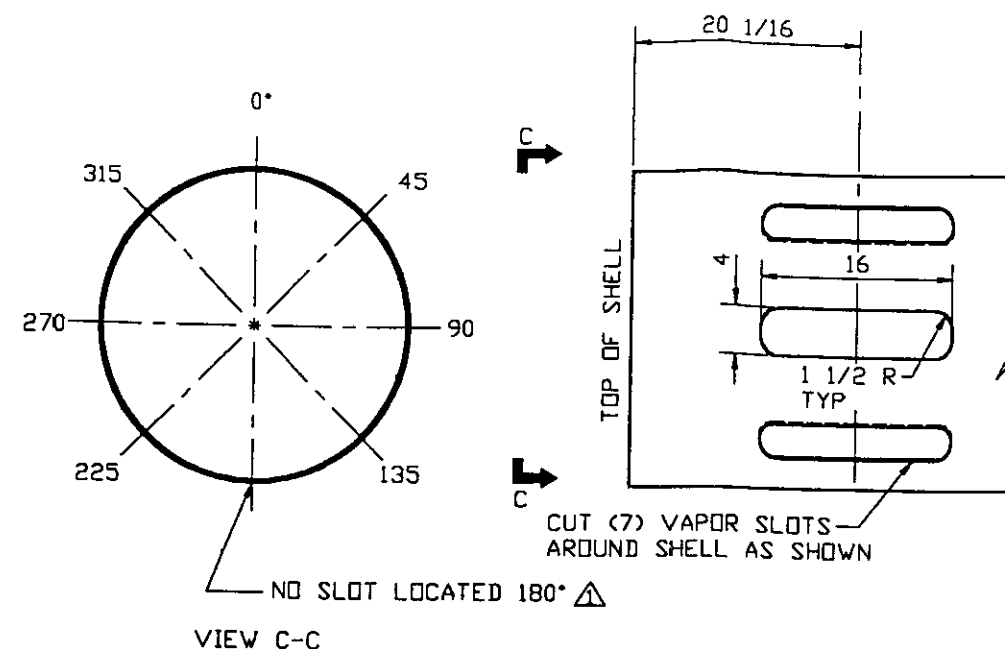


MODULAR PROCESS SYSTEMS FOR
HOFFMANN - LA ROCHE
PROJECT NO: 2701
MPST P.I. NO: 96272-009
POSITION NO: E0543
ASSET NO:
PLANT LOCATION: BELVIDERE, NJ

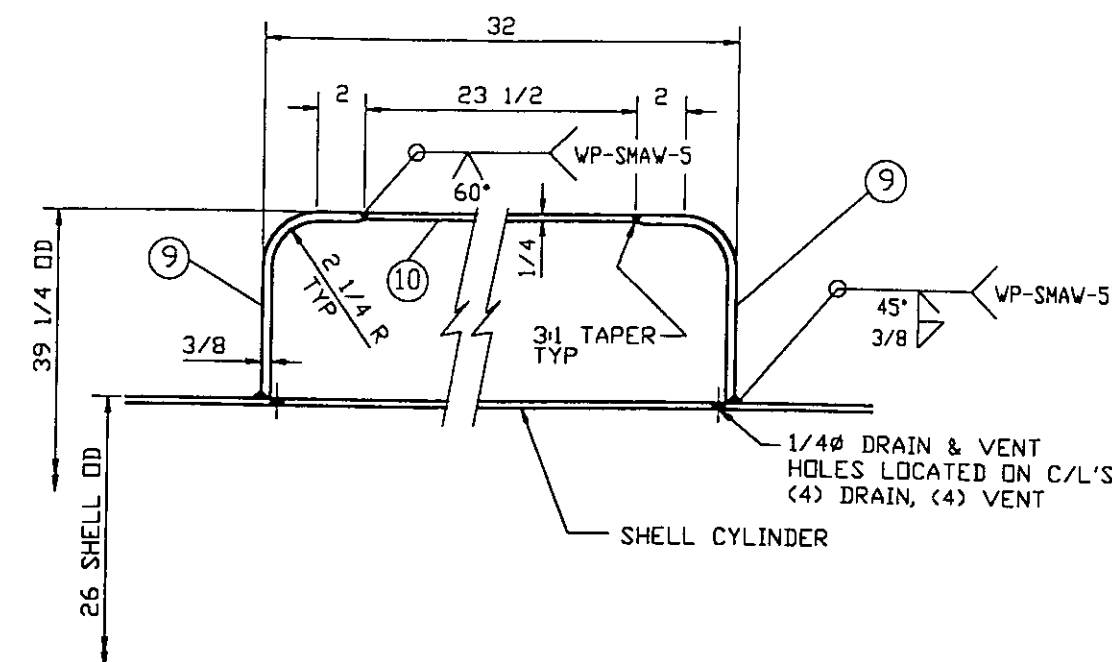
TITLE: LAYOUT / TUBESHEETS	SCALE: NTS
DWN. BY: DRA (DATE: JAN 3/97)	CHK. BY: CAZ (DATE: JAN 8)
APP. BY: C.A. ZAHARA (DATE: JAN 8/97)	
REV. 1	DESCRIPTION
BY	DATE
APP	DATE
DWG. NO: 96-3697-03	REV. 1



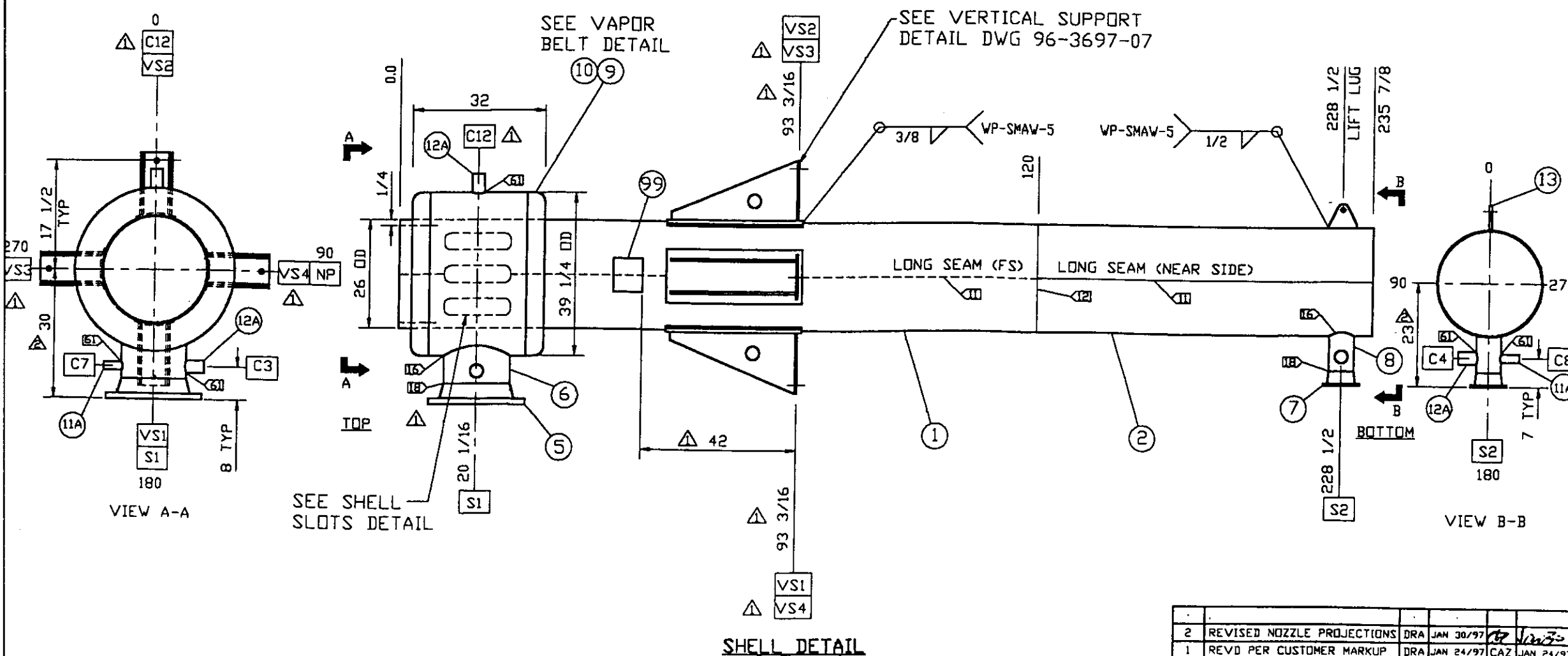
⑬ SHELL LIFT LUG DETAIL 3/4THK



VAPOR SLOTS DETAIL



⑨⑩ VAPOR BELT DETAIL



SHELL DETAIL

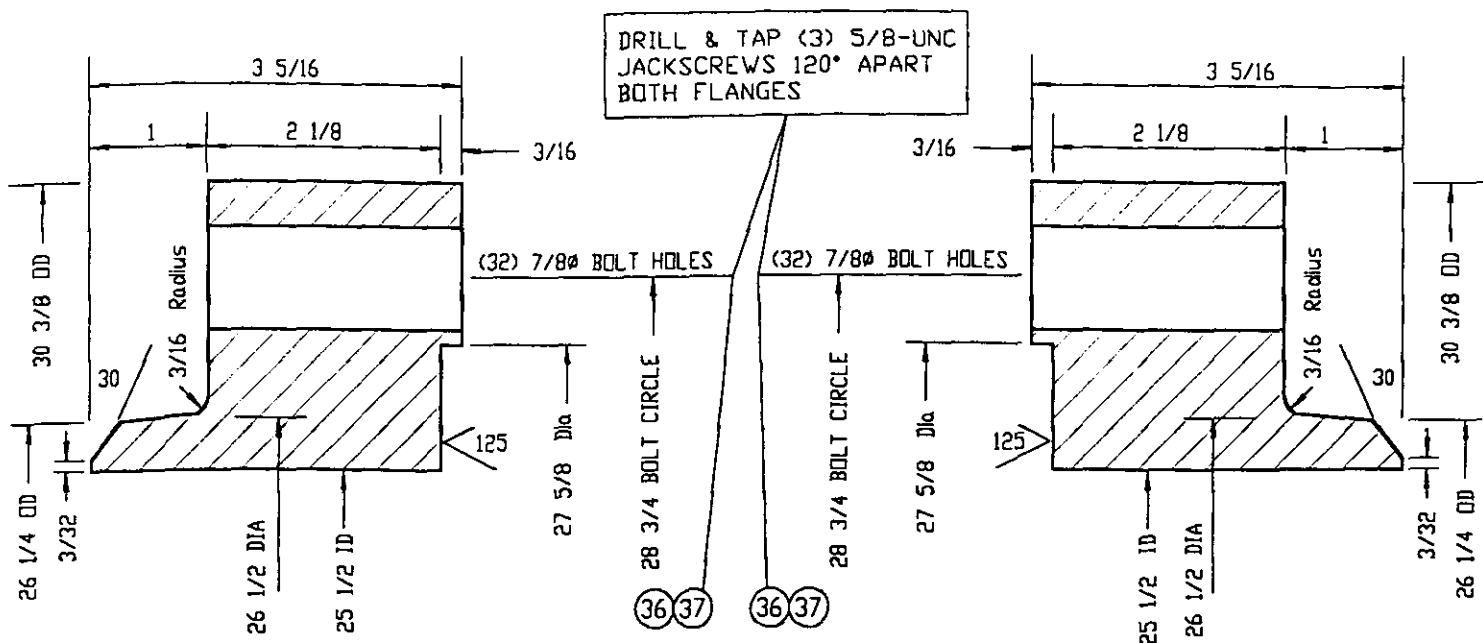
NOTES:

- DIMENSIONS IN INCHES
- WELD JOINT DETAILS PER DRAWING #2
- PER ASME SEC VIII DIV 1 95 ED
- BOLT HOLES TO STRADDLE CENTER LINES
- WELDING IN ACCORDANCE WITH CODE
- UNLESS OTHERWISE SPECIFIED WELDS 3/8



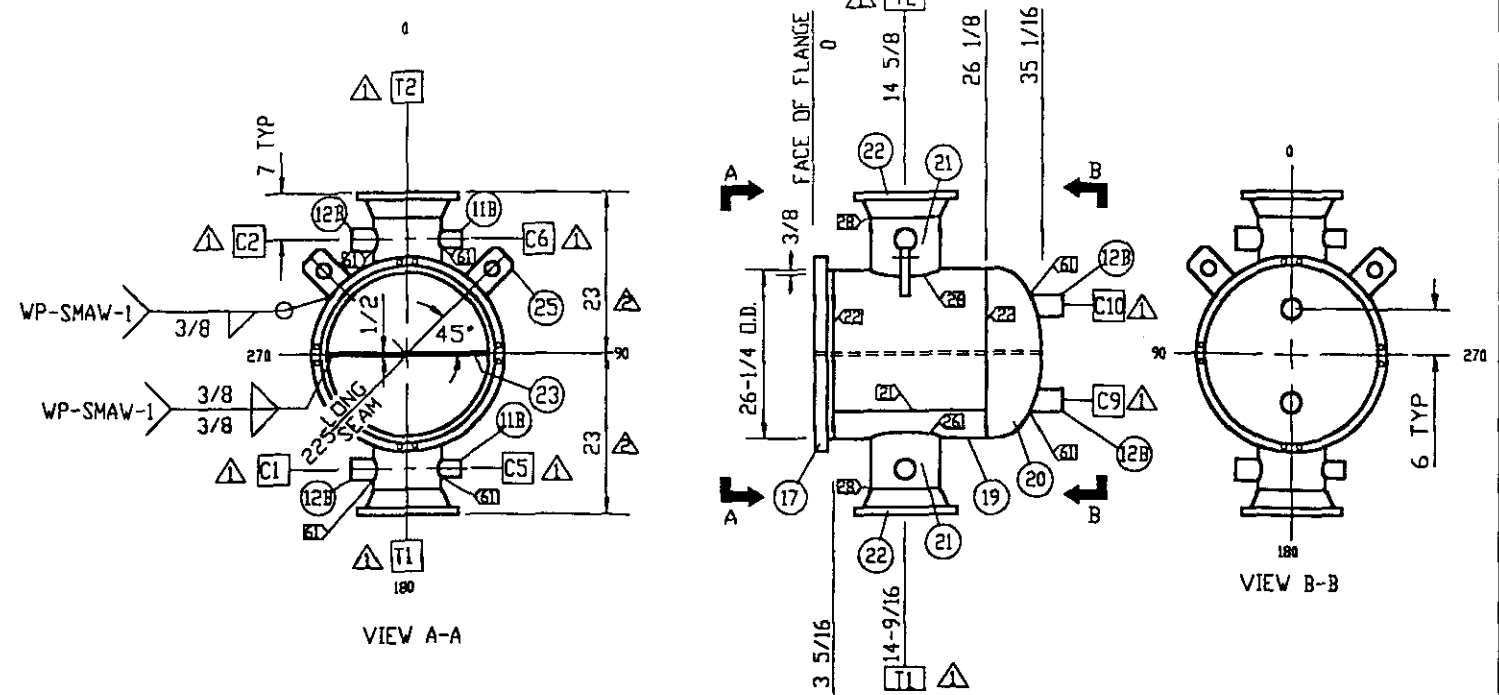
MODULAR PROCESS SYSTEMS FOR
HOFFMANN - LA ROCHE
PROJECT NO: 2701
NPST P.O. NO: 96272-009
POSITION NO: E0543
ASSET NO:
PLANT LOCATION: BELVIDERE, NJ

REV	DESCRIPTION	BY	DATE	APP	DATE	TITLE: SHELL DETAIL	SCALE: NTS
2	REVISED NOZZLE PROJECTIONS	DRA	JAN 30/97	CAZ	JAN 30/97	DWN. BY: DRA DATE: JAN 6/97	CHK. BY: CAZ DATE: JAN 8
1	REV'D PER CUSTOMER MARKUP	DRA	JAN 24/97	CAZ	JAN 24/97	APP. BY: C.A. ZAHARA DATE: JAN 8/97	
						DWG. NO: 96-3697-04	REV. 2

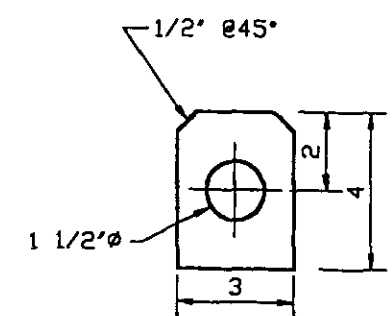


17 BOTTOM HEAD FLANGE AT TUBESHEET

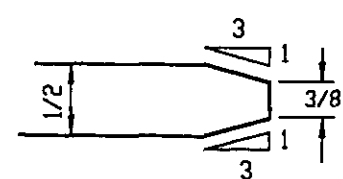
18 TOP HEAD FLANGE AT TUBESHEET



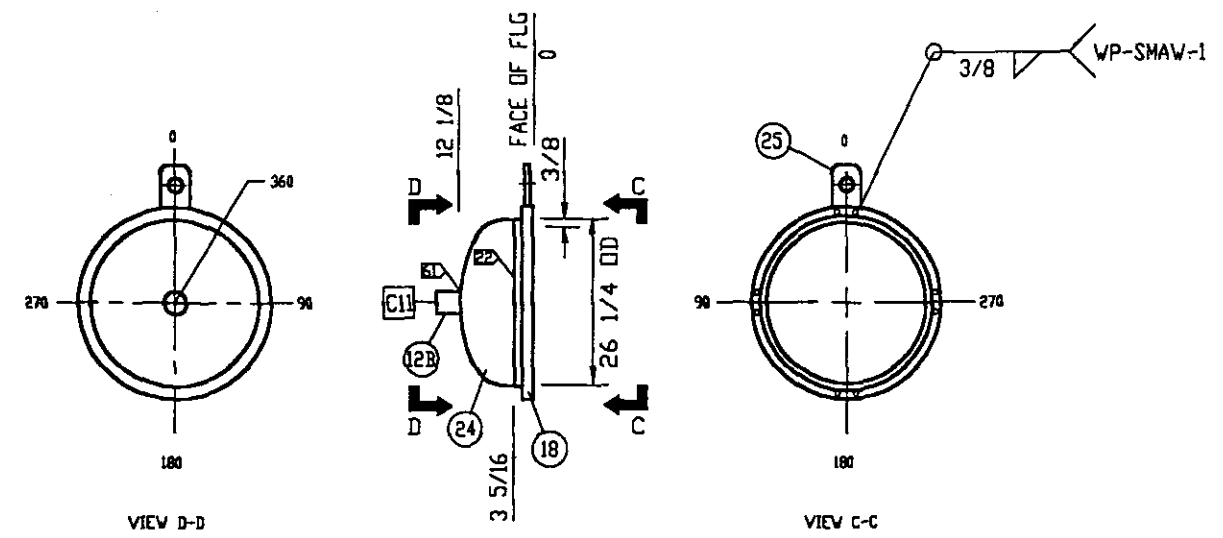
BOTTOM HEAD DETAIL



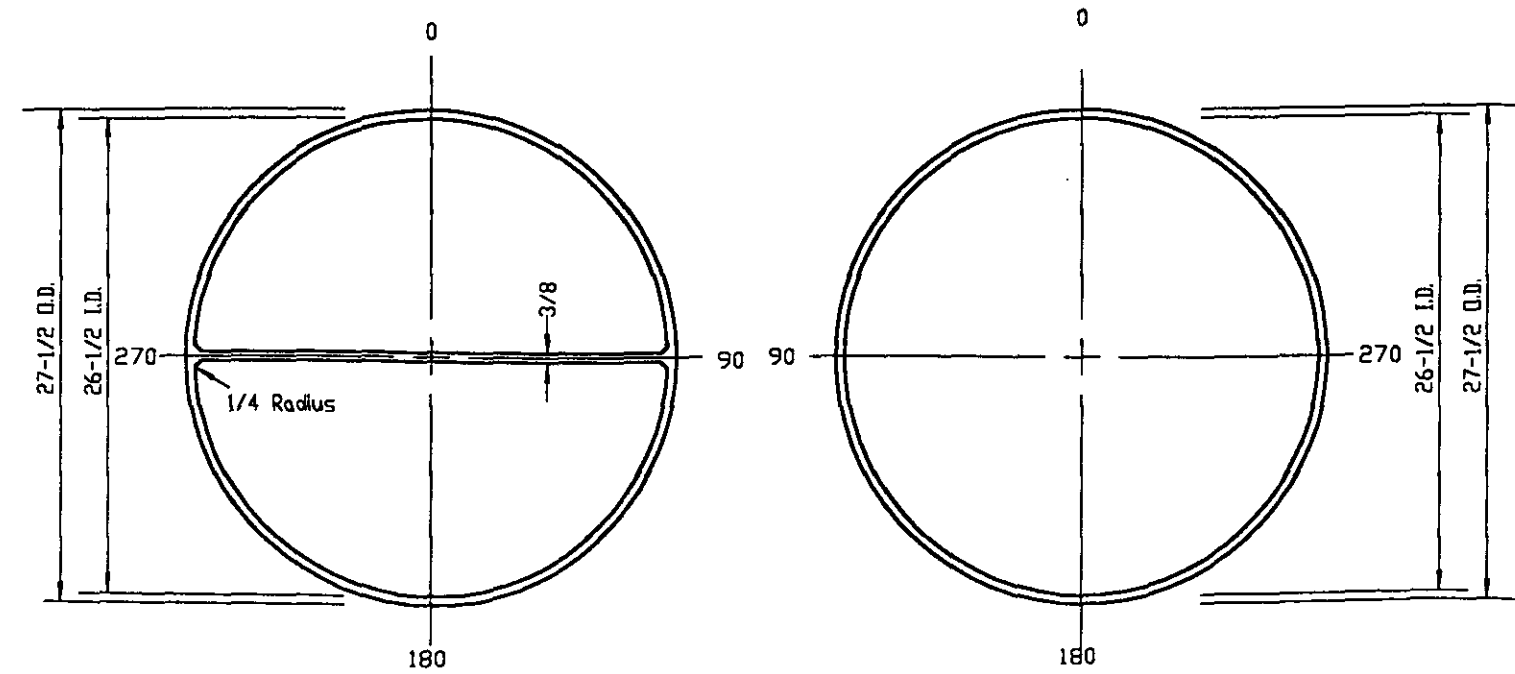
25 HEADS LIFT LUG DETAIL 1/2" THK



23 PASS PLATE TAPER DETAIL



TOP HEAD DETAIL



26 BOTTOM HEAD GASKET AT TUBESHEET

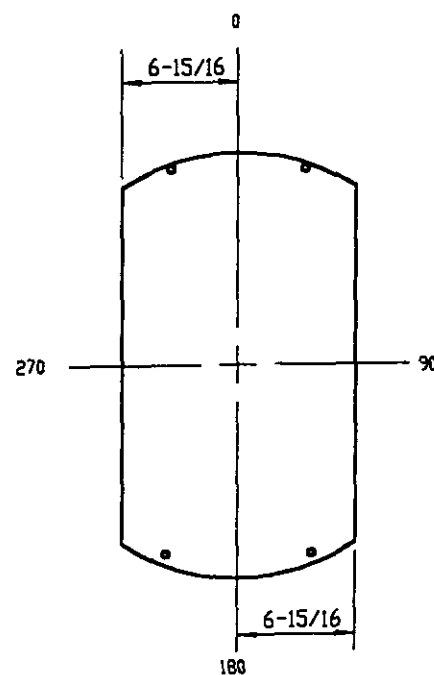
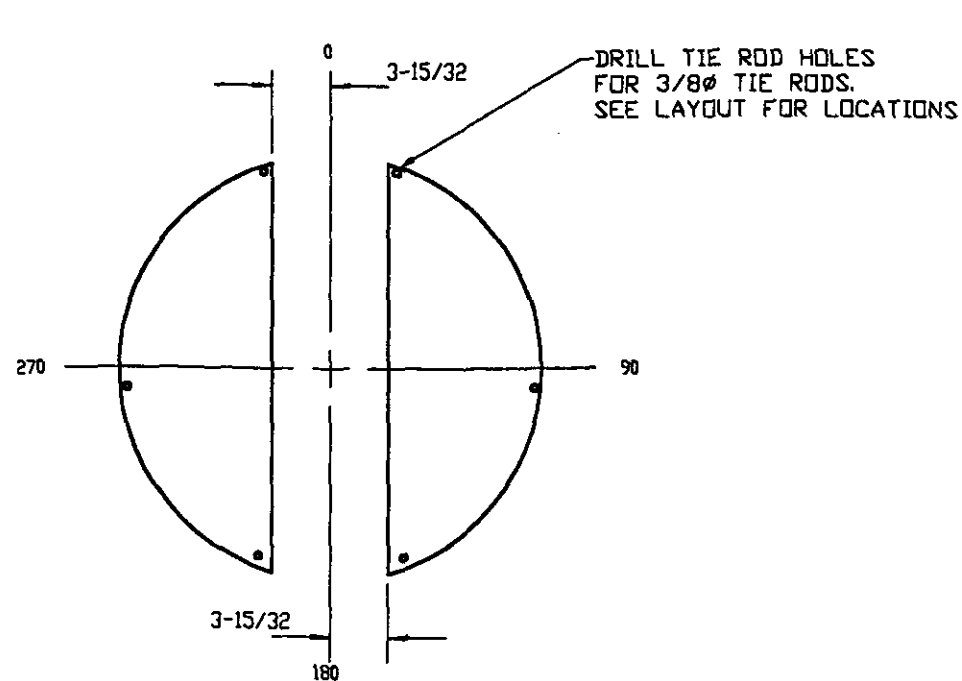
27 TOP HEAD GASKET AT TUBESHEET

- NOTES:
- DIMENSIONS IN INCHES
 - WELD JOINT DETAILS PER DRAWING #2
 - PER ASME SEC VIII DIV 1 95 ED
 - BOLT HOLES TO STRADDLE CENTER LINES
 - WELDING IN ACCORDANCE WITH CODE
 - UNLESS OTHERWISE SPECIFIED WELDS 3/8

KALTEX
HEAT EXCHANGER LTD
EDMONTON, ALB. CANADA

MODULAR PROCESS SYSTEMS FOR
HOFFMANN - LA ROCHE
PROJECT NO: 2701
MPSI P.O. NO: 96272-009
POSITION NO: E0543
ASSET NO:
PLANT LOCATION: BELVIDERE, NJ

REV	DESCRIPTION	BY	DATE	APP	DATE	TITLE	SCALE
2	REVISED NOZZLE PROJECTION	DRA	JAN 30/97	CAZ	JAN 30/97	HEADS AND GASKETS DETAILS	SCALE: NTS
1	REV'D PER CUSTOMER MARKUP	DRA	JAN 24/97	CAZ	JAN 24/97	DWN. BY: DRA DATE: JAN 6/97	CHK. BY: CAZ DATE: JAN 8
						APP. BY: C.A. ZAHARA DATE: JAN 8/97	
						DWG. NO: 96-3697-05	REV. 2

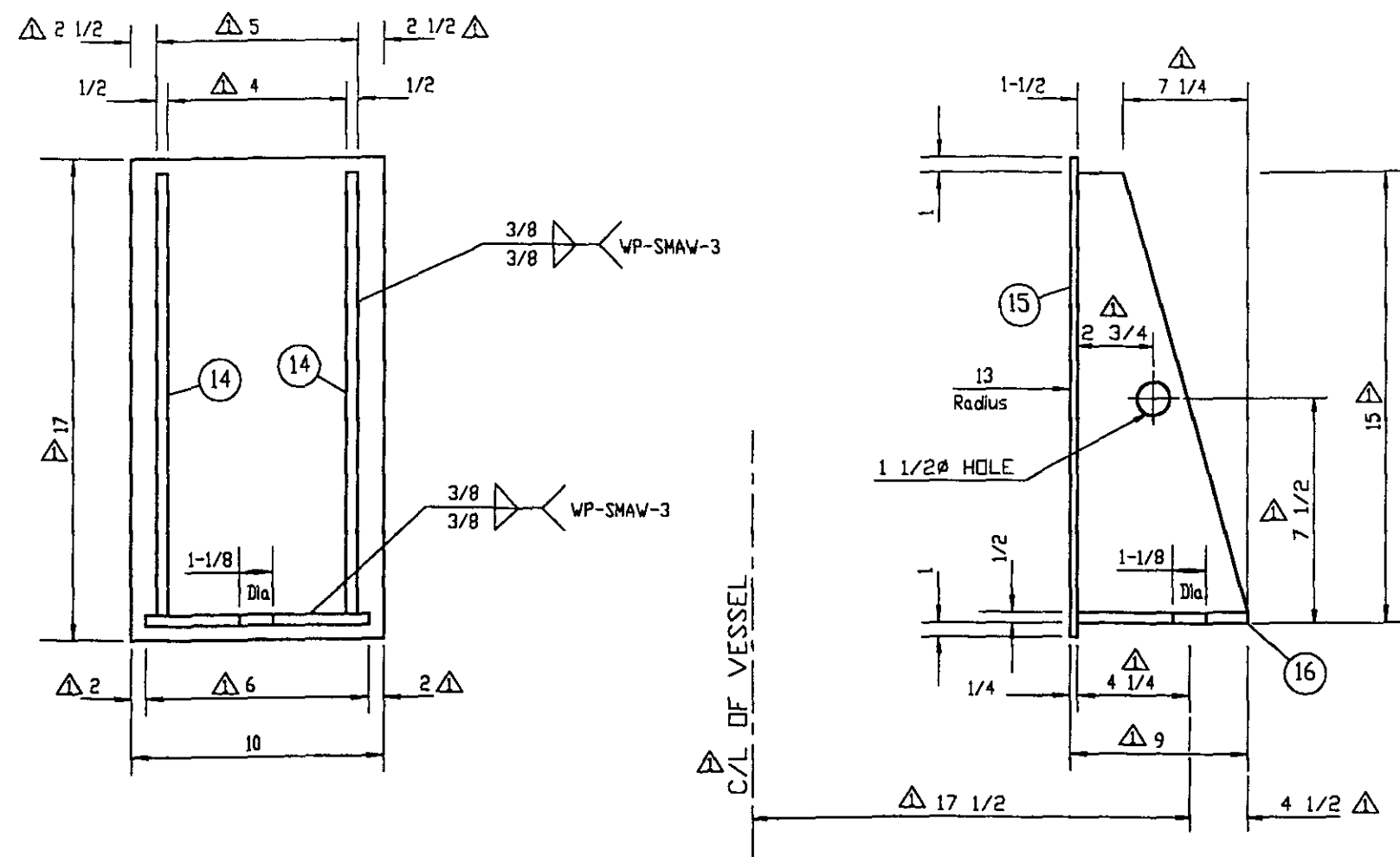


- DIMENSIONS IN INCHES
- WELD JOINT DETAILS PER DRAWING #2
- PER ASME SEC VIII DIV 1 95 ED
- BOLT HOLES TO STRADDLE CENTER LINES
- WELDING IN ACCORDANCE WITH CODE
- UNLESS OTHERWISE SPECIFIED WELDS 3/8
- DRILL TUBE HOLES IN BAFFLES 49/64ø

***ALTEX**
HEAT EXCHANGER LTD.
EDMONTON, ALB., CANADA

MODULAR PROCESS SYSTEMS FOR
HOFFMANN - LA ROCHE
PROJECT NO: 2701
MPST P.I. NO: 96272-009
POSITION NO: E0543
ASSET NO:
PLANT LOCATION: BELVIDERE, NJ

					TITLE: BUNDLE DETAIL		SCALE: NTS	
					DWN. BY: DRA		DATE: JAN 6/97	
					CHK. BY: CAZ		DATE: JAN 8	
1 REVD PER CUSTOMER MARKUP					DRA		JAN 24/97	
REV					DESCRIPTION		BY DATE APP DATE	
					DWG. NO.: 96-3697-06		REV. 1	



VERTICAL SUPPORT DETAIL (VSL VS2, VS3, VS4) △

NOTES:

- DIMENSIONS IN INCHES
- PER ASME SEC VIII DIV 1 95 ED
- WELDING IN ACCORDANCE WITH CODE
- UNLESS OTHERWISE SPECIFIED WELDS 3/8

DWG NO. 96-3697-07



MODULAR PROCESS SYSTEMS FOR
HOFFMANN - LA ROCHE
PROJECT NO: 2701
MPSI P.O. NO: 96272-009
POSITION NO: E0543
ASSET NO:
PLANT LOCATION: BELVIDERE, NJ

REV	DESCRIPTION	BY	DATE	APP	DATE	TITLE	SCALE	NTS
1	REV'D PER CUSTOMER MARKUP	DRA	JAN 24/97	CAZ	JAN 24/97	VERTICAL SUPPORT DETAIL	1:1	NTS
						DWN. BY: DRA DATE: JAN 6/97	CHK. BY: CAZ	DATE: JAN 8
						APP. BY: C.A. ZAHARA DATE: JAN 8/97		
						DWG NO: 96-3697-07		REV 1