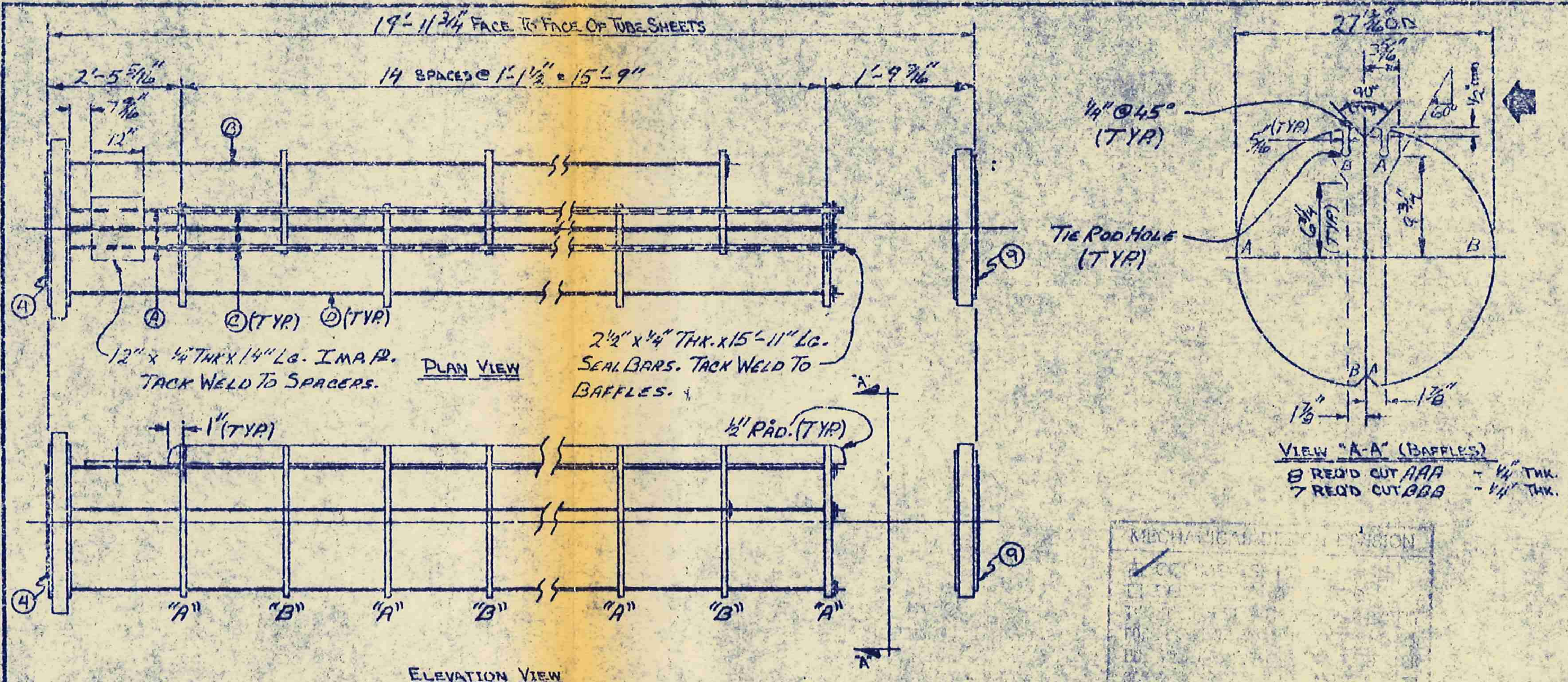
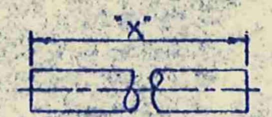
JOB. NO. .... DATE 2/19/77 P.O. 1607-009
DEPT. Glycol EQPT. NO. 21-08-026
VENDOR Hughes-Anderson
MFR. ....
EQPT. USED FOR Reabsorber Water Cooler



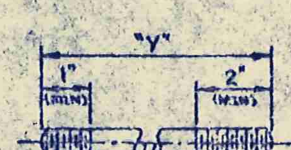
3-24-76 UOS

FINAL DESIGN



3/4" O.D. SPACER TUBING

MK	No.	"X"
(A)	4	2'-3 11/16"
(B)	1	3'-4 15/16"
(C)	42	1'-1 1/4"
(D)	13	2'-2 3/8"
( )		
( )		
( )		
( )		
( )		



1/2" DIA. TIE ROD

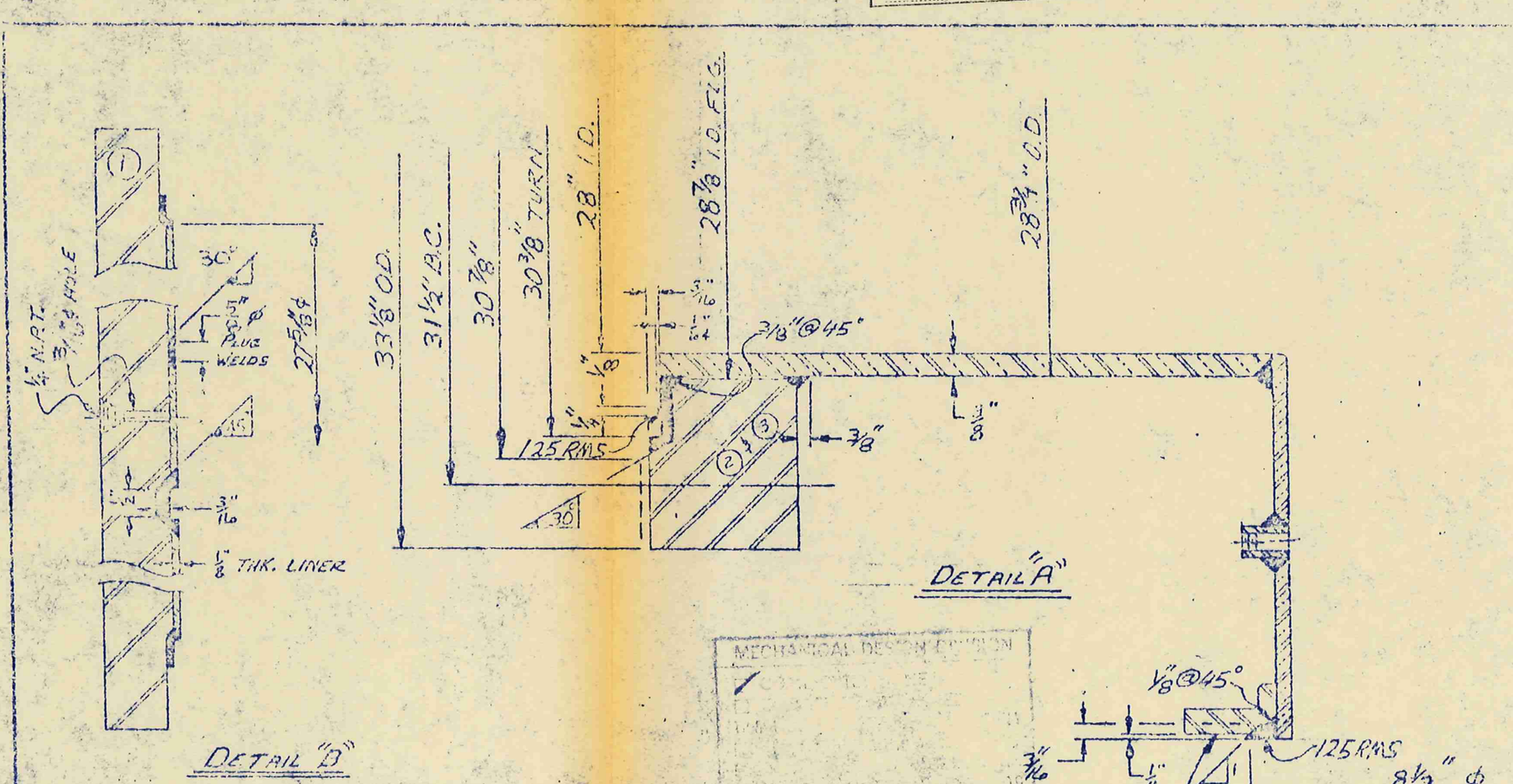
No.	"Y"
4	18'-3"
1	17'-1 1/2"

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

JOB # 1607
ITEM # E-1404

HUGHES-ANDERSON ENGINEERING CORP. TULSA, OKLAHOMA			
DRAWING TITLE BUNDLE DETAILS			
WORK ORDER 1823		NUMBER REQ'D. ONE	
DR. STEVE	DATE 2-18-76	SIZE 28" x 20"	DRAWING NUMBER
CK MP	SCALE NONE	TYPE AFM	1823-09

T6



NOTES:
1. ALL OVERLAY TO BE IN 309-L FIRST PASS & 308-L REMAINDER & IN ACCORDANCE W/ PROCEDURES UCL-43 (308-L-1-A) & UCL-43 (308-L-1-M).
2. ALL OVERLAY TO HAVE CHEM. ANALYSIS.

MECHANICAL DESIGN SECTION
3-24-76

FINAL DESIGN

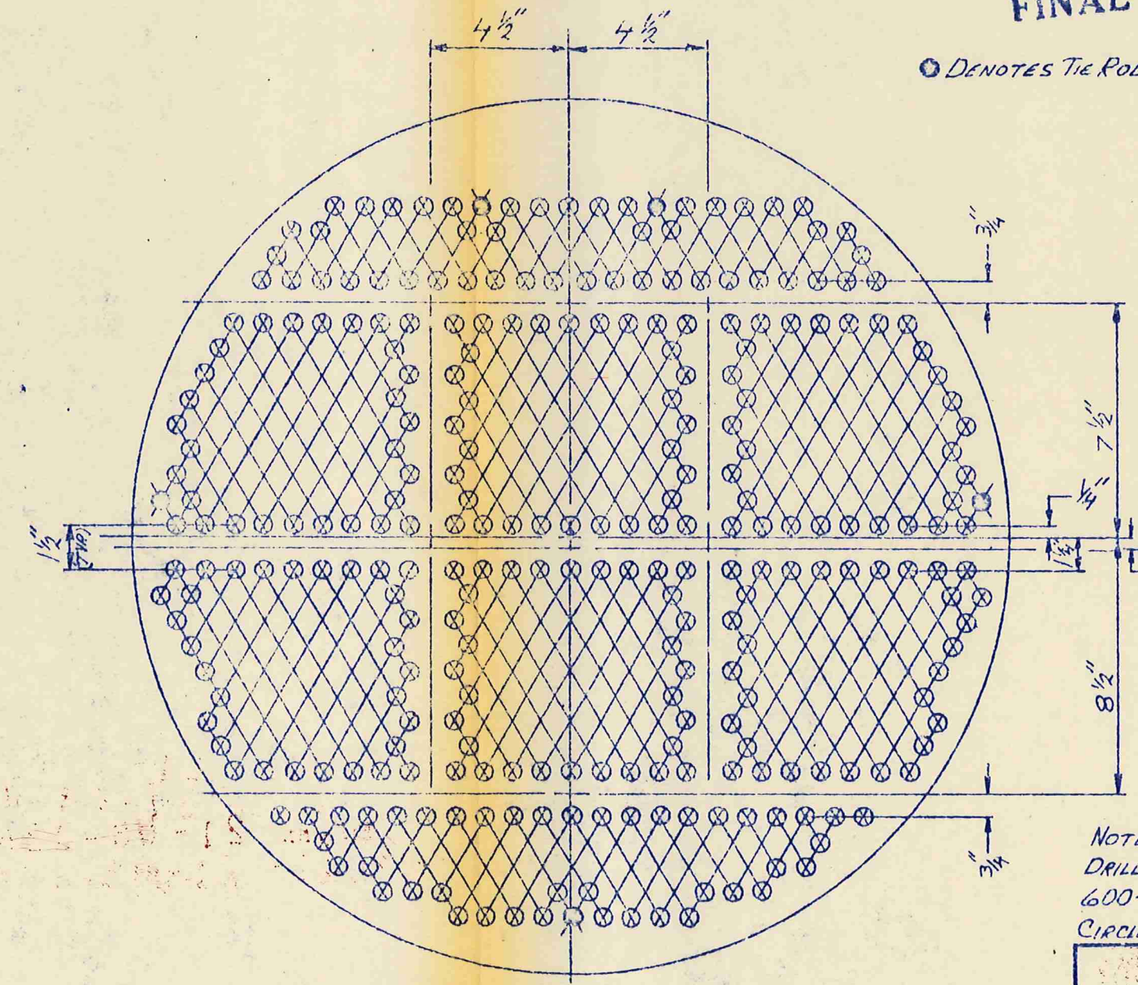
JOB # 1607
ITEM # E-1404

HUGHES-ANDERSON ENGINEERING CORP.
TULSA, OKLAHOMA

DRAWING TITLE	OVERLAY DETAILS		
WORK ORDER 1823		NUMBER REQ'D ONE	
DR. STEVE	DATE 2-24-76	SIZE 28"x20"	DRAWING NUMBER 1823-06
CK. MLC	SCALE NONE	TYPE AFM	

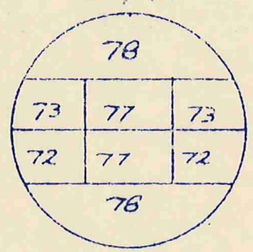
FINAL DESIGN

O DENOTES TIE ROD LOCATION



VIEW FROM SHELL SIDE OF NO. 4 TUBE SHEET

3-24-76



TUBES/PASS

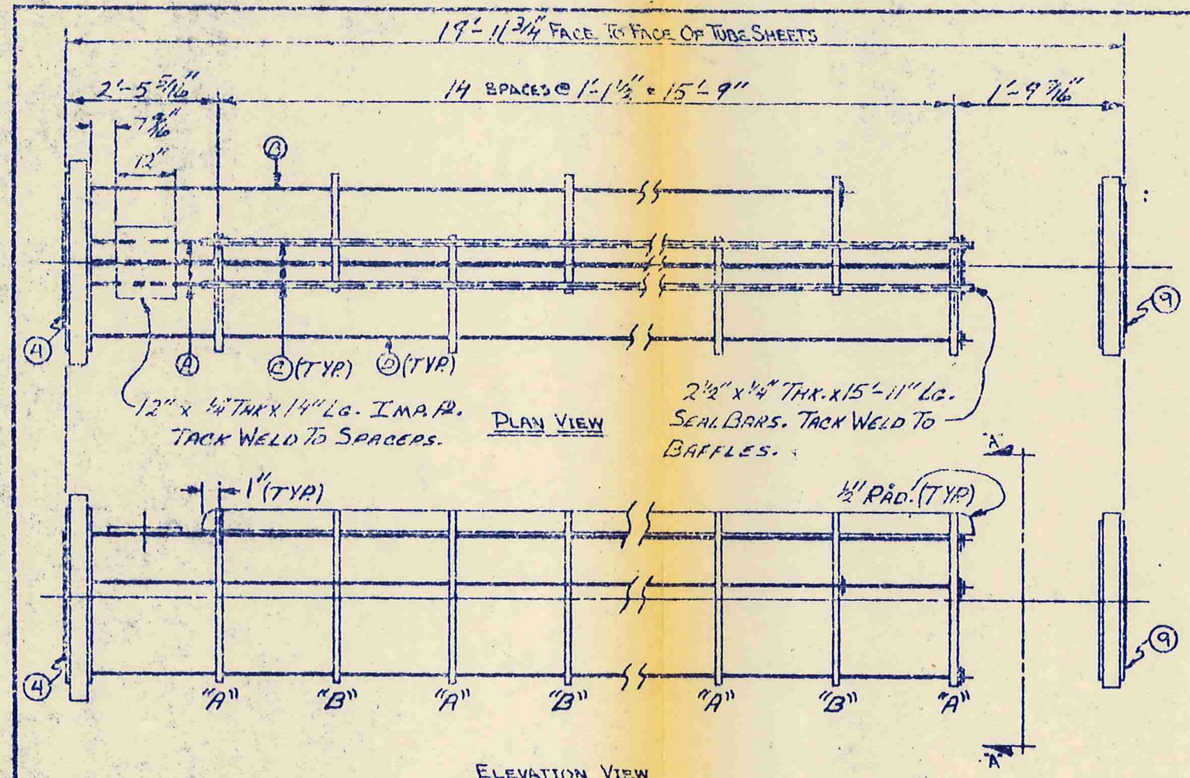
℄ UNIT
℄ PASS

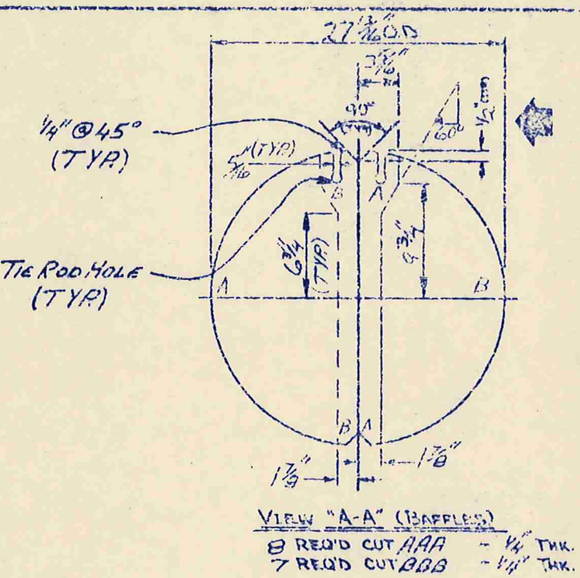
Job # 1607
ITEM # E-1404

Equip. No. 21-08-026

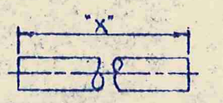
NOTES:
DRILL REAM TUBE HOLES TO .758" ± .002" FOR 600 - 3/4" O.D. ON 15/16" Δ PITCH @ 27½° TUBE CIRCLE. GROOVE TUBE HOLES PER DETAIL "A" DWG. 1823-07

HUGHES-ANDERSON ENGINEERING CORP. TULSA, OKLAHOMA			
DRAWING TITLE TUBE LAYOUT			
WORK ORDER 1823		NUMBER REQ'D ONE	
DR. STEVE	DATE 2-17-76	SIZE 28" x 20"	DRAWING NUMBER 1823-07
CK. KH	SCALE NONE	TYPE A.F.M.	



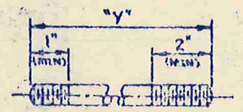


VIEW "A-A" (BAFFLES)
8 REQ'D CUT AAA - 1/4" THK.
7 REQ'D CUT BBB - 1/4" THK.



3/4" O.D. SPACER TUBING

MK	No.	"X"
(9)	4	2'-3 7/16"
(5)	1	3'-4 15/16"
(6)	42	1'-1 3/4"
(3)	13	2'-2 5/8"



1/2" DIA. TIE ROD

No.	"Y"
4	18'-3"
1	17'-1 1/2"

NOTES!
1. DRILL "19/64" DIA. HOLES IN BAFFLES FOR TUBES.
2. DRILL 3/16" DIA. HOLES IN BAFFLES FOR TIE RODS.
3. DEBURR ALL TUBE HOLES AND REMOVE ALL SHARP CORNERS.

FINAL DESIGN

Equip. No. 21-08-026

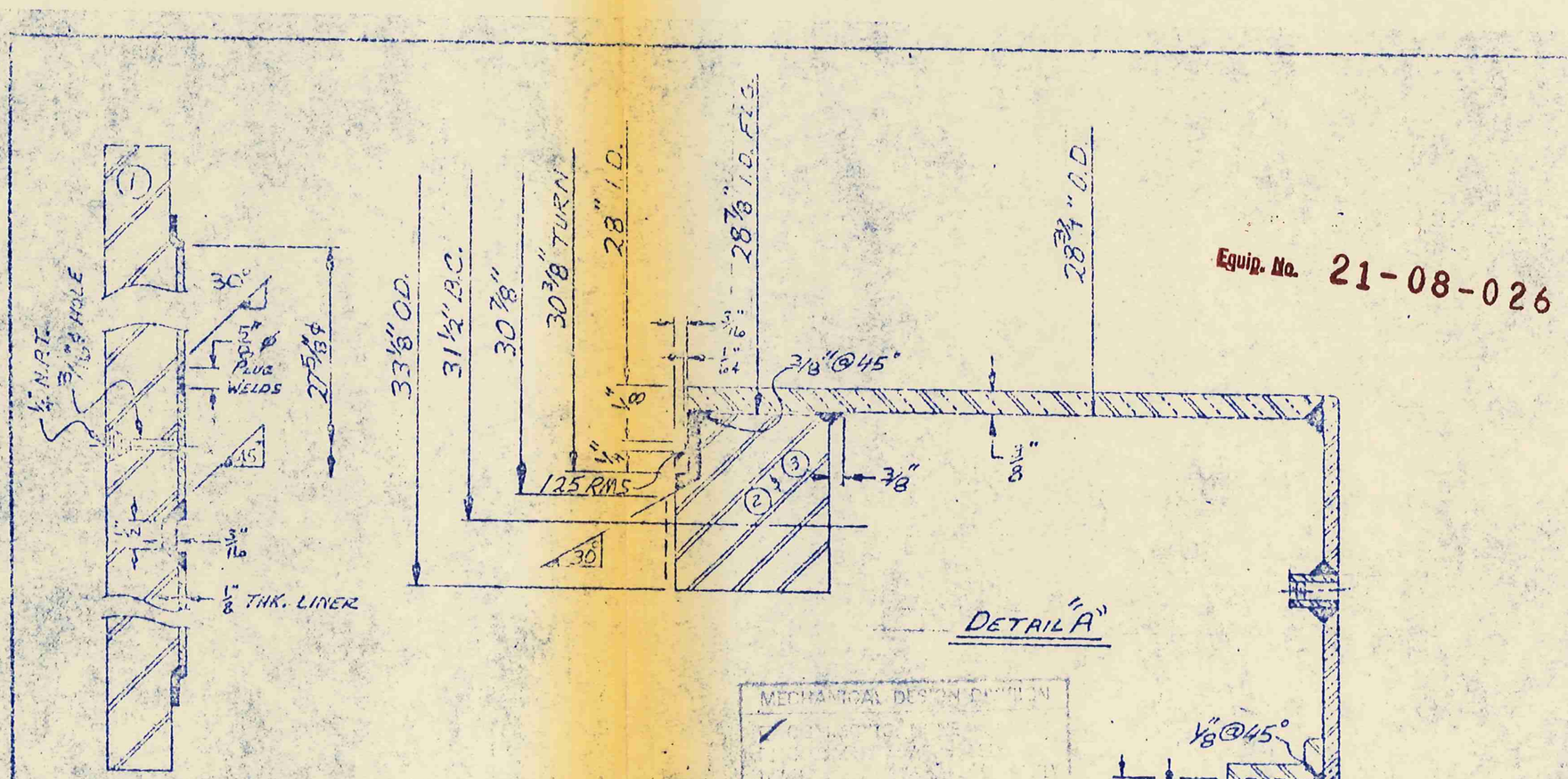
3-24-76 WB

Job # 1607
Item # E-1404

HUGHES-ANDERSON ENGINEERING CORP.
TULSA, OKLAHOMA

DRAWING TITLE Bundle Details			
WORK ORDER 1823		NUMBER REQ'D ONE	
DR. Steve	DATE 2-18-76	SIZE 28"x20"	DRAWING NUMBER 1823-09
CK. WDP	SCALE NONE	TYPE AFM	

T6



Equip. No. 21-08-026

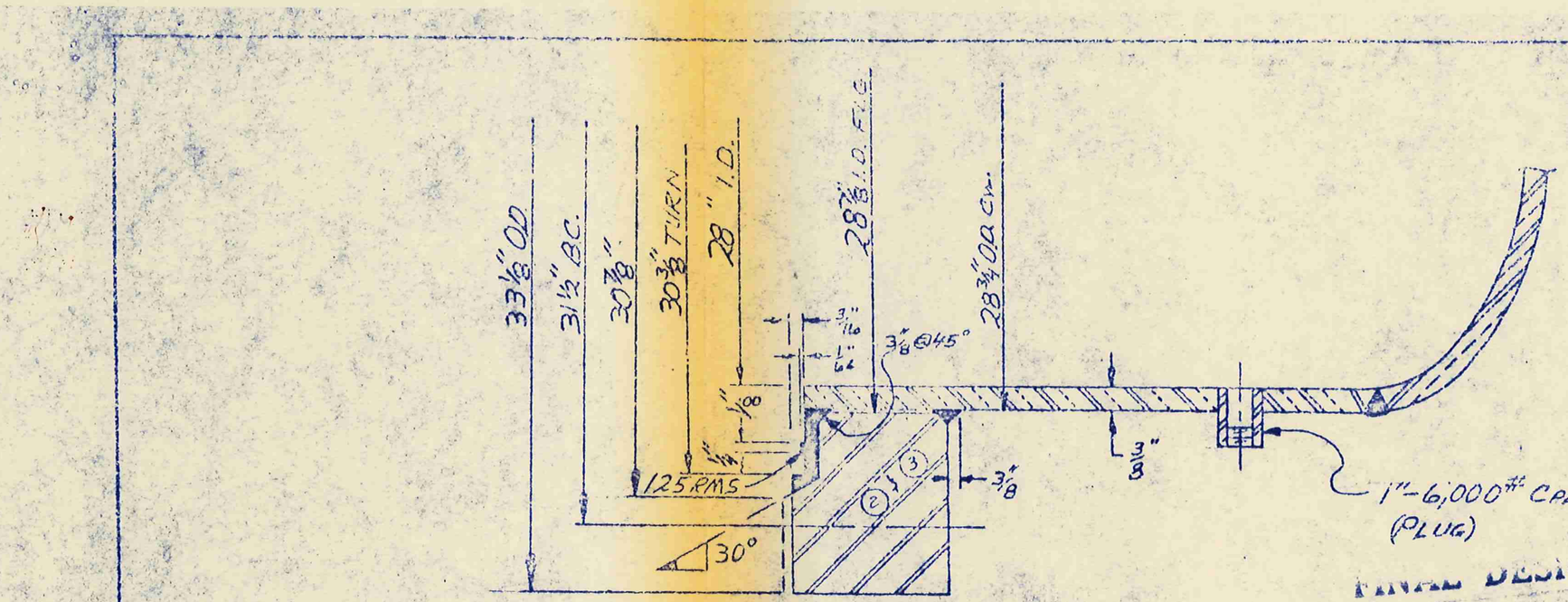
NOTES:
1. ALL OVERLAY TO BE IN 309-L FIRST PASS & 308-L REMAINDER & IN ACCORDANCE W/ PROCEDURES UCL-43 (308-L-1-A) & UCL-43 (308-L-1-M).
2. ALL OVERLAY TO HAVE CHEM. ANALYSIS.

MECHANICAL DESIGN DIVISION
3-24-76

FINAL DESIGN

Job # 1607
Item # E-1404

HUGHES-ANDERSON ENGINEERING CORP. TULSA, OKLAHOMA			
DRAWING TITLE: OVERLAY DETAILS			
WORK ORDER: 1823			NUMBER REQ'D: ONE
DR: STEVE	DATE: 2-24-76	SIZE: 28 X 20	DRAWING NUMBER: 1823-06
CK:	SCALE: NONE	TYPE: AFM	



DETAIL "A"

NOTES:
1. ALL OVERLAY TO BE IN 309-L FIRST PASS & 308-L REMMINDER & IN ACCORDANCE W/ PROCEDURES UCL-43(308-L-1-A) & UCL-43(308-L-1-M).
2. ALL OVERLAY TO HAVE CHEM. ANALYSIS.

FINAL DESIGN

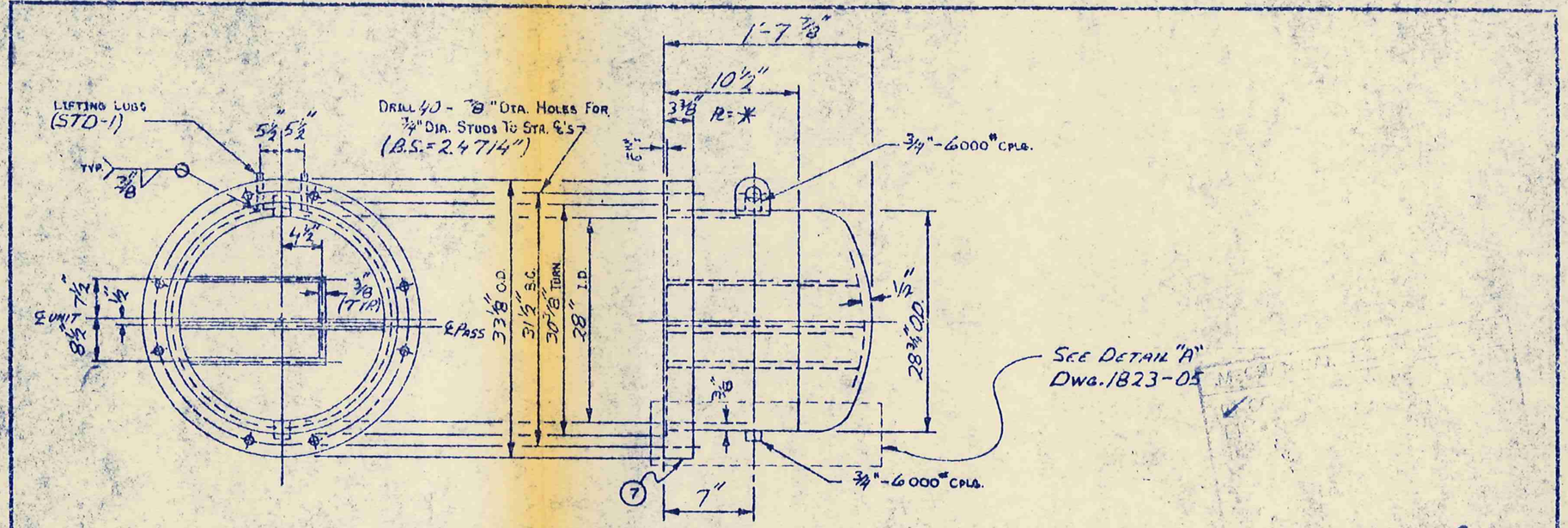
Equip. No. 21-08-026

3-24-76 UR

Job # 1607
Item # E-1404

HUGHES-ANDERSON ENGINEERING CORP.
TULSA, OKLAHOMA

DRAWING TITLE: OVERLAY DETAILS			
WORK ORDER 1823		NUMBER TO D ONE	
DR STEVE	DATE 2-24-76	SIZE 28X20	DRAWING NUMBER 1823-05
CK [illegible]	SCALE NONE	TYPE AFM	



BACK CHANNEL DETAIL

3-24-76 DS

USE R - 89 3/8" X 3/8" THK. X 1'-10" LG.

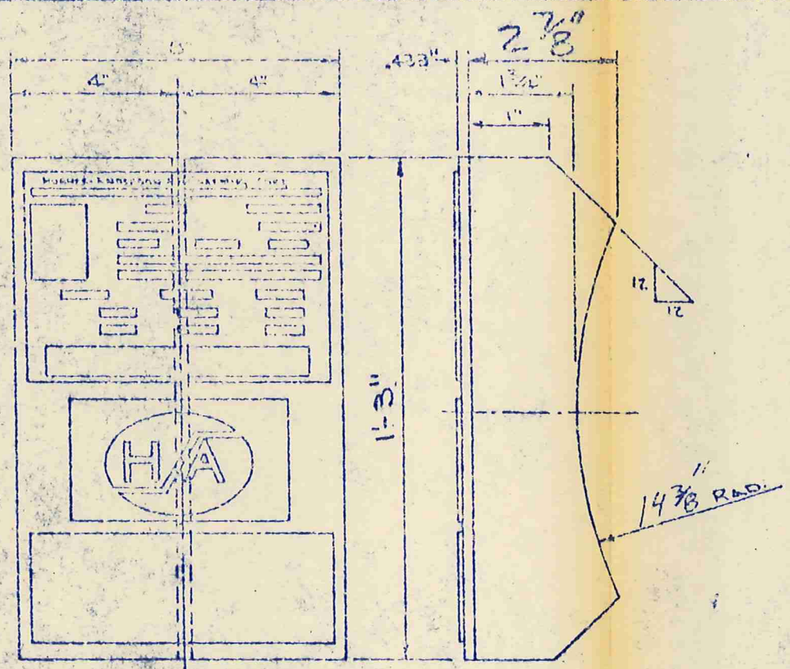
FINAL DESIGN

NOTES!

1) SPOT X-RAY BACK CHANNEL
2) SEE DWG. STD.-1 FOR WELD DETAILS.
3) BOLT HOLES TO STRADDLE ℄'S
4) ALL WELDING TO BE IN ACCORDANCE W/ PROCEDURES MA-304, SA-304 AND SA-1-8.
5) ALL OVERLAY TO BE 308L 1ST PASS 309L REMAINER IN ACC. W/ PROCEDURES UCL-43(308-L-1-M) AND UCL-43(308-L-1-A).
6) ALL OVERLAY TO HAVE CHEM. ANALYSIS.

Equip. No. 21-08-026
Job# 1607
ITEM# E-1404

HUGHES-ANDERSON ENGINEERING CORP. TULSA, OKLAHOMA			
DRAWING TITLE BACK CHANNEL DETAILS			
WORK ORDER 1823		NUMBER REQ'D ONE	
DR. STEVE	DATE 2-23-76	SIZE 28"X20"	DRAWING NUMBER 1823-04
CK GHP	SCALE NONE	TYPE AFM	



HUGHES-ANDERSON ENGINEERING CORP

REABSORBER WATER COOLER

RT-3

NAT'L. BOARD NO. 452 ITEM NO. E-1404

P.O. NO. 1607-007 SERIAL NO. 0825

SIZE 28x20 TYPE AEM SURFACE 2315 SQFT.

R.T. SPOTS CHANNELS E SHELL

H.T.

DATE SHOP TEST SHELL 120 P.S.I. TUBES 115 P.S.I.

SHELL M.A.W.P. 80 P.S.I. AT 170 °F FIELD TEST 120 P.S.I.

TUBES M.A.W.P. 75 P.S.I. AT 190 °F FIELD TEST 115 P.S.I.

TUBES 810-¾"O.D.x16 BWG x 20'-0" SA-249-304

HOUSTON CHEMICAL COMPANY DIVISION OF PPG INDUSTRIES INC. BEAUMONT, TEXAS

EQUIPMENT NO. 21-08-026

INSURANCE NO.

NATIONAL BOARD NO. 452

MATL. SHELL SA-516-70 TUBES SA-249-304

DESIGN PRESS. PSI 80 75

DESIGN TEMP. °F 170 190

OPERATING PRESS. PSI

OPERATING TEMP. °F

SHELL THK. 3/8" HEAD THK. 1/2" HEAD RAD. 25 5/8"

MANUFACTURER HUGHES ANDERSON ENGR.

SAFETY FACTOR

MFGR'S SERIAL NO. 1823 YEAR 1976

NAME PL DETAIL

3-24-76 WS

Equip. No. 21-08-026

FINAL DESIGN

JOB # 1607

ITEM # E-1404

HUGHES-ANDERSON ENGINEERING CORP.
TULSA OKLAHOMA

DRAWING TITLE NAME PL DETAILS			
WORK ORDER 1523		NUMBER REQ'D ONE	
DR. SMG	DATE 3-9-76	SIZE 28"x20"	DRAWING NUMBER
CK'D	SCALE NONE	TYPE AEM	1823-10

NA

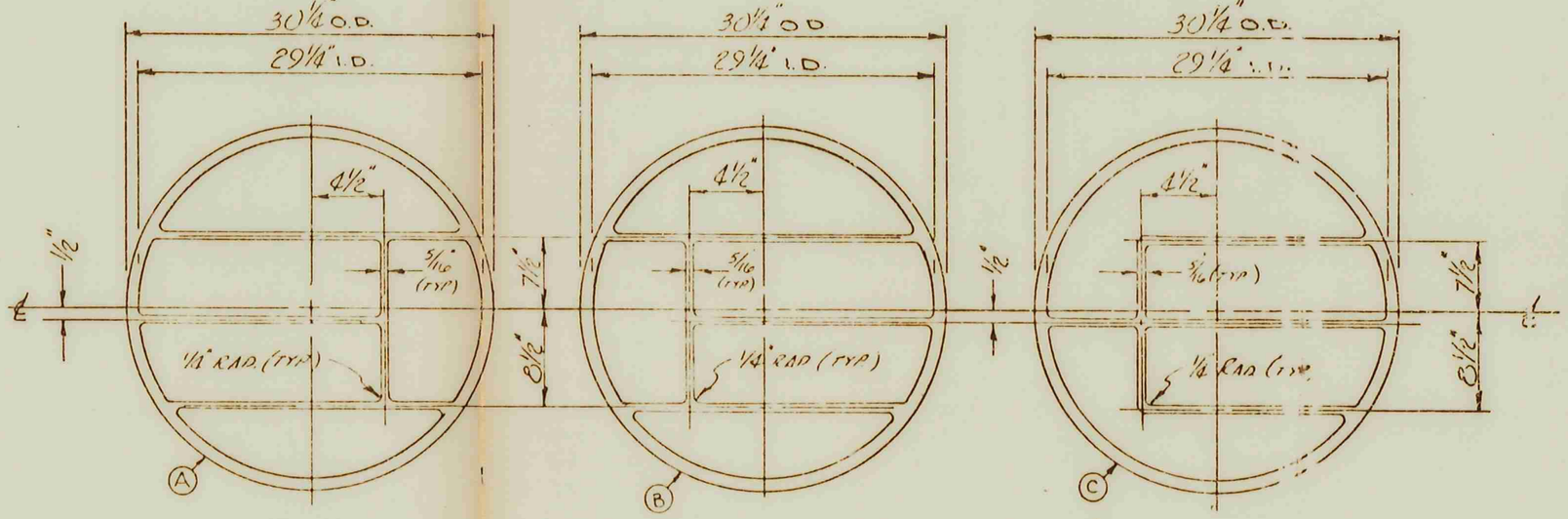
BILL OF MATERIAL					CUSTOMER: SCIENTIFIC DESIGN	SCH. TO SHIP: AUG 76			FILE NO: 241-75	DATE: 2-24-76	NO. UNITS: ONE		W.O.: 1833		
DWG NO.	PART NO.	REQ'D FOR 1	TOTAL REQ'D	PART NAME	DESCRIPTION	MATERIAL	REV	X-STK + D.O.	REMARKS	P.O. NUMBER	ORDER DATE	DUE DAYS	REC'D DATE	EST. COST	PURCH COST
					SANDBLAST / SSPC-SP10		(1)								
		4 QT.	4 QT.	PRIMER	INORGANIC ZINC RICH PRIMER (PPG #UC-46745 & UC-46746)		(1)								
		6 QT.	6 QT.	EPOXY	HIGH SOLIDS EPOXY LIGHT GRAY (PPG #UC-46545)		(2)								
		4 QT.	4 QT.	PAINT	AQUAPON WHITE (PPG #A-UC-46840 & B-UC-46834)		(2)								

FINAL DESIGN

DATE 8/4/76

Equip. No. 21-08-026

REV.	BY	DATE	AUTH. BY	REV.	BY	DATE	AUTH. BY	REV.	DATE	AUTH. BY	REV.	DATE	AUTH. BY	REV.	DATE	AUTH. BY	REV.	DATE	AUTH. BY		DRAWING NO.
(1)	KEN	3/30/76	CUST.	(2)	KEN	5/25/76	CUST.													HUGHES-ANDERSON ENGINEERING CORP. TULSA, OKLA.	1833-14



CHANNEL COVER GASKET
1/8" THK. 304 STN. STL. JACKETED ASBESTOS FILLED. ONE REQ'D. (J.M. 923 OR EQUAL)

CHANNEL GASKET
1/8" THK. 304 STN. STL. JACKETED ASBESTOS FILLED. ONE REQ'D. (J.M. 923 OR EQUAL)

BACK CHANNEL GASKET
1/8" THK. 304 STN. STL. JACKETED ASBESTOS FILLED. ONE REQ'D. (J.M. 923 OR EQUAL)

REQUIRED AS INDICATED FOR ONE SET

HUGHES-ANDERSON ENGINEERING CORP.
TULSA, OKLAHOMA

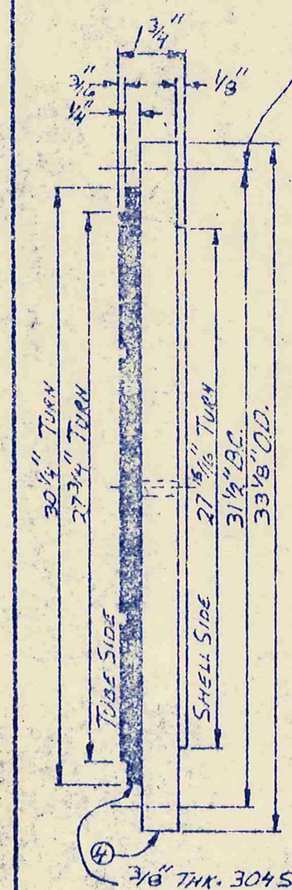
DRAWING TITLE: GASKET DETAILS			
WORK ORDER 3		NUMBER REQ'D. TWO SETS	
DR. KEN	10/15/75	SIZE "X 30"	DRAWING NUMBER 1823-11
CK. JM	SCALE NONE	TYPE FM	

1 REV. PASS RISS 11/14/75 KEN 2 ADD J.M. NUMBER / CUST. 3/29/76 KEN

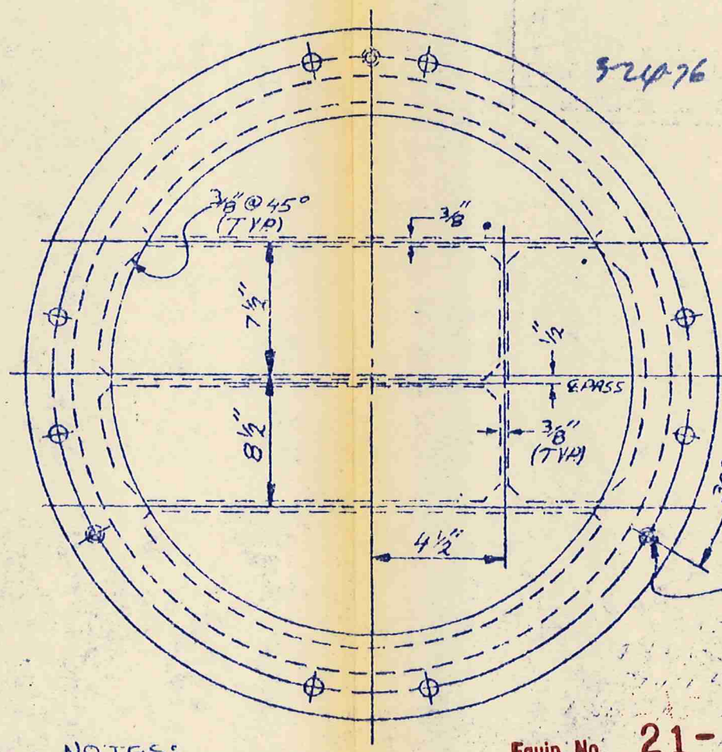
FINAL DESIGN

DRILL 3/4" DEEP $ BOTTOM TAP FOR 5 - 1/2" ϕ TIE RODS ON SHELL SIDE ONLY. DO NOT DRILL THRU!

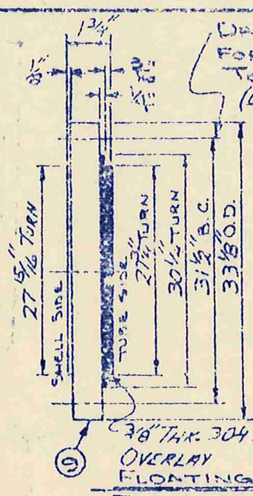
DRILL 40 - 7/8" ϕ HOLES FOR 3/4" STUDS TO STA. E's. (B.S. = 2.4714")



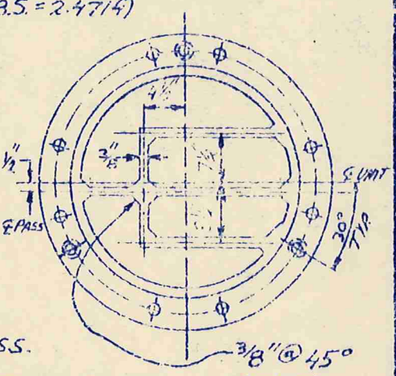
3/8" THK. 304 SS OVERLAY.

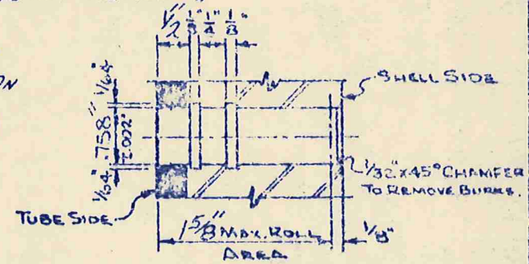


℄ UNIT DRILL & TAP THRU FOR 3-3/4" ϕ JACKSCREWS ON B.C. AND HORZ. E.



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





DETAIL "A"

NOTES:
1. HEAT TREAT FOR 1 1/4 HR. @ 1100°F.
2. CHEM. ANALYSIS OF ALL OVERLAY REQ'D.
3. OVERLAY TO BE 309L. 1ST PASS & 308L REMAINDER & IN ACCORDANCE W/ PROCEDURE UCL-4.3 (30 BL-1A).

NOTE:
DRILL & REAM TUBE HOLES TO .758" ±.002" FOR 600 - 3/4" O.D. TUBES ON 15/16" Δ PITCH & 27 1/2" TUBE CIRCLE. GROOVE TUBE HOLES PER DETAIL "A".

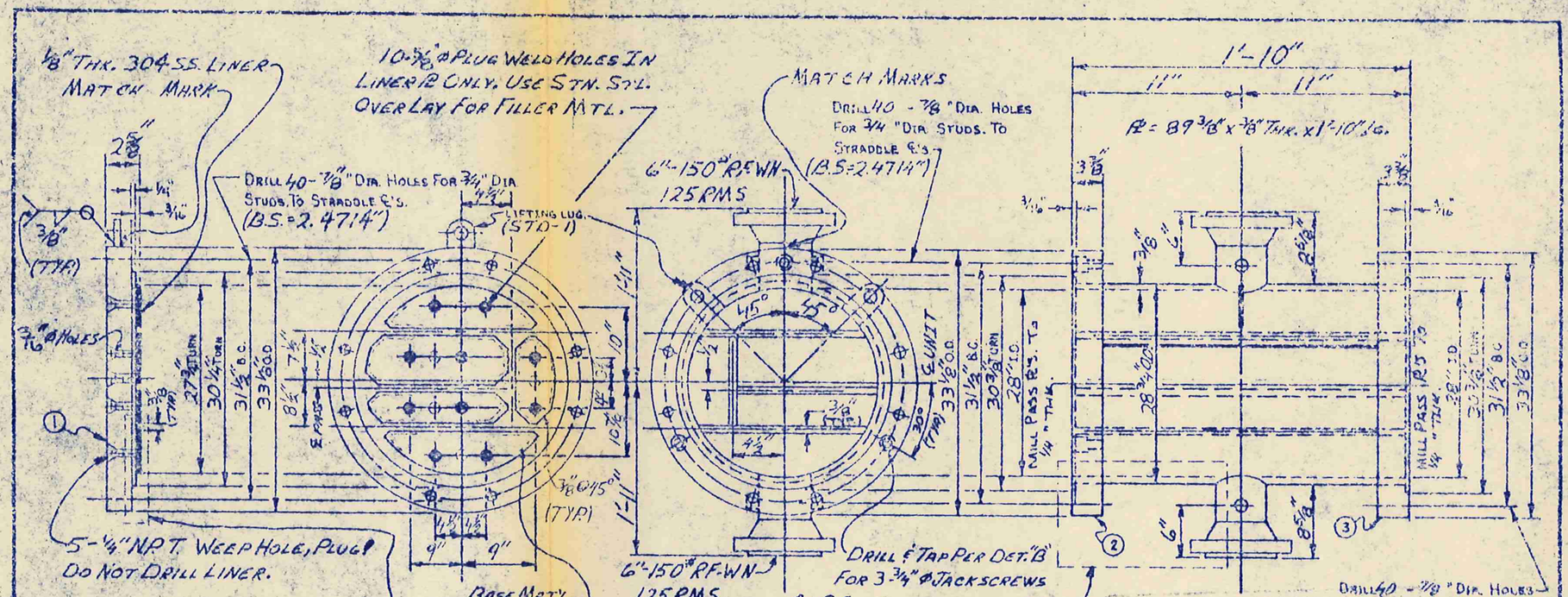
Equip. No. 21-08-026

STATIONARY TUBE SHEET

JOB # 1607
ITEM # E-1404

HUGHES-ANDERSON ENGINEERING CORP. TULSA, OKLAHOMA			
DRAWING TITLE TUBE SHEET DETAILS			
WORK ORDER 18.23		NUMBER REQ'D. ONE	
DR. STEVE	DATE 2-18-76	SIZE 28" x 20"	DRAWING NUMBER
CK ALF	SCALE NONE	TYPE AFM	1823-08

T3



CHANNEL COVER DETAILS

NOTES!

1) ALL BOLT HOLES TO STRADDLE ℄'S.
2) SPOT X-RAY CHANNEL.
3) SEE DWG. STD.-1 FOR WELD DETAILS.
4) WELDING TO BE IN ACCORDANCE W/ PROCEDURES MR-304 AND SA-304 AND SA-1-B.
5) EACH NOZ. EQUIPPED W/ 2-3/4"-6000# CPLG'S. (PLUGGED).
6) ALL OVERLAY TO BE 308 L 1ST PASS 309L REMAINER IN ACC. W/ PROCEDURES UCL-43(308-L-1-M) AND UCL-43(308-L-1-A).
7. ALL OVERLAY TO HAVE CHEM. ANALYSIS.

FINAL DESIGN

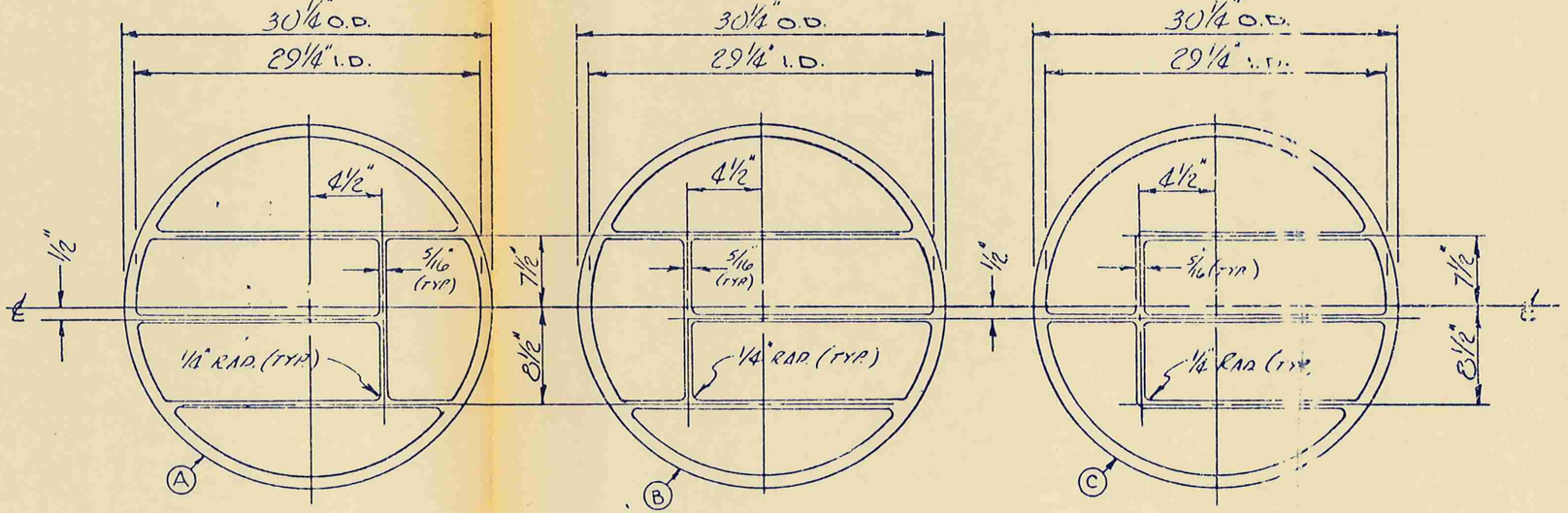
Equip. No. 21-08-026

3-24-76

Job # 1607
Item # E-1404

HUGHES-ANDERSON ENGINEERING CORP. TULSA, OKLAHOMA			
DRAWING TITLE CHANNEL DETAILS			
WORK ORDER 1823		NUMBER REQ'D ONE	
DR STEVE	DATE 2-19-76	SIZE 28" x 20"	DRAWING NUMBER 1823-02
CK	SCALE NONE	TYPE AFM	

C5



CHANNEL COVER GASKET

1/8" THK. 304 STN. STL. JACKETED ASBESTOS FILLED. ONE REQ'D. (J.M. 923 OR EQUAL)

CHANNEL GASKET

1/8" THK. 304 STN. STL. JACKETED ASBESTOS FILLED. ONE REQ'D. (J.M. 923 OR EQUAL)

BACK CHANNEL GASKET

1/8" THK. 304 STN. STL. JACKETED ASBESTOS FILLED. ONE REQ'D. (J.M. 923 OR EQUAL)

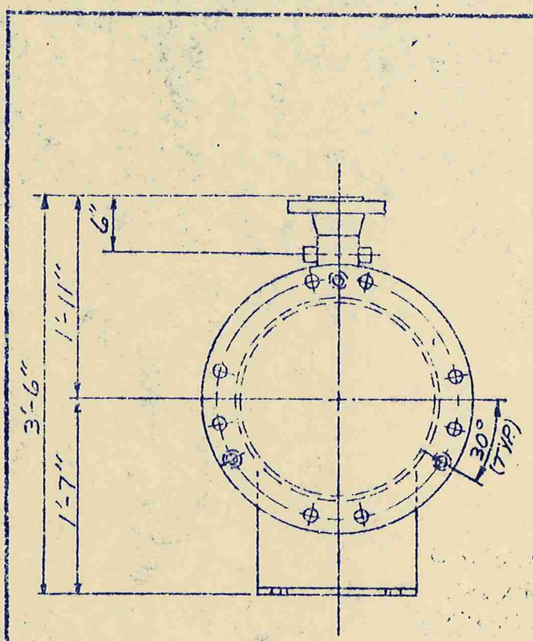
REQUIRED AS NOTED FOR ONE SET

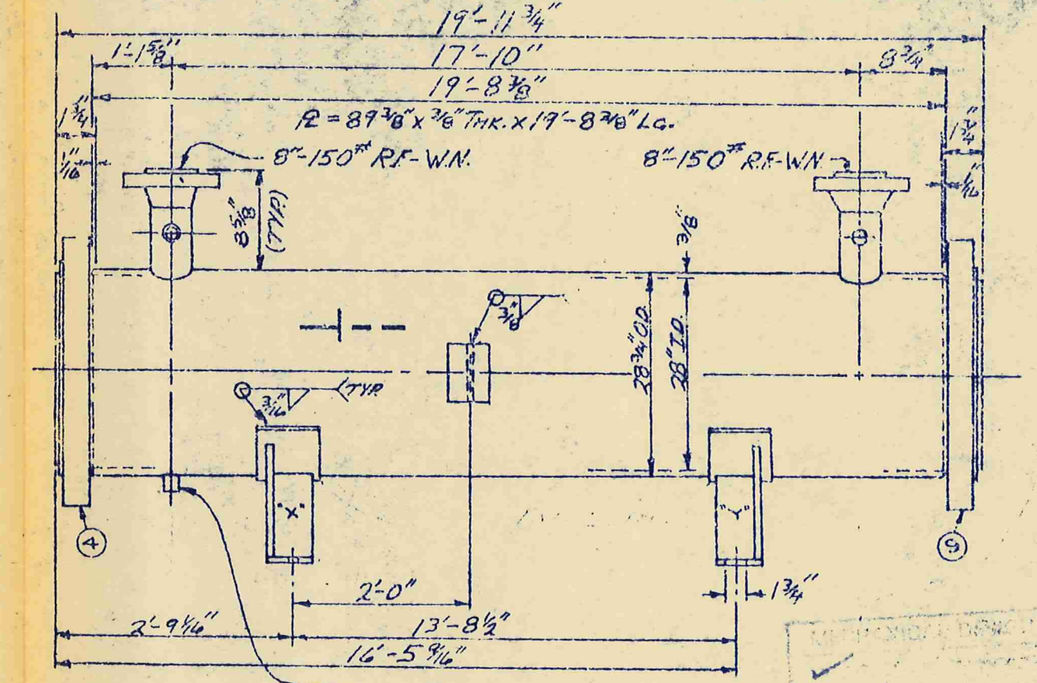
X

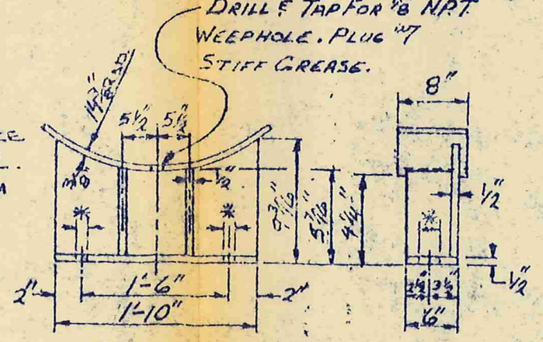
8/4/76 US

HUGHES-ANDERSON ENGINEERING CORP. TULSA, OKLAHOMA			
DRAWING TITLE: GASKET DETAILS			
WORK ORDER: 3		NUMBER REQ'D: TWO SETS	
DR. KEN	10/15/75	SIZE: 30"	DRAWING NUMBER: 1823-11
CK. JIM	B. NONE	TYPE: FM	

1 REV. PASS RISS 11/12/75 KEN 2 ADD J.M. NUMBER / CUST. 3/29/76 KEN







NOTES:

1. SEE DWG. STD.-1 FOR WELD DETAILS.
2. GRIND ALL WELDS FLUSH W/ I.D..
3. SPOT X-RAY SHELL..
4. ALL BOLT HOLES TO STR. 6's.
5. ALL WELDING TO BE IN ACCORDANCE W/ PROCEDURES MA-1A & SA-1A.
6. PAINT P.O. No. 1607-009 & ITEM NO. E-1404 ON SIDE & ONE END OF UNIT.

SUPPORT DETAILS

* { 1-REQ'D. W12-7/8" ϕ HOLES MK'D. (X).
  { 1-REQ'D W12-7/8" x 1 3/4" SLOTS MK'D. (Y).

FINAL DESIGN

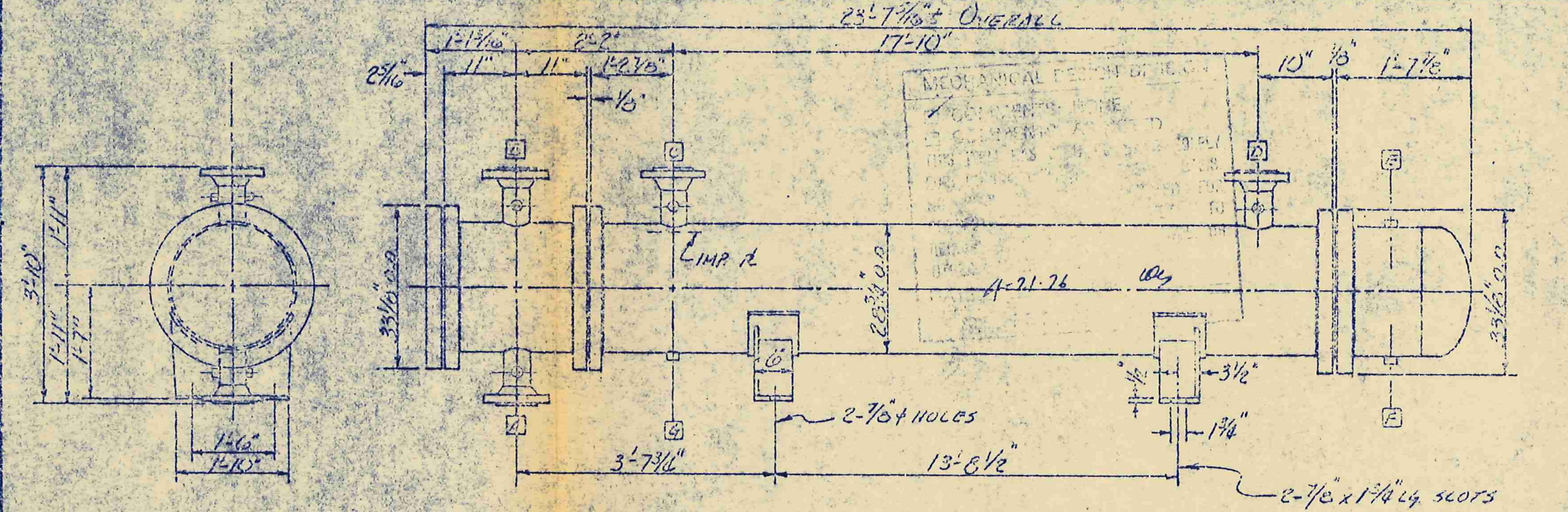
3-24-76 LDT

JOB # 1607
ITEM # E-1404

HUGHES-ANDERSON ENGINEERING CORP. TULSA OKLAHOMA			
DRAWING TITLE SHELL DETAILS			
WORK ORDER 1823		NUMBER REQ'D. ONE	
DR. STEVE	DATE 2-19-76	SIZE 28"-20'	DRAWING NUMBER
CK MP	SCALE NONE	TYPE AFM	1823-03

FOREIGN PRINT FILE
HOUSTON CHEMICAL COMPANY
DIVISION OF
PPG INDUSTRIES, INC.
BEAUMONT, TEXAS 77704

JOB. NO. .... DATE 8-17-76 P.O. 1607-009
DEPT. GLYCOL EQPT. NO. 21-08-026
VENDOR HUGHES ANDERSON
MFR. ....
EQPT. USED FOR REABSORBER WATER COOLER



CLIENT EQUIP. № 21-08-026

FOR: HOUSTON CHEMICAL CO.
BEAUMONT, TEXAS

DESIGN DATA		
	SHELL	TUBES
DESIGN PRESS (MAWP)	80 PSI	75 PSI
TEST PRESS.	120 PSI	115 PSI
DESIGN TEMPERATURE	170 °F	190 °F
CORROSION ALLOWANCE	1/8"	——
NUMBER OF PASSES	1	8
TUBE SURFACE (EFF.)	2315 SQ. FT.	
TUBES: 600 - 3/4" O x 16 BWG (AV) SA-249-304		
ESTIMATED WEIGHT EACH		
DRY 13,000 LBS	WET 18,200 LBS	

NOZZLE DATA				
MARK	SIZE	RATING	FACING	SERVICE
A	6"	150#	R.F.	INLET
B	6"	150#	R.F.	OUTLET
C	8"	150#	R.F.	INLET
D	8"	150#	R.F.	OUTLET
E	3/4"	6000#	CPLG.	VENT
F	3/4"	6000#	CPLG.	DRAIN
G	1"	6000#	CPLG.	DRAIN

EACH NOZZLE EQUIPPED WITH 2-3/4" 6000# CPLG'S. (PLUGGED).

#125 RMS FINISH ON FLG. FACE

GENERAL NOTES

1. DESIGN & CONSTRUCTION SHALL BE IN ACCORDANCE WITH:
   (A) SECTION VIII 1974 EDITION OF THE ASME CODE, DIV. 1 & SO STAMPED BY NATIONAL BOARD
   (B) TEMA "B".
   (C) CUST. SPEC'S
2. ALL BOLT HOLES TO STRADDLE ℄S.
3. SPOT X-RAY CHANNELS & SHELL
4. ONE SPARE SET OF GASKETS REQ'D.
5. CHLORIDE CONTENT SHALL NOT EXCEED 25 PPM FOR TEST WATER ON STN. STL. PARTS
6. Near white blast/SSPC-SP10 on shell and all carbon steel parts and apply one coat of inorganic zinc rich primer (PPG #UC-46745 and 46) 3 mils min. D.F.T. 1st coat to be high solids epoxy (PPG #UC-42208) light gray 5 mils min. D.F.T. Top coat to be Aquapon (PPG #UC-42207) white 2 mils min. D.F.T.

CERTIFIED CORRECT FOR FABRICATION
BY: A. O. [illegible] DATE: 10/21/75

CUST.: SCIENTIFIC DESIGN CO.
DEST.: BEAUMONT, TEXAS
CUST. P.O.: 1607-009
ITEM: E-1404
SERVICE: REABSORBER WATER COOLER
SERIAL: 1823
FILE: 291-75

HUGHES-ANDERSON ENGINEERING CORP.
TULSA, OKLAHOMA

DRAWING TITLE OUTLINE DIMENSIONAL			
WORK ORDER 1823		NUMBER REQ'D. ONE	
DR. K.M.	DATE 10/15/75	SIZE 28"x 80'	DRAWING NUMBER 1823-01
CK. Jim	SCALE NONE	TYPE AFH	

△1 Rev. / Cust. Dwgs 11/12/75 K.M. △2 [illegible] CPLG'S / Cust. 12/2/75 K.M. Delete [illegible] CPLG'S △3 Gen. Rev. / Cust. 12/24/75 K.M. △4 Add Note #6 per Cust. 3/[illegible]/76 K.M.

FINAL DESIGN

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