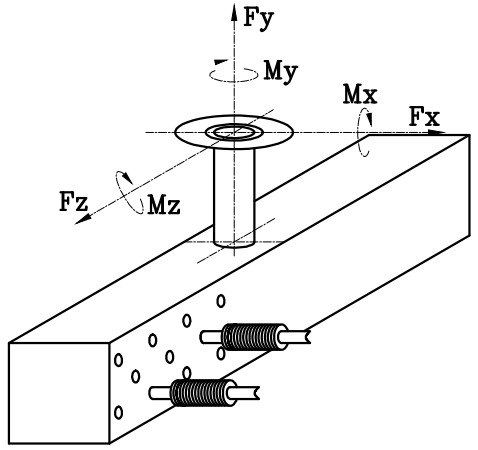


| TABLE: Joint Reactions | | | | |
|------------------------|------------|------------|-------------|------------|
| Joint | OutputCase | Fx | Fy | Fz |
| Text | Text | Kgf | Kgf | Kgf |
| A-1 | DEAD_S | 16.65 | -45 | 861.98 |
| A-1 | DEAD | 49.34 | -158.83 | 1640.14 |
| A-1 | DEAD_OP | 4.08 | -14.37 | 92.37 |
| A-1 | DEAD_N | -1631.93 | 429.16 | -2881.5 |
| A-1 | LIVE | 3.34 | 25.54 | 1383.73 |
| A-1 | WX | 31.57 | 329.34 | -352.72 |
| A-1 | WY | -387.76 | 93.94 | -669.09 |
| A-1 | SNOW | 9.74 | -24.99 | 547.61 |
| A-1 | EQX | 106.43 | 1146.34 | -1764.17 |
| A-1 | EQY | -1561.76 | 337 | -3289.21 |
| A-1 | EQXO | 210.24 | 2295.43 | -3529.78 |
| A-1 | EQYO | -3123.79 | 673.24 | -6571.39 |
| A-2 | DEAD_S | -20.6 | 1.599E-13 | 380.54 |
| A-2 | DEAD | -33.06 | -0.00000289 | 811.07 |
| A-2 | DEAD_OP | -0.21 | -3.963E-07 | 55.27 |
| A-2 | DEAD_N | -10.59 | -1.13 | -378.95 |
| A-2 | LIVE | -76.47 | 6.353E-13 | 402.18 |
| A-2 | WX | 1.165E-12 | 49.87 | 8.288E-13 |
| A-2 | WY | -54.91 | -1.269E-13 | -353.83 |
| A-2 | SNOW | -19.58 | -8.653E-07 | 221.21 |
| A-2 | EQX | 0.004107 | 45.8 | 0.09216 |
| A-2 | EQY | -48.82 | -0.38 | -1465.12 |
| A-2 | EQXO | 0.00889 | 92.7 | 0.18 |
| A-2 | EQYO | -98.54 | -0.78 | -2927.34 |
| A-3 | DEAD_S | 16.65 | 45 | 861.98 |
| A-3 | DEAD | 49.34 | 158.83 | 1640.17 |
| A-3 | DEAD_OP | 4.08 | 14.37 | 92.37 |
| A-3 | DEAD_N | 39.17 | 235.02 | 482.86 |
| A-3 | LIVE | 3.34 | -25.54 | 1383.73 |
| A-3 | WX | -31.57 | 329.34 | 352.72 |
| A-3 | WY | -387.76 | -93.94 | -669.09 |
| A-3 | SNOW | 9.74 | 24.99 | 547.61 |
| A-3 | EQX | -106.49 | 1146.49 | 1764.07 |
| A-3 | EQY | -1071.77 | -428.48 | -2570.23 |
| A-3 | EQXO | -210.36 | 2295.75 | 3529.6 |
| A-3 | EQYO | -2144 | -856.2 | -5134.3 |
| B-1 | DEAD_S | 34.11 | -1.44 | 482.68 |
| B-1 | DEAD | 174.23 | -2.24 | 983.92 |
| B-1 | DEAD_OP | 16.3 | 0.03128 | 81.45 |
| B-1 | DEAD_N | -670.87 | 1.33 | 2555.04 |
| B-1 | LIVE | -43.74 | -6.51 | 64.14 |
| B-1 | WX | -255.25 | 0.99 | -374.63 |
| B-1 | WY | -1.33 | -70.96 | 504.74 |
| B-1 | SNOW | 24.65 | -1.56 | 193.87 |
| B-1 | EQX | -985.73 | 4.1 | -1834.5 |
| B-1 | EQY | -51.12 | -28.6 | 2619.38 |
| B-1 | EQXO | -1968.03 | 8.18 | -3658.39 |
| B-1 | EQYO | -102.38 | -57.85 | 5233.15 |
| B-2 | DEAD_S | -3.76E-15 | -9.82 | 342.79 |
| B-2 | DEAD | -1.168E-10 | -61.15 | 847.79 |
| B-2 | DEAD_OP | -1.602E-11 | -8.01 | 77.09 |
| B-2 | DEAD_N | -0.0003857 | -403.24 | 720.08 |
| B-2 | LIVE | 8.844E-15 | 82.61 | -147.91 |
| B-2 | WX | -56.07 | 3.583E-12 | -6.399E-12 |
| B-2 | WY | -8.004E-14 | -439.42 | 682.53 |
| B-2 | SNOW | -3.498E-11 | 3.21 | 131.34 |
| B-2 | EQX | 0.02819 | 0.04229 | -0.07544 |
| B-2 | EQY | 0.006383 | 1570.51 | 2804.88 |
| B-2 | EQXO | -0.2 | 0.08416 | -0.15 |
| B-2 | EQYO | 0.0007535 | -3138.25 | 5603.81 |
| B-3 | DEAD_S | -34.11 | -1.44 | 482.68 |
| B-3 | DEAD | -174.23 | -2.24 | 983.9 |
| B-3 | DEAD_OP | -16.3 | 0.03128 | 81.45 |
| B-3 | DEAD_N | -670.87 | 1.26 | 1104.47 |
| B-3 | LIVE | 43.74 | -6.51 | 64.14 |
| B-3 | WX | -255.25 | -0.99 | 374.63 |
| B-3 | WY | 1.33 | -70.96 | 504.74 |
| B-3 | SNOW | -24.65 | -1.56 | 193.87 |
| B-3 | EQX | -985.8 | -4.09 | 1834.58 |
| B-3 | EQY | -40.75 | -28.68 | 1900.29 |
| B-3 | EQXO | -1968.16 | -8.15 | 3658.54 |
| B-3 | EQYO | -81.36 | -57.83 | 3796.07 |

- NOTES:
- 1) Loading Data
WIND :ASCE7-16,VELOCITY :125Km/h, EXPOSURE : C
Earthquake: Standard No. 2800,A=0.3,B=2.75,I=1.4,R=3.5,SOIL TYPE=IV
 - 2) Fans
-100% AP(Adjustable pitch-manual)
 - 3) Miscellaneous
- The Inlet Header Boxes Are Fixed In The Direction Of Fin Tubes,
Refer To Table For The Lateral Displacement In Y Direction
- Flange Face Detail : ASME ANSI B16.5
 - 4) All Dimensions Are In Millimeter Unless Otherwise Specified.
 - 5) All Dimensions Tolerances Are According To API 661.(Figure 10)
 - 6) Bolts which are used for fixing headers to side frame , on sliding side should be removed after erection.
 - 7) PROTECTION(SEE Galvanizing Specification and Inspection Procedure: EIO27-DMF-VD-QC-PRO-024
 - 8) RADIOGRAPHIC TEST (FULL/SPOT) SHALL BE IN COMPLIANCE WITH THE REQUIREMENTS OFASME SEC. VIII DIV.1 UW-11 & UW-12.

| LOAD DEFINITION * | |
|---|--|
| DEAD | DEAD LOAD(PLENUMS+FAN RINGS+FAN GUARDS+FAN+MOTOR+SPEED REDUCERS+GRATING+TUBE BUNDLE EMPTY)+HEADER WALK WAY |
| DEAD OP | WEIGHT OF LIQUID WITHIN EACH TUBE BUNDLE& STEAM COIL(WATER) |
| DEADS | SELF WEIGHT OF STRUCTURE |
| DEADN | NOZZEL LOAD |
| LIVE | WALKWAY LOAD 250 Kg/m2 |
| EQX | SEISMIC LOAD DIR.X |
| EQY | SEISMIC LOAD DIR.Y |
| WX | WIND LOAD DIR.X |
| WY | WIND LOAD DIR.Y |
| SNOW | 66 Kg/m2 |
| * Further Definition Check the 'Steel Structure Calculation.Doc No.: EIO27-DMF-VD-ST-CAL-004 1158-A01-0030-00 | |

| THE MAXIMUM ALLOWABLE MOMENTS AND FORCES PER EACH NOZZLE (IF LOADS ARE DIVIDED EQUALLY FOR NOZZLES ACCORDING TO 3xAPI 661(7.1.10.1) | | | | | |
|---|-------|-------|-------|---------|---------|
| SIZE | Fx(N) | Fy(N) | Fz(N) | Mx(N.m) | Mz(N.m) |
| 4" | 10020 | 8010 | 10020 | 2430 | 3660 |
| 2" | 3060 | 3990 | 3060 | 450 | 720 |



| CONNECTIONS | | | | |
|-------------|----------------------|-------------------|-----|---|
| NO. | REP. | QTY. PER BAY/ITEM | DIA | DESIGNATION |
| N1 | INLET NOZZLE/FLANGE | 1/1 | 4" | FLANGE ANSI B16.5,#300,LWN,RF,SA-333 0.6 /SA-350 LF2 CL1N |
| N2 | OUTLET NOZZLE/FLANGE | 1/1 | 2" | FLANGE ANSI B16.5,#300,LWN,RF,SA-350 LF2 CL1N |
| V1&V2 | VENT | 2/2 | 1" | FLANGE ANSI B16.5,#300,LWN,SA-350 LF2 CL1 N |
| D1&D2 | DRAIN | 2/2 | 1" | FLANGE ANSI B16.5,#300,LWN,SA-350 LF2 CL1 N |
| 1A | VIBRATION SWITCH | 2/2 | - | SEE FAN DRIVE ASSEMBLY DRAWING |
| 2A | MOTOR(7.5kw) | 2/2 | - | SEE FAN DRIVE ASSEMBLY DRAWING |
| 3A | FAN | 2/2 | 7ft | SEE FAN DRIVE ASSEMBLY DRAWING |

LATERAL DISPLACEMENT OF HEADERS (DIRECTION X) INSIDE BUNDLE FRAME IN RELATION WITH EXPANSION FORCES ON NOZZLES (mm) (ACCORDING TO API661 7-1-1-2)

MAXIMUM DISPLACEMENT INLET/OUTLET : ±9

| * FOR MORE DETAILS FOR EACH COMPONENT OF AIR COOLER REFER TO BELOW DRAWING & DOCUMENTS. | | |
|---|---------------------|-------------------------|
| REFERENCED DWG&DOC. | | |
| TITLE | VENDOR DOCUMENT NO. | CLIENT DOCUMENT NO. |
| Tube Bundle Drawing | 1158-A01-2000-00 | EIO27-DMF-VD-ME-DWG-005 |
| Bundle Frame Drawing | 1158-A01-2400-00 | EIO27-DMF-VD-ME-DWG-007 |
| Fan Drive Assembly Drawing | 1158-A01-6000-00 | EIO27-DMF-VD-ME-DWG-008 |
| Fan Ring Drawing | 1158-A01-5067-00 | EIO27-DMF-VD-ME-DWG-009 |
| Support Mechanism Drawing | 1158-A01-5167-00 | EIO27-DMF-VD-ME-DWG-010 |
| Plenum Drawing | 1158-A01-6307-00 | EIO27-DMF-VD-ME-DWG-011 |
| Steel Structure Drawing | 1158-A01-1100-00 | EIO27-DMF-VD-ST-DWG-013 |
| Header Walkway Drawing | 1158-A01-1200-00 | EIO27-DMF-VD-ST-DWG-014 |
| Ladder Drawing | 1158-A01-1520-00 | EIO27-DMF-VD-ST-DWG-015 |
| Surface Preparation and Painting Procedure for Air Cooler | 1158-A01-Q501-00 | EIO27-DMF-VD-QC-PRO-024 |

| | | | | | | |
|-----|------------|---------------------|----------|------------|-------------|-------------------|
| R2 | 08/10/2024 | ISSUED FOR APPROVAL | F.SZ | J.M. | J.B.L | A.GHZ |
| R1 | 07/22/2024 | ISSUED FOR APPROVAL | F.SZ | J.M. | J.B.L | A.GHZ |
| R0 | 06/30/2024 | ISSUED FOR APPROVAL | F.SZ | J.M. | J.B.L | A.GHZ |
| REV | DATE | DESCRIPTION | DRAWN BY | CHECKED BY | APPROVED BY | FINAL APPROVED BY |

CLIENT:

CONTRACTOR:

PROJECT :
AIR COOLER FOR
Toase-che Park Sanati Gohar Ofogh Petrochemical Co.

General Arrangement Drawing
1158-A01-1000-00

DWG. NO. EIO27-DMF-VD-ME-DWG-003

SCALE : N.T.S. SIZE: A1 REV.: R2

Factory : Km 14 special Karaj road

Table 1. Weight of equipments For 1 Units (Total Units = 2)

| | Total No in one Unit | Total Weight in one Unit (tonf) | Total No. for One Bay | Weight for One Bay (kgf) |
|--|----------------------|---------------------------------|-----------------------|--------------------------|
| Bundle Frame | 1 | 0.865 | 1 | 865 |
| Tube Bundle & Headers | 1 | 2.635 | 2 | 2635 |
| sum | | | | 3500 |
| Water in Tubes & Headers | 1 | 0.48 | 1 | 480 |
| sum | | | | 480 |
| Plenum | 2 | 0.245 | 2 | 490 |
| Fan Ring | 2 | 0.13 | 2 | 260 |
| Motor | 2 | 0.07 | 2 | 140 |
| Fan | 2 | 0.0275 | 2 | 55 |
| Speed Reducer | 2 | 0.25 | 2 | 500 |
| Machinery Mount | 2 | 0.32 | 2 | 640 |
| Fan Guard | 2 | 0.0325 | 2 | 65 |
| sum | | | | 2160 |
| Fabrication Weight For 1 Units | | | | 5650 |
| Operation Weight For 1 Units | | | | 6130 |
| Hydrotest Weight For 1 Units | | | | 6130 |
| Total Weight of Main structure, Ladder for 1 Units | | | | 5600 |

| GENERAL DATA | |
|---|--|
| ITEM NO. | - |
| DESIGN CODE BUNDLE/STRUCTURE | ASME SEC.VIII (DIV.1 (2019), API661 (2013-7th EDITION)/Standard No. 2800 |
| INLET PRESSURE/PRESSURE HGO. (ALLOWABLE/CALC) | 19.8 Bar / (0.1/0.016) Bar |
| DESIGN PRESSURE | 22+P.V. (barg) |
| HYDROSTATIC TEST PRESSURE | 28.6 (bar) |
| TEMPERATURE IN/OUT(TUBE SIDE) | 73.5°C/56.32°C |
| DESIGN TEMPERATURE | 120 °C |
| MINIMUM DESIGN METAL TEMPERATURE | -45°C |
| AIR INLET/OUTLET TEMPERATURE (AIR SIDE) | 48 / 52.26 °C |
| MINIMUM DESIGN AMBIENT TEMPERATURE | 5 °C |
| CORROSION ALLOWANCE | 3 mm |
| ULTRASONIC TEST | YES(Full)[See note 6] |
| RADIOGRAPHY | YES(Full)[See note 6] |
| STRESS RELIEVING | YES |
| BAR/FINNED SURFACE PER UNIT | 68.101/1579.2 m2 |
| NUMBER OF BUNDLE PER BAY | 1 |
| NUMBER OF UNIT | 1 |
| NUMBER OF BAY PER UNIT | 1 |
| NOZZLE SIZE(INLET/OUTLET/RATING/TYP) | 1x4"/1x2"/SCH.160/#300 |
| PROCESS FLUID NAME | PROPANE |
| SERVICE | PROPANE |
| PASSES PER BUNDLE | 4 |
| FINNED-TUBES/BUNDLE | NO.140 TUBES , OD=25.4 MIN W THK.=1.65, L=6096 mm |
| STEAM COIL | NO |
| LOUVER/TYP | NO/- |
| PLENUM / FAN RING | FORCED TYPE/CONICAL L/D=0.05 |
| VIBRATION SWITCH | YES(FOR EACH FAN) MANUAL & ELECTRIC RESET |
| FAN SPECIFICATION :RPM/DIAMETER | 382/7 Ft |
| BLADE NO./ MATERIAL | 3/ALUMINIUM |
| AIR QUANTITY FOR FAN | 26.679 m3/S |
| STATIC PRESSURE | 102.95 Pa |
| AIR TEMPERATURE IN/OUT | 46°C/52.28°C |
| SPEED REDUCER TYPE | V BELLT |
| REDUCTION RATIO | 3.76 |
| MOTOR TYPE | ELECTRIC-Exe.IIB-T3-IP55 |
| VOLTAGE/Freq./PHASES | 400/50/3 |
| RPM/KW | 1500/7.5 Kw |
| S.P.L 1m all side of fan: | <85 dB(A)1m all sides |