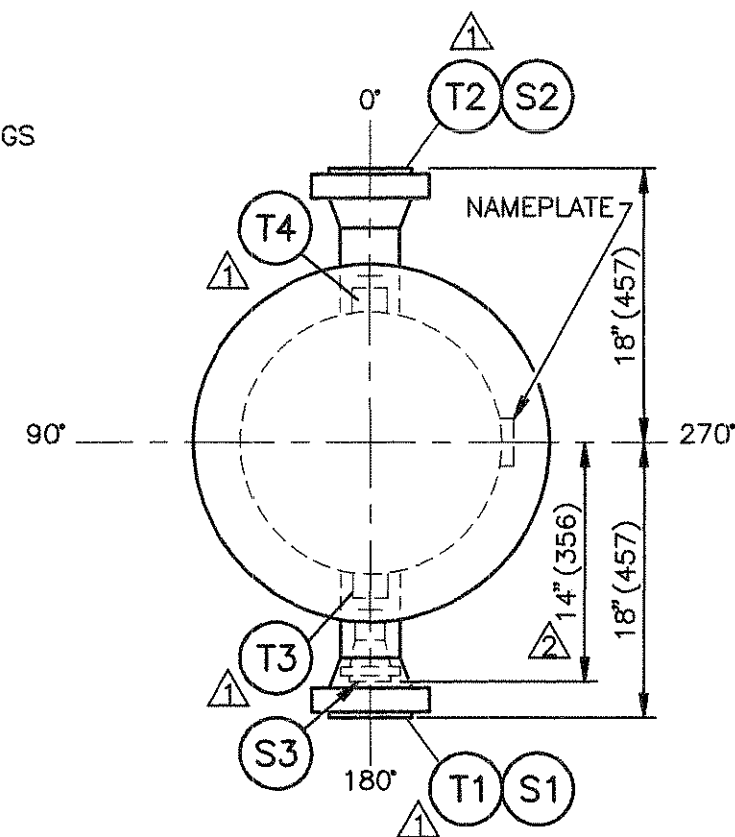
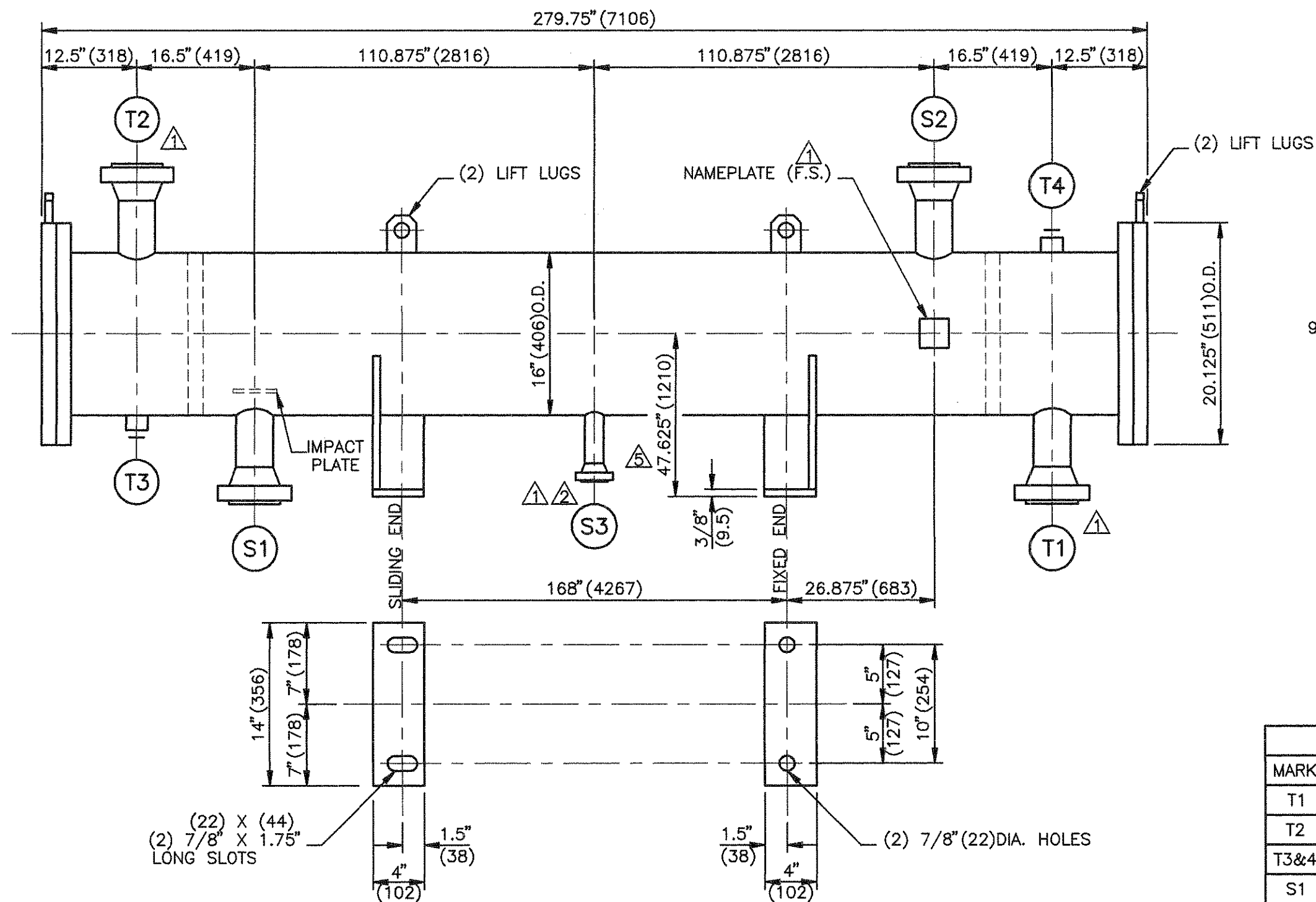




NOZZLE SCHEDULE					
MARK	SIZE	RATING	TYPE	SCH.	SERVICE
T1	6"	300#	RFWN	XH	CHANNEL INLET
T2	6"	300#	RFWN	XH	CHANNEL OUTLET
T3&4	3/4"	6000#	CPLG	-	VENT & DRAIN
S1	6"	300#	RFWN	XH	SHELL INLET
S2	6"	300#	RFWN	XH	SHELL OUTLET
S3	3/4"	300#	RFWN	160	DRAIN

This drawing is the property of Exchanger Industries and shall not be used in any way detrimental to Exchanger Industries nor shall be copied, lent or used for any purpose other than that intended.

REVISIONS

- ① PER CUST'R APPV'L FEB 16/94
- ② PER CUST'R APPV'L MAR 25/94 N.I. - 004398
- ③ PER E.I. APRIL 5/94 A-004415
- ④ PER E.I. APRIL 7/94 B-004422
- ⑤ PER E.I. AS BUILT APR/13/94 C-004431

CUSTOMER: I.P. CONSTRUCTORS LTD
 FOR: NORCEN ENERGY, GOLDEN SPIKE PHASE 2
 SULFEROX PROCESS SKID PACKAGE.
 P.O. NO.: 1536-2
 TEMA TYPE: NEN
 SIZE: 15-240 (381-6096)
 SERVICE: GAS/GAS EXCHANGER

SHELL/TUBE EXCHANGER OUTLINE DRAWING

I.P.C. DWG# B-1536-09-30 SHT.1

NO. OF EXCHANGERS REQ'D: ONE

DWN GG CKD DSL ITEM E-202

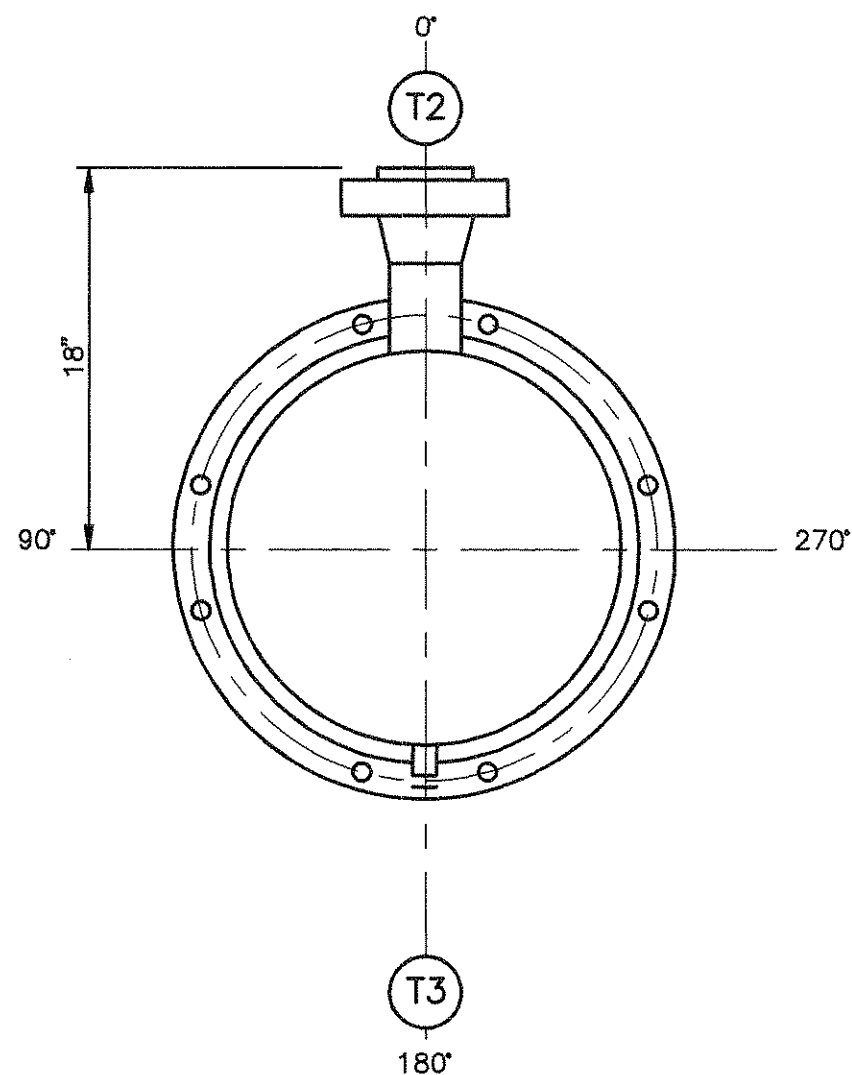


EXCHANGER INDUSTRIES
 CALGARY, ALBERTA

DWG NO. 94-2996

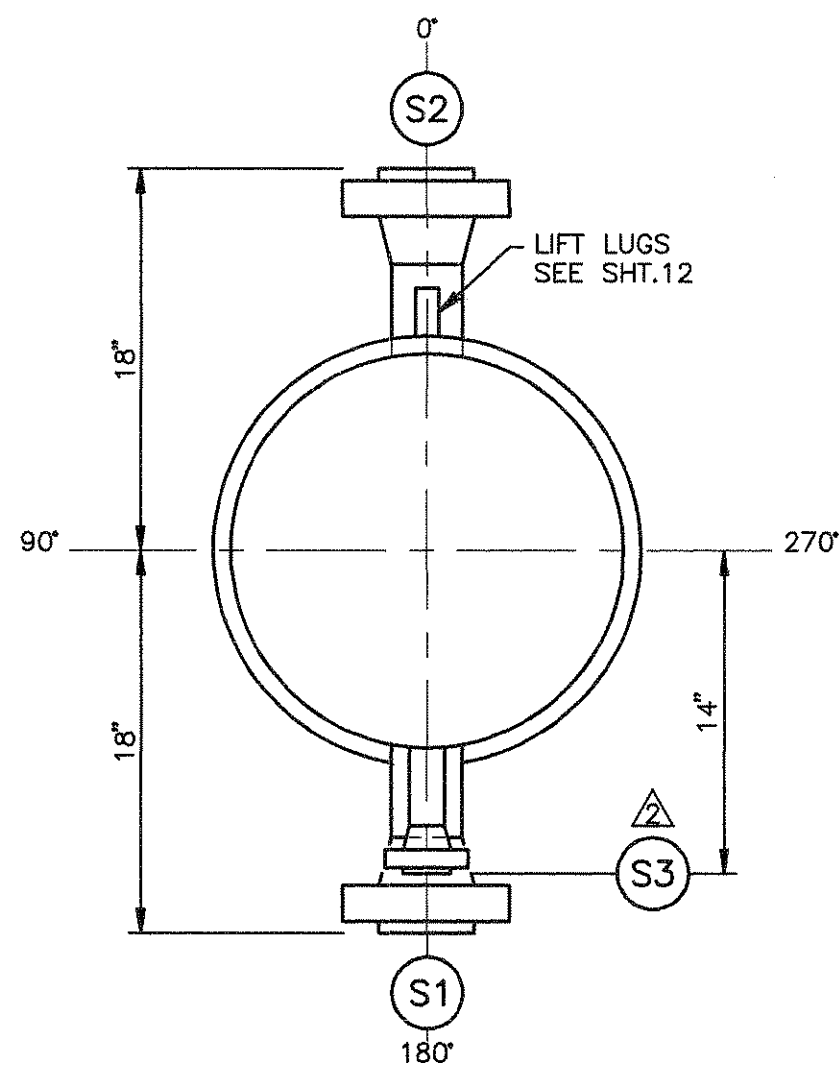
SHEET 1 OF 13

MATERIAL LIST						CONSTRUCTION NOTES						
LINE	PART	MATERIAL	LINE	PART	MATERIAL	(1) CONSTRUCTION TO BE PER ASME CODE SECTION VIII DIVISION 1 1992 EDITION & 1992 DECEMBER ADDENDA, TEMA CLASS "C" 1988 EDITION, & CUSTOMER SPECIFICATIONS. (2) ALL BOLT HOLES TO STRADDLE CENTER LINES UNLESS NOTED OTHERWISE. (3) CODE STAMP REQ'D: YES (PROVINCE OF ALBERTA). (4) IMPACT TESTING: EXEMPT PER UHA-51(a). (5) STRESS RELIEVE: NONE. (6) RADIOGRAPHY: 100% ALL BUTT WELDS (SHELL & CHANNEL) ²  TO INCLUDE WELDED PIPE SEAMS. (7) WELD PROCEDURES: M1-P8, A-34 & SA-A-17. (8) PAINT: NONE. (9) INSULATION: NONE.						
CHANNEL			TUBE BUNDLE									
1	COVER/HEAD	SA-240-304L	37	TUBESHEET	SA-240-304L							
2	TEMA FLANGE	SA-182-304L	38	TUBES	SA-249-304L							
3	CYLINDER	SA-312-304L WLD ⁴ 	39	BAFFLE/SUPPORT PLATES	SA-240-304L							
4	NOZZLE FLANGE	SA-182-304L	40	IMPACT PLATE	SA-240-304L							
5	NOZZLE NECK	SA-312-304L	41	TIE-ROD/NUT/SPACER	304S.S.							
6	NOZZLE REINFORCEMENT PAD	-	42									
7	COUPLING/THREDOLET/PLUG	SA-182-304L	43									
8	PASS PLATE	-	GASKETS									
9	STUDBOLTS	SA-193-B7M	44	CHANNEL ⁴ 	304LS.S. D.J. NONASB.							
10	NUTS	SA-194-2HM	45	SHELL	-							
11			46	FLOATING HEAD	-							
12			47	CHANNEL NOZZLE	-							
	SHELL		48	SHELL NOZZLE	-							
13	TEMA FLANGE	-	49									
14	CYLINDER	SA-312-304L WLD ⁴ 	50									
15	HEAD	-	MATERIAL NOTES			DESIGN CONDITIONS	SHELL SIDE	CHANNEL SIDE				
16	CONE	-				DESIGN PRESSURE	465PSI (3206kPa)	465PSI (3206kPa)				
17	NOZZLE FLANGE	SA-182-304L				EXTERNAL PRESSURE	-	-				
18	NOZZLE NECK	SA-312-304L				DESIGN TEMPERATURE	150°F (65.5°C)	150°F (65.5°C)				
19	NOZZLE REINFORCEMENT PAD	-				MDMT	-20°F (-29°C)	-20°F (-29°C)				
20	COUPLING/THREDOLET/PLUG	SA-182-304L				C&H MAWP	-	-				
21	WEIR PLATE	-				C&H MAWP LIMITED BY	-	-				
22	SUPPORT WRAPPER PLATE	-				HYDRO TEST PRESSURE	702PSI (4840kPa)	702PSI (4840kPa)				
23	SUPPORT	SA-240-304L				CORROSION ALLOWANCE	1/16" (1.6mm)	1/16" (1.6mm)				
24	STUDBOLTS	-				N&C MAX. PRESS.	-	-				
25	NUTS	-				N&C M.P. LIMITED BY	-	-				
26			(1) STUDBOLTS & NUTS TO BE COATED WITH XYLAN 1070 ¹ 			SHOP HYDRO TEST PRESS.	702PSI (4840kPa)	702PSI (4840kPa)				
27						NUMBER OF PASSES	ONE	ONE				
FLOATING HEAD						SURFACE AREA	438.2SQ.FT (40.7SQ.M)					
28	FLANGE	-				SHIPPING WEIGHT	4600LBS (2086.5kgs)					
29	DISH	-				WEIGHT FULL OF WATER	6500LBS (2948kgs)					
30	PASS PLATE	-				BUNDLE WEIGHT	NOT REMOVABLE					
31	STUDBOLTS	-				CAPACITY	30.5CU.FT (0.864CU.M)					
32	NUTS	-				REVISIONS ¹ PER CUST'R APPV'L FEB 16/94 ² PER CUST'R APPV'L MAR 25/94 ⁴ PER E.I. APR 7/94 B-004422			MATERIALS & DESIGN CONDITIONS		 EXCHANGER INDUSTRIES CALGARY, ALBERTA	
33									² I.P.C. # B-1536-09-31 NO. OF EXCHANGERS REQ'D: ONE			
34									DWN GG	CKD DSL	ITEM E-202	DWG NO. 94-2996
35												SHEET 1A OF 13
36												



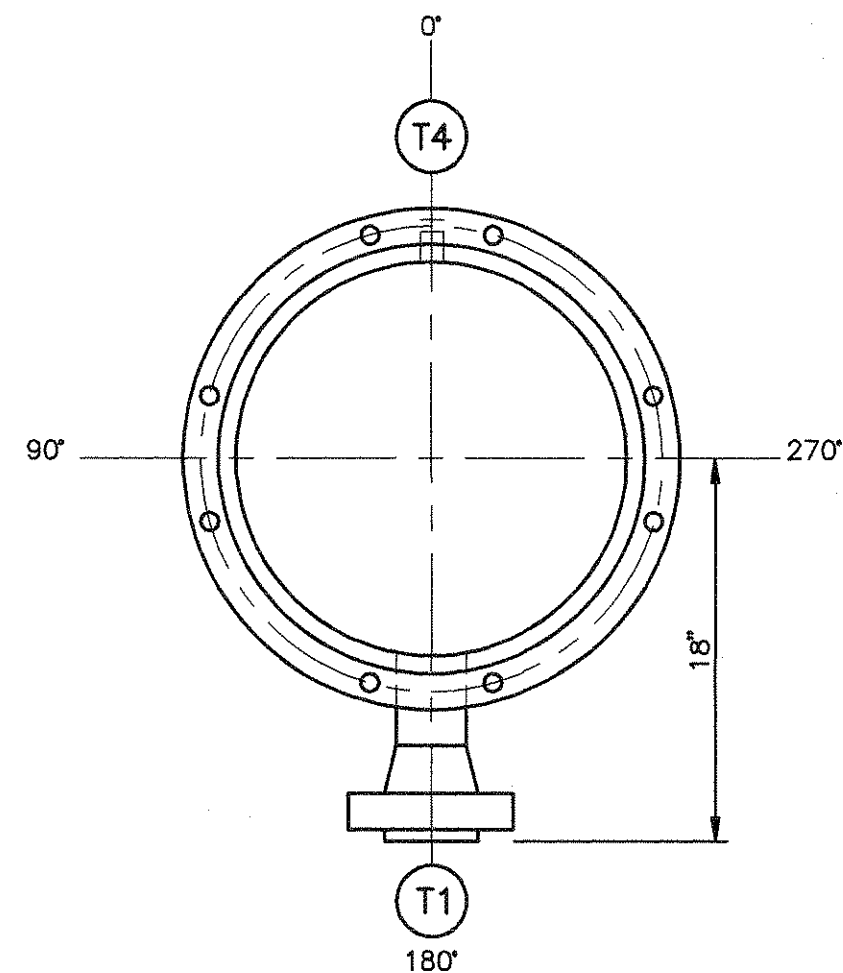
SECTION "C-C"

PREHEAT WELDS: 150°F
 RADIOGRAPHY: 100% ALL BUTT WELDS.
 POST HEAT TREAT: NO



SECTION "B-B"

PREHEAT WELDS: 150°F
 RADIOGRAPHY: 100% ALL BUTT WELDS.
 POST HEAT TREAT: NO



SECTION "A-A"

PREHEAT WELDS: 150°F
 RADIOGRAPHY: 100% ALL BUTT WELDS.
 POST HEAT TREAT: NO

REVISIONS
 △ PER CUST'R APPV'L MAR 25/94 N.I.-004398

**SHELL & CHANNEL
 SECTIONS**

△ I.P.C. # B-1536-09-33
 NO. OF EXCHANGERS REQ'D: ONE

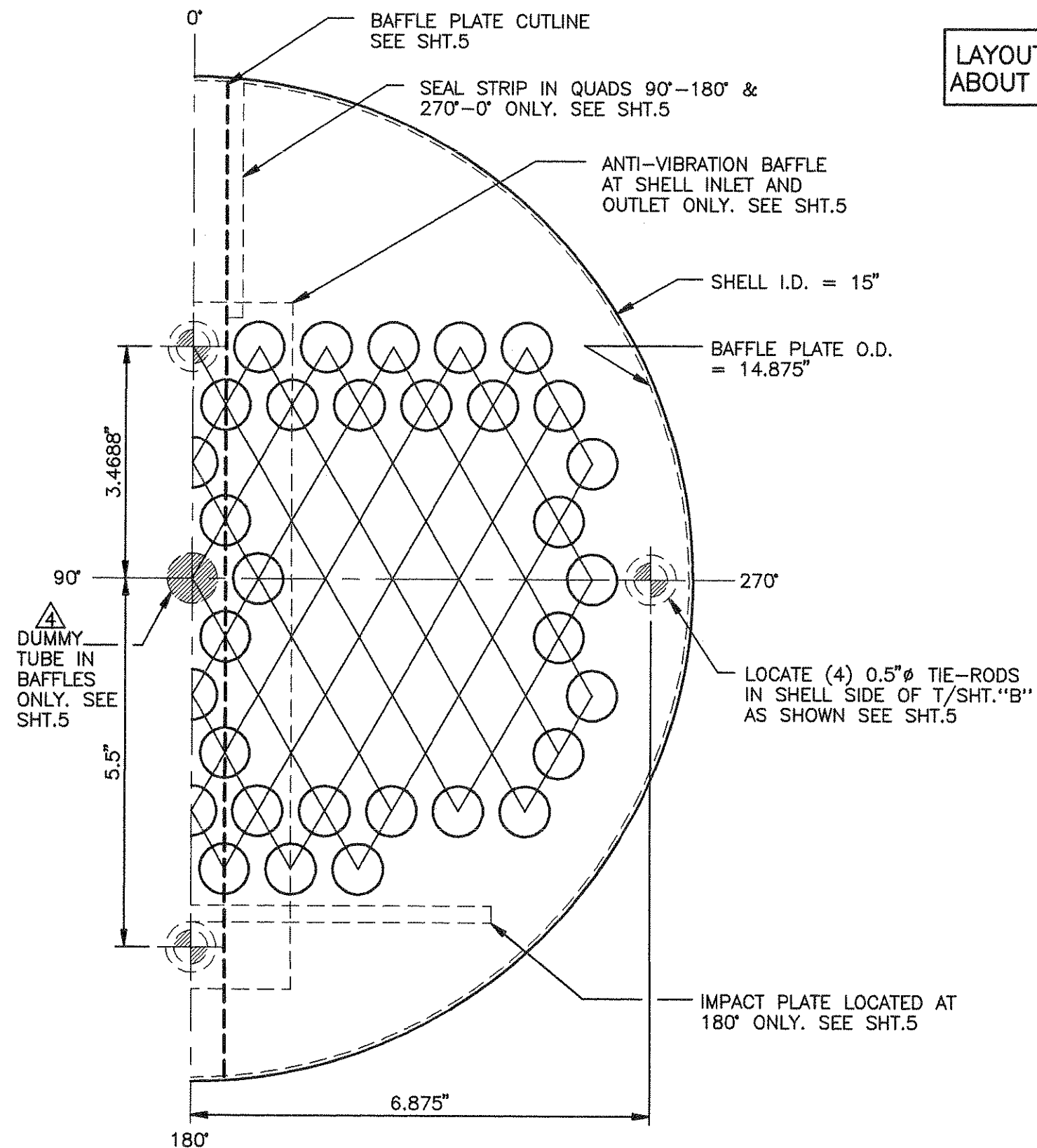
DWN VBL CKD DSL ITEM E-202



EXCHANGER INDUSTRIES
 CALGARY, ALBERTA

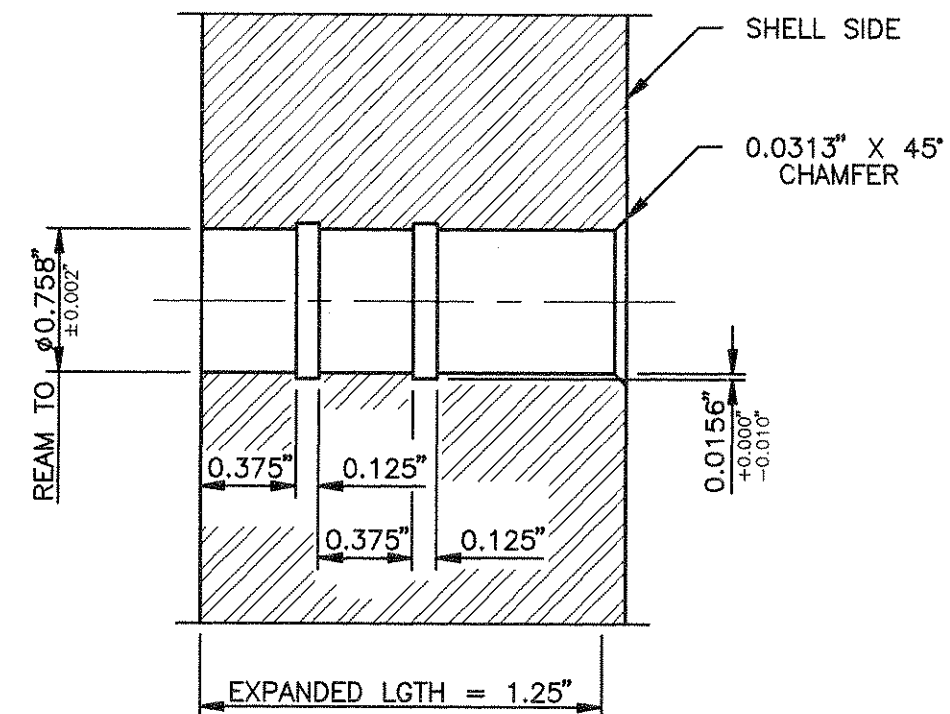
DWG NO. 94-2996

SHEET 3 OF 13

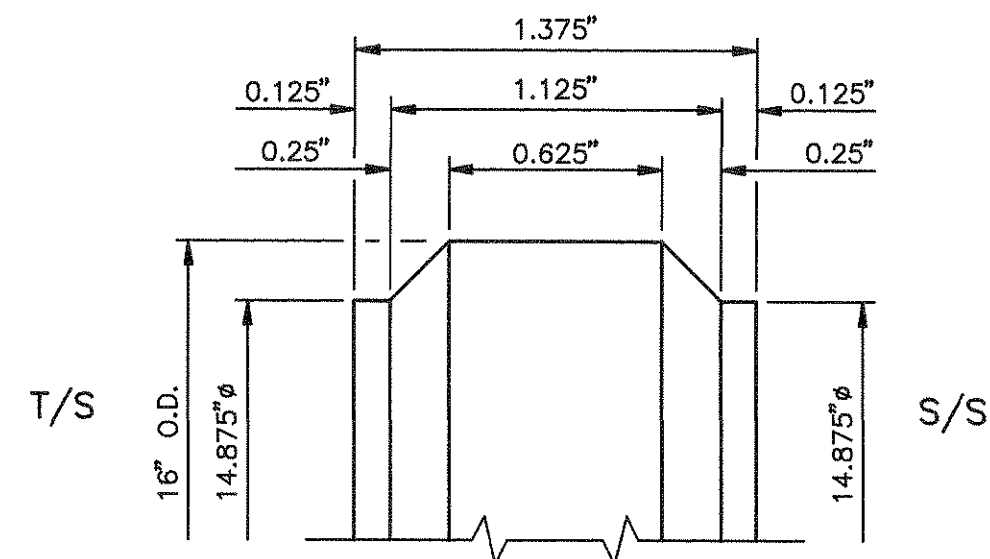


LAYOUT IS SYMMETRICAL
ABOUT VERT'L CTR LINES

4



TUBE HOLE GROOVING DETAIL



TUBESHEET DETAIL

TWO REQ'D EACH EXCHANGER
MATERIAL: SA-240-304L

3

TUBE O.D. = 0.75"

TUBE PITCH = 1.00" 60°

NO. OF TUBES = 113

NO. OF PASSES = ONE

REVISIONS

- 2 PER CUST'R APPV'L MAR 23/94 N.I.-004398
- 3 PER E.I. APRIL 5/94 A-004415
- 4 PER E.I. APRIL 7/94 A-004422

TUBE HOLE LAYOUT

I.P.C. # B-1536-09-34

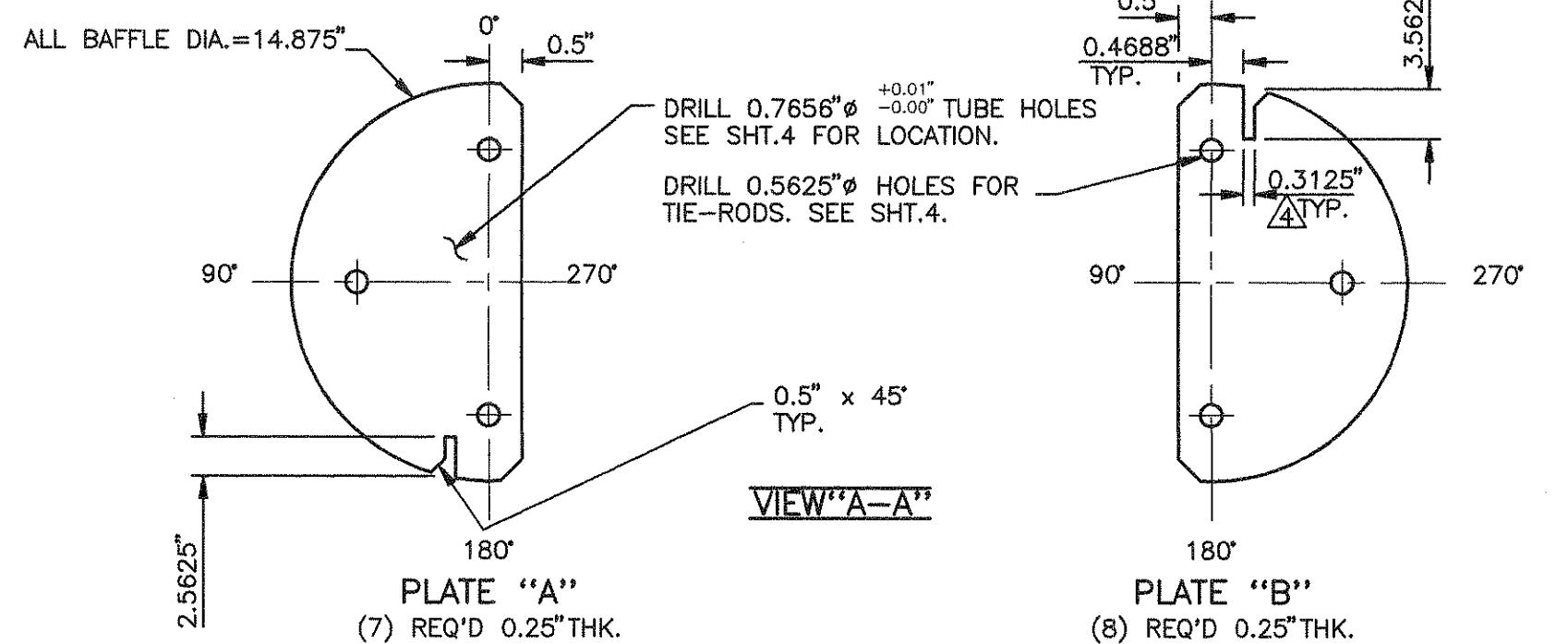
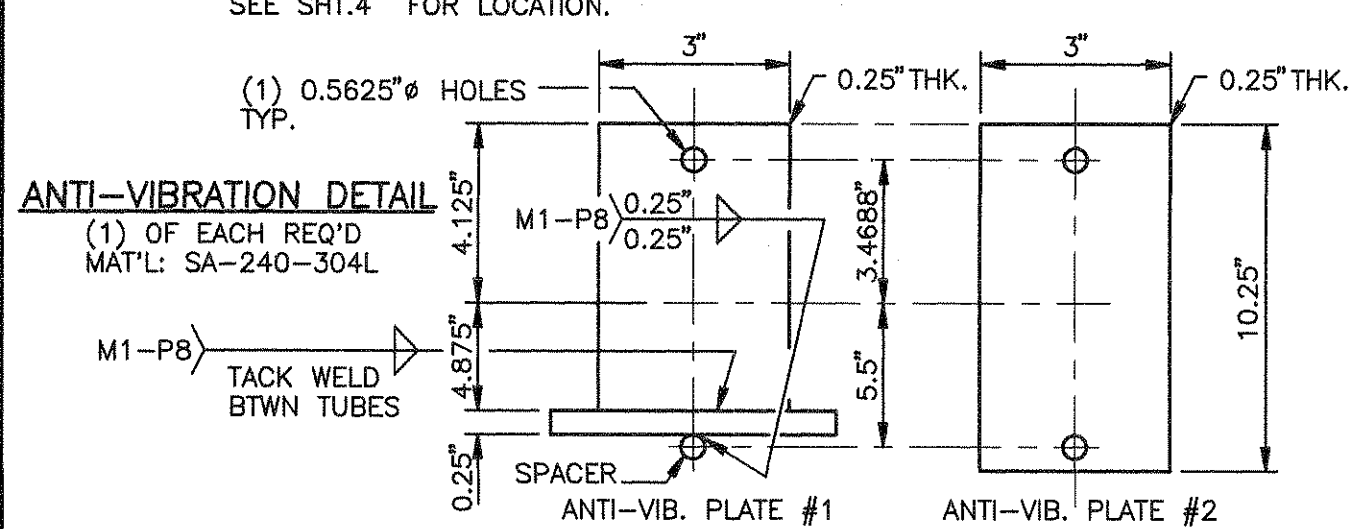
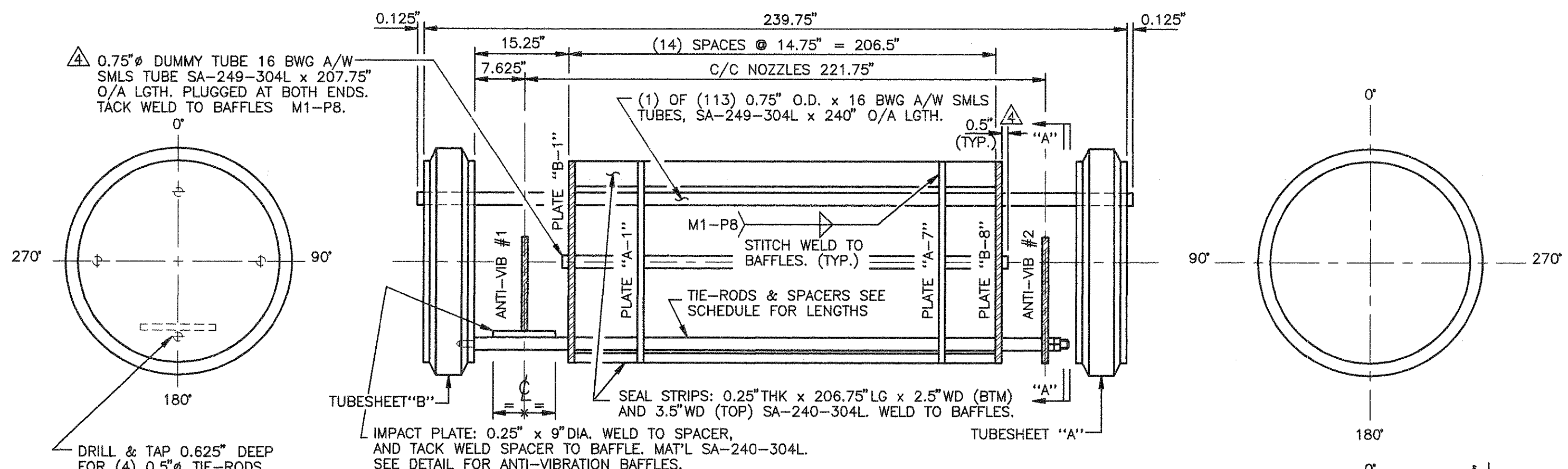
NO. OF EXCHANGERS REQ'D: ONE

DWN VBL CKD DSL ITEM E-202

EXCHANGER INDUSTRIES
CALGARY, ALBERTA

DWG NO. 94-2996

SHEET 4 OF 13



DIMENSIONS ARE IN DECIMAL INCHES.				TIE-ROD SCHEDULE			
TIE-ROD DIA.: 0.5"				TIE-ROD MAT'L: 304 SS			
TOTAL NO. REQ'D EACH BUNDLE: (4) C/W (2) 304 SS NUTS [△]							
NO.:	2	1	1				
LGTH:	232.375	224.75	210				

DIMENSIONS ARE IN DECIMAL INCHES.				SPACER SCHEDULE			
SPACER O.D.: 0.75"				SPACER MAT'L: 304 SS			
TOTAL NO. REQ'D EACH BUNDLE: (48)							
NO.:	2	2	1	13	28	2	
LGTH:	15.25	7.5	30	29.25	14.5	7.25	

REVISIONS

PER CUST'R APPV'L MAR 25/94 N.I.-004398

PER E.I. APRIL 7/94 B-004422

BUNDLE DETAIL

I.P.C. # B-1536-09-35

NO. REQ'D EACH EXCHANGER: ONE

NO. OF EXCHANGERS REQ'D: ONE

DWN VBL CKD DSL ITEM E-202

EXCHANGER INDUSTRIES

CALGARY, ALBERTA

DWG NO. 94-2996

SHEET 5 OF 13

CERTIFIED BY
EXCHANGER INDUSTRIES
A DIVISION OF PREMETALCO INC.
CALGARY, ALBERTA, CANADA

U

MAWP: SHELL 465 PSI AT 150 °F

W

MAWP: TUBE 465 PSI AT 150 °F

RT1

MDMT: SHELL -20 °F AT 465 PSI

-

MDMT: TUBE -20 °F AT 465 PSI

JOB NO. 94-2996 YEAR MFD. 1994

TEST PRESS: SHELL 702 PSI TUBE 702 PSI

P.O. NO. 1536-2 ITEM NO. E-202

SIZE 15-240 TYPE NEN TEMA C

SHELL MAT'L SA-312-304L MIN. THK. 0.438" C.A. 0.0625"

CHAN. MAT'L SA-312-304L MIN. THK. 0.438" C.A. 0.0625"

HEAD MIN. THK: SHELL - CHAN. 1.9375"

GAS/GAS EXCHANGER

PROV. REG.

CRN

0.0313" THK X 6" X 6.25"
MAT'L: STAINLESS STEEL
BKT MAT'L: SA-240-304L
BKT TO SHELL WELD TO
BE 0.1875" THK CONT.
SEAL WELD.

PROJECTION = 1.5"

REVISIONS

NAME PLATE DETAIL

I.P.C. # B-1536-09-36

NO. REQ'D EACH EXCHANGER: ONE

NO. OF EXCHANGERS REQ'D: ONE

DWN VBL CKD DSL ITEM E-202

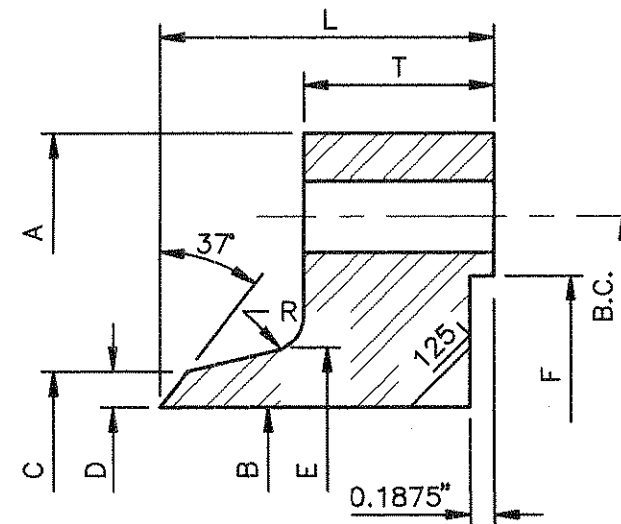


EXCHANGER INDUSTRIES

CALGARY, ALBERTA

DWG NO. 94-2996

SHEET 6 OF 13



FLG. STYLE I

MATERIAL: SA-182-304L

250 OVERALL FINISH EXCEPT AS NOTED.

NOTE: ALL DIMENSIONS IN INCHES.

LINE NO.	MK. NO.	NO. REQ'D	FLG. STYLE	A	B	C	D	△E	F	G	R	T	L	B.C.	BOLT HOLES	
															NO.	DIA.
1	1	1	I	20.125	15	16	0.5	16.2813	17.125	—	0.375	2.125	3.125	18.5	24	0.875
2	2	1	I	↓	↓	↓	↓	↓	↓	—	↓	↓	↓	↓	↓	↓

REVISIONS

△ PER E.I. APR/21/94

FLANGE DETAIL

I.P.C. # B-1536-09-37

MK.1&2 15" I.D. — 465 PSI MAWP
TEMA "C"

NO. OF EXCHANGERS REQ'D: ONE

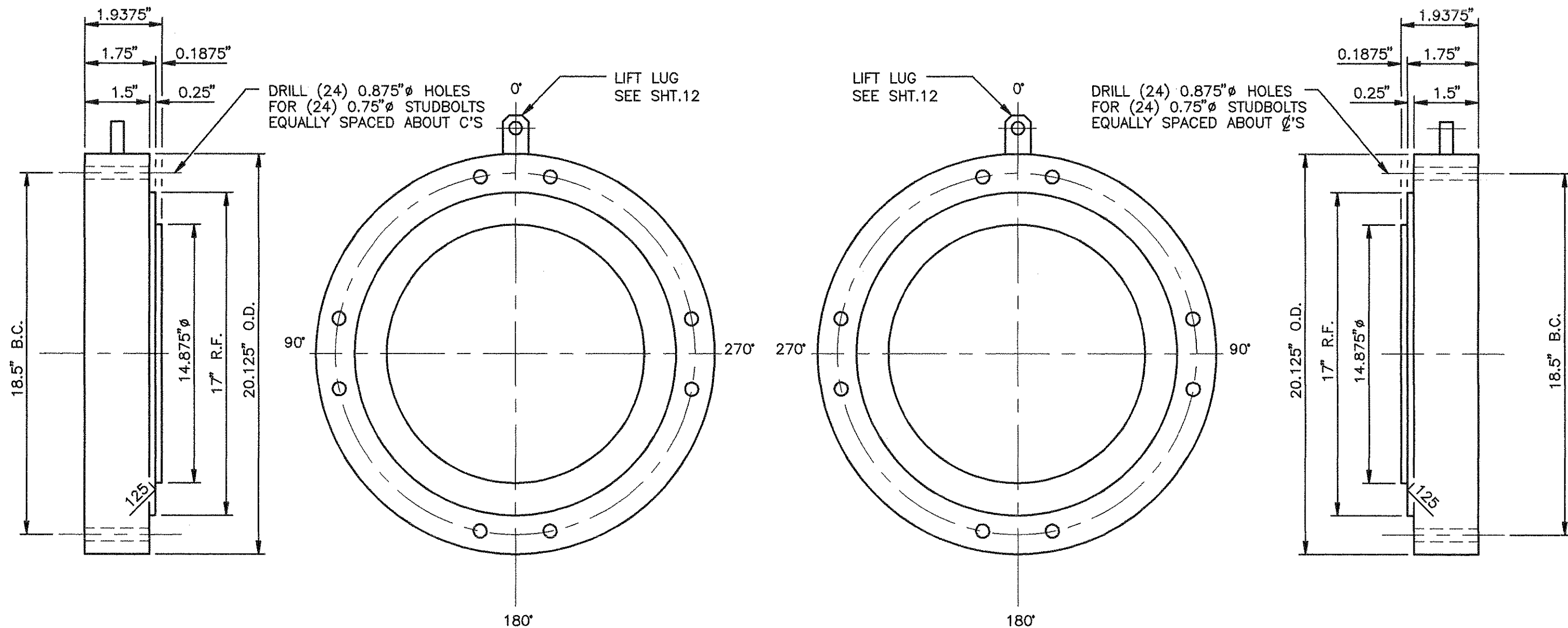
DWN VBL CKD DSL ITEM E-202



EXCHANGER INDUSTRIES
CALGARY, ALBERTA

DWG NO. 94-2996

SHEET 7 OF 13



REVISIONS

MATERIAL: SA-240-304L
 250 OVERALL FINISH EXCEPT AS NOTED

COVER DETAIL

NO. OF EXCHANGERS REQ'D: ONE
 I.P.C.# B-1536-09-38



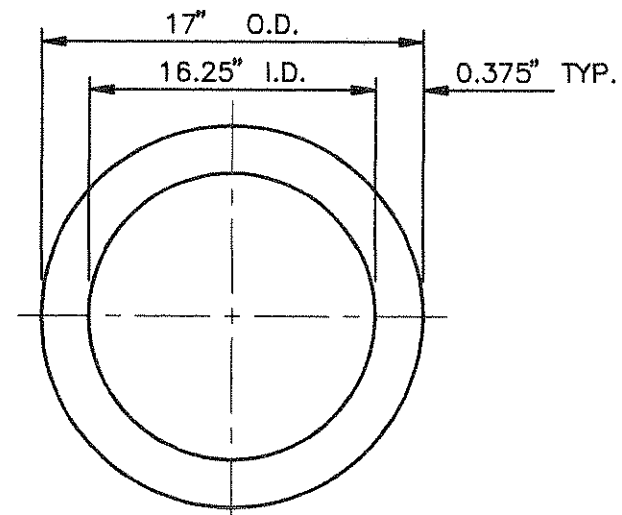
EXCHANGER INDUSTRIES

CALGARY, ALBERTA

DWG NO. 93-2996

SHEET 8 OF 13

DWN VBL CKD DSL ITEM E-202



CHANNEL COVER / FLG
TWO REQ'D EACH SET

NOTES:

- (1) UNLESS OTHERWISE NOTED ALL GASKETS ARE TO BE: 0.125" THK. 304LSS DBL JCKT'D NON-ASB.
- (2) THICKNESS CALLED FOR IS THE TOTAL THICKNESS REQUIRED
- (3) ALL GASKETS ARE TO BE ONE PIECE SEAMLESS CONSTRUCTION

* INCLUDES ONE SPARE SET.

REVISIONS

GASKET DETAIL

I.P.C.# B-1536-09-39

NO. OF SETS REQ'D EACH EXCHANGER: TWO *

NO. OF EXCHANGERS REQ'D: ONE

DWN VBL CKD DSL ITEM E-202



EXCHANGER INDUSTRIES

CALGARY, ALBERTA

DWG NO. 94-2996

SHEET 9 OF 13

LOCATION	NO. REQ'D	SIZE	LENGTH	T.P.I.
INLET CHANNEL FLG TO COVER	24	0.75"ø	5.625"	10
OUTLET CHANNEL FLG TO COVER	24	0.75"ø	5.625"	10

MATERIAL:
STUDBOLTS: SA-193-B7M
NUTS: SA-194-2HM

REVISIONS
△ PER CUST'R APPV'L MAR 25/94
N.I.-004398

NOTES:
(1) NUMBER SHOWN IS NUMBER OF STUDBOLTS REQ'D FOR EACH EXCHANGER.
(2) TWO AMERICAN STANDARD HEAVY HEX. NUTS REQ'D FOR EACH STUDBOLT UNLESS NOTED OTHERWISE.
(3) ENTIRE LENGTH OF STUDBOLTS & NUTS TO BE COATED WITH XYLAN 1070.

BOLT SCHEDULE
△ I.P.C. # B-1536-09-40
NO. OF EXCHANGERS REQ'D: ONE

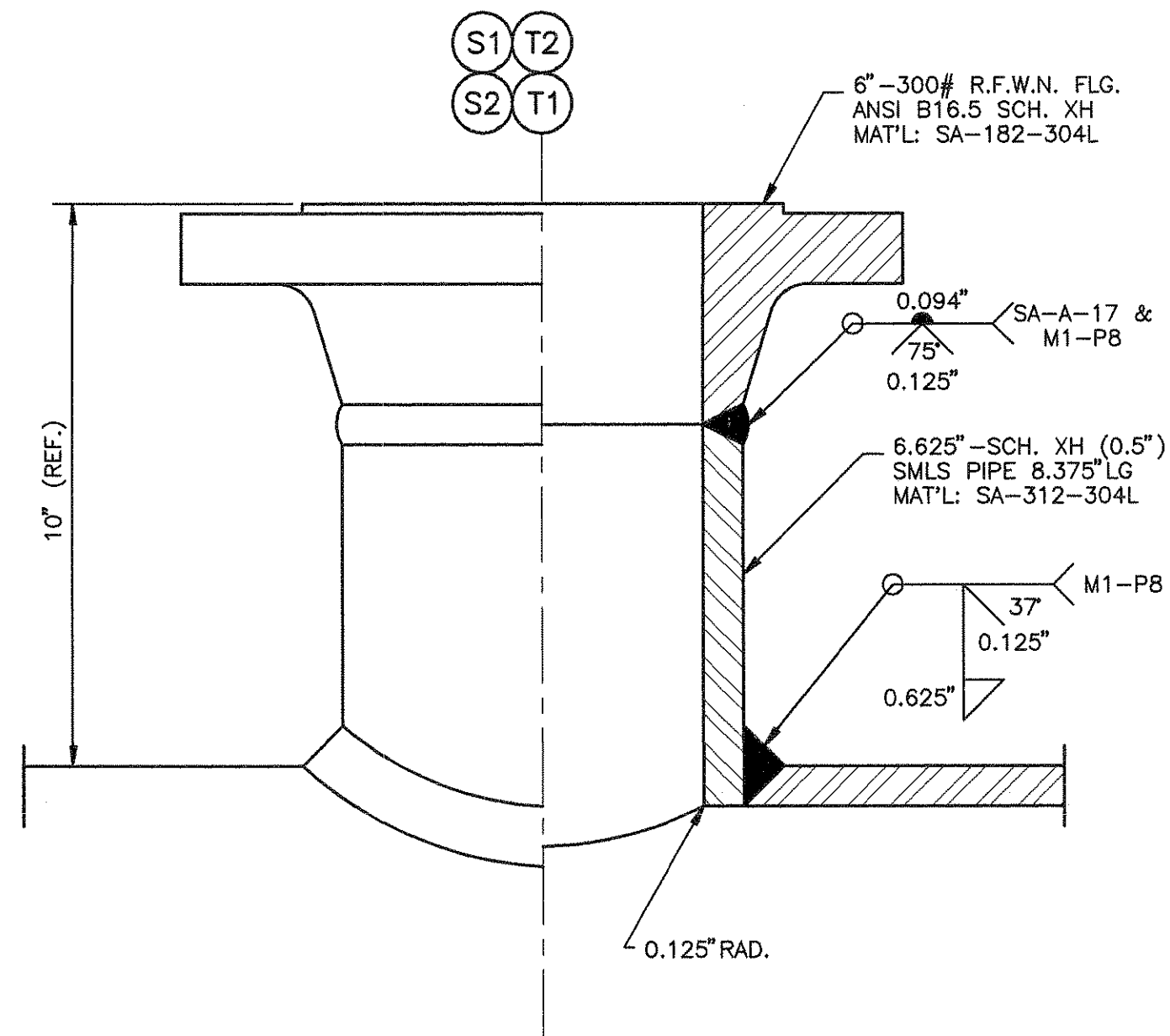


EXCHANGER INDUSTRIES
CALGARY, ALBERTA

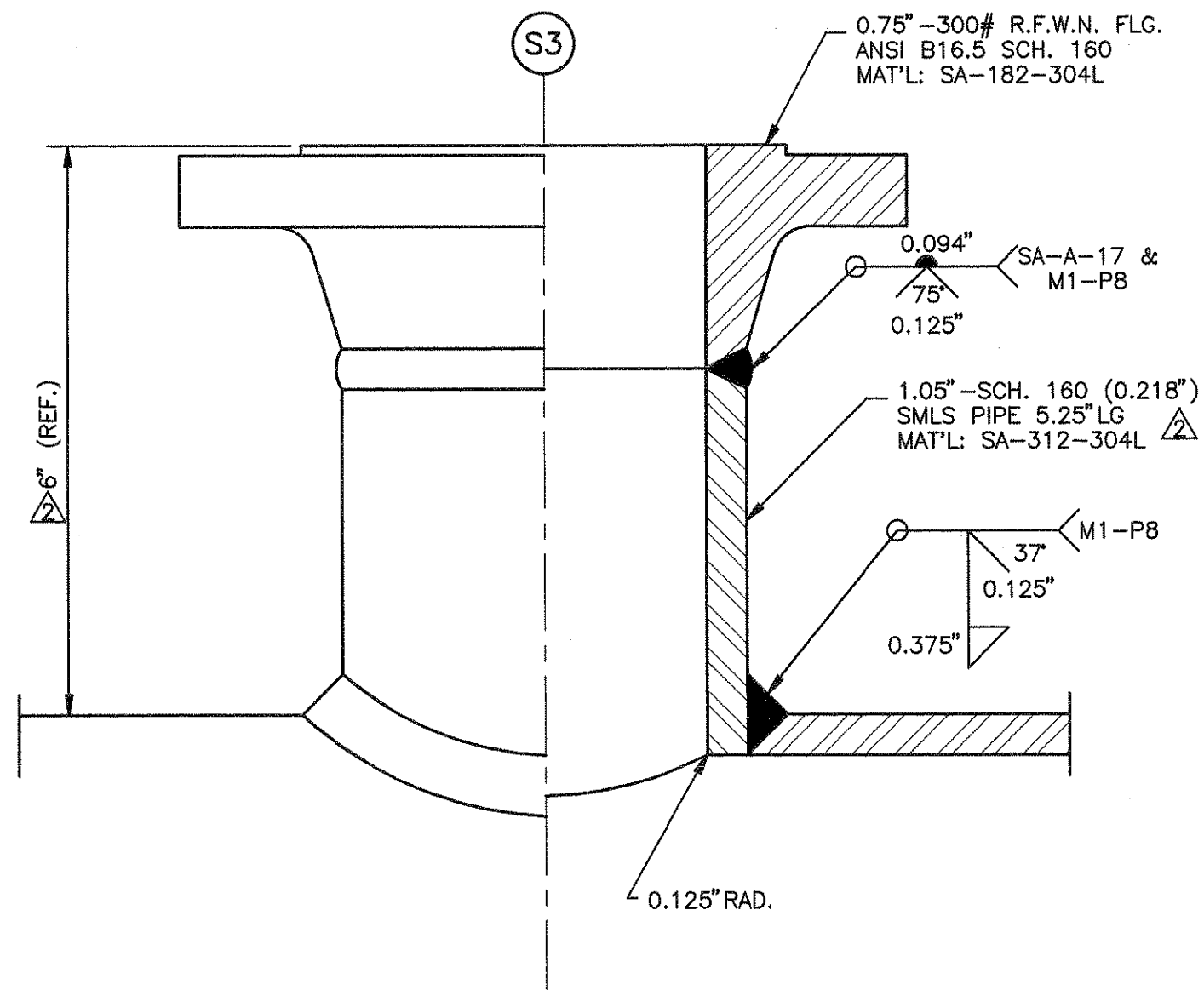
DWG NO. 94-2996

SHEET 10 OF 13

DWN VBL | CKD DSL | ITEM E-202



(4) REQ'D FOR CHANNEL & SHELL



(1) REQ'D FOR SHELL

REVISIONS
 PER CUST'R APPV'L MAR 25/94 N.I.-004398

NOZZLE DETAILS

I.P.C. # B-1536-09-41
 NO. OF EXCHANGERS REQ'D: ONE

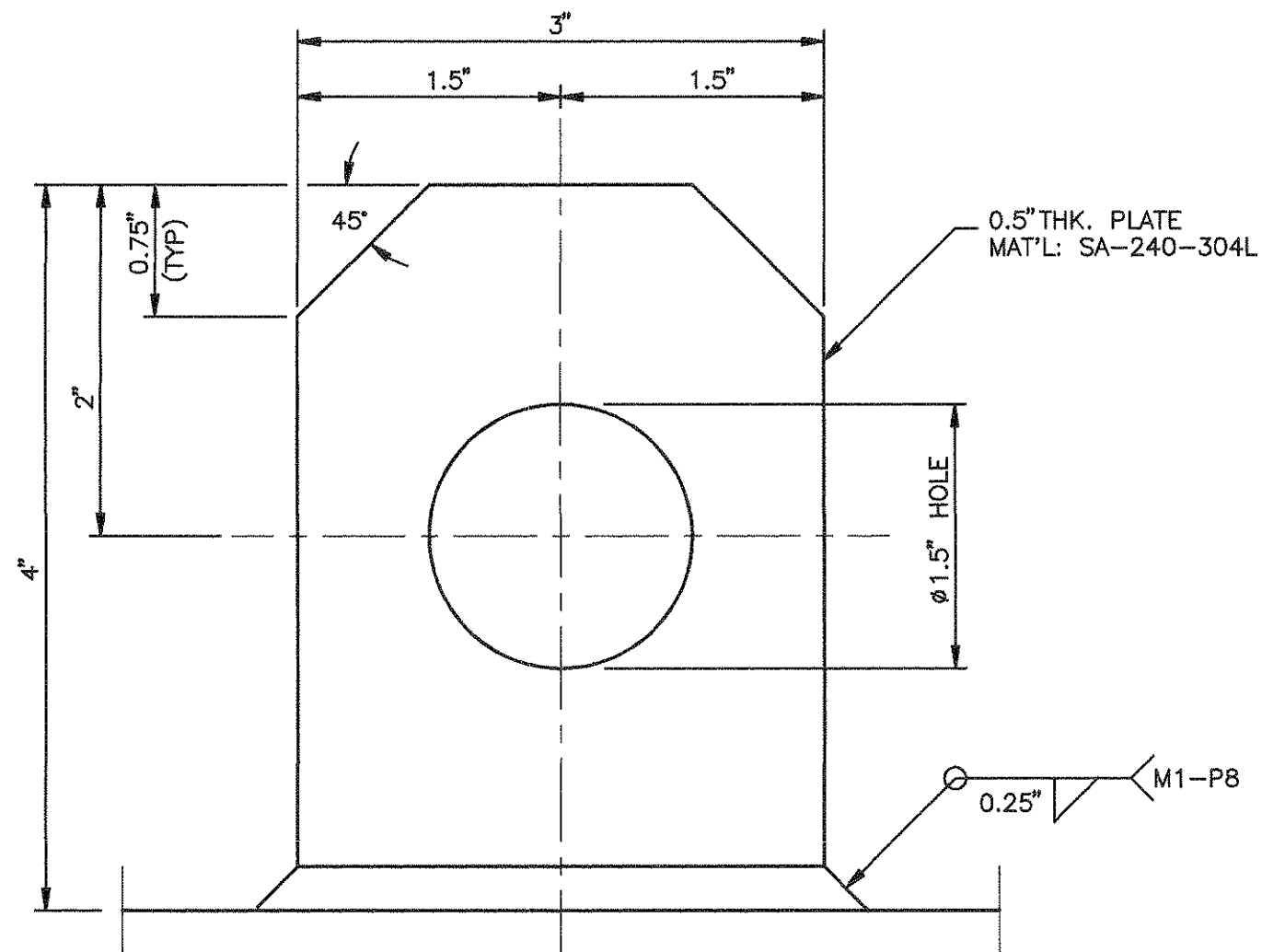


EXCHANGER INDUSTRIES
 CALGARY, ALBERTA

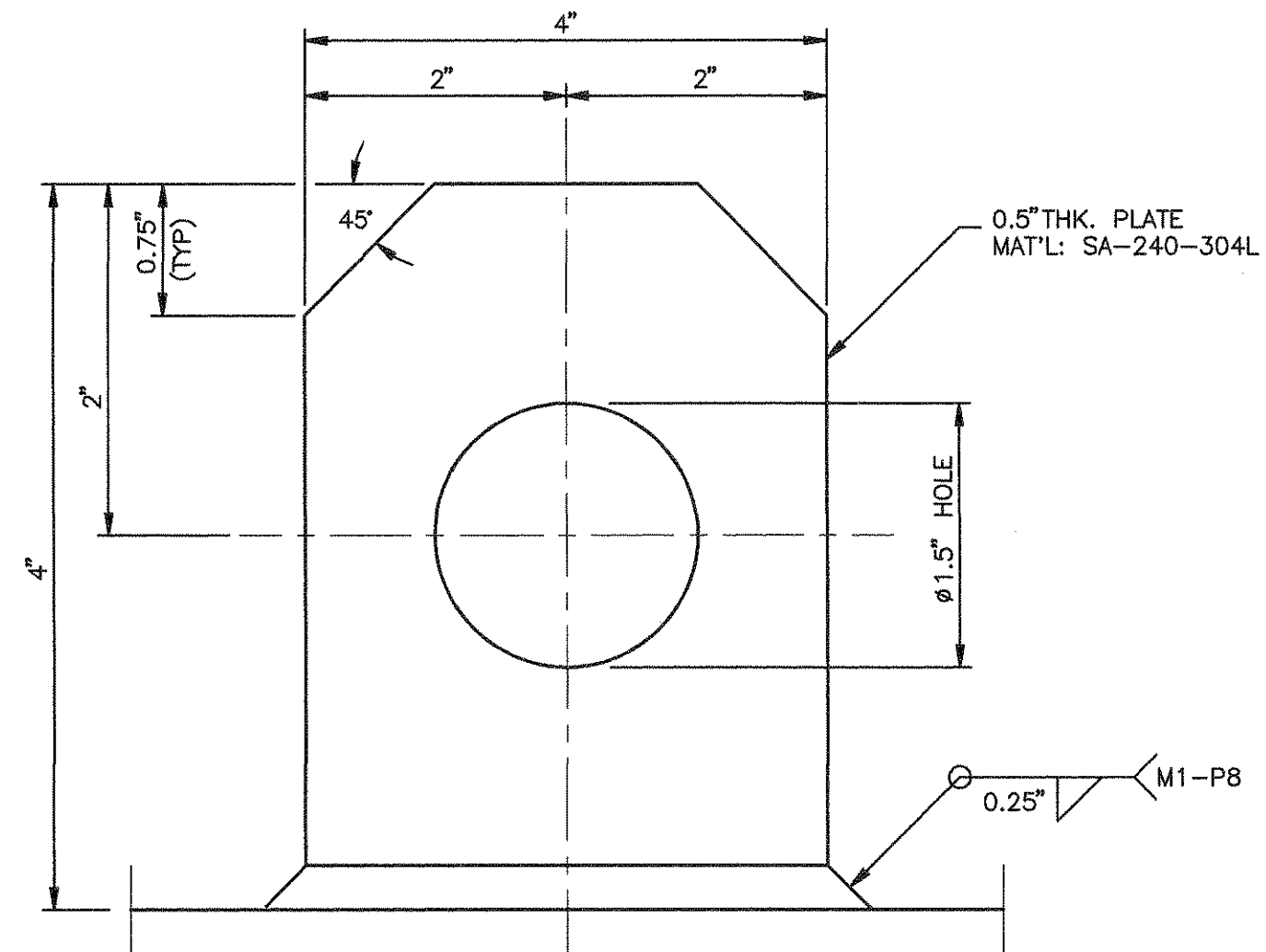
DWG NO. 94-2996

SHEET 11 OF 13

DWN VBL CKD DSL ITEM E-202



(2) REQ'D (1) EACH COVER



(2) REQ'D FOR SHELL

REVISIONS

LIFT LUG DETAIL

I.P.C. # B-1536-09-42

NO. OF EXCHANGERS REQ'D: ONE



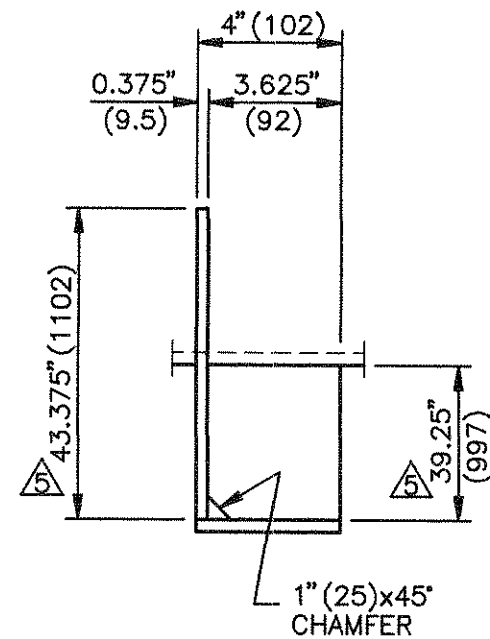
EXCHANGER INDUSTRIES

CALGARY, ALBERTA

DWG NO. 94-2996

DWN VBL CKD DSL ITEM E-202

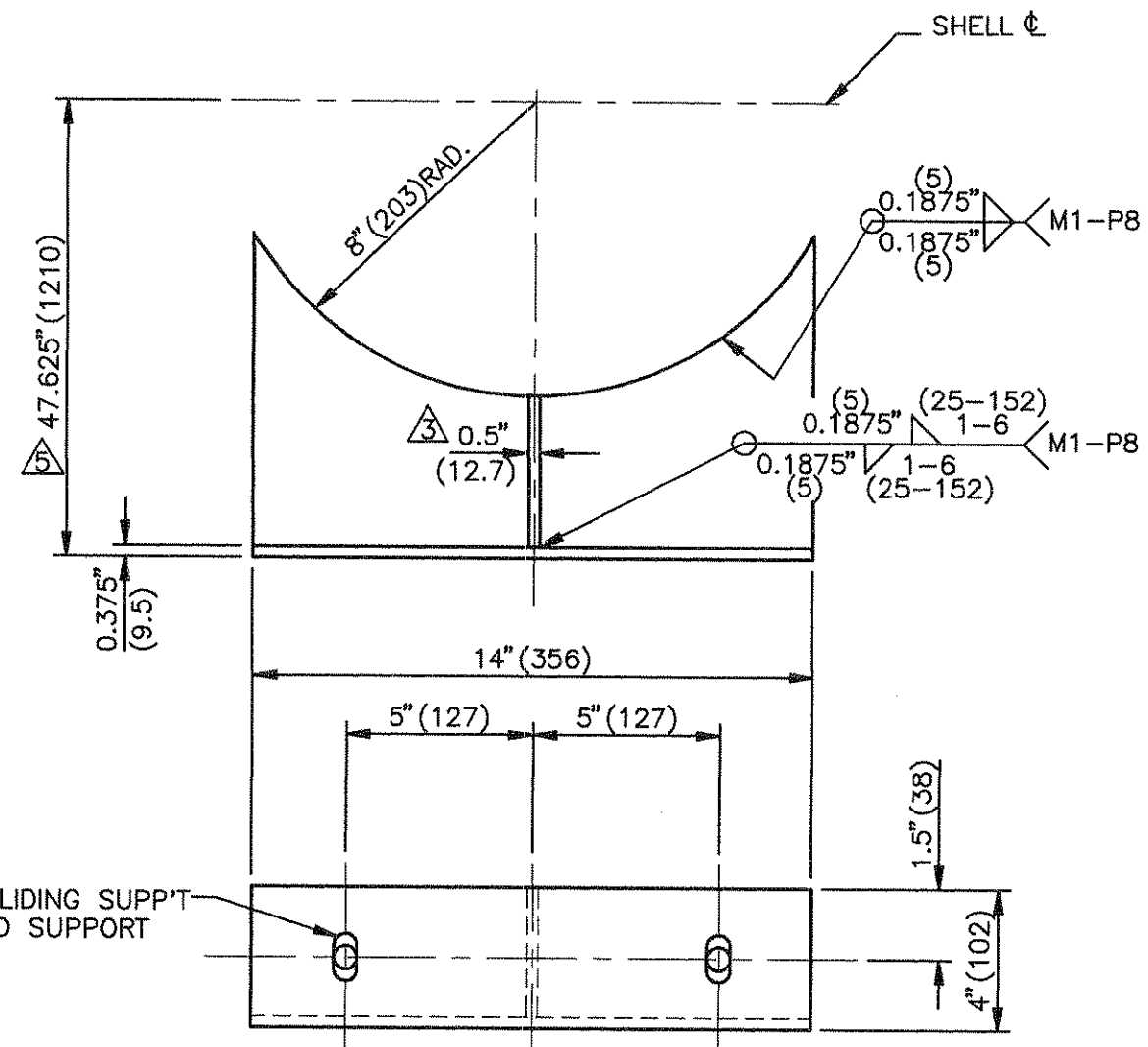
SHEET 12 OF 13



- (22) x (44)
 (2) 0.875" x 1.75" LG SLOTS IN SLIDING SUPP'T
 (2) 0.875" (22) DIA. HOLES IN FIXED SUPPORT

NOTES:

- (1) ALL MATERIAL TO BE SA-240-304L
 (2) SEE SHT.1 FOR ORIENTATION.



REVISIONS

- 3 PER E.I. APRIL 5/94 A-004415
 5 PER E.I. AS BUILT APR/13/94
 C-004431

SUPPORT DETAIL

I.P.C. # B-1536-09-43
 NO. REQ'D EACH EXCHANGER: TWO
 NO. OF EXCHANGERS REQ'D: ONE

DWN VBL CKD DSL ITEM E-202



EXCHANGER INDUSTRIES
 CALGARY, ALBERTA

DWG NO. 94-2996

SHEET 13 OF 13