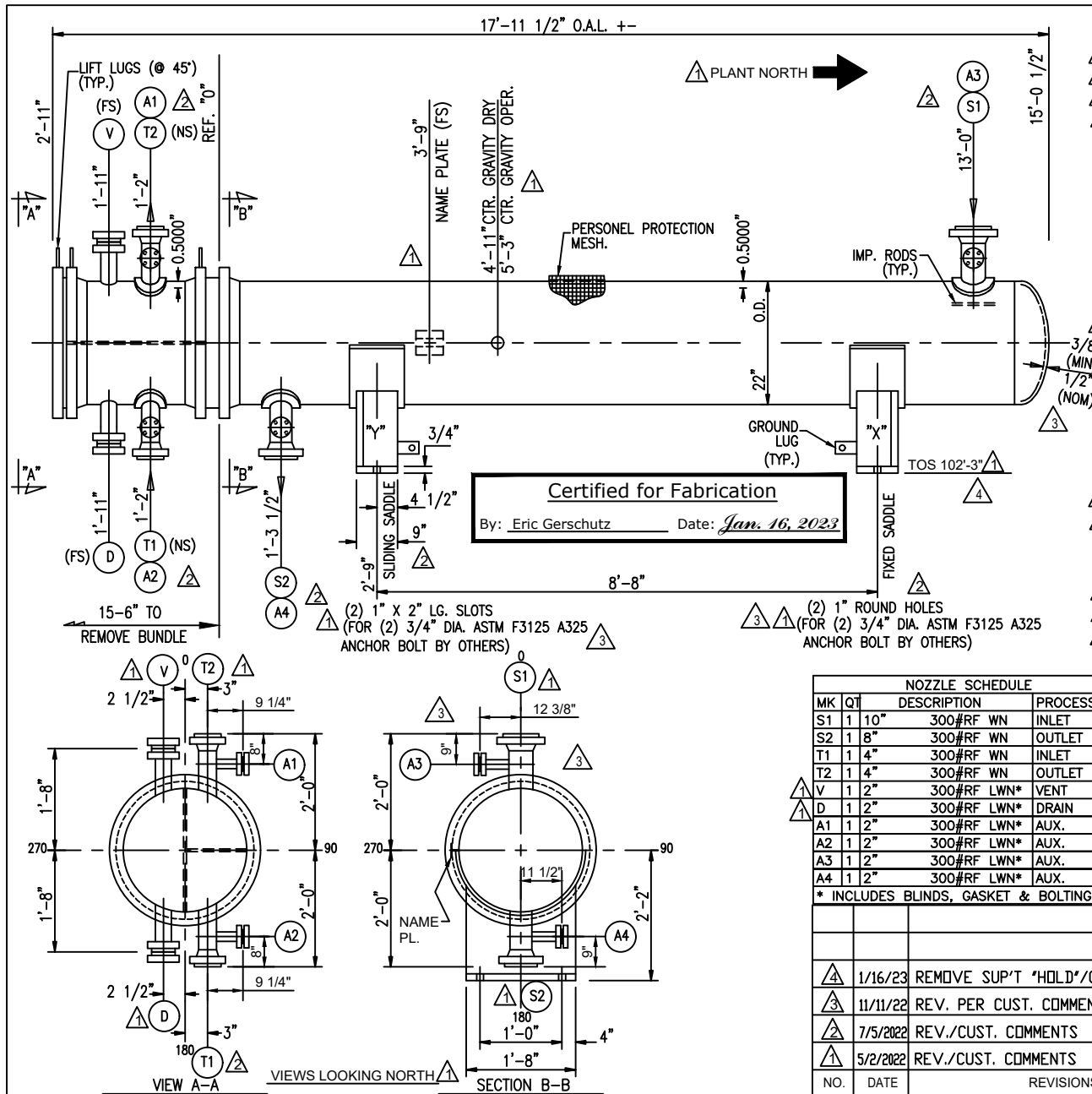
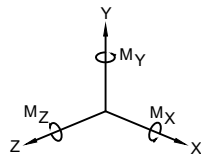




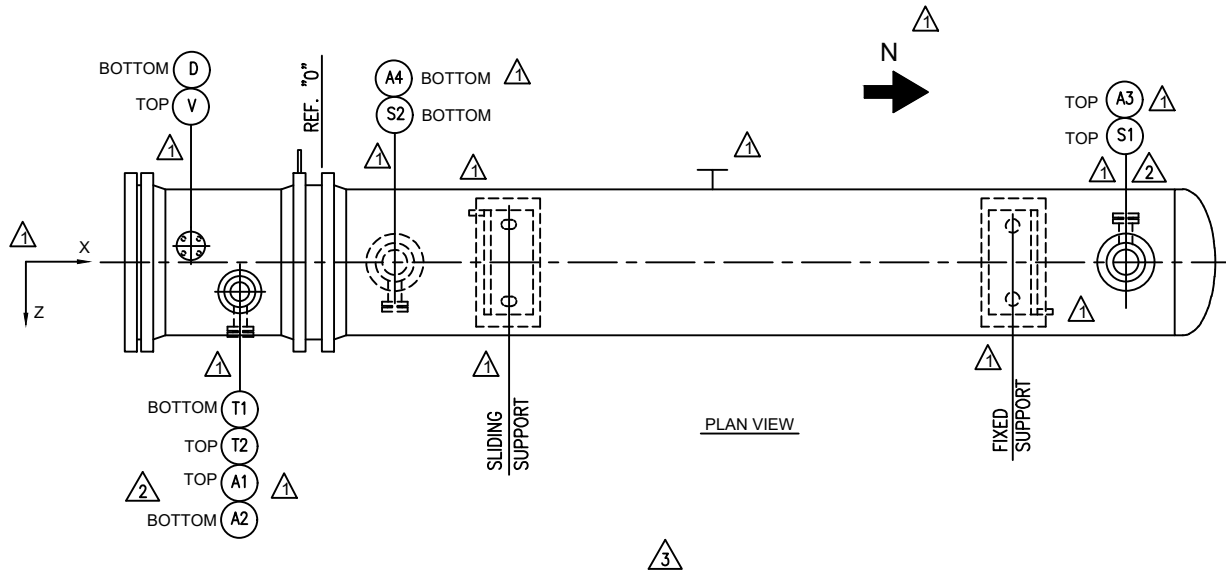
DESIGN DATA		SHELL	TUBE
DESIGN PRESSURE P.S.I.G.	95		120
M.A.W.P. P.S.I.G.	265		150
M.A.P. P.S.I.G.	345		158
LIMITED BY	TUBESHEET		CHAN. CVR.
VACUUM PRESSURE P.S.I.G.	-15 @ 300" F.		N/A
TEST PRESSURE P.S.I.G.	SHOP-449/FIELD-345		SHOP-206/FIELD-195
DESIGN TEMP. Deg.F.	300		150
MDMT Deg. F.	32		32
CORROSION ALLOWANCE	3/16" (CARBON STL.)		1/8" (CARBON STL.)
NUMBER OF PASSES	1		4
RADIOGRAPHY	SPOT/UW-11(a)(5)(b)		SPOT/UW-11(a)(5)(b)
HEAT TREAT REQUIRED	NO		NO
ESTIMATED WEIGHTS, LBS.			
DRY: 5800 BUNDLE: 2150 WET: 8300 CHAN.: 1200 SHELL: 2450 CHAN. CVR: 350			
SPECIFICATIONS			
ASME Code Section VIII, Division 1, 2021 Ed. (Stamp: Yes)			
TEMA Class R (10TH Ed; & Natl Bd Reg. is Req'd API-660 9TH Ed APPLIES			
Design Reviewed For Compliance With The Requirements of UG-120(d).			
Impact Test Exempt per UCS-66(a),(c),(g), Fig. UCS-66 Gen. Note (c) &			
UCS-67. Tubesheet Impact Tested at -40" f. Per UHA-51, Tubes Exempt.			
Tubes Exempt from I.T.			
MATERIAL			
CHANNEL:	SA-516-70N	BAFFLES:	SA-240-316/316L
SHELL:	SA-516-70N	TUBES:	SA-789-S31803/S32205 (SMLS)
TUBESHEETS:	SA-240-S31803/S32205	SEE BOM FOR OTHER MATERIALS	
(104) U's 3/4"	O.D.X	0.065" (AVG.) X 14'-0"	LG.
TUBE PITCH 1"	◇ 45"	△ SURFACE 568.9 (EFF)	SQ.FT.
GENERAL NOTES			
ALL BOLT HOLES TO STRADDLE NATURAL CENTER LINES.			
SHELLSIDE TO HAVE PERSONNEL PROTECTION MESH.			
TUBING SHALL BE SOLUTION ANNEALED.			
FIREPROOFING SUPPORTS: N/A			
SEAL WELD & EXPAND TUBES TO TUBESHEET			
GASKETS: .1750" THK. 304 SPIRAL WOUND GPHT FILLED W/ 304 S.S.			
INNER & OUTER COMP. RINGS			
10% SPARE BOLTING FOR BODY FLG'S.			
2 SETS OF SPARE GASKETS REQUIRED.			
PAINT: SEE SHT. -1A			
PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT			
EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC			
SERVICE: PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER			
LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA			
PRODUCT: PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER			
ITEM NO.: 18-X-370A			
AIR PRODUCTS P.O. NO.: 4505600058 / A8KM-4-402-PO-3			
AP PROJECT NO.: EN-20-7120			
VDR CODE NO.: HCO9			
SERIAL NO.: S21-13258-6			
ENGINEER: EG			
CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT			

ASSEMBLY AND SPECIFICATIONS FOR	
ONE 21-168 A E U	
CUST DD/DG	DWN. BY
NTS DD/DG	EMG
GO/DD	DATE
EMG	12-18-21
CKD. BY	DWG.NO.
GS	S21-13258-6-1
REV.	4

Fabsco	
SHELL & TUBE, LLC	



NOZZLE LOADS							
MK.	M _X LBF-FT	M _Y LBF-FT	M _Z LBF-FT	F _X LBF	F _Y LBF	F _Z LBF	LOAD BASES
S1	9020	14600	11460	4560	3640	4560	10"-150#; 2 x API-660
S2	8020	12960	10180	3240	2580	3240	8"-150#; 2 x API-660
T1	1420	2280	1800	1360	1080	1360	4"-150#; 2 x API-660
T2	1420	2280	1800	1360	1080	1360	4"-150#; 2 x API-660



DESIGN DATA	SHELL	TUBE
OPERATING PRESSURE PSIG	63	50
OPERATING TEMP. °F.	IN: 219.8 OUT: 111.7	IN: 80 OUT: 95
HYDROTEST TEMP. °F.	60 (MIN)	60 (MIN)
JOINT EFF.	1	1
FLUID NAME	OFFGASES	COOLING WATER
FLUID DENSITY lb/ft ³	IN: .415 OUT: .434	IN: 62.226 OUT: 62.059
LETHAL SERVICE	NO	NO
SERVICE	TOXIC AND FLAMMABLE	COOLING WATER
DESIGN DUTY Btu/hr	2310000	
WIND CODE	ASCE 7-16 WIND SPEED: 101 MPH IMP. FACTOR: 1	
SEISMIC CODE	ASCE 7-16 IMP. FACTOR: 1.5 Fa: 1 Fv: 1.721	
	Ss: 1.616 S ₁ : 0.579 Site Class: D Sd ₁ : 0.996	

PAINT:
 SOLVENT CLEAN PER SSPC-SP1
 SANDBLAST PER SSPC-SP10 (1.5-2.5 MILS ANCHOR PROFILE)

SHELLSIDE:
PRIMER: ONE COAT SHERWIN WILLIAMS ZINC CLAD II (2.5-4.0 MILS DFT)
INTERM: ONE COAT SHERWIN WILLIAMS HEAT FLEX HI-TEMP 500 (1.5-2.0 MILS D.F.T.) (COLOR: SW4003 PALLET TAN)
FINISH: ONE COAT SHERWIN WILLIAMS HEAT FLEX HI-TEMP 500 (1.5-2.0 MILS D.F.T.) (COLOR: LIGHT GRAY RAL #7035)

TUBESIDE:
PRIMER: ONE COAT SHERWIN WILLIAMS ZINC CLAD II (2.5-4.0 MILS DFT)
INTERM: ONE COAT SHERWIN WILLIAMS MACROPOXY 646 (4.0-6.0 MILS DFT) (COLOR: MILLWHITE)
FINISH COAT: ONE COAT SHERWIN WILLIAMS ACROLON 218HS (2.0-3.0 MILS DFT) (COLOR: LIGHT GRAY RAL #7035)

APPLICABLE SPECIFICATIONS :
 3-11-10, 4-11-11, 4WEQ-1051, 4WGN-10001,
 4WPI-670210, A8KM-PP-000-40002-A,
 A8KM-PP-000-50720-A, A8KM-PP-000-200001-A,
 A8KM-PP-000-500005-A, A8KM-PP-000-500510-A,
 A8KM-PP-000-500512-A, A8KM-PP-000-500520-A,
 A8KM-PP-000-500550-A, FORM 8232,
 SPEC-ENG-DOC001, SPEC-ENG-DOC002,
 SPEC-ENG-MQ042, SPEC-ENG-MQ057,
 SPEC-MED-DOC001

PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT
EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC
SERVICE: PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER
LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA
PRODUCT: PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER
ITEM NO.: 18-X-370A
AIR PRODUCTS P.O. NO.: 4505600058 / A8KM-4-402-PO-3
AP PROJECT NO.: EN-20-7120
VDR CODE NO.: HC09
SERIAL NO.: S21-13258-6
ENGINEER: EG
CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

CHANNEL COVER TO CHANNEL FLANGE BOLTING INFO

STUD DIAMETER: 3/4" O.D.
 NUMBER STUDS: (44)
 STUD MATERIAL: SA-193-B7
 BOLT TORQUE RANGE TO BE ACHIEVED: 248 - 250 Ft. LBS.

CHAN. FLG./T'SHT./SHELL FLG. BOLTING INFO

STUD DIAMETER: 3/4" O.D.
 NUMBER STUDS: (44)
 STUD MATERIAL: SA-193-B7
 BOLT TORQUE RANGE TO BE ACHIEVED: 164 - 252 Ft. LBS.

				SUPPLEMENTAL INFORMATION	
				ONE 21 - 168	A E U
				DWN. BY	
				EMG	
				DATE	
				5/2/2022	
				CKD. BY	
				DiCarlo	
				DWG.NO.	
				S21-13258-6-1A	
				REV.	
				3	

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 SHELL & TUBE, LLC

-----API-660-----

- 1) STENCIL THE FOLLOWING ON THE EXCHANGER IN
3" HIGH (MIN.) WHITE BLOCK LETTERS:
P.O. NO.: 4505600058
ITEM NO.: 18-X-370A
SHIPPING WT.: 5800#
- 2) STUDS, NUTS AND THREADED SURFACES SHALL BE COATED WITH MARKAL E-Z- BREAK COMPOUND BEFORE ASSEMBLY.
- 3) HYDRO TEST PRESSURE SHALL BE HELD FOR A MINIMUM OF ONE HOUR.
- 4) PLUG SHELL INSIDE DIAMETER WITH A METAL TEMPLATE CONSISTING OF TWO DISCS (EACH HAVING A DIAMETER EQUAL TO THE DIAMETER OF THE BAFFLES) RIGIDLY MOUNTED PERPENDICULAR TO A SHAFT, AND SPACED 12" APART.
- 5) AT LEAST ONE SPOT RADIOGRAPH SHALL BE MADE OF EACH CIRCUMFERENTIAL AND LONGITUDINAL JOINT. SPOT RADIOGRAPHS SHALL INCLUDE EACH START, STOP AND BURN-THROUGH OF WELDS MADE BY THE AUTOMATIC SUBMERGED ARC PROCESS.
- 6) SPOT RADIOGRAPHS SHALL BE AT LEAST 10" LONG, OR SHALL BE FULL LENGTH WHERE WELDS ARE LESS THAN 10 INCHES LONG.
- 7) THE FLATNESS TOLERANCE (MAXIMUM DEVIATION FROM A PLANE) ON PERIPHERAL GASKET CONTACT SURFACES SHALL BE $\pm 1/32"$.
- 8) FLATNESS OF GASKET SURFACES SHALL BE MEASURED WITH A DIAL INDICATOR. PASS PLATE GROOVES CAN BE MEASURED WITH A STRAIGHT EDGE.

-----API-660 CONT.-----

- 9) WELD METAL AND HAZ. HARDNESS EXAMINATION REQUIREMENTS ARE AS FOLLOWS (AFTER PWHT, IF REQUIRED):
-225 BHN, MAXIMUM.
-A 10mm BALL IS REQUIRED FOR TESTING.
-TEST ONE LONGITUDINAL AND ONE CIRCUMFERENTIAL WELD AND EACH CONNECTION TO COMPONENT WELD OF NOZZLES 2" NPT AND LARGER.
-IF MORE THAN ONE WELDING PROCEDURE IS USED TO PERFORM LONGITUDINAL OR CIRCUMFERENTIAL WELDS, HARDNESS READINGS SHALL BE MADE OF THE WELDS DEPOSITED BY EACH PROCEDURE.
-HARDNESS READINGS AND LOCATIONS SHALL BE RECORDED.
-TESTING TO BE DONE ON INSIDE SURFACE IF ACCESSIBLE.
- 10) COAT EXPOSED MACHINED SURFACES WITH AN EASILY REMOVABLE RUST PREVENTATIVE.
- 11) NOTIFY CUSTOMER FIVE (5) DAYS PRIOR TO START OF FABRICATION, WITNESS OR HOLD POINTS.
- 12) MATCH MARKS SHALL BE PROVIDED TO ENSURE PROPER ALIGNMENT OF BOLTED JOINTS.
- 13) STAMP THE SERIAL No. ON O.D. OF TUBESHEETS, FLANGES AND CHANNEL COVERS.
- 14) HYDRO TEST CHARTS REQUIRED.
- 15) NOZZLE WELD PADS & SUPPORT PADS SHALL BE AIR & SOAP TESTED W/15 PSI (MIN), 25 PSI (MAX) AIR PRESSURE.
- 16) SHELLSIDE HYDRO TEST SHALL BE PERFORMED WITH CHANNEL COVER REMOVED.

-----STANDARD SHOP PRACTICES-----

- 1) ALL BOLT HOLES SHALL STRADDLE NATURAL CENTERLINES.
- 2) GRIND INSIDE WELDS FLUSH WITH SHELL.
- 3) GRIND INSIDE WELDS SMOOTH WITH CHANNELS.
- 4) RADIUS ALL NOZZLES 1/8" INSIDE AT CYLINDER I.D.
- 5) SEAL WELD SUPPORT SADDLES WITH 1/4"(MIN) FILLET WELD.
- 6) EXCHANGER SHALL BE CLEANED INSIDE AND OUTSIDE OF WELD SPATTER, DIRT, WELD ROD AND OTHER DEBRIS.
- 7) FOR MDMT OF +30° F. (MINIMUM), HYDRO TEST WATER TEMPERATURE SHALL NOT TO BE LESS THAN 40°F.
- 8) ALL EXTERNAL ATTACHMENTS TO BE SEAL WELDED.
- 9) HYDROSTATIC TEST, USE CLEAN WATER WITH A CORROSION INHIBITOR ADDED.
VOLUME OF WATER SHELLSIDE = 205 GALLONS (APPROXIMATELY)
VOLUME OF WATER TUBESIDE = 99 GALLONS (APPROXIMATELY)
- 10) ALL LIFTING DEVICE ATTACHMENT WELDS SHALL BE EXAMINED BY THE PT METHOD.
- 11) INSTALL SHIPPING COVERS ON ALL NOZZLES.
- 12) ALL SEAL WELDED EXTERNAL NON PRESSURE ATTACHMENTS REQUIRE A 1/4" NPT VENT HOLE.
- 13) AFTER THE HYDRO TEST, THE HEAT EXCHANGER SHALL BE COMPLETELY DRAINED AND THOROUGHLY DRIED.

-----NDT REQUIREMENTS-----

- 1) SHELL: SPOT RADIOGRAPH PER UW-11(a)(5)(b)
- 2) CHANNEL: SPOT RADIOGRAPH PER UW-11(a)(5)(b)

-----STAINLESS STEEL REQUIREMENTS-----

- 1) TEST WATER CHLORIDE CONTENT NOT TO EXCEED 50 PPM.
- 2) TOOLS, GRINDING WHEELS, BRUSHES, ETC. USED ON STN. STL. SHALL NOT HAVE BEEN USED PREVIOUSLY ON CARBON STEEL.

PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT
EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC
SERVICE: PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER
LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA
PRODUCT: PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER
ITEM NO.: 18-X-370A
AIR PRODUCTS P.O. NO.: 4505600058 / A8KM-4-402-PO-3
AP PROJECT NO: EN-20-7120
VDR CODE NO.: BE04
SERIAL NO.: S21-13258-6
ENGINEER: EG
CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

			JOB NOTES		
			DWN. BY	Fabsco SHELL & TUBE, LLC	
			B.W.		
			DATE		
			7/5/22		
			CKD. BY	DWG. NO.	REV.
			DiCarlo	S21-13258-6-1B	1
NO.	DATE	ADDED DWG./FABSCO	GO/DD	REVISIONS	

-----CUST. NOTES-----

- 1) ALL SHARP EDGES SHALL BE GROUND TO A .078" RAD. (MIN.)
- 2) THE INITIAL ROOT PASS OF DBL WELDED GROOVE JOINTS, INCLUDING ROOT TACK WELDS, SHALL BE CHIPPED, GROUND &/OR GOUGED TO SOUND METAL, AREA TO BE EITHER MPE OR DPE PRIOR TO WELDING FROM OTHER SIDE.
- 3) PRESSURE CONTAINING WELDS, INTERNAL ATTACHMENT WELDS, & SUPPORT WELDS SHALL BE CONTOURED TO PERMIT PROPER INTERPRETATION OF ANY REQ'D. UT EXAMINATION.
- 4) ALL WELDING CONSUMABLES SHALL BE OF LOW HYDROGEN TYPE. E60XX ELECTRODES SHALL NOT BE USED!
- 5) BRINNELL HARDNESS READINGS TO BE PREFORMED ON INSIDE SURFACE WHEN POSSIBLE.
- 6) TEMPORARY ATTACHMENTS TO BE REMOVED BY MECHANICALLY OR THERMALLY CUT WITHIN 1/8" OF SURFACE. AREA TO BE GROUND FLUSH W/ SURROUNDING AREAS, FOLLOWED BY MPE OR DPE. DO NOT "KNOCK OFF."
- 7) HYDRO TEST WATER TEMP. AT ALL LOCATIONS SHALL BE AT LEAST 50°F. AT ALL TIMES DURING HYDROTEST.
- 8) THE TEMPERATURE OF THE HYDROTEST WATER AND THE EXCHANGER SHALL BE EQUALIZED PRIOR TO HYDROTEST.
- 9) STAMPING TO BE DONE W/ "LOW STRESS" STAMPS.
- 10) NOZ. TO CYL. WELDS, BRANCH NOZ. WELDS WHICH CAN'T BE X-RAYED SHALL BE UT.
- 11) ALL ARC STRIKES, START, STOPS SHALL BE CONFINED TO THE WELDING GROOVE OR SHALL BE REMOVED BY LIGHT GRINDING FOLLOWED BY MPT OR DPE.
- 12) THE USE OF HIGH NICKEL CONTENT C'STL. WELDING CONSUMABLES OR C-1/2Mo CONSUMABLES IS PROHIBITED.
- 13) ALL WELD SURFACES TO BE VISUALLY INSPECTED TO ENSURE THAT LAMINATIONS &/OR OTHER DEFECTS ARE NOT PRESENT.
- 14) PEENING IS NOT PERMITTED FOR PURPOSE OF CLEANING WELDS.
- 15) EXCH'S. TO BE STENCILED W/ THE FOLLOWING"
 "HEIGHT" : 4'-6"
 "WIDTH" : 2'-6"
 "LENGTH" : 18'-0"
 "WEIGHT" : 5,800#
- 16) FINISHED EXCHANGER IS TO BE WEIGHTED.
 TO BE WITHIN +/- 2% OR BETTER ACCURACY.
 A CALIBRATED WEIGHT CERTIFICATE SHALL BE PROVIDED.

-----CUST. NOTES CONT.-----

- 17) LIFTING POINTS & CENTER OF GRAVITY SHALL BE MARKED ON EXCHANGER.
- 18) THE ENTIRE SURFACE OF FORGINGS INCLUDING WELD BEVEL SHALL BE EXAMINED BY MT AFTER FINISH MACHINING & PRIOR TO WELDING.
- 19) EXCHANGER SHALL BE IN A MANNER WHICH KEEPS NOZZLES FROM TOUCHING THE TRUCK BEDS AND/OR SURFACES AT OFF-LOADING AREA AT JOBSITE.
- 20) PRIOR TO WELDING, JOINTS SHALL BE VISUALLY INSPECTED FOR CLEANLINESS, CONDITION OF TACK WELDS IF PRESENT, PREHEAT IF SPECIFIED, AND FILLER METAL TO BE USED.
- 21) REQUIRED PREHEAT TEMPERATURE SHALL ALSO APPLY TO THERMAL CUTTING AND TACK WELDING.
- 22) PREHEAT ALL JOINT TO A MINIMUM OF 125° F. WHEN MOISTURE REMOVAL IS REQUIRED.
- 23) PMI OF MATERIALS WILL BE BASED ON TESTING PREFORMED AFTER FABRICATION. PMI OF WELD CONSUMABLES PRIOR TO WELDING SHALL BE PREFORMED. THE RESULT OF CHEM. ANALYSIS SHALL MEET THE DEPOSIT ANALYSIS OF UNDILUTED WELD METAL.
- 24) PMI AS FOLLOWS:
 A) 5% OF TUBES.
 B) 100% OF ALL PRESSURE CONTAINING WELDS.
 C) 100% PRESSURE RETAINING PARTS.
 D) VERIFIED MATERIALS SHALL BE MARKED WITH "PMI" OR "PMI-B"
 E) CHEMICAL COMPOSITION FOR 2205 DUPLEX SS MATERIAL:
 Ni= 4.50-6.50% (MIN.) N=0.14-0.20 (MIN)
 Cr= 22.0-23.0% (MIN.) Mo= 3.00-3.50% (MIN)
 F) RESULTS OF PMI SHALL BE RECORDED ON REPORT FORMS & NOTED ON DWG'S.

-----CUST. NOTES CONT.-----

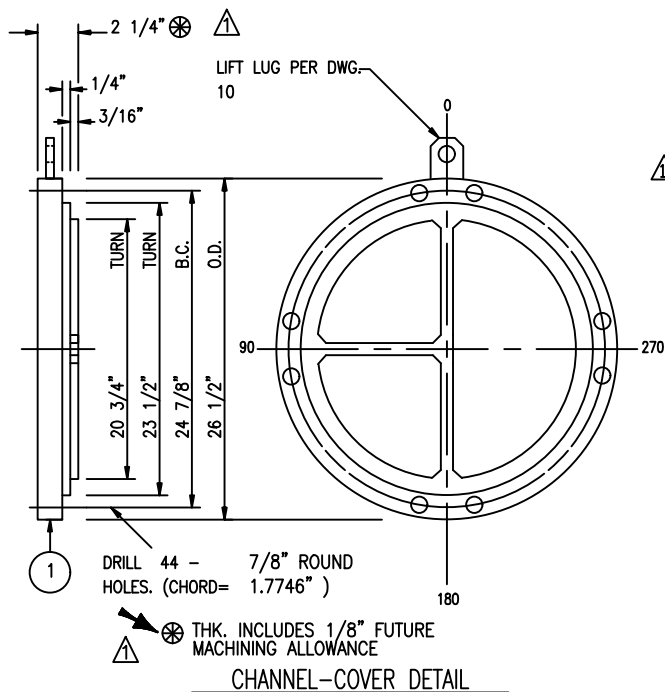
- 25) FOR SET ON NOZZLES, THE BASE METAL ADJACENT TO AUX. NOZZLE OPENINGS ON MAIN NOZZLES SHALL BE THOROUGHLY U.T. & M.P.E. TO ENSURE THAT THERE ARE NO FLAWS. (ETC. LAMINATIONS)
- 26) WELDS FROM EACH WELD PROCEDURE, WELDER/WELDING OPERATOR SHALL BE SPOT RADIOGRAPHED IF ACCESSIBLE.
- 27) NON PRESSURE PARTS TO PRESSURE CONTAINING COMPONENT WELDS SHALL BE 100% M.P.E. OR D.P.E.

PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT
 EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC
 SERVICE: PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER
 LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA
 PRODUCT: PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER
 ITEM NO.: 18-X-370A
 AIR PRODUCTS P.O. NO.: 4505600058 / A8KM-4-402-PO-3
 AP PROJECT NO: EN-20-7120
 VDR CODE NO.: BE04
 SERIAL NO.: S21-13258-6
 ENGINEER: EG
 CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

			JOB NOTES (CONT.)		
			DWN. BY		
			GO		
			DATE		
			7/5/22		
			CKD. BY	DWG. NO.	REV.
			DiCarlo	S21-13258-6-1C	1
			NO.	DATE	REVISIONS

COVER NOTES:

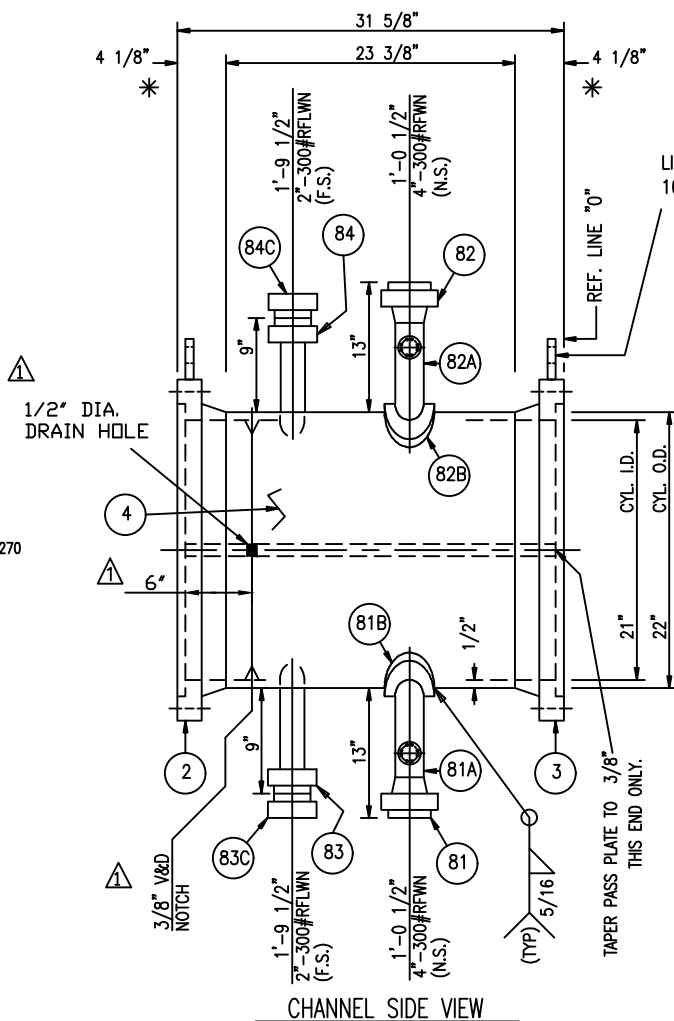
- 1) MACHINE ALL COVER SURFACES TO 250 RMS EXCEPT GASKET FACES TO BE 125 RMS.
- 2) ALL COVER PASS PLATE GROOVE WIDTHS TO BE 5/8" WIDE.
- 3) ALL COVER PASS PLATE GROOVE JUNCTIONS TO BE NOTCHED 3/8" AT 45 Deg.



NOTES:

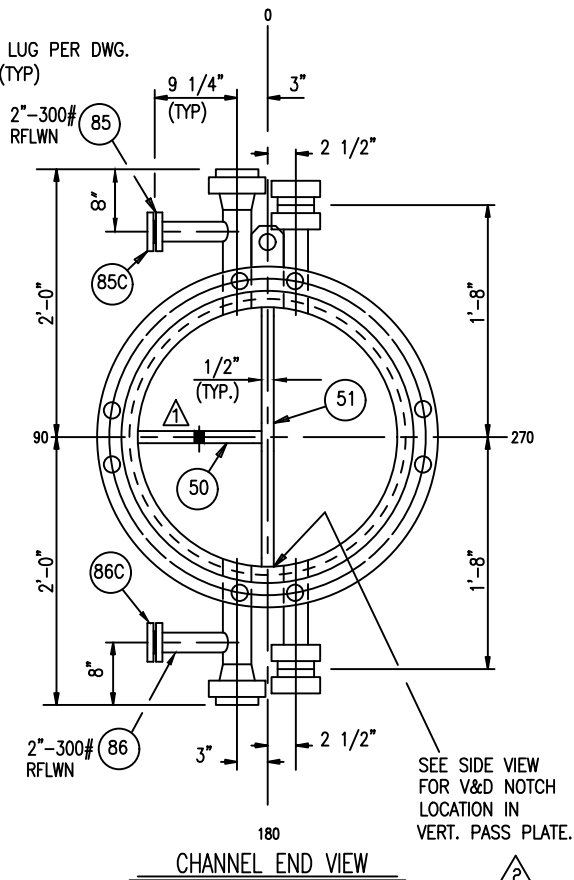
- 1) ALL WELDING TO BE IN ACCORDANCE W/ PROCEDURES ON DWG. -18.
- 2) ALL BOLT HOLES TO STRADDLE CENTER LINES.
- 3) FOR WELD AND BEVEL DETAILS SEE DWG. -13.
- 4) GRIND ALL INSIDE WELDS SMOOTH.
- 5) SPOT PER UW-11(a)(5)(b) RADIOGRAPHY.

PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT
 EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC
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 LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA
 PRODUCT: PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER
 ITEM NO.: 18-X-370A
 AIR PRODUCTS P.O. NO.: 4505600058 / A8KM-4-402-PO-3
 AP PROJECT NO.: EN-20-7120
 VDR CODE NO.: BE04
 SERIAL NO.: S21-13258-6
 ENGINEER: EG
 CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT



* MACHINE GASKET FACING AFTER ALL WELDING.
 FOR FLANGE DETAILS SEE DWG. 12

LIFT LUG PER DWG. 10 (TYP)



FRONT CHANNEL DETAILS

Fabsco
 SHELL & TUBE, LLC

DWN. BY
 B.W.

DATE
 5/4/22

CKD. BY
 DiCarlo

DWG. NO.

S21-13258-6-2

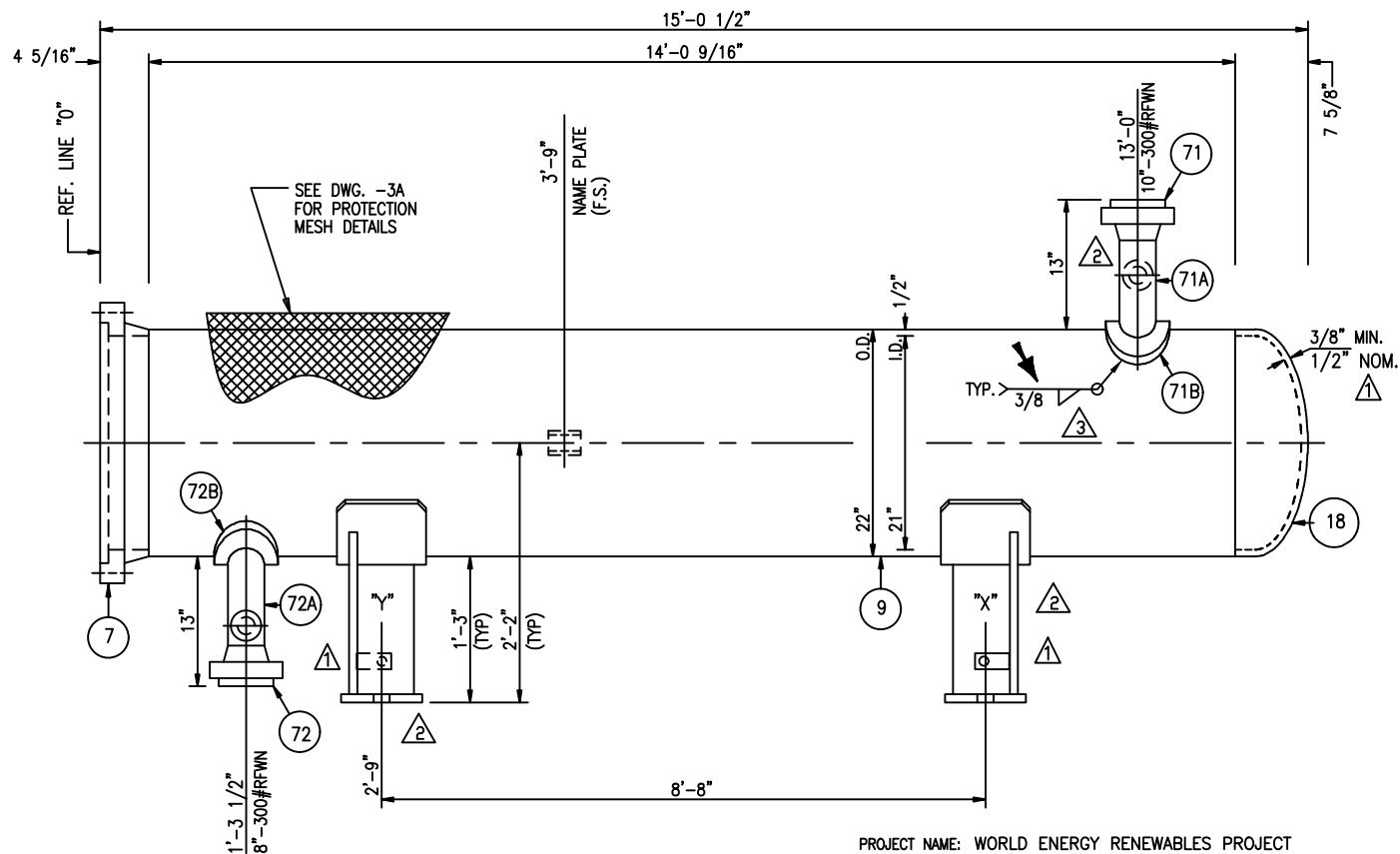
REV.
 2

NO.	DATE	REVISIONS
Δ	11/11/22	ADDED NOTE/CUST. DD/DG
Δ	7/5/2022	REV./CUST. COMMENTS GD/DD

[illegible]

2:1 ELLIP. HEAD NORMALIZING TEMP.
CYCLE, HOLD TIME, LOADING TEMP.
AND UNLOADING TEMP'S ARE ON
THE C.M.T.R'S FURNISHED WITH
DATA BOOK.

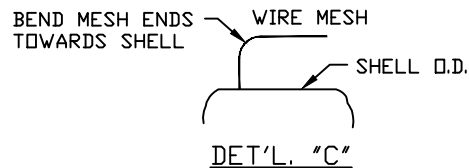
- 1) ALL WELDING TO BE IN ACCORDANCE W/ PROCEDURES ON DWG. -18
- 2) ALL BOLT HOLES TO STRADDLE CENTER LINES.
- 3) FOR WELD AND BEVEL DETAILS SEE DWG. -13.
- 4) FOR SUPPORT DETAILS SEE DWG. -9.
- 5) GRIND ALL INSIDE WELDS FLUSH.
- 6) SPOT PER UW-11 (a)(5)(b) RADIOGRAPHY.



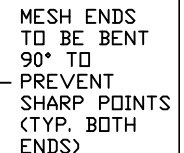
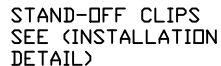
PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT
EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC
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VDR CODE NO.: BE04
SERIAL NO.: S21-13258-6
ENGINEER: EG
CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

SHELL SIDE VIEW

			SHELL DETAILS			
△3	1/16/23	REV. PER CUST. COMMENTS	DD/DG	DWN. BY B.W.	Fabsco SHELL & TUBE, LLC	
△2	11/11/22	REV. PER CUST. COMMENTS	DD/DG	DATE 5/4/22		
△1	7/5/2022	REV./CUST. COMMENTS	GO/DD	CKD. BY <i>DiCarlo</i>	DWG.NO. S21-13258-6-3	REV. 3
NO.	DATE	REVISIONS				



1. APPLICABLE SPECIFICATIONS, ABKM-PP-000-500540-A GALVANIZING SPECIFICATION.
2. STAND-OFF CLIPS SHALL BE INSTALLED IN ROWS AT 24" SPACING IN TWO (2) DIRECTIONS. MAX. DISTANCE FROM EDGE OF EXPANDED METAL TO CENTERLINE OF STAND-OFFS SHALL BE 6".
3. EXPANDED METAL SHALL BE PRE-ROLLED OR FORMED WITH ALL EXPOSED EDGES CUT SUCH THAT FULL DIAMONDS FORM A CLEAN EDGE AND ALL SHARP EDGES ARE SMOOTH AND FREE OF BURRS.
4. STAND OFF CLIPS SHALL BE SHOP WELDED TO THE CYL/HD & BE THE SAME MATERIAL. BOLTING HARDWARE & EXPANDED METAL SHALL BE STN. STL.
5. ALL PARTS INCLUDING HARDWARE SHALL BE SUPPLIED BY FABSCO.
6. ALL PARTS SHALL BE IDENTIFIED WITH A METAL TAG INDICATING ITEM NO., PO NO. & PIECE MARK NO. INSTALLATION HARDWARE SHALL BE BOXED & TAGGED AS ABOVE WITH TEN PERCENT (10%) EXTRA TO ACCOUNT FOR LOSS OR DAMAGE.
7. STANDOFF DISTANCE SHALL BE 3" MIN.

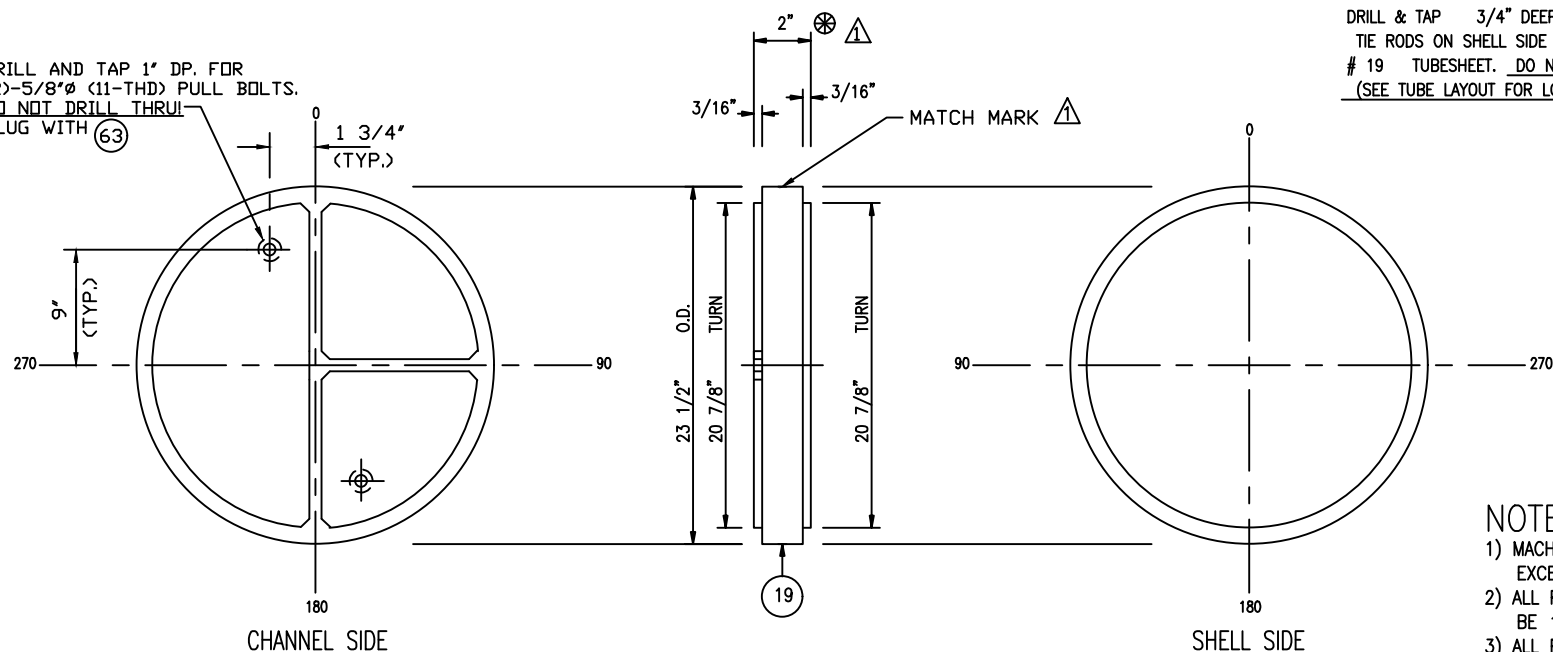


PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT
EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC
SERVICE: PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER
LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA
PRODUCT: PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER
ITEM NO.: 18-X-370A
AIR PRODUCTS P.O. NO.: 4505600058 / A8KM-4-402-PO-3
AP PROJECT NO.: EN-20-7120
VDR CODE NO.: BE04
SERIAL NO.: S21-13258-6
ENGINEER: EG
CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

				SHELL MESH DETAILS
			DWN. BY B.W.	Fabsco SHELL & TUBE, LLC
			DATE 4/30/22	
			CKD. BY <i>DiCarlo</i>	
	7/5/2022	REV./FABSCO	GO/DD	DWG.NO. S21-13258-6-3A
NO.	DATE	REVISIONS		REV. 1

DRILL AND TAP 1" DP. FOR
(2)-5/8"Ø (11-THD) PULL BOLTS.
DO NOT DRILL THRU!
PLUG WITH (63)

DRILL & TAP 3/4" DEEP FOR 8- 1/2" DIA.
TIE RODS ON SHELL SIDE OF
19 TUBESHEET. DO NOT DRILL THRU!!
(SEE TUBE LAYOUT FOR LOCATIONS.)

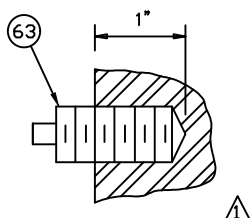


NOTES:

- 1) MACHINE ALL SURFACES TO 250 RMS EXCEPT GASKET FACES TO BE 125 RMS.
- 2) ALL PASS PLATE GROOVE WIDTHS TO BE 1/2" WIDE.
- 3) ALL PASS PLATE GROOVE JUNCTIONS TO BE NOTCHED 3/8" AT 45 Deg.

THK. INCLUDES 1/8" FUTURE
MACHINING ALLOWANCE

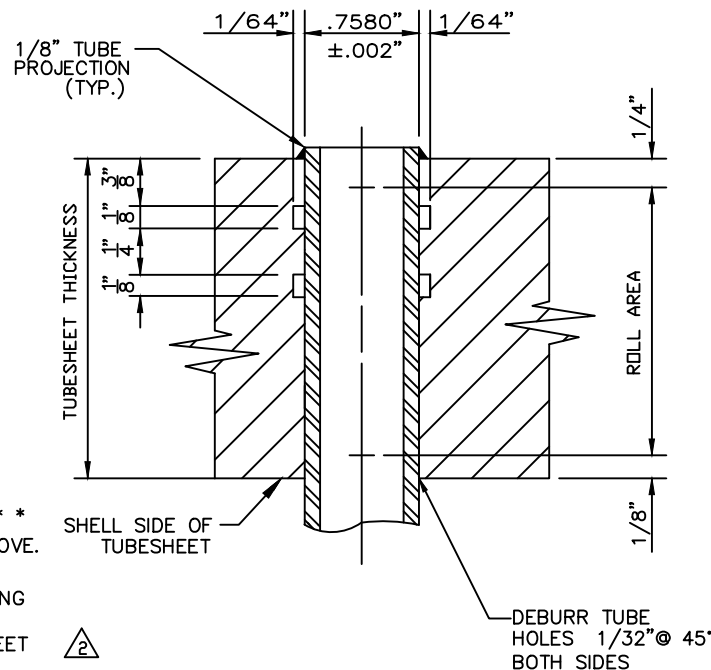
SEE DWG. -4A FOR SEAL WELD
& TUBE HOLE GROOVING DETAIL



(65) PULL BOLT PLUG DETAIL
(EYE BOLT TO SHIP LOOSE W/ EXCHANGER)

PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT
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AP PROJECT NO.: EN-20-7120
VDR CODE NO.: BE04
SERIAL NO.: S21-13258-6
ENGINEER: EG
CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

TUBESHEET DETAILS			
			DWN. BY B.W.
			DATE 5/4/22
Δ	7/5/22	REV. PER CUST. GO/DD	CKD. BY DiCarlo
			DWG.NO. S21-13258-6-4
NO.	DATE	REVISIONS	REV. 1



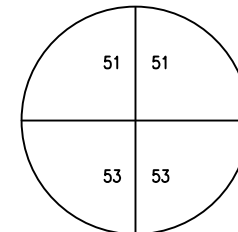
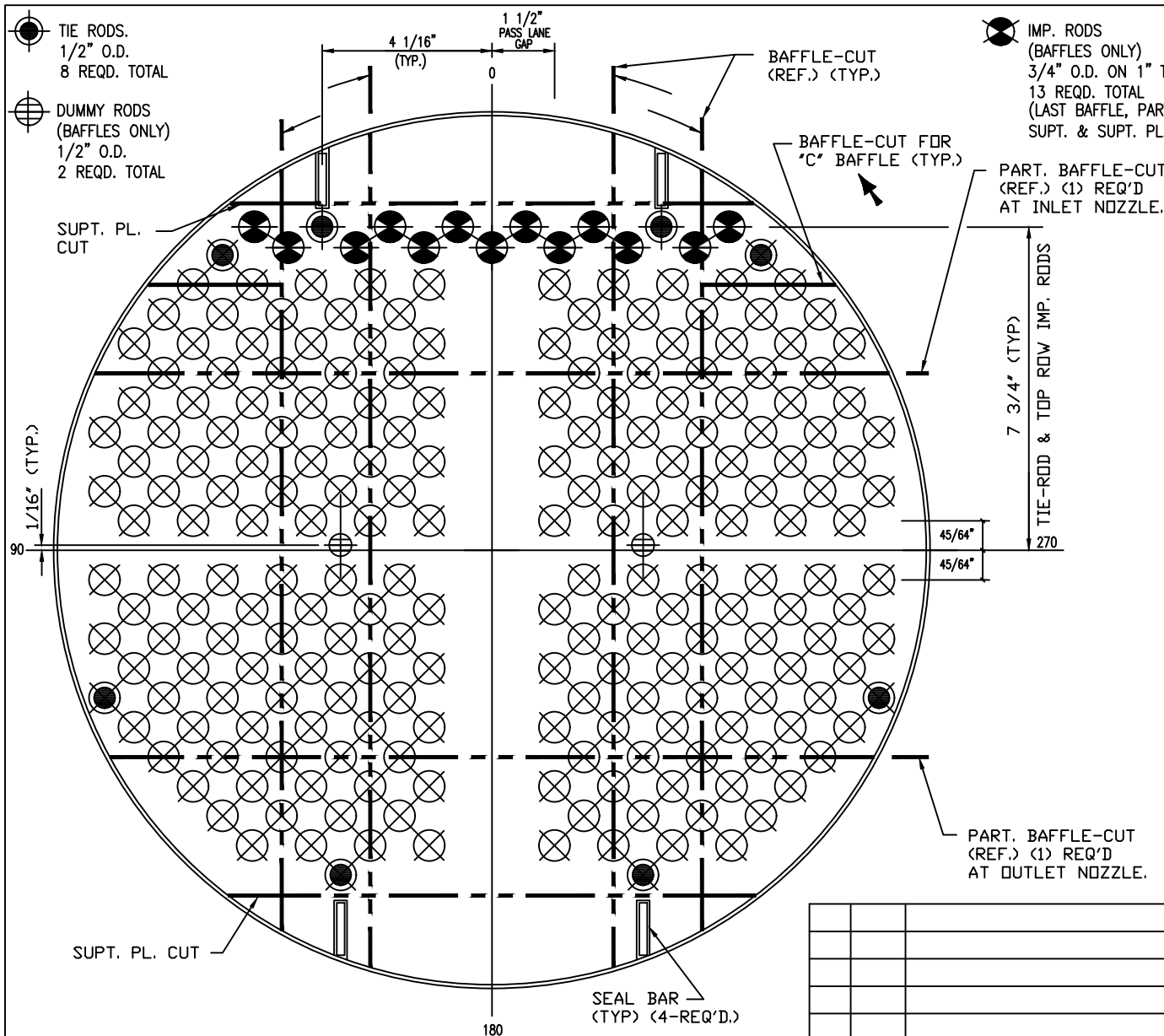
TUBE TO TUBESHEET SEAL WELD AND FABRICATION SEQUENCE

1. DRILL, REAM AND RING GROOVE TUBE HOLES PER DETAIL ABOVE.
2. CLEAN AREAS TO BE WELDED AND ROLLED WITH DEGREASER.
3. TUBESHEET HOLES & TUBES WILL BE CHECKED FOR OVERSIZING AND TOLERANCES PRIOR TO INSTALLING INTO POSITION.
 ALL TUBE SHALL HAVE CORRECT PROTRUSION FROM TUBESHEET AS REQUIRED ON DWG. -7
 INSTALL TUBES IN BUNDLE AND SET PROJECTIONS. △2
4. FUSION WELD USING GTAW PROCESS USING WPS: "T-219". △3
5. LIQUID PENETRANT EXAMINE ALL WELDS AND THEN CLEAN THEM WITH DEGREASER. REPAIR ANY DEFECTIVE WELDS AND RECHECK.
6. TUBE-TO-T'SHT. WELDS SHALL BE AIR & SOAP TESTED PRIOR TO FINAL ROLLING W/ 15 PSI (MAX.) AIR PRESSURE.
7. FINAL ROLL TUBES INTO TUBESHEET PER DETAIL ABOVE. TUBES TO BE ROLLED FOR TUBESHEET THICKNESS SHOWN ABOVE. STOP SHALL BE USED ON TUBE ROLLER TO THAT ASSURES EXPANSION IS WITHIN LIMITS OF ROLL AREA. TUBE WALL REDUCTION TO BE 2-3% MAX. △1
 TUBE ROLLING CHART TO BE DONE.
8. REPEAT STEP 5.
9. THE FERRITE CONTENT OF TUBE WELDS SHALL BE CHECKED USING EITHER A MAGNE-GAGE OR FISCHER FERRITE SLOPE CALIBRATED IN ACCORDANCE WITH AWS A4.2. A MIN. OF THREE (3) TESTS SHALL BE MADE OF EACH 1.7m (5 FT.) OF WELD.
 THE AVERAGE VALUE OF THE TESTS ON EACH WELD SHALL BE 30-70% FERRITE. A REPORT SHALL BE FILLED OUT.

PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT
 EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC
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 LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA
 PRODUCT: PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER
 ITEM NO.: 18-X-370A
 AIR PRODUCTS P.O. NO.: 4505600058 / A8KM-4-402-PD-3
 AP PROJECT NO.: EN-20-7120
 VDR CODE NO.: BE04
 SERIAL NO.: S21-13258-6
 ENGINEER: EG
 CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

TUBE SEAL WELD & TUBE HOLE GROOVING DETAIL			
△	10/23/23	REV. PER FABSCO DD/DG	DWN. BY B.W.
	11/11/22	REV. NOTE #3/CUST. DD/DG	DATE 5/4/22
△	7/5/22	REV. PER CUST. GO/DD	CKD. BY DiCarlo
NO.	DATE	REVISIONS	DWG. NO. S21-13258-6-4A
			REV. 3

Fabsco
 SHELL & TUBE, LLC



TUBE DISTRIBUTION

NOTES:

- 1) DRILL AND REAM TUBE HOLES IN TUBESHEETS TO 0.7580" $\pm$ 0.0020" DIA. FOR 104 - 3/4" O.D. U-TUBES. TOTAL HOLES = 208
- 2) TUBE PITCH = 1" ROT. SQUARE.
- 3) NUMBER OF PASSES = 4
- 4) SEE DRAWING 4A FOR TUBE GROOVING DETAILS.
- 5) BAFFLE O.D. = 20 13/16"
- 6) O.T.L. = 20 9/16"

PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT
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 PRODUCT: PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER
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 AP PROJECT NO: EN-20-7120
 VDR CODE NO.: BE04
 SERIAL NO.: S21-13258-6
 ENGINEER: EG
 CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

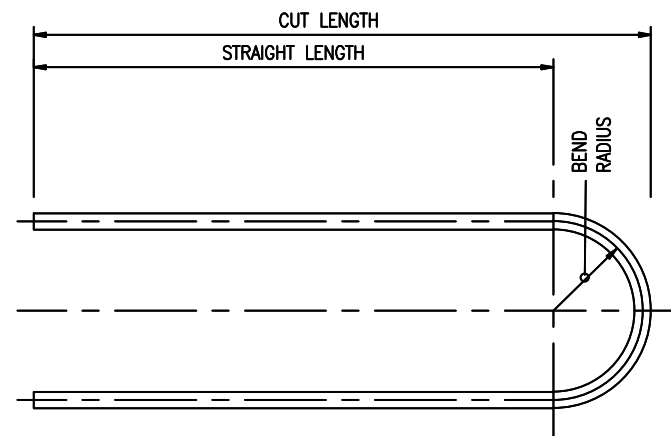
VIEW LOOKING AT SHELL SIDE OF NO. 19 TUBESHEET

TUBE LAYOUT			
		DWN. BY	Fabsco SHELL & TUBE, LLC
		B.W.	
		DATE	
		5/4/22	
		CKD. BY	DWG.NO.
		DiCarlo	S21-13258-6-5
NO.	DATE	REVISIONS	REV.
			0

ROW	NO.OF TUBES	BEND RADIUS	BEND DIAMETER	BEND LENGTH	STRAIGHT LENGTH	CUT LENGTH	DEVELOPED LENGTH
A	10	1 1/2"	3"	0'-4 3/4"	14'-0"	14'-1 7/8"	28'-4 3/4"
B	9	2 1/4"	4 1/2"	0'-7 1/8"	14'-0"	14'-2 5/8"	28'-7 1/8"
C	10	2 15/16"	5 7/8"	0'-9 1/4"	14'-0"	14'-3 5/16"	28'-9 1/4"
D	9	3 5/8"	7 1/4"	0'-11 7/16"	14'-0"	14'-4"	28'-11 7/16"
E	10	4 3/8"	8 3/4"	1'-1 3/4"	14'-0"	14'-4 3/4"	29'-1 3/4"
F	9	5 1/16"	10 1/8"	1'-3 15/16"	14'-0"	14'-5 7/16"	29'-3 15/16"
G	10	5 3/4"	11 1/2"	1'-6 1/8"	14'-0"	14'-6 1/8"	29'-6 1/8"
H	9	6 1/2"	13"	1'-8 7/16"	14'-0"	14'-6 7/8"	29'-8 7/16"
J	9	7 3/16"	14 3/8"	1'-10 5/8"	14'-0"	14'-7 9/16"	29'-10 5/8"
K	8	7 7/8"	15 3/4"	2'-0 3/4"	14'-0"	14'-8 1/4"	30'-0 3/4"
L	7	8 5/8"	17 1/4"	2'-3 1/8"	14'-0"	14'-9"	30'-3 1/8"
M	4	9 5/16"	18 5/8"	2'-5 5/16"	14'-0"	14'-9 11/16"	30'-5 5/16"

NOTES:

- 1) THE NITROGEN CONTENT SHALL BE 0.14%-0.20%.
- 2) EACH HEAT LOT OF DUPLEX TUBE MATERIAL SHALL BE CORROSION TEST PER ASTM A923 TEST METHOD "C". AND SHALL MEET THE GIVEN CRITERIA.
IN ADDITION, ONE SPECIMEN REPRESENTING EACH HEAT LOT OF DUPLEX STN. STL. SHALL RECEIVE A MICROSTRUCTURAL EXAMINATION PER THE REQUIREMENTS OF ASTM A923 TEX METHOD "A".
THE PRESENCE OF POSSIBLY AFFECTED, AFFECTED OR CENTERLINE STRUCTURES SHALL BE GROUNDS FOR REJECTION OF THE SOLUTION ANNEALED BATCH REPRESENTED BY THE SPECIMEN, AND THE BATCH SHALL REQUIRE REHEAT TREATMENT AND RETESTING.
THE SAMPLE SIZE SHALL BE A 25mm (1") LONG TUBE SPECIMEN FOR EACH HEAT LOT.
- 3) TUBING SHALL BE SOLUTION ANNEALED WITHIN THE TEMPERATURE RANGE LISTED FOR THE PARTICULAR GRADE IN ASME SA-789 FOR SUFFICIENT TIME TO ELIMINATE INTERMETALLIC PRECIPITATES AND THEN RAPIDLY COOLED BY WATER QUENCHING, OR AIR, OR INERT GAS COOLING TO BELOW 315deg C. (600deg F.).
OTHER HEAT TREATMENTS AND QUENCHING MEDIA OTHER THAN WATER MUST BE APPROVE BY THE CUSTOMER.
- 4) NO WELD REPAIRS OF BASE MATERIALS AND NO REPAIR OF TUBE DENTS ARE PERMITTED. THESE TUBE SECTIONS SHALL BE REJECTED.
- 5) HARDNESS TESTING OF TUBING SHALL BE DONE IN ACC. W/ SA-789, EXCEPT THAT THE MAXIMUM HARDNESS SHALL BE ROCKWELL C 28.
FAILURE TO MEET THIS HARDNESS REQUIREMENT SHALL CONSTITUTE FAILURE OF THE SPECIMEN AND SHALL RESULT IN HARDNESS TESTING BEING REQUIRED ON EACH LENGTH IN THE HEAT LOT REPRESENTED BY THE SPECIMEN.
- 6) ELECTRIC RESISTANCE SOLUTION ANNEAL U-BENDS PLUS 1'-0" OF STRAIGHT LENGTH AT 1900-1950deg F. FOLLOWED BY RAPID COOL.
- 7) AFTER HEAT TREATING, OTHER THAN BRIGHT ANNEAL PROCEDURES, ALL TUBING SHALL RECEIVE A DESCALING TREATMENT OF PICKLING FOLLOWED BY NEUTRALIZING AND APPROPRIATED RINSING TREATMENT.
ALL MILL SCALE SHALL BE REMOVED.



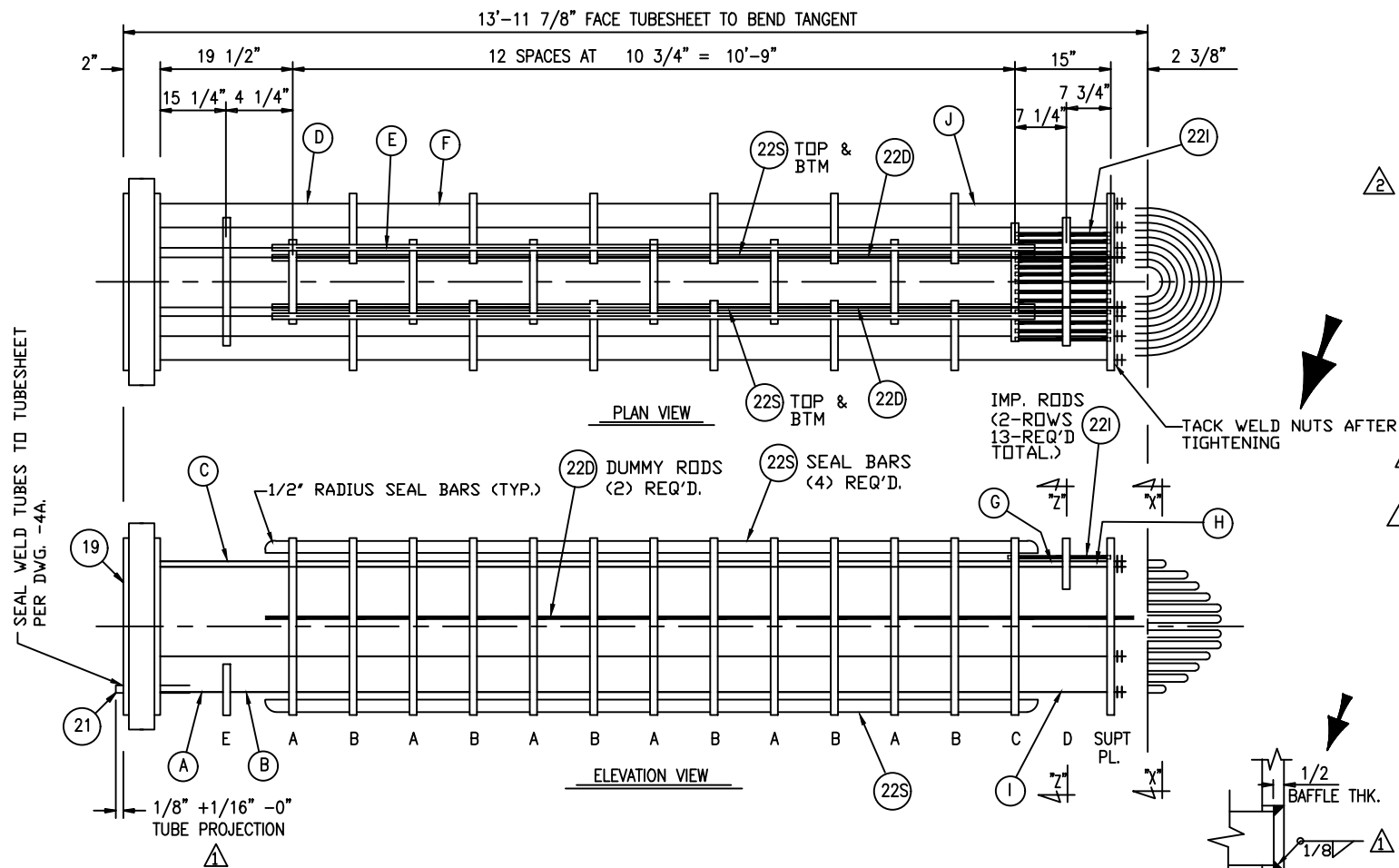
TOTAL NO. REQUIRED: 104
 SIZE: 3/4" .065" (AVG)
 MATERIAL: SA-789S31803/S32205 (SMLS)

MAXIMUM OUT-OF-ROUNDNESS OF TUBES AT
 U-BENDS NOT TO EXCEED 10%.

QUANTITIES SHOWN ARE FOR
 ONE SET OF U-TUBES,
 1 -SET REQ'D. TOTAL.

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 PRODUCT: PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER
 ITEM NO.: 18-X-370A
 AIR PRODUCTS P.O. NO.: 4505600058 / A8KM-4-402-PO-3
 AP PROJECT NO: EN-20-7120
 VDR CODE NO.: BE04
 SERIAL NO.: S21-13258-6
 ENGINEER: EG
 CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

			TUBE BENDING SCHEDULE		
			DWN. BY		
			B.W.		
			DATE		
			5/4/22		
			CKD. BY	DWG.NO.	REV.
			DiCarlo	S21-13258-6-6	0
NO.	DATE	REVISIONS			



"A"	
1"	3"
△ MAT'L: 316/316L 1/2" O.D. -13 NC TIE RODS (23)	
REQ'D.	"A"
(1) 8	13'-10"

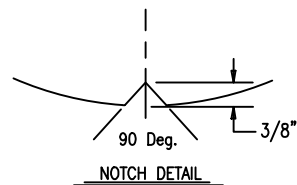
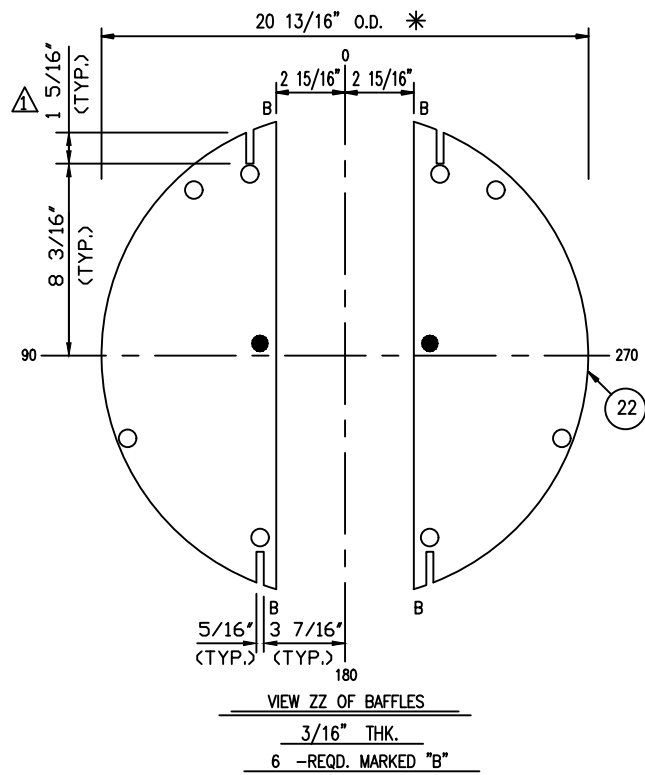
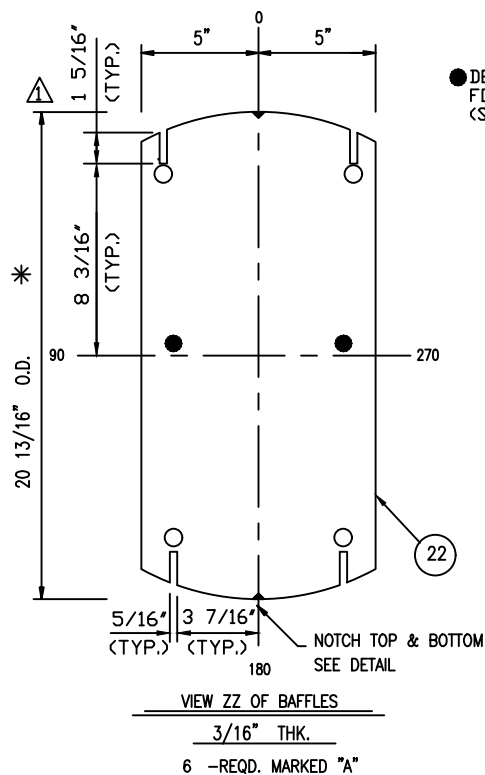
"B"	
1/4"	1"
△ MAT'L: 316/316L 3/4" O.D. SPACER TUBING	
REQ'D.	"B"
(A) 2	15 1/8"
(B) 2	4 1/16"
(C) 2	19 3/8"
(D) 4	30 1/8"
(E) 50	10 9/16"
(F) 20	21 5/16"
(G) 4	7 1/16"
(H) 4	7 1/2"
(I) 2	14 3/4"
(J) 2	25 1/2"

NOTES:

- 1) FOR SECTION AND VIEW DETAILS SEE DWG. 8
- 2) WELD SEAL BARS TO INTERSECTING BAFFLES ON TWO OPPOSING SIDES. TO PROJECT 1" PAST BAFFLES. RADIUS EACH END OF SEAL BAR W/ 1/4" (MIN.) F.W.
- 3) DUMMY TUBES SHALL EXTEND 1" PAST FIRST AND LAST BAFFLE. WELD TO FIRST AND LAST BAFFLE W/ 1/4" (MIN.) F.W.

PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT
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LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA
PRODUCT: PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER
ITEM NO.: 18-X-370A
AIR PRODUCTS P.O. NO.: 4505600058 / A8KM-4-402-PO-3
AP PROJECT NO.: EN-20-7120
VDR CODE NO.: BE04
SERIAL NO.: S21-13258-6
ENGINEER: EG
CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

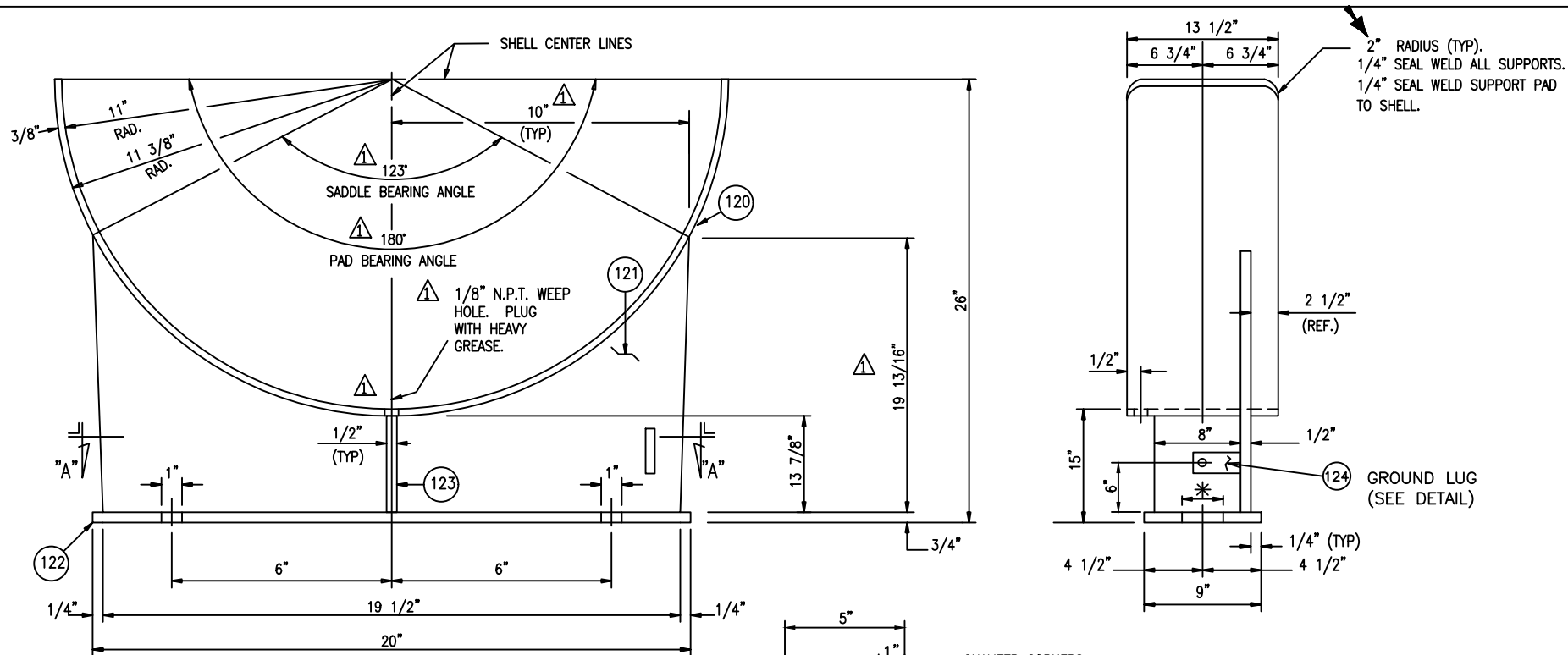
			BUNDLE DETAILS			
			DWN. BY B.W.		Fabsco SHELL & TUBE, LLC	
			DATE 5/4/22			
△	11/11/22	REV. MAT'L/FABSCO	DD/DG	CKD. BY DiCarlo	DWG.NO. S21-13258-6-7	REV. 2
△	7/5/22	REV. PER CUST.	GO/DD			
NO.	DATE	REVISIONS				



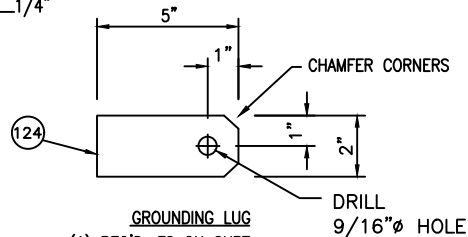
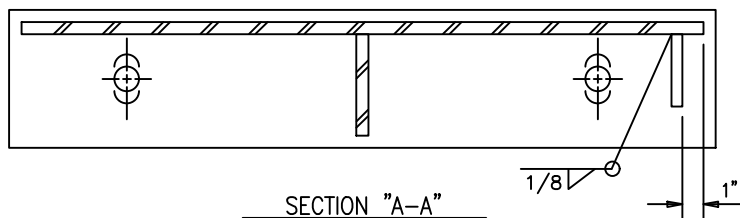
PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT
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ENGINEER: EG
CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

- NOTES:
- 1) DRILL TUBE HOLES IN BAFFLES 25/32" DIA. & DEBURR.
 - 2) DRILL TIE ROD HOLES 9/16" DIA.
SEE TUBE LAYOUT FOR LOCATION.
 - 3) RADIUS ALL CORNERS ON BAFFLE CUTS.
 - 4) CHECK SHELL I.D. BEFORE MACHINING BAFFLE O.D.
 - 5) MACHINE O.D. OF BAFFLES TO 250 RMS.

			BAFFLE DETAILS			
			DWN. BY B.W.		Fabsco SHELL & TUBE, LLC	
			DATE 5/4/22			
△	7/5/22	REV. PER CUST.	GO/DD	CKD. BY DiCarlo	DWG.NO. S21-13258-6-8	REV. 1
NO.	DATE	REVISIONS				



* ONE REQUIRED MARKED "X" W/ (2) 1" ROUND HOLES.
ONE REQUIRED MARKED "Y" W/ (2) 1" X 2" LG. SLOTS.

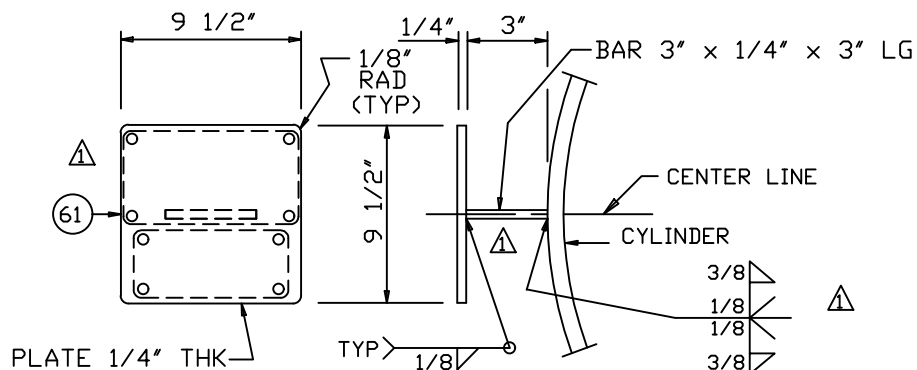


GROUNDING LUG
(1) REQ'D. FS ON SUPT.
MK "X", (1) REQ'D. NS
ON SUPT. MK "Y".
1/4" THK.
MATERIAL: SA-240-304

PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT
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VDR CODE NO.: BE04
SERIAL NO.: S21-13258-6
ENGINEER: EG
CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

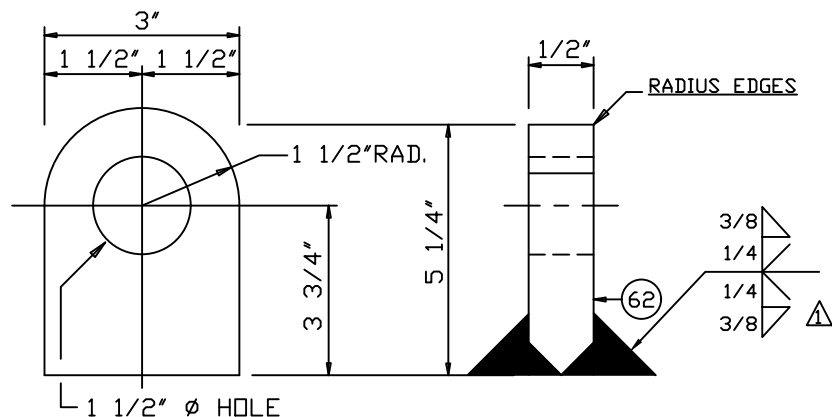
			SUPPORT DETAILS			
			DWN. BY	Fabsco SHELL & TUBE, LLC		
			<i>DiCarlo</i>			
			DATE			
			5/4/22			
	7/6/22	REV. PER CUST.	GD/DD	CKD. BY	DWG. No.	REV.
No.	DATE	REVISIONS		<i>DiCarlo</i>	S21-13258-6-9	1

* TO BE ASSIGNED AT TIME OF SHIPMENT



NAME PLATE BRACKET DETAIL

(ONE) REQUIRED



LIFTING LUG DETAIL

3-REQUIRED

PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT
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VDR CODE NO.: BE04
SERIAL NO.: S21-13258-6
ENGINEER: EG
CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

MATERIAL: 18-8 STN. STL.(16 GA)



U

RT-2



NAT'L BD. *

CERTIFIED BY

FABSCO SHELL & TUBE, LLC
SAPULPA, OKLAHOMA

	MAWP		MAWT	
SHELL	265	PSI AT	300	° F.
	MAEWP		MAWT	
SHELL	15	PSI AT	300	° F.
	MDMT		MAWP	
SHELL	32	° F. AT	265	PSI
	MAWP		MAWT	
TUBES	150	PSI AT	150	° F.
	MAEWP		MAWT	
TUBES	N/A	PSI AT	N/A	° F.
	MDMT		MAWP	
TUBES	32	° F. AT	150	PSI

SERIAL NUMBER

YEAR BUILT

ITEM/TAG NUMBER

S21-13258-6

2022

18-X-370A

P.O. NO.: 4505600058

WT.: 5800 LBS.

TEST DATE:

PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER

INFORMATION NAME PLATE

HYDRO TEST PRESS PSIG..TUBESIDE: SHOP-206/FIELD-195

HYDRO TEST PRESS PSIG..SHELLSIDE: SHOP-449/FIELD-345

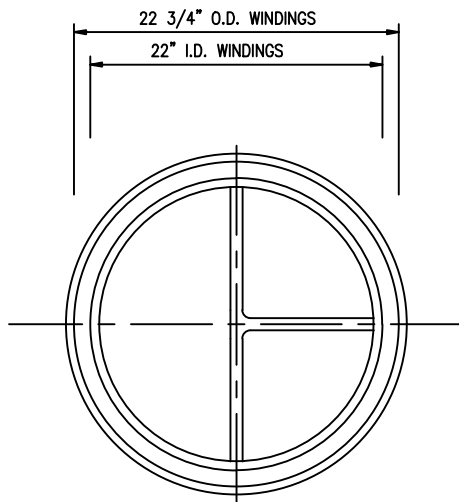
DESIGN PRESS.: SHELLSIDE=95 PSIG; TUBESIDE=120 PSIG

SECT. VIII, DIV 1, 2021 ED; API-660; TEMA "R"

LIFT LUG DETAIL w/
NAME PLATE & BRACKET

Fabscos
SHELL & TUBE, LLC

NO.	DATE	REVISIONS	DWN. BY	DATE	CKD. BY	DWG. NO.	REV.
1	11/9/23	REV. PER FABSCO DD/DG	B.W.	5/4/22	DiCarlo	S21-13258-6-10	3
2	10/23/23	REV. PER FABSCO DD/DG					
3	7/5/22	REV. PER CUST. GO/DD					



(1)-REQUIRED.
CHANNEL COVER GASKET.

0.175" THK. 304 S.S. SPIRAL WOUND

W/ GRAPHITE FILLER & INNER / OUTER COMP. RINGS (A)

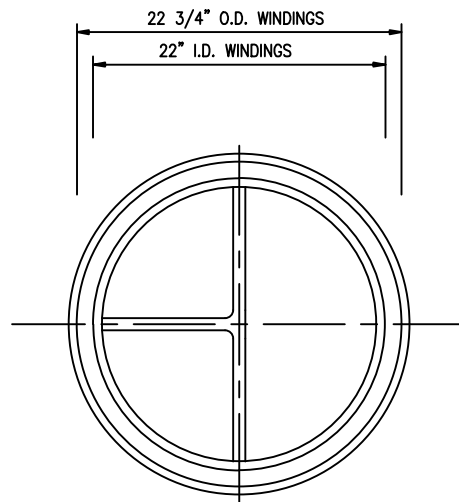
RIB TO BE 3/16" THK. X 3/8" WIDE 304 S.S. DBL. JACKETED

⚠ W/ GRAPHITE FILLER AND 1/64" THK. GRAPHITE

FACE ON BOTH SIDES

TEST PRESSURE:

SHOP: 206/ FIELD: 195



(1)-REQUIRED.
CHANNEL GASKET.

0.175" THK. 304 S.S. SPIRAL WOUND

W/ GRAPHITE FILLER & INNER / OUTER COMP. RINGS (B)

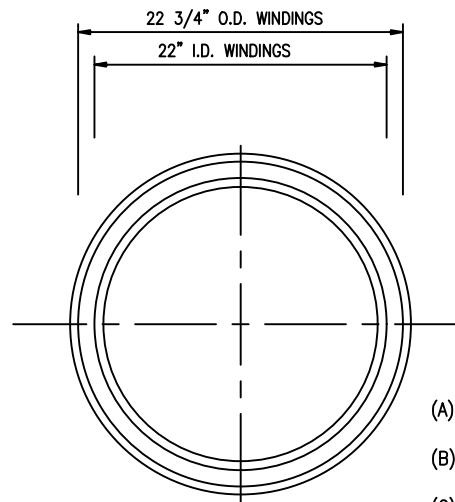
RIB TO BE 3/16" THK. X 7/16" WIDE 304 S.S. DBL. JACKETED

⚠ W/ GRAPHITE FILLER AND 1/64" THK. GRAPHITE

FACE ON BOTH SIDES

TEST PRESSURE:

SHOP: 206/ FIELD: 195



(1)-REQUIRED.
SHELL GASKET.

0.175" THK. 304 S.S. SPIRAL WOUND

W/ GRAPHITE FILLER & INNER / OUTER COMP. RINGS (C)

TEST PRESSURE:

SHOP: 449/ FIELD: 345

===== COMPRESSION RINGS =====

(A) 23.5000 O.D. X .1250 THICK: MATERIAL=SA-240-304

21.2500 I.D. X .1250 THICK: MATERIAL=SA-240-304

(B) 23.5000 O.D. X .1250 THICK: MATERIAL=SA-240-304

21.2500 I.D. X .1250 THICK: MATERIAL=SA-240-304

(C) 23.5000 O.D. X .1250 THICK: MATERIAL=SA-240-304

21.2500 I.D. X .1250 THICK: MATERIAL=SA-240-304

NOTES:

1) QUANTITIES SHOWN FOR ONE SET

(3)-SET REQUIRED TOTAL.

ONE SET OF GASKETS TO BE USED IN EXCH. AND

(2) SETS TO BE BOXED, MARKED WITH

P.O. & ITEM NO. & SHIPPED WITH EXCHANGER.

2) ALL RADII TO BE 1/4"

CHANNEL COVER TO CHANNEL FLANGE BOLTING INFO

STUD DIAMETER: 3/4" O.D.

NUMBER STUDS: (44)

STUD MATERIAL: SA-193-B7

BOLT TORQUE RANGE TO BE ACHIEVED: 248 - 250 Ft. LBS.

CHAN. FLG./T'SHT./SHELL FLG. BOLTING INFO

STUD DIAMETER: 3/4" O.D.

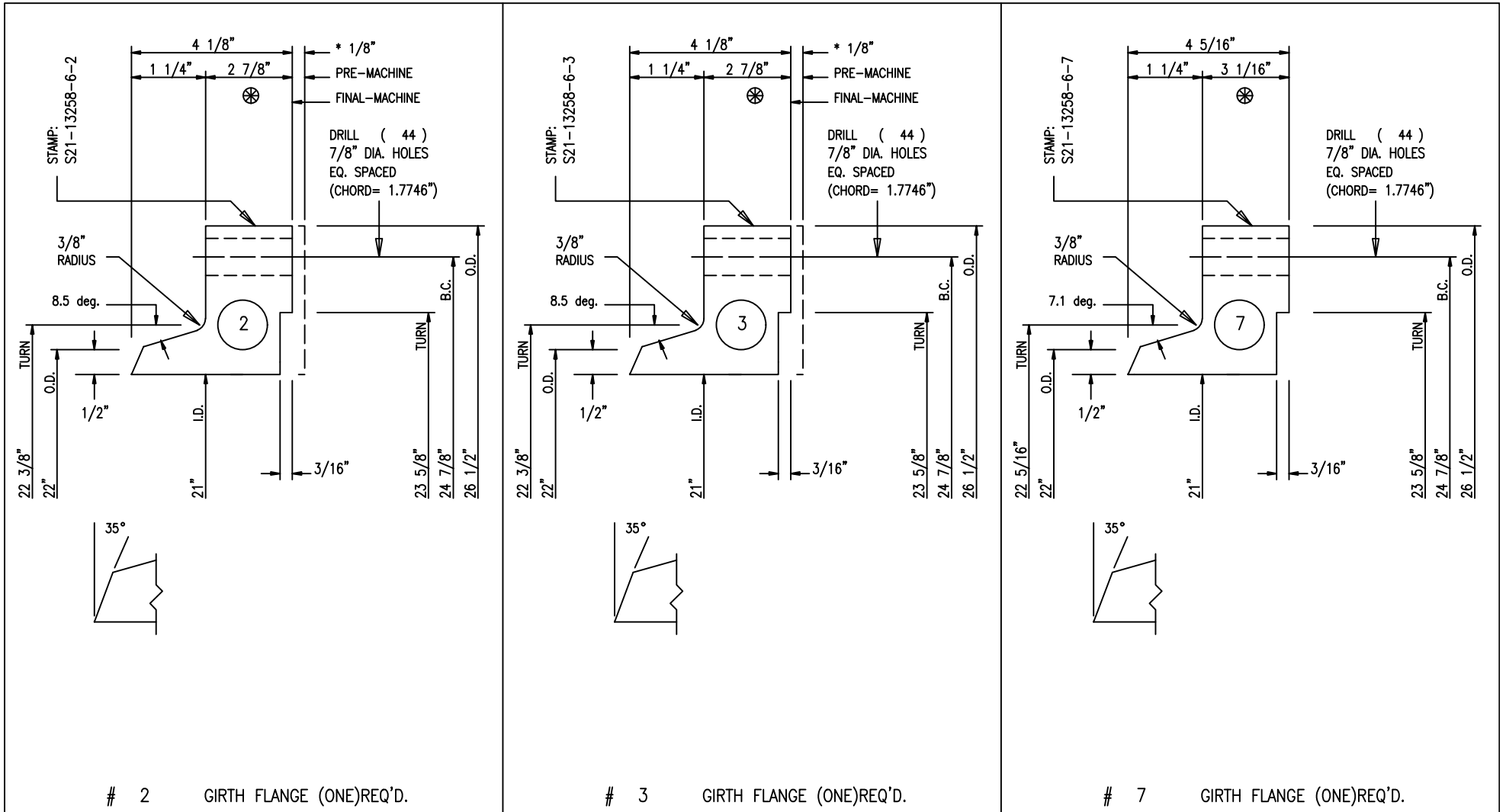
NUMBER STUDS: (44)

STUD MATERIAL: SA-193-B7

BOLT TORQUE RANGE TO BE ACHIEVED: 164 - 252 Ft. LBS.

PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT
EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC
SERVICE: PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER
LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA
PRODUCT: PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER
ITEM NO.: 18-X-370A
AIR PRODUCTS P.O. NO.: 4505600058 / A8KM-4-402-PO-3
AP PROJECT NO: EN-20-7120
VDR CODE NO.: BE04
SERIAL NO.: S21-13258-6
ENGINEER: EG
CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

GASKET DETAILS			
DWN. BY	B.W.	Fabsco SHELL & TUBE, LLC	
DATE	5/4/22	CKD. BY DiCarlo DWG.NO. S21-13258-6-11 REV. 1	
NO.	DATE	REV. PER CUST.	GO/DD
		REVISIONS	



NOTES:

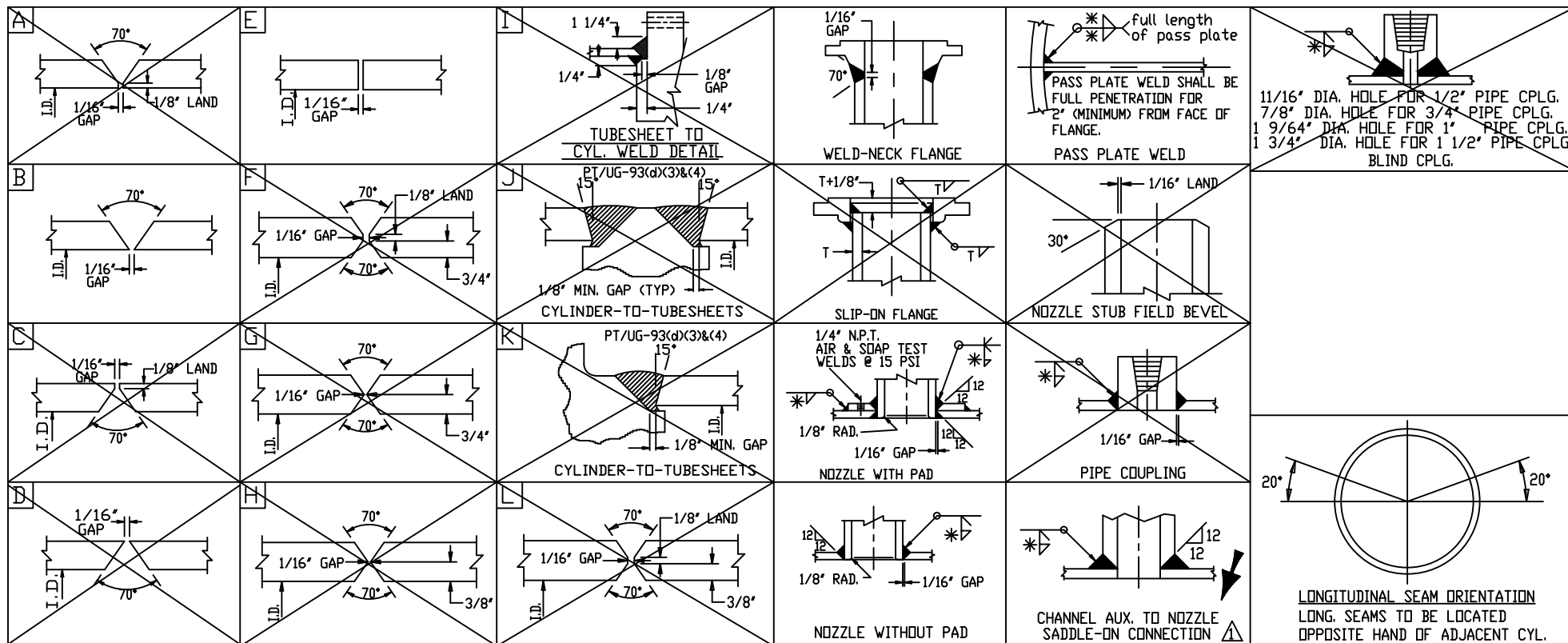
- MACHINE ALL SURFACES TO 250 RMS
EXCEPT GASKET SURFACES MACHINE TO 125 RMS.
- ALL BOLT HOLES TO STRADDLE NATURAL CENTER LINES.
- * FINAL MACHINE FACING AFTER FINAL WELDING.

THK. INCLUDES 1/8" FUTURE
MACHINING ALLOWANCE

PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT
EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC
SERVICE: PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER
LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA
PRODUCT: PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER
ITEM NO.: 18-X-370A
AIR PRODUCTS P.O. NO.: 4505600058/A8KM-4-402-PO-3
AP PROJECT NO: EN-20-7120
VDR CODE NO.: BE04
SERIAL NO.: S21-13258-6
ENGINEER: EG
CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

			GIRTH FLANGES		
			DWN. BY B.W.	Fabsco SHELL & TUBE, LLC	
			DATE 5/4/22		
			CKD. BY <i>DiCarlo</i>		
NO.	DATE	REVISIONS	DWG.NO.	S21-13258-6-12	REV. 0

Fabsco
SHELL & TUBE, LLC



CHANNEL BEVELS 1'-11 1/4" CYL.				SHELL BEVELS 8'-0" CYL.				HEAD BEVELS 6'-0 9/16" CYL.				WELD & BEVEL DETAILS DWN. BY B.W. DATE 5/4/22 CKD. BY DiCarlo DWG. NO. S21-13258-6-13 REV. 1			
GENERAL NOTES:				7/6/22				REV. PER FABSCO				GO/DD			
NO.				DATE				REVISIONS				Fabsco			
7/6/22				REV. PER FABSCO				GO/DD				S21-13258-6-13			

MK.NO.	QUAN.	DESCRIPTION	MATERIAL	NOZ MK.	SUPPLIER	P.O. NO.	DUE
21	△	TUBES 3/4" ODX 0.0650" (AVG) THK PER BEND SCHEDULE 13)	SA-789S31803				
	△		/S32205(SMLS)				
	△						
	△						
	△	FORGED RING MATERIAL					
2	△	1 FLG 26 1/2" O.D.X 21" I.D.X 4 1/8" THK (f) 6/7/8/12)	SA-350LF2CL1				
3	△	1 FLG 26 1/2" O.D.X 21" I.D.X 4 1/8" THK (f) 6/7/8/12)	SA-350LF2CL1				
7	△	1 FLG 26 1/2" O.D.X 21" I.D.X 4 5/16" THK (f) 6/7/8/12)	SA-350LF2CL1				
	△						
	△	TUBESHEETS & COVERS					
19	△	1 TUBESHEET 23 1/2" O.D.X 2" THK (f) 13/14)	SA-240S31803				
	△		/S32205				
1	△	1 COVER 26 1/2" O.D.X 2 1/4" THK (f) 7/8/12/15)	SA-516-70N				
	△	BAFFLES					
22	△	14 BAFFLES PER DWG. -8 & -8A	SA-240-316/316L				
22A	△	1 SUPT PL. PER DWG. -8A	SA-240-316/316L				
	△	HEADS					
18	△	1 ELLIP HD. 21" I.D.X 3/8" THK(min) W/2" SF 8/12)	SA-516-70N				
	△	CYLINDERS					
9	△	1 R&W CYL 21" I.D.X 1/2" THK X 14'-0 9/16" LG.					
	△	1-CYL 8'-0" 1-CYL 6'-0 9/16" LG. 8/12)	SA-516-70N				
4	△	1 R&W CYL 21" I.D.X 1/2" THK X 23 3/8" LG. 8/12)	SA-516-70N				
	△	NOZZLE SHIPPING CVR MAT'L (REMOVE BEFORE INSTALLING)					
180	△	2 ASME 4" - 300 # RF BLIND FLANGES	SA-105				
181	△	16 STUDS: 3/4" DIA. (10-THD.) X 5 1/2" LG. (4"-300# RF)	SA-193-B7				
182	△	32 NUTS: 3/4" (10-THD.) Hvy. HEX (4"-300# RF)	SA-194-2H				
183	△	2 GASKETS: 0.175" THK 304 SS SPIRAL WOUND GRAPHITE					
	△	FILLED, STYLE "CG", C-STL. COMP. RING (4"-300# RF)					
184	△	32 3/4" NARROW SERIES WASHERS	F-436-1				
185	△	1 PL. 15" O.D. X 3/8" THK. W/(12) 9/16" DIA. HOLES	C.-STL.				
	△	EQUALLY SPACED ON 13" B.C. (8"-300#)					
186	△	1 GASKETS: 0.175" THK. 304 S.S. SPIRAL WOUND GRAPHITE					
	△	FILLED, STYLE "CG", C-STL. COMP RING FOR (8"-300# RF)					
187	△	12 1/2" HEX HD. ALL THD. BOLTS X 3 1/2" LG. W/(1) HEX NUT	C.-STL.				
	△	AND (2) FLAT WASHERS EACH (8"-300# RF)					
188	△	1 PL. 17 1/2" O.D. X 3/8" THK. W/(16) 9/16" DIA. HOLES	C.-STL.				
	△	EQUALLY SPACED ON 15 1/4" B.C. (10"-300#)					
189	△	1 GASKETS: 0.175" THK. 304 S.S. SPIRAL WOUND GRAPHITE					
	△	FILLED, STYLE "CG", C-STL. COMP RING FOR (10"-300# RF)					
190	△	16 1/2" HEX HD. ALL THD. BOLTS X 4" LG. W/(1) HEX NUT	C.-STL.				
	△	AND (2) FLAT WASHERS EACH (10"-300# RF)					
		NITROGEN PURGE MATERIAL					
108	△	2 1/4" NPT GAGE W/ -30 TO 30 PSI (MINIMUM) DIAL	C.-STL.				
109	△	2 1/4" X 1" NPT BUSHING	C.-STL.				
110	△	2 1" - 3000 # SCREWED TEE	SA-234-WPB				
111	△	4 1" NPT PIPE NIPPLE 0.179" (SCH. 80) X 2" LG. (TOE)	SA-106-B				
112	△	4 1" NPT PIPE NIPPLE 0.179" (SCH. 80) X 1 1/2" LG. (TBE)	SA-106-B				
113	△	4 1" - 50 # (MAX.) THD. BALL VALVE	C-STL.				
114	△	4 1" - 3000 # HEX HEAD PLUG	C-STL.				
115	△	2 1" 3M FS THRD 90 ELL	SA-105				
	△	SEE DWG. -17 FOR BILL OF MATERIAL NOTES					

PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT
EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC
SERVICE: PROPANE RECOVERY COMPRESSOR

INTERSTAGE COOLER
LOCATION: WORLD ENERGY, PARAMOUNT, CA USA
PRODUCT: PROPANE RECOVERY COMPRESSOR

ITEM NO.: 18-X-370A
AIR PRODUCTS P.O. NO.: 4505600058 / ASKM-4-402-PO-3

AP PROJECT NO: EN-20-7120
VDR CODE NO.: FA01
SERIAL NO.: S21-13258-6
ENGINEER: EG

CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

BILL OF MATERIAL

Fabsco
SHELL & TUBE, LLC

DWN. BY

B.W.

DATE

5/5/22

CKD. BY

DiCarlo

DWG.ND. S21-13258-6-14

REV.

3

MK.NO.	QUAN.	DESCRIPTION				MATERIAL	NOZ MK.	SUPPLIER	P.O. NO.	DUE
△		ANSI FLANGES								
71 △	1	ASME 10" - 300 #	RF WN	W/ (SchXH BORE)	5)8)12)	SA-350LF2CL1	S1			
72 △	1	ASME 8" - 300 #	RF WN	W/ (SchXH BORE)	5)8)12)	SA-350LF2CL1	S2			
81 △	1	ASME 4" - 300 #	RF WN	W/ (Schstd BORE)	5)8)12)	SA-350LF2CL1	T1			
82 △	1	ASME 4" - 300 #	RF WN	W/ (Schstd BORE)	5)8)12)	SA-350LF2CL1	T2			
73 △	1	ASME 2" - 300 #	RF LWN	X 9" LG(2.000"BORE)	5)8)12)	SA-350LF2CL1	A3			
74 △	1	ASME 2" - 300 #	RF LWN	X 9" LG(2.000"BORE)	5)8)12)	SA-350LF2CL1	A4			
83 △	1	ASME 2" - 300 #	RF LWN	X 11" LG(2.000"BORE)	5)8)12)	SA-350LF2CL1	D			
84 △	1	ASME 2" - 300 #	RF LWN	X 11" LG(2.000"BORE)	5)8)12)	SA-350LF2CL1	V			
85 △	1	ASME 2" - 300 #	RF LWN	X 9" LG(2.000"BORE)	5)8)12)	SA-350LF2CL1	A1			
86 △	1	ASME 2" - 300 #	RF LWN	X 9" LG(2.000"BORE)	5)8)12)	SA-350LF2CL1	A2			
73C △	1	ASME 2" - 300 #	RF BLIND FLG.		5)8)12)	SA-350LF2CL1	A3			
74C △	1	ASME 2" - 300 #	RF BLIND FLG.		5)8)12)	SA-350LF2CL1	A4			
83C △	1	ASME 2" - 300 #	RF BLIND FLG.		5)8)12)	SA-350LF2CL1	D			
84C △	1	ASME 2" - 300 #	RF BLIND FLG.		5)8)12)	SA-350LF2CL1	V			
85C △	1	ASME 2" - 300 #	RF BLIND FLG.		5)8)12)	SA-350LF2CL1	A1			
86C △	1	ASME 2" - 300 #	RF BLIND FLG.		5)8)12)	SA-350LF2CL1	A2			
71A △	1	SMLS,PIPE 10" X(0.5000" SchXH)	X 11" LG.	8)12)		SA-106-B	S1			
72A △	1	SMLS,PIPE 8" X(0.5000" SchXH)	X 10 1/2" LG.	8)12)		SA-106-B	S2			
81A △	1	SMLS,PIPE 4" X(0.237" Schstd)	X 1'-0" LG.	8)12)		SA-106-B	T1			
82A △	1	SMLS,PIPE 4" X(0.237" Schstd)	X 1'-0" LG.	8)12)		SA-106-B	T2			
71B △	3	WELD PAD 19 3/4" OD X 19"	OD X 12" ID X				S1			
△		11 1/4" ID X 3/8" THK.		ROLL TO 11" IR	8)12)	SA-516-70N				
72B △	1	WELD PAD 13 3/16" OD X 12 3/4"	OD X 9 9/16" ID X				S2			
△		9 1/8" ID X 3/8" THK.		ROLL TO 11" IR	8)12)	SA-516-70N				
81B △	1	WELD PAD 9 1/8" OD X 8 3/4"	OD X 5 3/8" ID X				T1			
△		5" ID X 3/8" THK.		ROLL TO 11" IR	8)12)	SA-516-70N				
82B △	1	WELD PAD 9 1/8" OD X 8 3/4"	OD X 5 3/8" ID X				T2			
△		5" ID X 3/8" THK.		ROLL TO 11" IR	8)12)	SA-516-70N				
△										
△										
△										
△										
40 △	1	LOT OF GASKETS PER DWG. -11								
41 △	44	3/4" ROUND X 10-THREAD STUDS	X 9 1/4" LG.	1&2	12)	SA-193-B7				
42 △	44	3/4" ROUND X 10-THREAD STUDS	X 11 3/4" LG.	3&7	12)	SA-193-B7				
43 △	352	3/4" HEAVY HEX NUTS 10-THREAD			12)	SA-194-2H				
43 △	176	3/4" NARROW SERIES WASHERS				F-436-1				
△										
△		SPARE STUDS & NUTS (TO SHIP LOOSE W/EXCH.)								
141 △	5	3/4" DIA. (10-THD.) STUDS X 9 1/4"	LG.	1&2	12)	SA-193-B7				
142 △	5	3/4" DIA. (10-THD.) STUDS X 11 3/4"	LG.	3&7	12)	SA-193-B7				
143 △	35	3/4" Hvy HEX NUTS (8-THD.)			12)	SA-194-2H				
144 △	18	3/4" NARROW SERIES WASHERS				F-436-1				
△										
△										
△										
△		FOR BILL OF MATERIAL NOTES, SEE DWG. -17								
△										
△										
△										
△										
△										

PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT
EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC
SERVICE: PROPANE RECOVERY COMPRESSOR

LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA
PRODUCT: PROPANE RECOVERY COMPRESSOR
INTERSTAGE COOLER
ITEM NO.: 18-X-370A
AIR PRODUCTS P.O. NO.: 4505600058 / 48KM-4-402-PO-3

AP PROJECT NO: EN-20-7120
VOR CODE NO.: FA01
SERIAL NO.: S21-13258-6
ENGINEER: EG
CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

BILL OF MATERIAL

DWN. BY
B.W.

DATE
5/5/22

CKD. BY
DtCarlo

1/16/23

REV. LINE 71B/CUST.

DD/DG

11/11/25

REV. PER CUST. COMMENTS

DD/DG

7/5/2022

REV./CUST. COMMENTS

GD/DD

ND.

DATE

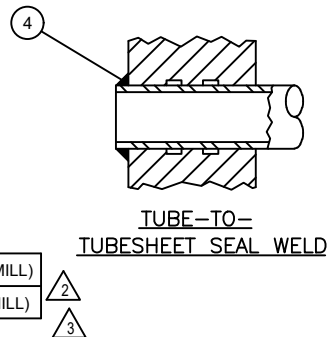
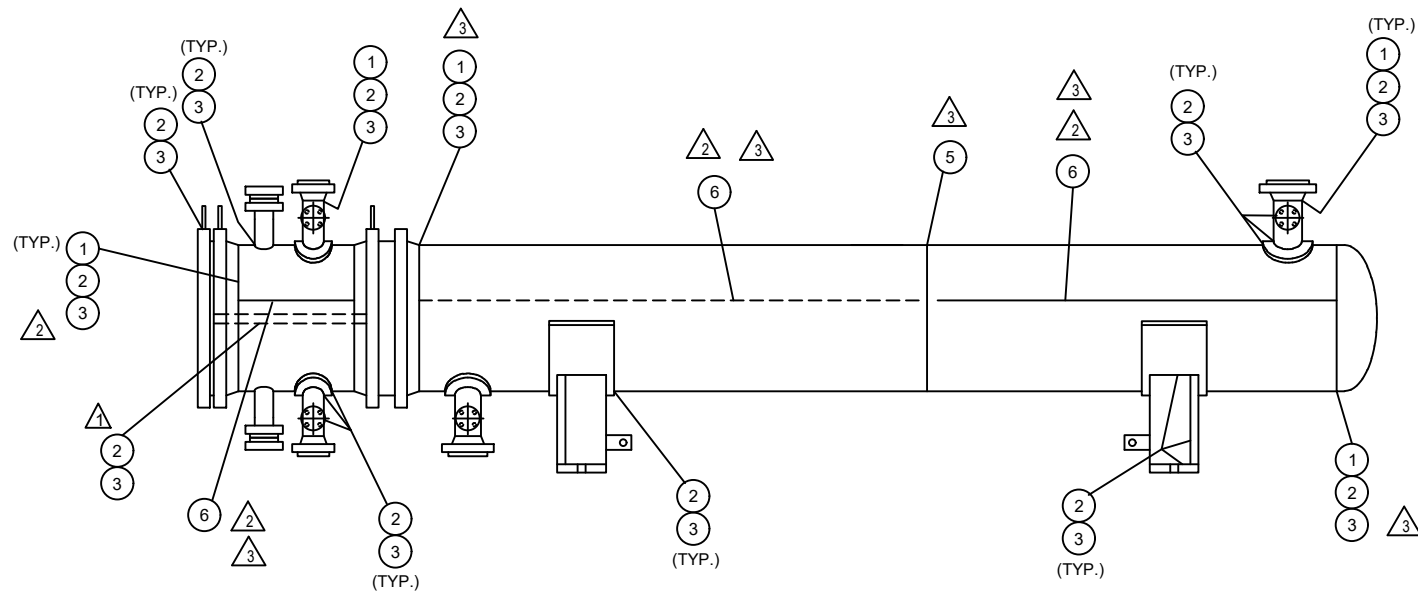
REVISIONS

Fabsco

SHELL & TUBE, LLC

DWG.ND. S21-13258-6-15

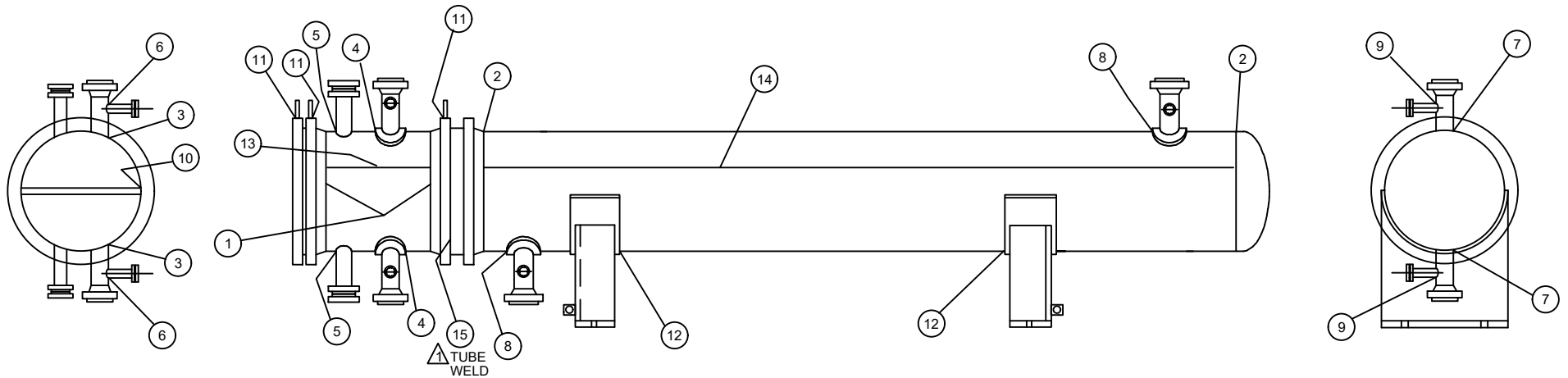
REV.
3



MK.	PROC. #
1	A-344
2	F-148
3	M-189
4	T-219
5	GBIX-G32.13 (BY GREENS BAYOU PIPE MILL)
6	GBIX-L42.13 (BY GREENS BAYOU PIPE MILL)

PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT
 EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC
 SERVICE: PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER
 LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA
 PRODUCT: PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER
 ITEM NO.: 18-X-370A
 AIR PRODUCTS P.O. NO.: 4505600058 / A8KM-4-402-PO-3
 AP PROJECT NO.: EN-20-7120
 VDR CODE NO.: QD07
 SERIAL NO.: S21-13258-6
 ENGINEER: EG
 CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

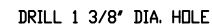
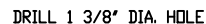
WELD MAP			
	10/23/23	REV. PER FABSCO DD/DG	DWN. BY
	3/22/23	REV. PER CUST.& FABSCO DD/DG	B.W.
	3/6/23	REV. PER CUST. COMMENTS DD/DG	DATE
	7/5/2022	REV. PER CUST.& FABSCO GD/DD	5/4/22
NO.	DATE	REVISIONS	CKD. BY
			MO
			DWG. No.
			S21-13258-6-18
			REV.
			4



	X-RAY	U.T.	M.T.	P.T.	W.F.M.T.	BRINELL	MK.	
CHANNEL CIRCULAR SEAM	X		X	X	X	X	(1)	△
SHELL CIRCULAR SEAM	X		X	X	X	X	(2)	△
CHANNEL NOZZLE TO PIPE	X	X	X	X	X	X	(3)	△
CHANNEL WELD PAD TO PIPE	X	X	X	X	X	X	(4)	△
CHANNEL V & D TO PIPE		X	X	X	X	X	(5)	
CHANNEL AUX. TO PIPE		X	X	X	X	X	(6)	
SHELL NOZZLE TO PIPE	X	X	X	X	X	X	(7)	△
SHELL WELD PAD TO PIPE		X	X	X	X	X	(8)	
SHELL AUX. TO PIPE			X	X	X	X	(9)	
PASS PLATE TO CYLINDER		X	X	X	X	X	(10)	
LIFT LUG WELDS			X	X			(11)	
SUPPORT PAD TO CYLINDER			X	X	X	X	(12)	
CHANNEL LONG SEAM	X		X	X	X	X	(13)	△
SHELL LONG SEAM	X		X	X	X	X	(14)	△
TEMPORARY ATTACHMENT LOCATIONS			X	X				
TUBE SEAL WELD				X			(15)	△

PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT
 EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC
 SERVICE: PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER
 LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA
 PRODUCT: PROPANE RECOVERY COMPRESSOR INTERSTAGE COOLER
 ITEM NO.: 18-X-370A
 AIR PRODUCTS P.O. NO.: 4505600058 / A8KM-4-402-PO-3
 AP PROJECT NO: EN-20-7120
 VDR CODE NO.: QD07
 SERIAL NO.: S21-13258-6
 ENGINEER: EG
 CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

			NDE MAP	
			DWN. BY	Fabsco SHELL & TUBE, LLC
			B.W.	
			DATE	
			5/4/22	
			CKD. BY	DWG. No.
				S21-13258-6-19
△	7/5/2022	REV./CUST. COMMENTS	GO/DD	REV.
NO.	DATE	REVISIONS		1



			PRESSURE GAGE & VALVE DETAIL FOR NITROGEN PURGE			
			DWN. BY DD	Fabsco SHELL & TUBE, LLC		
			DATE 1/16/23			
△	1/16/23	ADDED DETAIL/CUST. DD/DG				
NO.	DATE	REVISIONS		CKD. BY DG	DWG.NO. S21-13258-6-20	REV. 1