

Joint	OutputCase	Fx	Fy	Fz
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	547.6
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	-0.0000289	811.07
A-2	DEAD_OP	-0.21	-3.96E-07	55.27
A-2	DEAD_N	-10.59	-1.13	-378.95
A-2	LIVE	-76.47	6.35E-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	82.81	-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	-670.07	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:**
- 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
  - Fans  
-100% AP(Adjustable pitch-manual) (RT)
  - 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
  - All Dimensions Are In Millimeter Unless Otherwise Specified.
  - All Dimensions Tolerances Are According to API 661.(Figure 10)
  - Bolts which are used for fixing headers to side frame , on sliding side should be removed after erection.
  - PROTECTION(SEE Galvanizing Specification and Inspection Procedure: EIO27-DMF-VD-QC-PRO-024 (RT))
  - RADIOGRAPHIC TEST (FULL/SPOT) SHALL BE IN COMPLIANCE WITH THE REQUIREMENTS OFASME SEC. VIII DIV.1 UW-11 & UW-12.

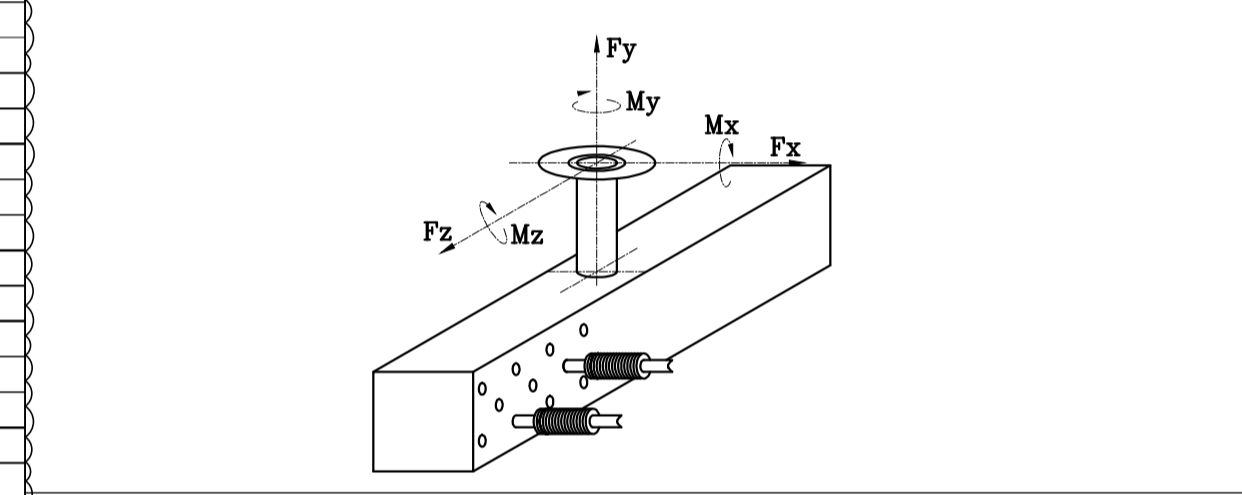
**LOAD DEFINITION \***

LOAD	DESCRIPTION
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)
DEAD S	SELF WEIGHT OF STRUCTURE
DEAD N	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)	My(N.m)	Mz(N.m)
4"	10020	8010	10020	2430	3660	2430
2"	3060	3990	3060	450	720	450



**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 Gr.6 /SA-350 LF2 CL.1N
N2	OUTLET NOZZLE/FLANGE	1/1	2"	FLANGE ANSI B16.5,#300,LWN,RF,SA-350 LF2 CL.1N
V1&V2	VENT	2/2	1"	FLANGE ANSI B16.5,#300,LWN,SA-350 LF2 CL.1 N
D1&D2	DRAIN	2/2	1"	FLANGE ANSI B16.5,#300,LWN,SA-350 LF2 CL.1 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
Ring Drawing	1158-A01-5007-00	EIO27-DMF-VD-ME-DWG-009
Port Mechanism Drawing	1158-A01-5167-00	EIO27-DMF-VD-ME-DWG-010
Plenum Drawing	1158-A01-5110-00	EIO27-DMF-VD-ME-DWG-011
Steel Structure Drawing	1158-A01-1100-00	EIO27-DMF-VD-ME-DWG-013
Header Walkway Drawing	1158-A01-1200-00	EIO27-DMF-VD-ME-DWG-014
Ladder Drawing	1158-A01-1520-00	EIO27-DMF-VD-ME-DWG-015
Surface Preparation and Painting Procedure for Air Cooler	1158-A01-0501-00	EIO27-DMF-VD-QC-PRO-024

REV	DATE	DESCRIPTION	DRAWN BY	CHECKED BY	APPROVED BY	FINAL APPROVED BY
R2						
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

CLIENT: **ENBR TEKNOLOJI**

CONTRACTOR: **dt Damafin thermal technology**

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.: R1

Factory : Km 14 special Karaj road

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**GENERAL DATA**

DESIGN CODE BUNDLE/STRUCTURE	ASME SEC.VIII DIV.1(2017), API661(2013-7th EDITION)Standard No. 2800
INLET PRESSURE/PRESSURE DRG. (ALLOWABLE/CLC)	19.8 Bar / (0.1/0.016) Bar
DESIGN PRESSURE	22+P.V. (barg)
HYDROSTATIC TEST PRESSURE	38 (barg)
TEMPERATURE IN/OUT(TUBE SIDE)	73.5°C/56.32°C
DESIGN TEMPERATURE	120 °C
AIR INLET/OUTLET TEMPERATURE (AIR SIDE)	48 / 52.28 °C
MINIMUM DESIGN AMBIENT TEMPERATURE	5 °C
CORROSION ALLOWANCE	3 mm
ULTRASONIC TEST	YES(Full)(See note 8)
RADIOGRAPHY	YES(Full)(See note 8)
STRESS RELIEVING	YES (RT)
BARE/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(OUTLET/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	26.879 m3/s
STATIC PRESSURE	102.85 Pa
AIR TEMPERATURE IN/OUT	48°C/52.28°C
SPEED REDUCER TYPE	V BELT
REDUCTION RATIO	3/76
MOTOR TYPE	ELECTRIC -Exd, IIB-T3-IP55
VOLTAGE/Freq./PHASES	400/50/3
RPM/KW	1500/7.5 Kw
S.P.L. 1m all side of fan:	c85 4B(A)1m all sides

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	1	2635
sum				<b>3600</b>
Water in Tubes & Headers	1	0.48	1	480
sum				<b>480</b>
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				<b>2160</b>
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				<b>6600</b>

