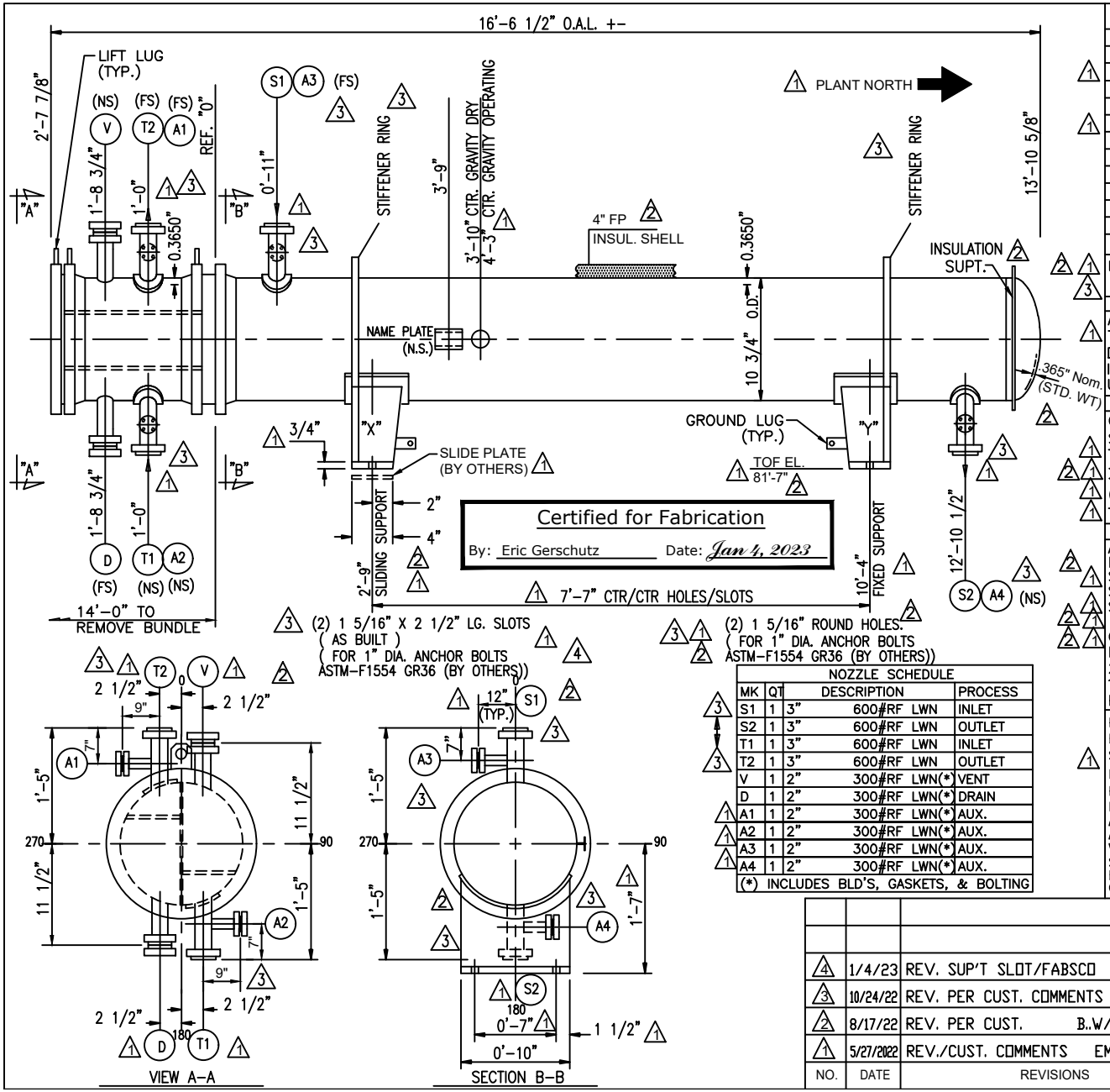



| NOZZLE SCHEDULE | | | | |
|---|---|---|---|---|
| MK | QT | DESCRIPTION | | PROCESS |
| S1 | 1 | 3" | 600#RF LWN | INLET |
| S2 | 1 | 3" | 600#RF LWN | OUTLET |
| T1 | 1 | 3" | 600#RF LWN | INLET |
| T2 | 1 | 3" | 600#RF LWN | OUTLET |
| V | 1 | 2" | 300#RF LWN(*) | VENT |
| D | 1 | 2" | 300#RF LWN(*) | DRAIN |
| A1 | 1 | 2" | 300#RF LWN(*) | AUX. |
| A2 | 1 | 2" | 300#RF LWN(*) | AUX. |
| A3 | 1 | 2" | 300#RF LWN(*) | AUX. |
| A4 | 1 | 2" | 300#RF LWN(*) | AUX. |
| (*) INCLUDES BLD'S, GASKETS, & BOLTING | | | | |

| DESIGN DATA | SHELL | TUBE |
|---|---|---|
| DESIGN PRESSURE P.S.I.G. | 240 | 185 |
| M.A.W.P. P.S.I.G. | 430 | 430 |
| M.A.P. P.S.I.G. | 575 | 575 |
| LIMITED BY | TUBESHEET | TUBESHEET |
| VACUUM PRESSURE P.S.I.G. | 15 @ 300° F. | N/A |
| TEST PRESSURE P.S.I.G. | SHOP-747/FIELD-559 | SHOP-747/FIELD-559 |
| DESIGN TEMP. Deg.F. | 300 | 150 |
| MDMT Deg. F. | 10 | 32 |
| CORROSION ALLOWANCE | 1/8" | 1/8" |
| NUMBER OF PASSES | 1 | 6 |
| RADIOGRAPHY | SPOT | SPOT |
| HEAT TREAT REQUIRED | NO | YES & U-BENDS |

ESTIMATED WEIGHTS, LBS.

DRY: 1900 DRY W/ INS.: 2080 BUNDLE: 550 WET/HYDRO: 2500 SHELL: 800
CHN'L. CVR.: 90 CHN'L: 460

SPECIFICATIONS

ASME Code Section VIII, Division 1, 2021 Ed. (Stamp: Yes)
TEMA Class R 10th Ed.;& Natl. Bd.Reg. is Reqd. 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.

MATERIAL

CHANNEL: SA-106-B TUBESHEETS: SA-516-70N
SHELL: SA-106-B BAFFLES: SA-516-70
TUBES: SA-179 (SMLS.)
**REFER TO BILL OF MAT'L. FOR REMAINING MAT'L.**
( 12 ) U's 3/4" O.D.X 0.083" (MIN) X 13'-3" LG.
TUBE PITCH 1" 90° □ SURFACE 61.26 (EFF) SQ.FT.

GENERAL NOTES

ALL BOLT HOLES TO STRADDLE NATURAL CENTER LINES.
INSULATION: 4" FP SHELLSIDE ONLY; TUBESIDE: NONE
SUPPORTS FIRE PROOFING: N/A
STRESS RELIEVE U-BENDS PLUS 1'-0" OF STRAIGHT LENGTH
SEAL WELD & EXPAND TUBES TO TUBESHEET
SHELLSIDE FLAMMABLE & TOXIC SERVICE ; TUBESIDE: ----
GASKETS: .1750" THK. 304 SPIRAL WOUND GPHT FILLED W/ 304 S.S. INNER & OUTER COMP. RINGS
2 SETS OF SPARE GASKETS REQUIRED.
10% SPARE BOLTING FOR BODY FLG'S
PAINT: SEE SHT. -1A

PROJECT NAME: WORLD ENERGY RENEWABLES PROJECT
EQUIPMENT OWNER: AIR PRODUCTS MANUFACTURING LLC
SERVICE: BUTANE PRODUCT COOLER
LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA
PRODUCT: BUTANE PRODUCT COOLER
ITEM NO.: 18-X-380
AIR PRODUCTS P.O. NO.: 4505600057 / A8KM-4-402-PO-2
AP PROJECT NO: EN-20-7120
VDR CODE NO.: HC09
SERIAL NO.: S21-13258-16
ENGINEER: EG
CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

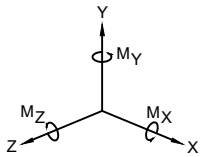
| NO. | DATE | REVISIONS |
|---|---|---|
| 4 | 1/4/23 | REV. SUP'T SLOT/FABSCO DD/DG |
| 3 | 10/24/22 | REV. PER CUST. COMMENTS DD/DG |
| 2 | 8/17/22 | REV. PER CUST. B..W/DD |
| 1 | 5/27/2022 | REV./CUST. COMMENTS EMG |

ASSEMBLY AND SPECIFICATIONS FOR
ONE 10-159 A E U

DWN. BY EMG
DATE 12- 2-21
CKD. BY GS

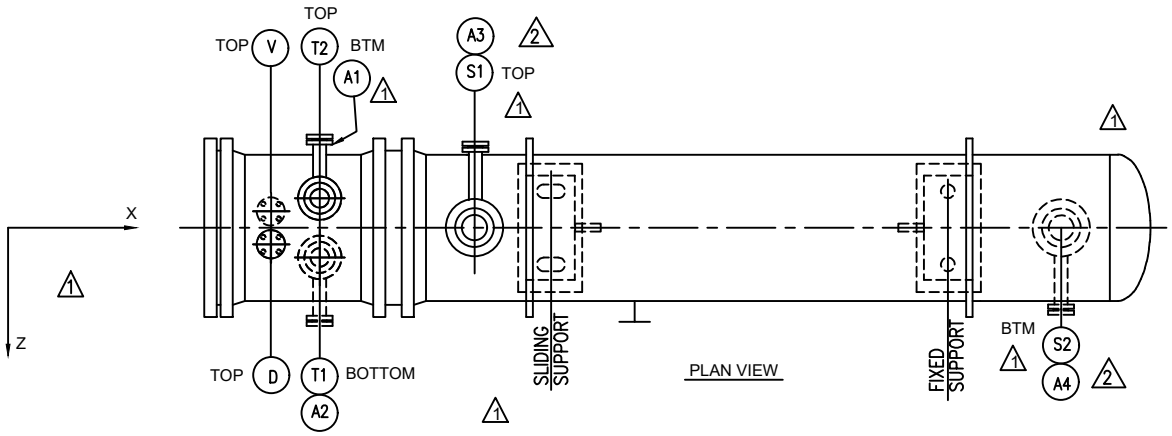
Fabsco
SHELL & TUBE, LLC

DWG.NO. S21-13258-16-1
REV. 4




## 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 | 1080 | 1720 | 1360 | 1340. | 1060 | 1340 | 3"-300#; 2 x API-660 |
| S2 | 1080 | 1720 | 1360 | 1340. | 1060 | 1340 | 3"-300#; 2 x API-660 |
| T1 | 1080 | 1720 | 1360 | 1340. | 1060 | 1340 | 3"-300#; 2 x API-660 |
| T2 | 1080 | 1720 | 1360 | 1340. | 1060 | 1340 | 3"-300#; 2 x API-660 |




PLAN VIEW

## VESSEL DESIGN SEISMIC BASE SHEAR

| | |
|---|---|
| EMPTY CONDITION | 1130 LBS. |
| OPERATING CONDITION | 1381 LBS. |

| DESIGN DATA | SHELL | TUBE |
|---|---|---|
| OPERATING PRESSURE PSIG | 174.7 | 64.7 |
| OPERATING TEMP. °F. | IN: 106.4 OUT: 95 | IN: 80 OUT: 91 |
| HYDROTEST TEMP. °F. | --- | --- |
| JOINT EFF. | 1 | 1 |
| FLUID NAME | BUTANE | COOLING WATER |
| FLUID DENSITY lb/ft$^3$ | IN: 33.43 OUT: 33.95 | 62.226 |
| LETHAL SERVICE | FLAMMABLE & TOXIC | --- |
| DESIGN DUTY Btu/hr | 89714 | |
| 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 (1.5-2.0 MILS ANCHOR PROFILE)

TUBESIDE: (SYSTEM 1)
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)

SHELL SIDE : (SYSTEM 6)
PRIMER: ONE COAT SHERWIN WILLIAMS PHENICON HS (8.0-10.0 MILS DFT)
(COLOR: OFF WHITE)
FINISH: ONE COAT SHERWIN WILLIAMS PHENICON HS (8.0-10.0 MILS DFT)
(COLOR: LIGHT GRAY)

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: ***BUTANE PRODUCT COOLER***
LOCATION: WORLD ENERGY, PARAMOUNT, CA. USA
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AP PROJECT NO: EN-20-7120
VDR CODE NO.: HC09
SERIAL NO.: S21-13258-16
ENGINEER: EG
CUSTOMER / CLIENT: WORLD ENERGY PARAMOUNT

1 CHANNEL COVER TO CHANNEL FLANGE BOLTING INFO
STUD DIAMETER: 7/8" O.D.
NUMBER STUDS: (20)
STUD MATERIAL: SA-193-B7
BOLT TORQUE RANGE TO BE ACHIEVED: 360.2-405.9 FT. LBS

1 CHAN. FLG./T'SHT./SHELL FLG. BOLTING INFO
STUD DIAMETER: 7/8" O.D.
NUMBER STUDS: (20)
STUD MATERIAL: SA-193-B7
BOLT TORQUE RANGE TO BE ACHIEVED: 360.2-405.9 FT. LBS

| NO. | DATE | REVISIONS |
|---|---|---|
| 3 | 1/4/23 | REV. PER CUST. COMMENTS DD/DG |
| 2 | 10/24/22 | REV. PER CUST. COMMENTS DD/DG |
| 1 | 8/18/22 | REV. PER CUST. B..W/DD |

SUPPLEMENTAL INFORMATION
ONE 10 - 159 A E U

DWN. BY: EMG
DATE: 5/20/2022
CKD. BY: *DiCarlo*

Fabsco
SHELL & TUBE, LLC

DWG.NO.: S21-13258-16-1A
REV.: 3