

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

- 1) STENCIL THE FOLLOWING ON THE EXCHANGER IN 3" HIGH (MIN.) WHITE BLOCK LETTERS::

P.O. NO.: 4505600055  
ITEM NO.: 18-X-263  
SHIPPING WT.: 5,400 LBS.

"DO NOT WELD ON VESSEL-PWHT"  
IN TWO (2) PLACES, 180° APART.

- 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) THE FLATNESS TOLERANCE (MAXIMUM DEVIATION FROM A PLANE) ON PERIPHERAL GASKET CONTACT SURFACES SHALL BE  $\pm 1/32"$ .
- 6) FLATNESS OF GASKET SURFACES SHALL BE MEASURED WITH A DIAL INDICATOR. PASS PLATE GROOVES CAN BE MEASURED WITH A STRAIGHT EDGE.
- 7) WELD METAL AND HAZ. HARDNESS EXAMINATION REQUIREMENTS ON CHANNEL 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.
- 8) FINAL VISUAL WELD INSPECTION SHALL BE PERFORMED AFTER POST WELD HEAT TREATMENT, IF REQUIRED.

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

- 9) COAT EXPOSED MACHINED SURFACES WITH AN EASILY REMOVABLE RUST PREVENTATIVE.
- △ 10) NOTIFY CUSTOMER TEN (10) DAYS PRIOR TO START OF FABRICATION, WITNESS OR HOLD POINTS.
- 11) MATCH MARKS SHALL BE PROVIDED TO ENSURE PROPER ALIGNMENT OF BOLTED JOINTS.
- 12) STAMP THE SERIAL No. ON O.D. OF TUBESHEETS, FLANGES AND CHANNEL COVERS.
- 13) HYDRO TEST CHARTS REQUIRED.
- 14) NOZZLE WELD PADS & SUPT. PADS SHALL BE AIR & SOAP TESTED W/15 PSI (MIN), 25 PSI (MAX) AIR PRESSURE.
- 15) ALL FINISHED WELDS ON SHELL & CHANNEL SHALL BE M.T. AFTER P.W.H.T.
- 16) SHELLSIDE HYDRO TEST SHALL BE PERFORMED WITH CHANNEL COVER REMOVED.
- 17) HEAT TREAT CHARTS REQUIRED.
- 18) THE TUBE WALL THICKNESS SHALL BE RANDOMLY CHECKED AND RECORDED. A MINIMUM OF 2% OF THE JOINTS PER TUBE BUNDLE, WITH A MINIMUM OF 5 JOINTS SHALL BE CHECKED.  
TUBE WALL REDUCTION SHALL BE 3-8% MAXIMUM.

-----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 50°F. (MIN.)
- 8) ALL EXTERNAL ATTACHMENTS TO BE SEAL WELDED.
- 9) HYDROSTATIC TEST, USE CLEAN WATER WITH A CORROSION INHIBITOR ADDED.  
VOLUME OF WATER TUBESIDE = 162 GALLONS (APPROXIMATELY)  
VOLUME OF WATER TUBESIDE = 92 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: 100% RADIOGRAPH.
- 2) CHANNEL: 100% RADIOGRAPH.

**WET H<sub>2</sub>S SERVICE ON SHELL SIDE**  
PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT  
EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC  
SERVICE: LP LEAN AMINE COOLER  
LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA  
PRODUCT: LEAN AMINE  
ITEM NO.: 18-X-263  
AIR PRODUCTS P.O. NO.: 4505600055/ABKM-4-402-PO-4  
AP PROJECT NO.: EN-20-7121  
VDR CODE NO.: BE04  
SERIAL NO.: S21-13258-1  
ENGINEER: GH  
CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

|     |         |                            |           |                              |                |
|-----|---------|----------------------------|-----------|------------------------------|----------------|
|     |         |                            | JOB NOTES |                              |                |
|     |         |                            | DWN. BY   | <b>Fabsco</b>                |                |
|     |         |                            | B.W.      |                              |                |
|     |         |                            | DATE      | <b>SHELL &amp; TUBE, LLC</b> |                |
|     |         |                            | 6/21/22   |                              |                |
| △   | 9/9/22  | REV. PER CUST. B.W./DD     | DATE      | CKD. BY                      | DWG. NO.       |
| △   | 6/30/22 | ADDED DWG./ FABSCO B.W./DD | 6/21/22   | EMG                          | S21-13258-1-1B |
| NO. | DATE    | REVISIONS                  |           |                              | REV.           |
|     |         |                            |           |                              | 2              |



- CUST. NOTES CONT.-----

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

- WET H<sub>2</sub>S SERVICE ON SHELL SIDE**  
PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT  
EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC  
SERVICE: LP LEAN AMINE COOLER  
LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA  
PRODUCT: LEAN AMINE  
ITEM NO.: 18-X-263  
AIR PRODUCTS P.O. NO.: 4505600055/A8KM-4-402-PO-4  
AP PROJECT NO.: EN-20-7121  
VDR CODE NO.: BE04  
SERIAL NO.: S21-13258-1  
ENGINEER: GH  
CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

|     |         |                           | JOB NOTES (CONT.)         |                                                                                                |           |  |  |  |
|-----|---------|---------------------------|---------------------------|------------------------------------------------------------------------------------------------|-----------|--|--|--|
|     |         |                           | DWN. BY<br>B.W.           | <div style="text-align: center;"> <b>Fabsco</b><br/> <hr/> <b>SHELL &amp; TUBE, LLC</b> </div> |           |  |  |  |
|     |         |                           | DATE<br>4/20/22           |                                                                                                |           |  |  |  |
|     |         |                           | CKD. BY<br><i>DiCarlo</i> | DWG. NO.<br>S22-13258-1-1C                                                                     | REV.<br>2 |  |  |  |
| A   | 8/25/22 | REV. PER CUST. B.W./DD    |                           |                                                                                                |           |  |  |  |
| A   | 6/30/22 | ADDED DWG./FABSCO B.W./DD |                           |                                                                                                |           |  |  |  |
| NO. | DATE    | REVISIONS                 |                           |                                                                                                |           |  |  |  |

- 29) 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)
- 30) WELDS FROM EACH WELD PROCEDURE, WELDER/WELDING OPERATOR SHALL BE SPOT RADIOGRAPHED IF ACCESSIBLE.
- 31) NON PRESSURE PARTS TO PRESSURE CONTAINING COMPONENT WELDS SHALL BE 100% M.P.E. OR D.P.E.
- 32) ALL CIRC SEAMS, NOZZLE ATTACHMENT WELDS SHALL BE FULL PENETRATION WELDED AS SHOWN ON DWG. -13.
- 33) FOR OFFSET NOZZLES, THE MIN. THROAT DIMENSIONS SHALL BE MAINTAINED.
- 34) ALL WELDING SHALL BE IN ACCORDANCE WITH ASME SECT. IX & PROJECT SPECIFICATIONS  
A8KM-PP-000-500550-A, A8KM-PP-000-500532-A,  
4WEQ-1051, 3-11-10, 4-11-11.
- 35) ALL SHELL & HEAD JOINTS SHALL BE BACK WELDED JOINTS, WHERE POSSIBLE.

PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT  
EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC  
SERVICE: LP LEAN AMINE COOLER  
LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA  
PRODUCT: LEAN AMINE  
ITEM NO.: 18-X-263  
AIR PRODUCTS P.O. NO: 4505600055/A8KM-4-402-PO-4  
AP PROJECT NO: EN-20-7121  
VDR CODE NO.: BE04  
SERIAL NO.: S21-13258-1  
ENGINEER: GH  
CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

|     |         |                         |                           |                                               |           |
|-----|---------|-------------------------|---------------------------|-----------------------------------------------|-----------|
|     |         |                         | JOB NOTES (CONT.)         |                                               |           |
|     |         |                         | DWN. BY<br><i>DiCarlo</i> | <b>Fabsco</b><br><u>SHELL &amp; TUBE, LLC</u> |           |
|     |         |                         | DATE<br>8/23/22           |                                               |           |
| ⚠   | 8/25/22 | ADDED DWG./FABSCD DD/DG | CKD. BY<br><i>DC</i>      | DWG. NO.<br>S21-13258-1-1D                    | REV.<br>1 |
| NO. | DATE    | REVISIONS               |                           |                                               |           |

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



### CHANNEL-COVER DETAIL

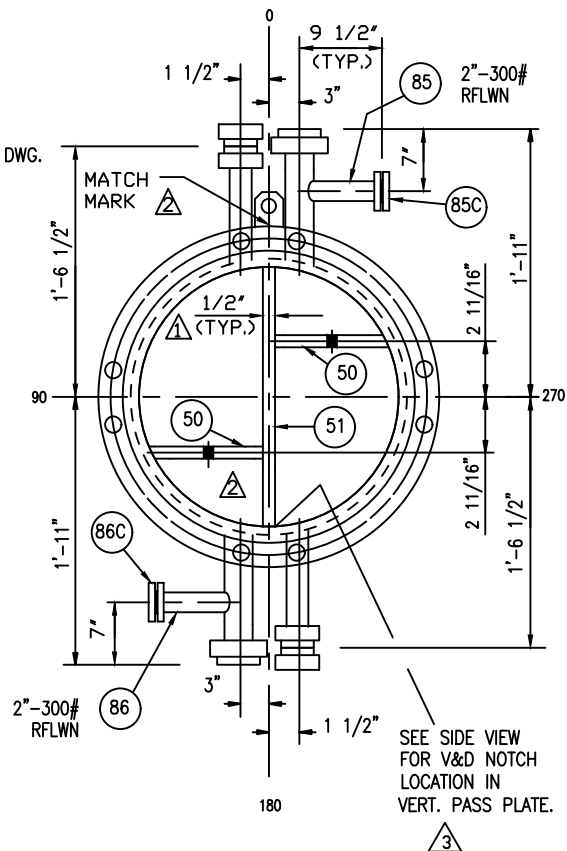
1) ALL WELDING TO BE IN ACCORDANCE W/ PROCEDURES ON DWG. -18.  
2) ALL BOLT HOLES TO STRADDLE CENTER LINES.  
3) FOR WELD AND BEVEL DETAILS SEE DWG. -13.  
4) GRIND ALL INSIDE WELDS SMOOTH.  
5) FULL RADIOGRAPHY.  
7) POST-WELD HEAT TREAT CHANNEL:  
A) HEAT FROM 800°F TO 1175°F +0° - 25° AT 400°F PER HOUR.  
B) HOLD AT 1175°F +0°-25° F FOR 1-HOUR (MIN).  
C) COOL FROM 1175°F +0° - 25° TO 800°F AT 500°F PER HOUR.  
D) FURTHER COOLING MAY BE IN STILL AIR.

**WET H<sub>2</sub>S SERVICE ON SHELL SIDE**  
 PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT  
 EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC  
 SERVICE: LP LEAN AMINE COOLER  
 LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA  
 PRODUCT: LEAN AMINE  
 ITEM NO.: 18-X-263  
 AIR PRODUCTS P.O. NO.: 4505600055/ABKM-4-402-PO-4  
 AP PROJECT NO: EN-20-7121  
 VDR CODE NO.: BE04  
 SERIAL NO.: S21-13258-1  
 ENGINEER: GH  
 CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT



\* { MACHINE GASKET FACING TO 125 RMS AFTER ALL WELDING AND HEAT TREATMENT. 

FOR FLANGE DETAILS SEE DWG. 12



CHANNEL END VIEW

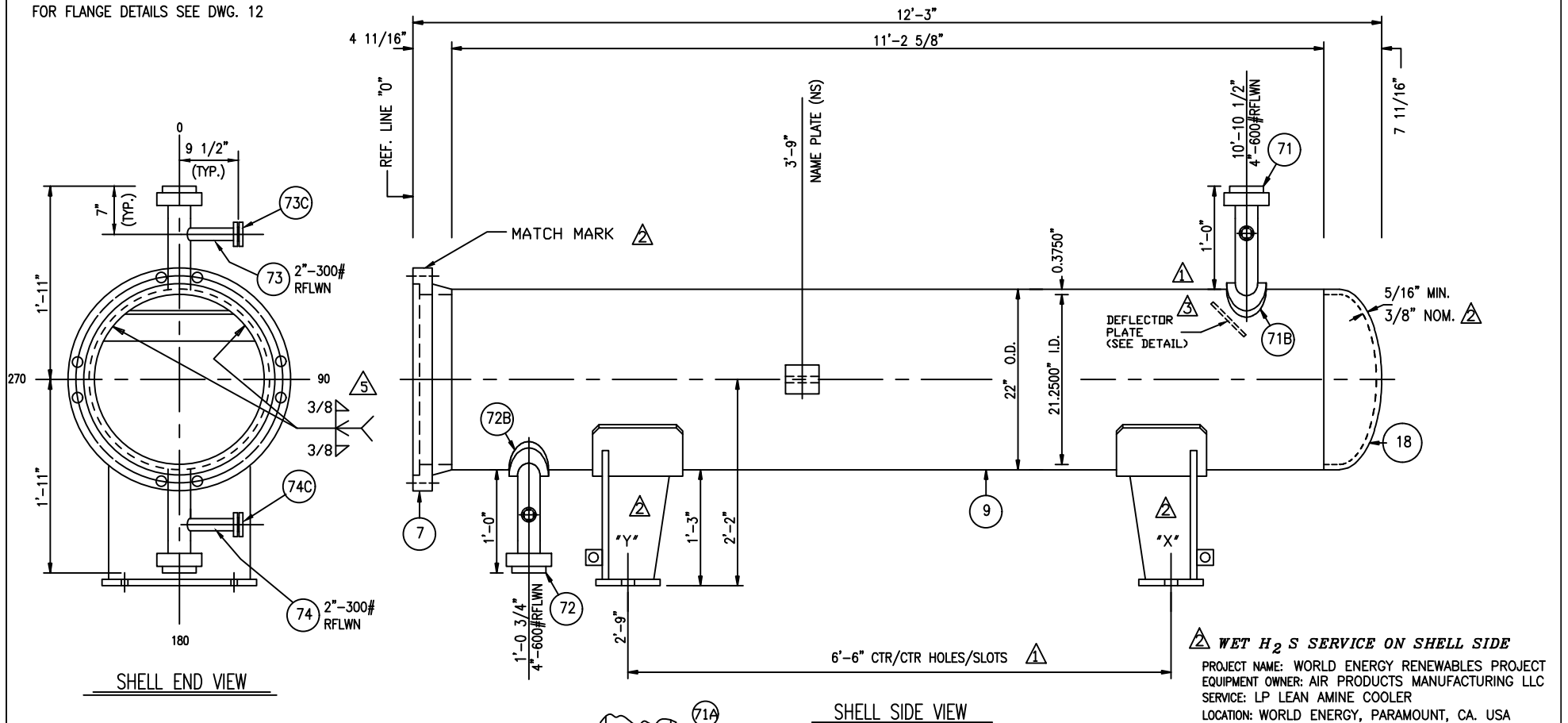
**Fabsco**  
SHELL & TUBE, LLC

S21-13258-1-2

|      |
|------|
| REV. |
| 3    |

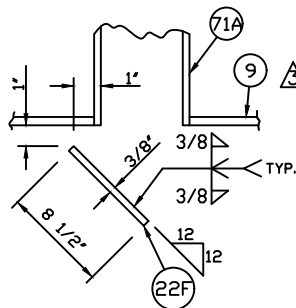
|     |          |                               | FRONT CHANNEL DETAILS |                              |           |  |  |  |
|-----|----------|-------------------------------|-----------------------|------------------------------|-----------|--|--|--|
|     |          |                               | DWN. BY<br>B.W.       | <b>Fabsco</b>                |           |  |  |  |
|     |          |                               | DATE<br>4/19/22       | <b>SHELL &amp; TUBE, LLC</b> |           |  |  |  |
| A   | 11/10/22 | REV. PER CUST. COMMENTS DD/DG | CKD. BY               | DWG.NO.                      |           |  |  |  |
| B   | 6/30/22  | REV. PER CUST. B.W./DD        | <i>DiCarlo</i>        | S21-13258-1-2                | REV.<br>3 |  |  |  |
| C   | 5/6/2022 | REV./FABSCO EMG               |                       |                              |           |  |  |  |
| NO. | DATE     | REVISIONS                     |                       |                              |           |  |  |  |

FOR FLANGE DETAILS SEE DWG. 12



## 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) FOR SUPPORT DETAILS SEE DWG. -9.
- 5) GRIND ALL INSIDE WELDS FLUSH.
- 6) 100% RADIOGRAPHY.
- 7) POST-WELD HEAT TREAT SHELL:
  - A) HEAT FROM 800°F TO 1175°F +0°-25° F. AT 400°F PER HOUR.
  - B) HOLD AT 1175°F 0°-25° F FOR 1 -HOUR (MINIMUM).
  - C) COOL FROM 1175°F +0°-25° F. TO 800°F AT 500°F PER HOUR.
  - D) FURTHER COOLING MAY BE IN STILL AIR.



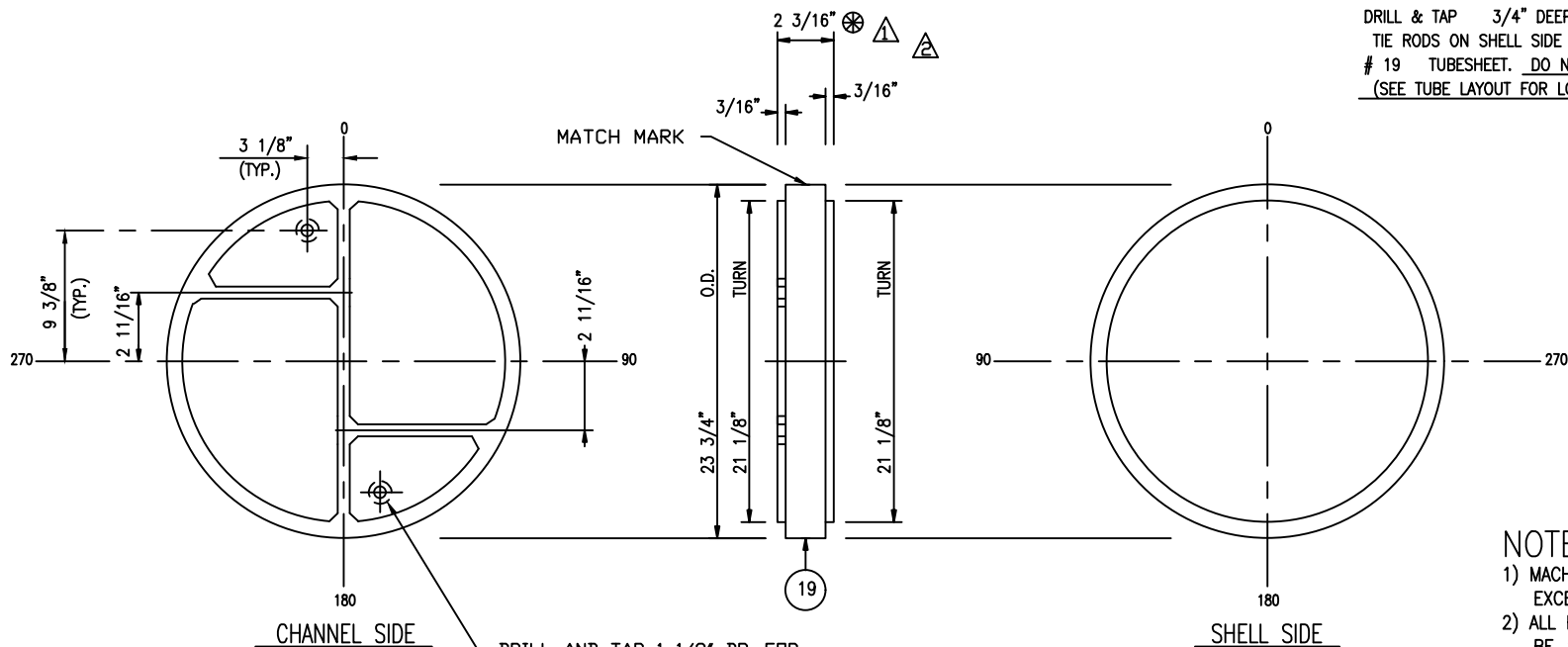
DEFLECTOR PL. DET'L.  
(WELD EACH END TO SHELL I.D.)

**WET H<sub>2</sub>S SERVICE ON SHELL SIDE**

PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT  
EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC  
SERVICE: LP LEAN AMINE COOLER  
LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA  
PRODUCT: LEAN AMINE  
ITEM NO.: 18-X-263  
AIR PRODUCTS P.O. NO.: 4505600055/A8KM-4-402-PO-4  
AP PROJECT NO.: EN-20-7121  
VDR CODE NO.: BE04  
SERIAL NO.: S21-13258-1  
ENGINEER: GH  
CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

| SHELL DETAILS |                        |           |                          |
|---------------|------------------------|-----------|--------------------------|
| 12/9/22       | REV. PER CUST. COMMENT | DD/DG     | DWN. BY<br>B.W.          |
| 11/10/22      | ADDED NOTE/CUST.       | DD/DG     |                          |
| 8/25/22       | REV. PER CUST.         | B.W./DD   | DATE<br>4/19/22          |
| 6/30/22       | REV. PER CUST.         | B.W./DD   |                          |
| 5/6/2022      | REV./FABSCO            | EMG       | CKD. BY<br>DiCarlo       |
| ND.           | DATE                   | REVISIONS |                          |
|               |                        |           | DWG.NO.<br>S21-13258-1-3 |
|               |                        |           | REV.<br>5                |

**Fabsco**  
SHELL & TUBE, LLC



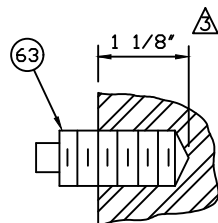
DRILL & TAP 3/4" DEEP FOR 6- 1/2" DIA.  
TIE RODS ON SHELL SIDE OF  
# 19 TUBESHEET. DO NOT DRILL THRU!!  
(SEE TUBE LAYOUT FOR LOCATIONS.)

### 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.
- 4) TUBE WALL REDUCTION TO BE 3-8%

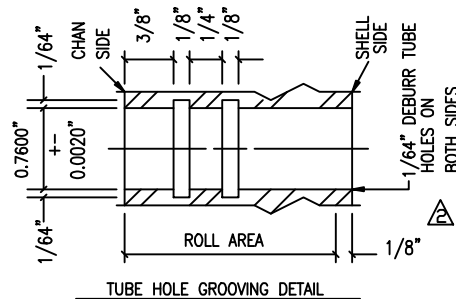
⚠ DRILL AND TAP 1 1/8" DP. FOR  
(2)-5/8"Ø (11-THD) PULL BOLTS.  
DO NOT DRILL THRU!  
PLUG WITH (63)

⚠ THK. INCLUDES 1/8" FUTURE  
MACHINING ALLOWANCE



SQUARE HEAD PULLBOLT PLUG DETAIL

⚠ (65) EYEBOLT (TO SHIP LOOSE W/ EXCHANGER)



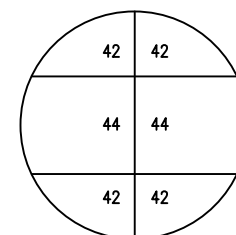
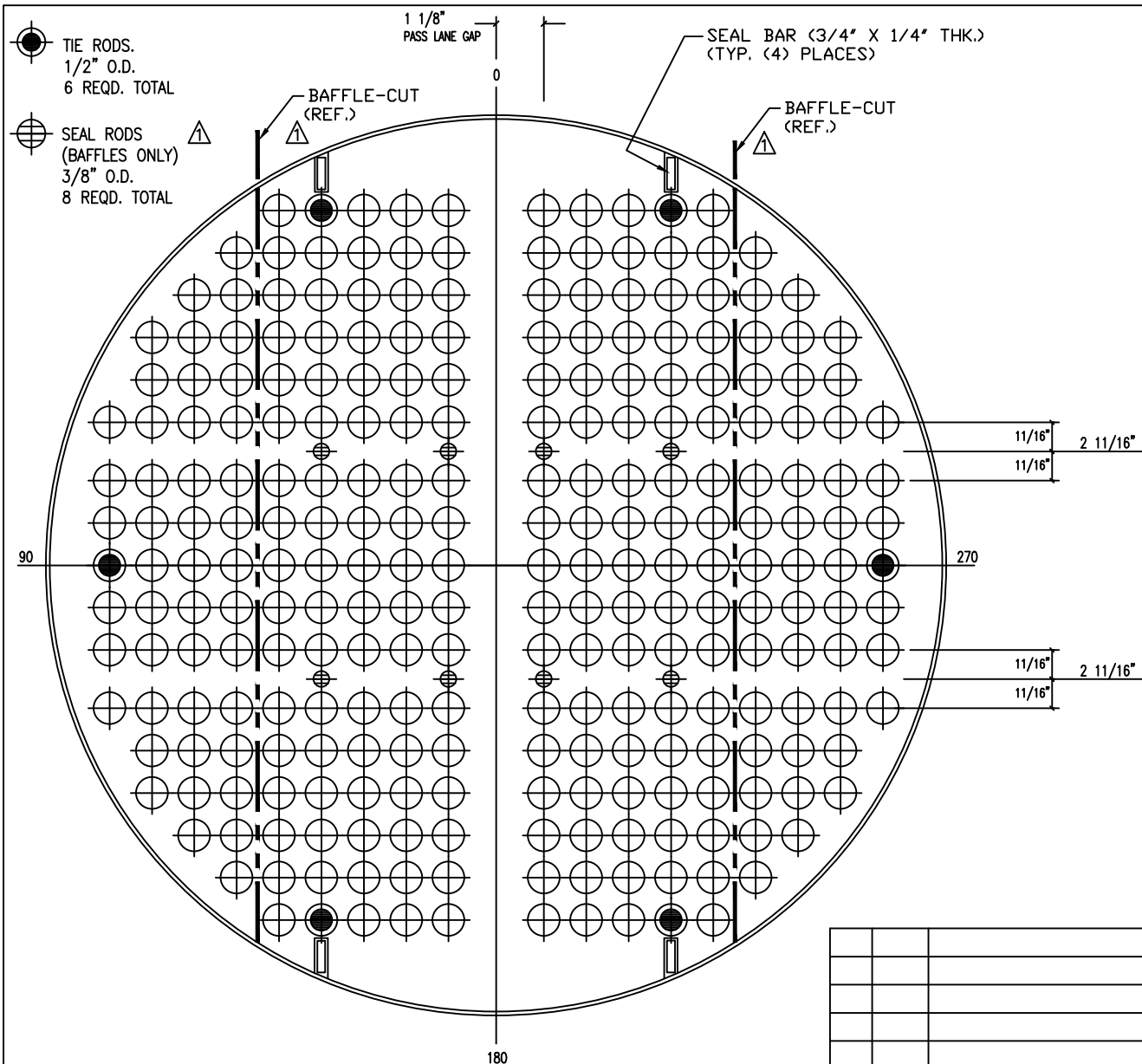
### ⚠ WET H<sub>2</sub>S SERVICE ON SHELL SIDE

PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT  
EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC  
SERVICE: LP LEAN AMINE COOLER  
LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA  
PRODUCT: LEAN AMINE  
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AIR PRODUCTS P.O. NO.: 4505600055/A8KM-4-402-PO-4  
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VDR CODE NO.: BE04  
SERIAL NO.: S21-13258-1  
ENGINEER: GH  
CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

### TUBESHEET DETAILS

| NO. | DATE     | REVISIONS              | DWN. BY<br>B.W. | DATE    | CKD. BY<br>DiCarlo | DWG. NO.<br>S21-13258-1-4 | REV.<br>3 |
|-----|----------|------------------------|-----------------|---------|--------------------|---------------------------|-----------|
|     |          |                        |                 |         |                    |                           |           |
| ⚠   | 8/25/22  | REV. PER CUST. B.W./DD |                 |         |                    |                           |           |
| ⚠   | 6/30/22  | REV. PER CUST. B.W./DD |                 |         |                    |                           |           |
| ⚠   | 5/6/2022 | REV./FABSCO EMG        |                 | 4/19/22 |                    |                           |           |

**Fabsc**  
**SHELL & TUBE, LLC**



TUBE DISTRIBUTION

NOTES:

- 1) DRILL AND REAM TUBE HOLES IN TUBESHEETS TO 0.7600"  $\pm$  0.0020" DIA. FOR 128 - 3/4" O.D. U-TUBES. TOTAL HOLES = 256
- 2) TUBE PITCH = 1" SQUARE.
- 3) NUMBER OF PASSES = 6
- 4) SEE DRAWING 4 FOR TUBE GROOVING DETAILS.
- 5) BAFFLE O.D. = 21 1/16"
- 6) O.T.L. = 20 7/16"



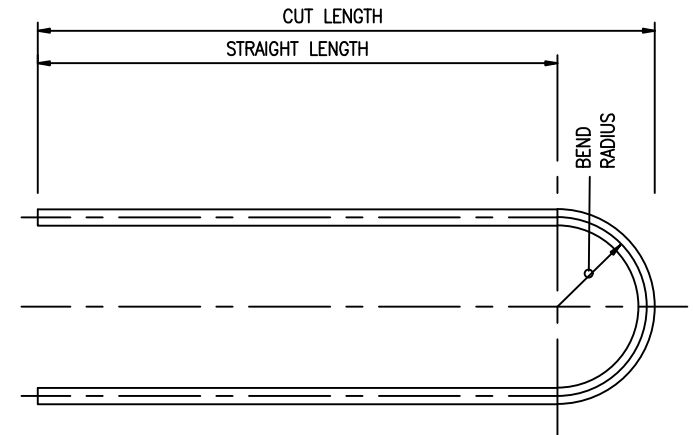
**WET H<sub>2</sub>S SERVICE ON SHELL SIDE**

PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT  
 EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC  
 SERVICE: LP LEAN AMINE COOLER  
 LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA  
 PRODUCT: LEAN AMINE  
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 AIR PRODUCTS P.O. NO.: 4505600055 / A8KM-4-402-PO-4  
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 VDR CODE NO.: BE04  
 SERIAL NO.: S21-13258-1  
 ENGINEER: GH  
 CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

VIEW LOOKING AT SHELL SIDE OF NO. 19 TUBESHEET

|     |      |                 |                |                              |      |
|-----|------|-----------------|----------------|------------------------------|------|
|     |      |                 | TUBE LAYOUT    |                              |      |
|     |      |                 | DWN. BY        | <b>Fabsc</b>                 |      |
|     |      |                 | B.W.           |                              |      |
|     |      |                 | DATE           | <b>SHELL &amp; TUBE, LLC</b> |      |
|     |      |                 | 4/19/22        |                              |      |
|     |      |                 | CKD. BY        | DWG.NO.                      | REV. |
|     |      |                 | <b>DiCarlo</b> | S21-13258-1-5                | 1    |
| NO. | DATE | REV. PER FABSCO | B.W./DD        |                              |      |
|     |      | REVISIONS       |                |                              |      |

| ROW | NO.OF<br>TUBES | BEND<br>RADIUS | BEND<br>DIAMETER | BEND<br>LENGTH | STRAIGHT<br>LENGTH | CUT<br>LENGTH | DEVELOPED<br>LENGTH |
|-----|----------------|----------------|------------------|----------------|--------------------|---------------|---------------------|
| A   | 17             | 1 1/8"         | 2 1/4"           | 0'-3 9/16"     | 10'-0"             | 10'-1 1/2"    | 20'-3 9/16"         |
| B   | 17             | 2 1/8"         | 4 1/4"           | 0'-6 11/16"    | 10'-0"             | 10'-2 1/2"    | 20'-6 11/16"        |
| C   | 17             | 3 1/8"         | 6 1/4"           | 0'-9 7/8"      | 10'-0"             | 10'-3 1/2"    | 20'-9 7/8"          |
| D   | 15             | 4 1/8"         | 8 1/4"           | 1'-1"          | 10'-0"             | 10'-4 1/2"    | 21'-1"              |
| E   | 17             | 5 1/8"         | 10 1/4"          | 1'-4 1/8"      | 10'-0"             | 10'-5 1/2"    | 21'-4 1/8"          |
| F   | 15             | 6 1/8"         | 12 1/4"          | 1'-7 1/4"      | 10'-0"             | 10'-6 1/2"    | 21'-7 1/4"          |
| G   | 13             | 7 1/8"         | 14 1/4"          | 1'-10 7/16"    | 10'-0"             | 10'-7 1/2"    | 21'-10 7/16"        |
| H   | 11             | 8 1/8"         | 16 1/4"          | 2'-1 9/16"     | 10'-0"             | 10'-8 1/2"    | 22'-1 9/16"         |
| J   | 6              | 9 1/8"         | 18 1/4"          | 2'-4 11/16"    | 10'-0"             | 10'-9 1/2"    | 22'-4 11/16"        |



TOTAL NO. REQUIRED: 128  
 SIZE: 3/4" (.083" MIN. THK.)  
 MATERIAL: SA-179 (SMLS)

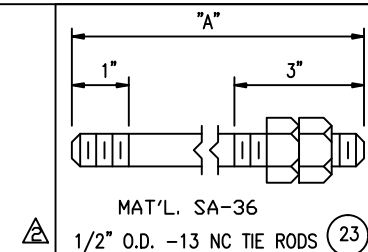
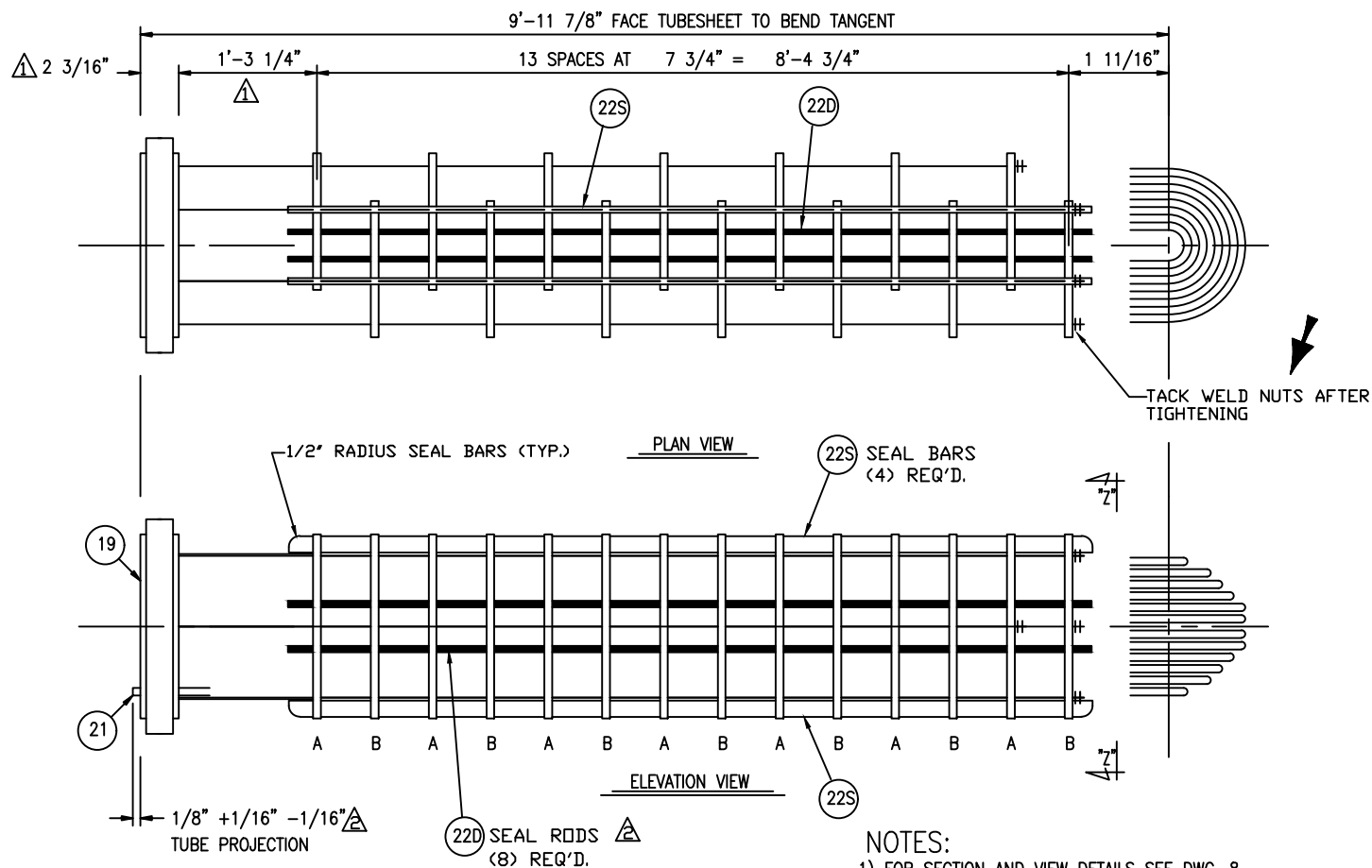
MAXIMUM OUT-OF-ROUNDNESS OF TUBES AT  
 U-BENDS NOT TO EXCEED 10%.

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

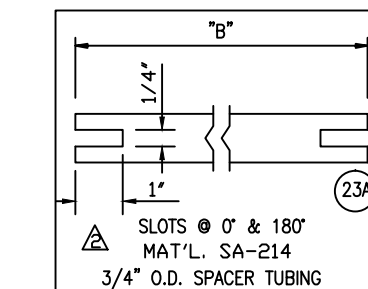
⚠ STRESS RELIEF ANNEAL U-BENDS PLUS 1'-0" OF STRAIGHT LGTH.  
 Ⓢ 1300°F. +0°F-25°F. FOR 15 SECONDS MAX. BY ELECTRIC RESISTANCE METHOD.

⚠ **WET H<sub>2</sub>S SERVICE ON SHELL SIDE**  
 PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT  
 EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC  
 SERVICE: LP LEAN AMINE COOLER  
 LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA  
 PRODUCT: LEAN AMINE  
 ITEM NO.: 18-X-263  
 AIR PRODUCTS P.O. NO.: 4505600055 / A8KM-4-402-PO-4  
 AP PROJECT NO.: EN-20-7121  
 VDR CODE NO.: BE04  
 SERIAL NO.: S21-13258-1  
 ENGINEER: GH  
 CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

| TUBE BENDING SCHEDULE |           |                |         |         |                                               |      |
|-----------------------|-----------|----------------|---------|---------|-----------------------------------------------|------|
|                       |           |                |         | DWN. BY | <b>Fabsco</b><br><b>SHELL &amp; TUBE, LLC</b> |      |
|                       |           |                |         | B.W.    |                                               |      |
|                       |           |                |         | DATE    |                                               |      |
|                       |           |                |         | 4/19/22 |                                               |      |
| ⚠                     | 7/28/2022 | REV. PER CUST. | EMG     | CKD. BY | DWG.NO.                                       | REV. |
| ⚠                     | 6/20/22   | REV. PER CUST. | B.W./DD | DiCarlo | S21-13258-1-6                                 | 2    |
| NO.                   | DATE      | REVISIONS      |         |         |                                               |      |



| REQ'D. | "A"        |
|--------|------------|
| (1) 5  | 9'-10 3/4" |
| (2) 1  | 9'-3"      |
| (3)    |            |



| REQ'D. | "B"      |
|--------|----------|
| (A) 5  | 15 1/8"  |
| (B) 1  | 23"      |
| (C) 52 | 7 9/16"  |
| (D) 12 | 15 5/16" |
| (E)    |          |
| (F)    |          |
| (G)    |          |

#### 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. 1/4"(MIN.) FILLET WELD.
- 3) SEAL RODS SHALL EXTEND 1" PAST FIRST AND LAST BAFFLE. WELD TO FIRST AND LAST BAFFLE. 1/4"(MIN.) FILLET WELD.

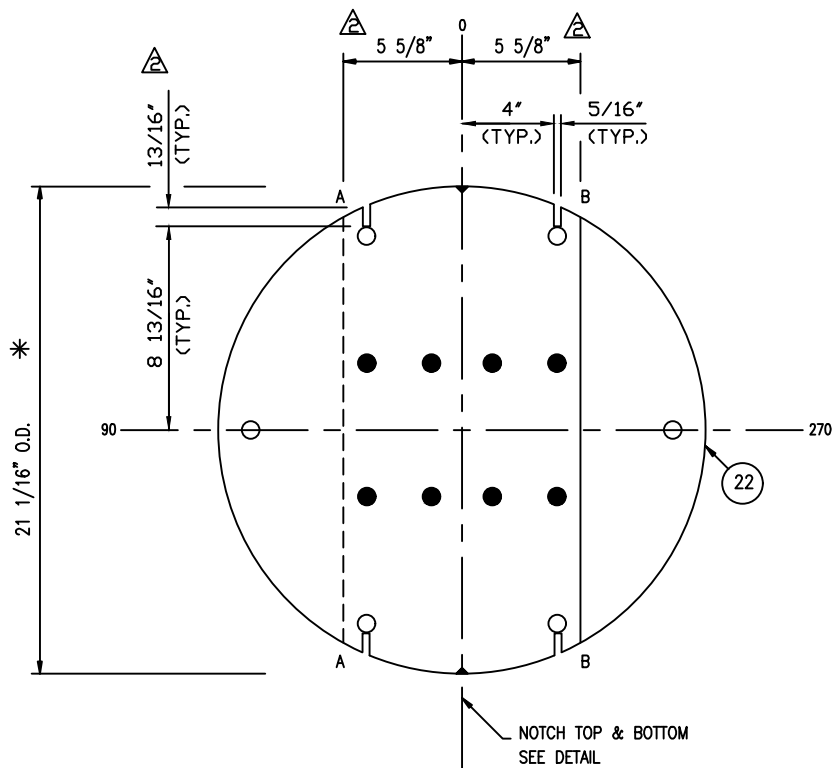
#### WET H<sub>2</sub>S SERVICE ON SHELL SIDE

PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT  
 EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC  
 SERVICE: LP LEAN AMINE COOLER  
 LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA  
 PRODUCT: LEAN AMINE  
 ITEM NO.: 18-X-263  
 AIR PRODUCTS P.O. NO.: 4505600055/ABKM-4-402-PO-4  
 AP PROJECT NO.: EN-20-7121  
 VDR CODE NO.: BE04  
 SERIAL NO.: S21-13258-1  
 ENGINEER: GH  
 CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

#### BUNDLE DETAILS

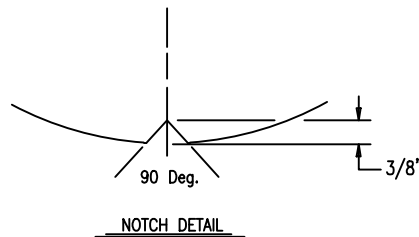
**Fabsco**  
 SHELL & TUBE, LLC

| NO. | DATE     | REVISIONS      | DWN. BY | B.W. | DATE    | CKD. BY | DWG. NO.      | REV. |
|-----|----------|----------------|---------|------|---------|---------|---------------|------|
|     | 8/25/22  | REV. PER CUST. | B.W./DD |      | 4/20/22 | DiCarlo | S21-13258-1-7 | 3    |
|     | 6/30/22  | REV. PER CUST. | B.W./DD |      |         |         |               |      |
|     | 5/6/2022 | REV./FABSCO    | EMG     |      |         |         |               |      |



 DENOTES (8) 7/16" HOLES  
 FOR (8) 3/8" O.D. SEAL RODS  
 (SEE TUBE LAYOUT FOR LOCATION)

| VIEW ZZ OF BAFFLES                                                                  |               |
|-------------------------------------------------------------------------------------|---------------|
|  | 1/4" THK.     |
| 7                                                                                   | -REQD. CUT AA |
| 7                                                                                   | -REQD. CUT BB |



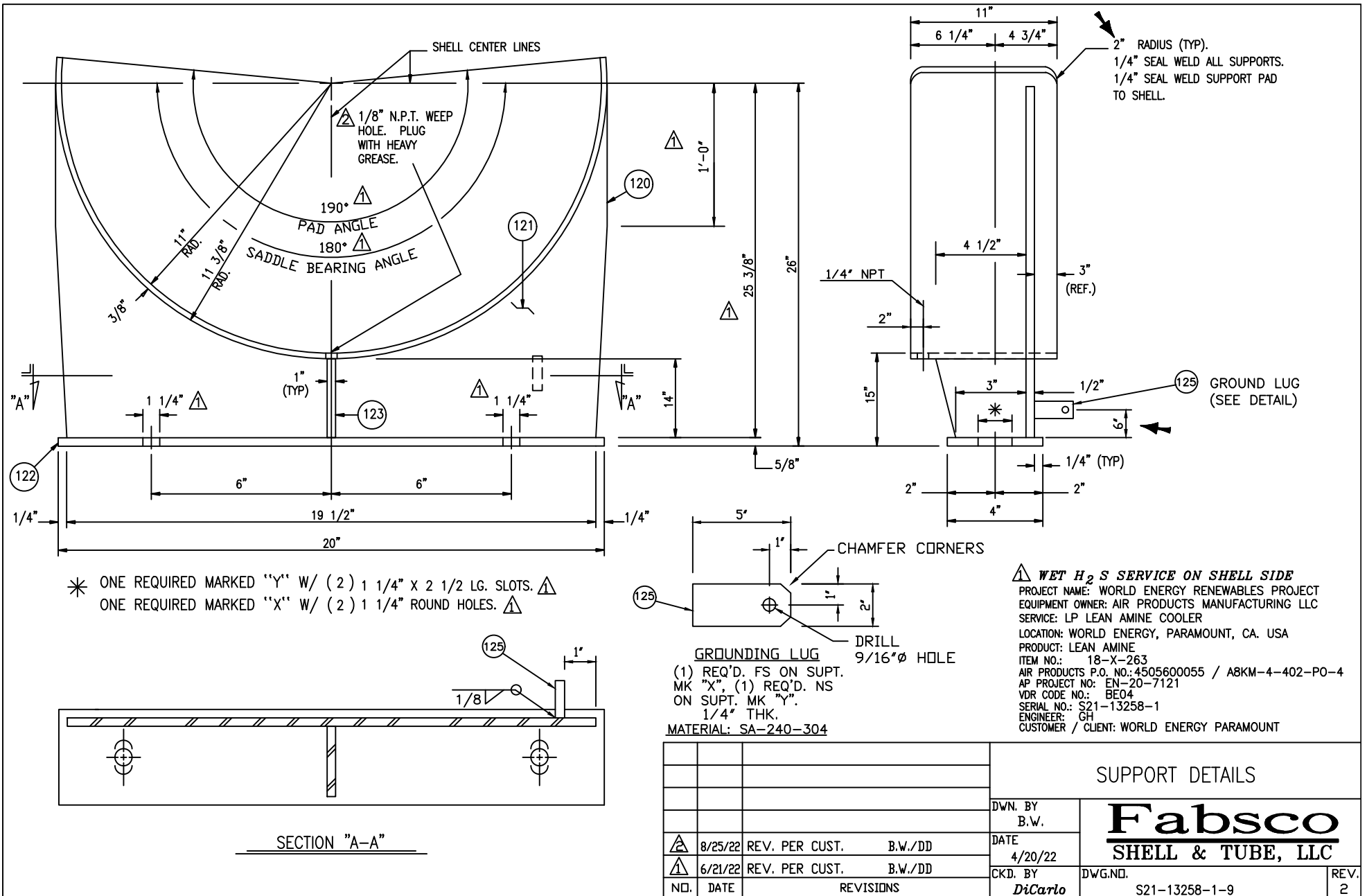
### WET H<sub>2</sub>S SERVICE ON SHELL SIDE

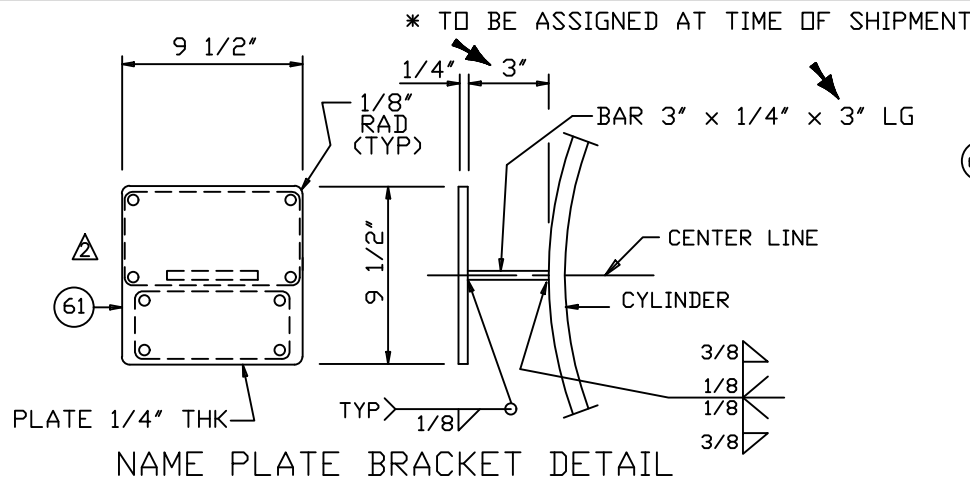
PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT  
 EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC  
 SERVICE: LP LEAN AMINE COOLER  
 LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA  
 PRODUCT: LEAN AMINE  
 ITEM NO.: 18-X-263  
 AIR PRODUCTS P.O. NO.: 4505600055 / A8KM-4-402-PO-4  
 AP PROJECT NO.: EN-20-7121  
 VDR CODE NO.: BE04  
 SERIAL NO.: S21-13258-1  
 ENGINEER: CH  
 CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

### NOTES:

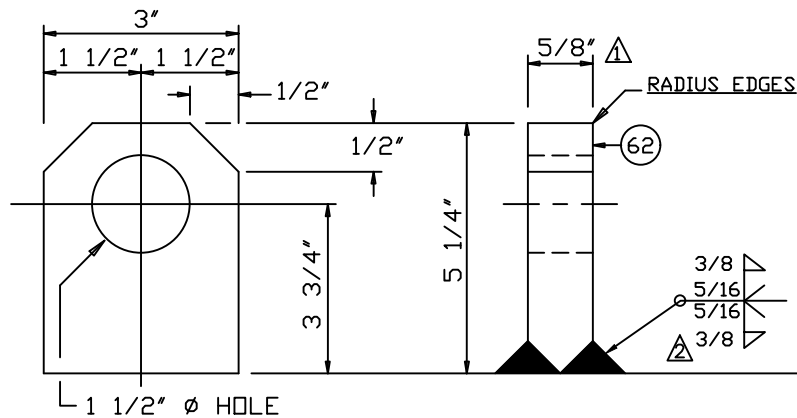
- 1) DRILL TIE ROD HOLES 25/32" DIA. & DEBURR.
- 2) DRILL TIE ROD HOLES 9/16" DIA.  
SEE TUBE LAYOUT FOR LOCATION.
- 3) RADIUS ALL CORNERS ON BAFFLE CUTS.
- \* 4) CHECK SHELL I.D. BEFORE MACHINING BAFFLE O.D.
- 5) MACHINE O.D. OF BAFFLES TO 250 RMS.

| BAFFLE DETAILS |  |  |                |                                                                                                                       |  |
|----------------|--|--|----------------|-----------------------------------------------------------------------------------------------------------------------|--|
|                |  |  | DWN. BY        | <br><b>SHELL &amp; TUBE, LLC</b> |  |
|                |  |  | B.W.           |                                                                                                                       |  |
|                |  |  | DATE           | 4/19/22                                                                                                               |  |
|                |  |  | CKD. BY        |                                                                                                                       |  |
|                |  |  | DiCarlo        | DWG. NO.<br>S21-13258-1-8                                                                                             |  |
|                |  |  | REV. PER CUST. | REV.<br>3                                                                                                             |  |
|                |  |  | B.W./DD        |                                                                                                                       |  |
|                |  |  | REV./FABSCO    | REV. NO.<br>3                                                                                                         |  |
|                |  |  | EMG            |                                                                                                                       |  |
|                |  |  | REVISIONS      |                                                                                                                       |  |





(ONE) REQUIRED



△ LIFTING LUG DETAIL

3-REQUIRED

△ **WET H<sub>2</sub>S SERVICE ON SHELL SIDE**  
 PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT  
 EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC  
 SERVICE: LP LEAN AMINE COOLER  
 LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA  
 PRODUCT: LEAN AMINE  
 ITEM NO.: 18-X-263  
 AIR PRODUCTS P.O. NO.: 4505600055 / ABKM-4-402-PO-4  
 AP PROJECT NO.: EN-20-7121  
 VDR CODE NO.: HC09  
 SERIAL NO.: S21-13258-1  
 ENGINEER: GH  
 CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

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



NAT'L BD. \*

CERTIFIED BY

**FABSCO SHELL & TUBE, LLC**  
 SAPULPA, OKLAHOMA

|       |       |         |      |      |
|-------|-------|---------|------|------|
|       | MAWP  |         | MAWT |      |
| SHELL | 312   | PSI AT  | 300  | ° F. |
|       | MAEWP |         | MAWT |      |
| SHELL | 15    | PSI AT  | 300  | ° F. |
|       | MDMT  |         | MAWP |      |
| SHELL | 32    | ° F. AT | 312  | PSI  |
|       | MAWP  |         | MAWT |      |
| TUBES | 212   | PSI AT  | 150  | ° F. |
|       | MAEWP |         | MAWT |      |
| TUBES | N/A   | PSI AT  | N/A  | ° F. |
|       | MDMT  |         | MAWP |      |
| TUBES | 32    | ° F. AT | 212  | PSI  |

SERIAL NUMBER

YEAR BUILT

ITEM/TAG NUMBER

S21-13258-1

2022

18-X-263

P.O. NO.: 4505600055

WT.: 5400 LBS.

TEST DATE:

SERVICE: LP LEAN AMINE COOLER

INFORMATION NAME PLATE

HYDRO TEST PRESS PSIG..TUBESIDE: SHOP-289/FIELD-276

HYDRO TEST PRESS PSIG..SHELLSIDE: SHOP-452/FIELD-406

DESIGN PRESS.: SHELLSIDE=270 PSI; TUBESIDE=210 PSI

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

LIFT LUG DETAIL w/  
 NAME PLATE & BRACKET

DWN. BY  
 B.W.

DATE  
 4/20/22

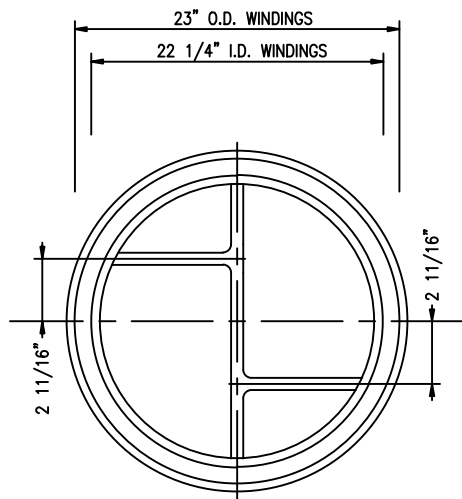
CKD. BY  
 DiCarlo

**Fabscos**  
 SHELL & TUBE, LLC

DWG. NO. S21-13258-1-10

REV.  
 3

| NO. | DATE     | REVISIONS               |
|-----|----------|-------------------------|
| △   | 8/25/22  | REV. PER FABSCO B.W./DD |
| △   | 6/30/22  | REV. PER CUST. B.W./DD  |
| △   | 5/6/2022 | REV./FABSCO EMG         |



(1)-REQUIRED.  
CHANNEL COVER GASKET.

0.175" THK. 316 S.S. SPIRAL WOUND

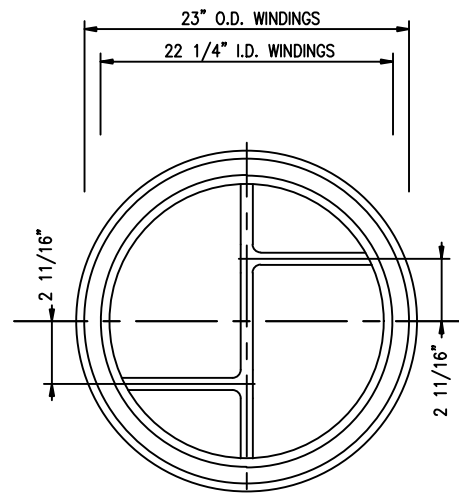
W/ GRAPHITE FILLER & INNER / OUTER COMP. RINGS (A)

△ RIB TO BE 3/16" THK. X 7/16" WIDE 316 S.S. DBL. JACKETED

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

FACE ON BOTH SIDES

TEST PRESSURE: 289 △



(1)-REQUIRED.  
CHANNEL GASKET.

0.175" THK. 316 S.S. SPIRAL WOUND

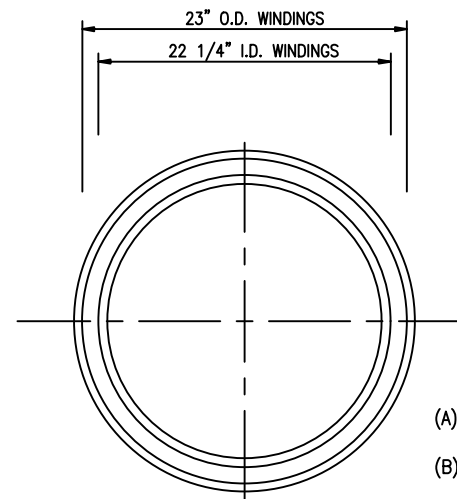
W/ GRAPHITE FILLER & INNER / OUTER COMP. RINGS (B)

△ RIB TO BE 3/16" THK. X 7/16" WIDE 316 S.S. DBL. JACKETED

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

FACE ON BOTH SIDES

TEST PRESSURE: 289 △



(1)-REQUIRED.  
SHELL GASKET.

0.175" THK. 316 S.S. SPIRAL WOUND

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

TEST PRESSURE: 452 △

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

- (A) 23.7500 O.D. X .1250 THICK: MATERIAL=SA-240-316 △  
21.5000 I.D. X .1250 THICK: MATERIAL=SA-240-316  
(B) 23.7500 O.D. X .1250 THICK: MATERIAL=SA-240-316  
21.5000 I.D. X .1250 THICK: MATERIAL=SA-240-316  
(C) 23.7500 O.D. X .1250 THICK: MATERIAL=SA-240-316 △  
21.5000 I.D. X .1250 THICK: MATERIAL=SA-240-316 △

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: 1 1/8" O.D.

NUMBER STUDS: (28)

STUD MATERIAL: SA-193-B7M

△ BOLT TORQUE RANGE TO BE ACHIEVED: 659 - 725 FT-LBS. △

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

STUD DIAMETER: 1 1/8" O.D.

NUMBER STUDS: (28)

STUD MATERIAL: SA-193-B7M

△ BOLT TORQUE RANGE TO BE ACHIEVED: 659 - 725 FT-LBS. △

△ **WET H<sub>2</sub>S SERVICE ON SHELL SIDE**

PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT

EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC

SERVICE: LP LEAN AMINE COOLER

LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA

PRODUCT: LEAN AMINE

ITEM NO.: 18-X-263

AIR PRODUCTS P.O. NO: 4505600055/A8KM-4-402-PO-4

AP PROJECT NO: EN-20-7121

VDR CODE NO.: BE04

SERIAL NO.: S21-13258-1

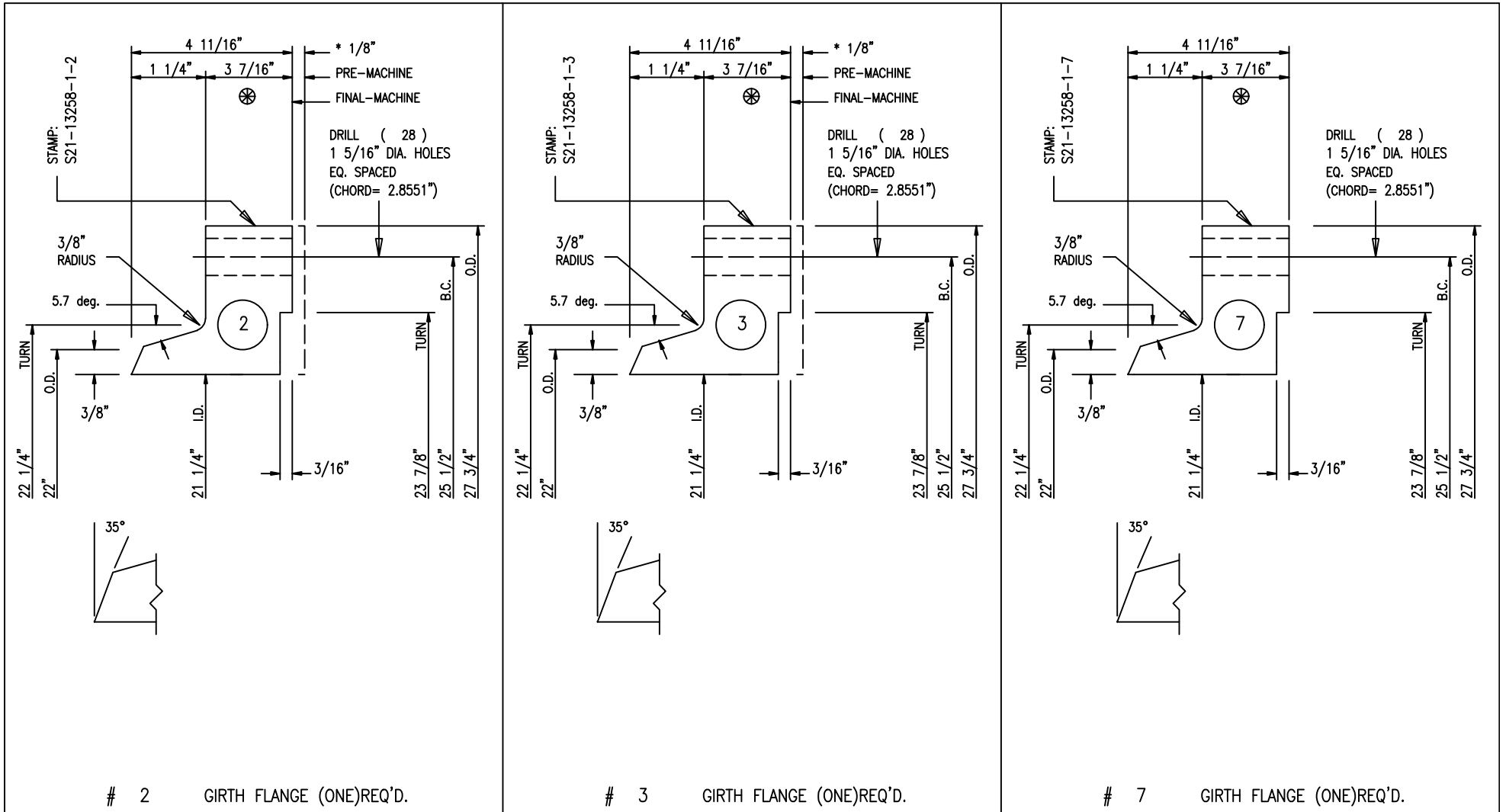
ENGINEER: GH

CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

GASKET DETAILS

**Fabsc**  
**SHELL & TUBE, LLC**

|     |          |                        |                    |                           |      |
|-----|----------|------------------------|--------------------|---------------------------|------|
| NO. | DATE     | REVISIONS              | GASKET DETAILS     |                           | REV. |
|     |          |                        | DWN. BY<br>B.W.    | DATE<br>4/19/22           |      |
| △   | 6/30/22  | REV. PER CUST. B.W./DD | CKD. BY<br>DiCarlo | DWG.NO.<br>S21-13258-1-11 | 2    |
| △   | 5/6/2022 | REV./FABSCD EMG        |                    |                           |      |



# 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 AND POST WELD HEAT TREATMENT.

THK. INCLUDES 1/8" FUTURE MACHINING ALLOWANCE



**WET H<sub>2</sub>S SERVICE ON SHELL SIDE**  
 PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT  
 EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC  
 SERVICE: LP LEAN AMINE COOLER  
 LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA  
 PRODUCT: LEAN AMINE  
 ITEM NO.: 18-X-263  
 AIR PRODUCTS P.O. NO.: 4505600055/A8KM-4-402-PO-4  
 AP PROJECT NO: EN-20-7121  
 VDR CODE NO.: BE04  
 SERIAL NO.: S21-13258-1 ENGINEER: GH  
 CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

|     |         |      |           |         |
|-----|---------|------|-----------|---------|
| ND. | DATE    | REV. | PER CUST. | B.W./DD |
|     | 6/21/22 |      |           |         |
|     |         |      |           |         |
|     |         |      |           |         |
|     |         |      |           |         |
|     |         |      |           |         |
|     |         |      |           |         |
|     |         |      |           |         |
|     |         |      |           |         |
|     |         |      |           |         |

## GIRTH FLANGES

**Fabsco**  
 SHELL & TUBE, LLC

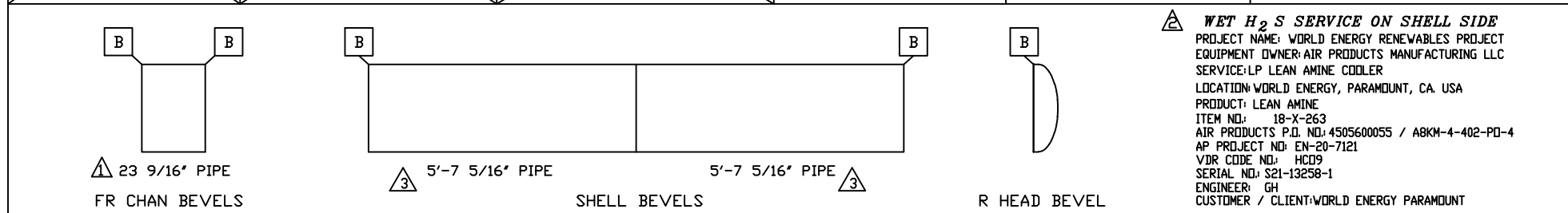
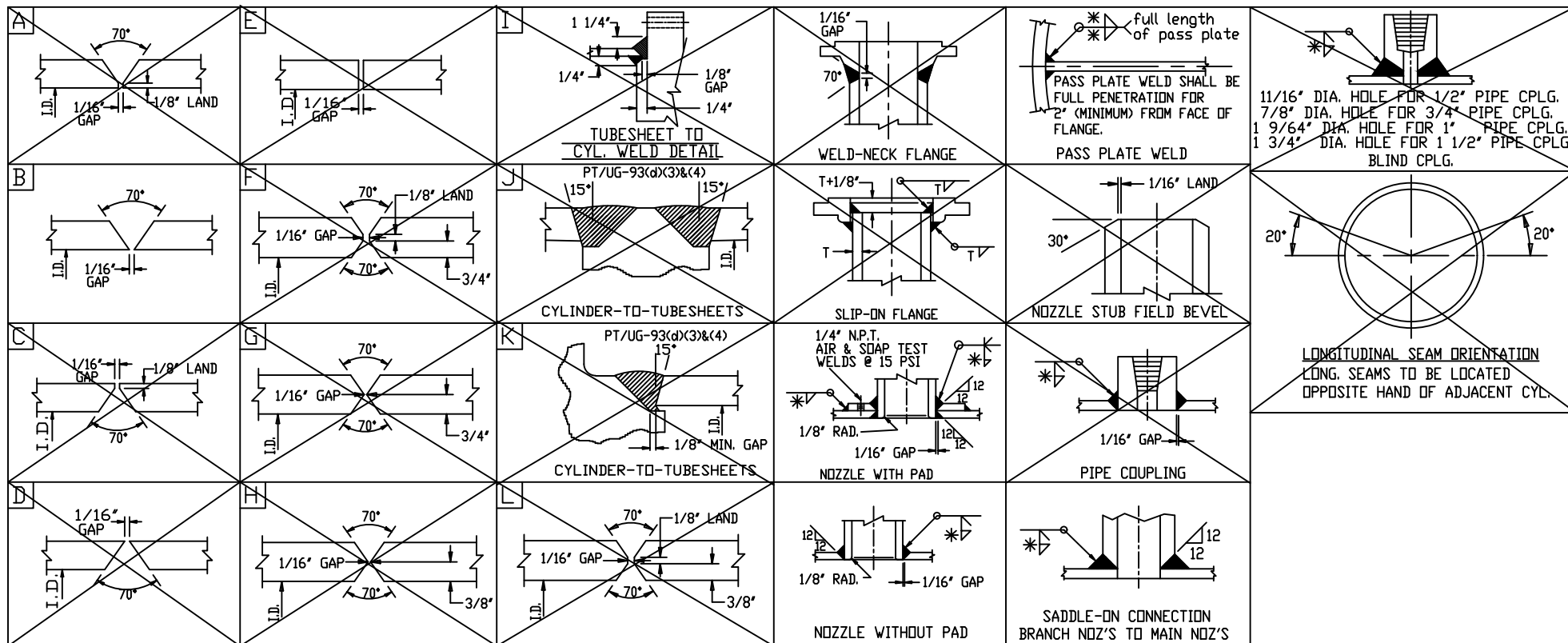
DWN. BY  
 B.W.

DATE  
 4/19/22

CKD. BY  
 DiCarlo

DWG.NO.  
 S21-13258-1-12

REV.  
 1



**WET H<sub>2</sub>S SERVICE ON SHELL SIDE**  
 PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT  
 EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC  
 SERVICE: LP LEAN AMINE COOLER  
 LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA  
 PRODUCT: LEAN AMINE  
 ITEM NO.: 18-X-263  
 AIR PRODUCTS P.O. NO.: 4505600055 / A8KM-4-402-PD-4  
 AP PROJECT NO.: EN-20-7121  
 VDR CODE NO.: HCD9  
 SERIAL NO.: S21-13258-1  
 ENGINEER: GH  
 CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

|                                                                                                                                                                                                                                                                                                                                              |          |                                |  |                                 |                                               |           |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------------------------|--|---------------------------------|-----------------------------------------------|-----------|--|
| <b>GENERAL NOTES</b><br>1) ALL WELDING SHALL BE IN ACCORDANCE WITH ASME CODE (SECTION IX).<br>* 2) ALL FILLET WELDS SHALL BE 3/8", UNLESS NOTED OTHERWISE.<br>3) LIFTING LUGS SHALL HAVE A 3/8" CONTINUOUS FILLET WELD, UNLESS NOTED OTHERWISE.<br>4) NOZZLE PADS SHALL BE UT OR RT 100% IF SPLIT IS WITHIN 45° OF VESSEL LONGITUDINAL AXIS. |          |                                |  | <b>WELD &amp; BEVEL DETAILS</b> |                                               |           |  |
|                                                                                                                                                                                                                                                                                                                                              |          |                                |  | DWN. BY<br>B.W.                 | <b>Fabsco</b><br><b>SHELL &amp; TUBE, LLC</b> |           |  |
|                                                                                                                                                                                                                                                                                                                                              |          |                                |  | DATE<br>4/19/22                 |                                               |           |  |
|                                                                                                                                                                                                                                                                                                                                              |          |                                |  | CKD. BY<br>DiCarlo              | DWG. NO.<br>S22-13258-1-13                    | REV.<br>3 |  |
| NO.                                                                                                                                                                                                                                                                                                                                          | DATE     | REVISIONS                      |  |                                 |                                               |           |  |
| 1                                                                                                                                                                                                                                                                                                                                            | 10/20/22 | REV. PER AS BUILT/FABSCD DD/DG |  |                                 |                                               |           |  |
| 2                                                                                                                                                                                                                                                                                                                                            | 6/30/22  | REV. PER CUST. B.W./DD         |  |                                 |                                               |           |  |
| 3                                                                                                                                                                                                                                                                                                                                            | 5/6/2022 | REV./FABSCD EMG                |  |                                 |                                               |           |  |