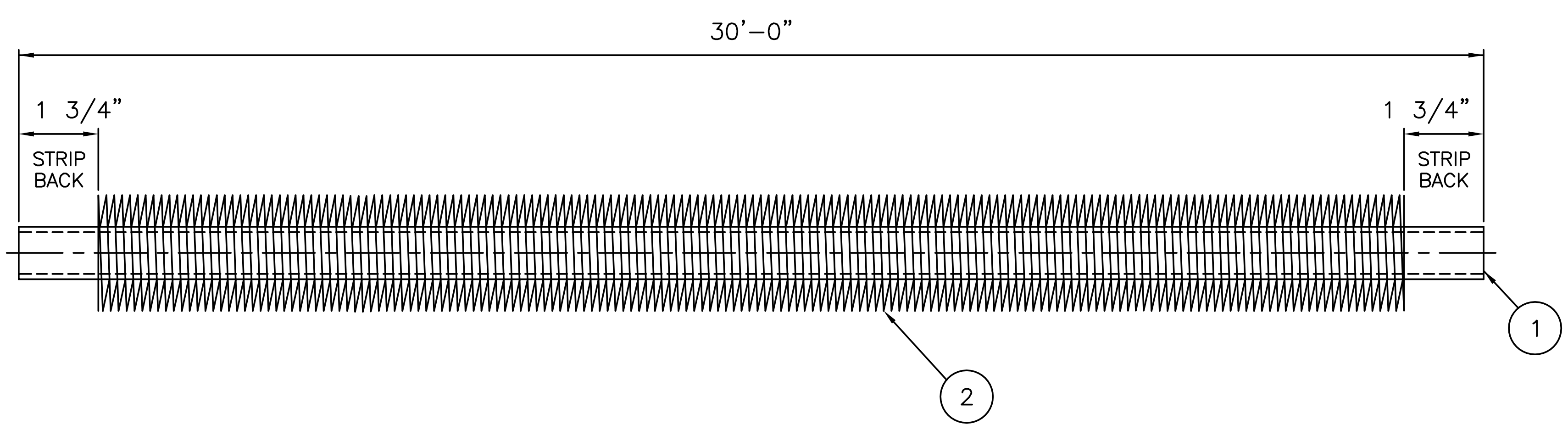

BILL OF MATERIAL: 1 IDENTICAL SECTIONS REQ'D. FOR THIS ITEM

MARK NO.	QTY. EACH	QTY. TOTAL	DESCRIPTION	MATERIAL	WT.(lbs)
1	132	132	TUBE O.D. : 1" TUBE WALL THICKNESS : 0.109" MW TUBE LENGTH : 30'-0" △1	SA-179	4518 △1
2	N/A	N/A	ALUMINUM FIN STRIP THICKNESS : 0.016" WIDTH : 0.637"	B209 1100-O	1521
N/A	N/A	N/A	ALUMINUM STRIP SPACER TUBE O.D. : 1" TUBE PITCH : 2 1/2" LIN. FT. : 227'-0"	B209 1100-O	27

NOTES FOR PURCHASING :

-WHEN ORDERING TUBES AND ALUMINUM BLOOMS, AN EXTRA 5% TIMES THE TOTAL NUMBER OF TUBES IS REQUIRED FOR SPARES.
-TUBE MATERIAL SHALL BE KILLED CARBON STEEL.
-TUBES SHALL HAVE MTR'S IN ACCORDANCE WITH CUSTOMER SPECIFICATION: SPEC-ENG-MQ042, SECTION 3.1. FOR TUBE MATERIALS ORIGINATING OUTSIDE OF THE USA, MTR'S SHALL CONFORM TO EN 10204 TYPE 3.1.
-APPROVED COUNTRIES OF ORIGIN FOR TUBE MATERIALS ARE: AUSTRIA, BELGIUM, CANADA, CZECH REPUBLIC, DENMARK, FINLAND, FRANCE, GERMANY, IRELAND, ITALY, JAPAN, LUXEMBOURG, LIECHTENSTEIN, THE NETHERLANDS, NORWAY, MEXICO, POLAND, SPAIN, SOUTH KOREA, SOUTH AFRICA, SWEDEN, SWITZERLAND, TAIWAN, THE UNITED KINGDOM, AND THE UNITED STATES OF AMERICA.

NOTES FOR FINNING :

- TUBES ARE STRENGTH WELDED & LIGHTLY ROLLED TO TUBE SHEET.

FINNING INFORMATION	
FIN TYPE	EMBEDDED
FINS PER INCH	10
FIN HEIGHT	5/8"

NO.	DESCRIPTION	DATE	DWN.	APPROVED
1	TUBE WALL	7/6/23	TRR	
0	ORIGINAL ISSUE	12/8/22	TRR	RPK

REVISIONS

Kelvion
Thermal Solutions
Tulsa Port of Catoosa
Catoosa, Oklahoma, USA

KELVION JOB NO: R-12961-1A
CUST. P.O. NO: SM00002003
CUST. ITEM NO: 18-XF-1504
SERVICE: JET PRODUCT COOLER

CUSTOMER
AIR PRODUCTS MANUFACTURING, LLC △1 PARAMOUNT, CA

TITLE	SCALE	DWG. NO.	REV.
FIN TUBE DETAIL	NONE	1296101AFT	1

Kelvion

Date	2/26/2024	Rev.	5	By	ckha
Proposal	33295CKHA	Item No.	1		
Job No.	R-12961	Item No.	1.A		

1	Customer	AIR PRODUCT MANUFACTURING, LLC			Cust. PO No.	SM00002003.		
2	Address	PARAMOUNT, CA			Plant Location	PARAMOUNT, CA		
3	Service	JET PRODUCT COOLER					Weight/Bay	45,600 lb
4	1	Model	1-1430T132	Forced Draft	No. of Bays	1(SHARED)	No. of Fan Cells / Bay	2
5	Dimensions	L 32' 4"	W 13' 9"	H 14' 2"	Structure Mounted c/c 20'		Shop Assembled Unit(s)	

6	**PERFORMANCE**				
7	Customer Item		18-XF-1504 (1 OF 2 ITEMS SHARING BAYS)		
8	Fluid Circulated		JET PRODUCT		
9	Heat Exchanged	Btu/hr	10,170,000.0		
10	U External - Bare	Btu/hr·ft²·°F	3.34 / 4.32 / 3.49		
11	CLMTD	°F	138.4		
12	External Surface	ft²	21,807.0		
13	Bare Tube Surface	ft²	1,014.0		
14	**TUBE SIDE**				
15	Total Flow	lbs/hr	62,130.00		
16			**IN**		**OUT**
17	Vapor	"	0.00		0.00
18	Liquid	"	62,130.00		62,130.00
19	Steam	"	0.00		0.00
20	Non-Condensable	"	0.00		0.00
21	Temperature	°F	442.7		186.0
22	Pressure	psia	96.7		92.6
23	Pressure Drop	psi	Allowed: 7.0		Calculated: 4.1
24	Density L|V	lbs/ft³	35.5		43.6
25	Viscosity L|V	cP	0.169		0.564
26	Vapor Molecular Weight				
27	Specific Heat L|V	Btu/lb·°F	0.714		0.554
28	Thermal Conductivity L|V	Btu/hr·ft·°F	0.0540		0.0640
29	Fouling Resistance IS	hr·ft²·°F/Btu	0.00200		
30	**AIR SIDE**				
31	Temperature In - Out	°F	90.0 - 238.8		(Min. Amb. = 35.0)
32	Elev 69 ft	Air Quantity lbs/hr	291,560.0		
33	**CONSTRUCTION**				
34	Design Press. psig - Temp.	°F	125 - 515 / FV - 515		(MDMT = 32.0)
35	Codes		ASME VIII/1,API 7th Ed.		
36	No. Bundles - Tubes / Bundle		1 - 132		
37	No. Rows - Passes / Bundle		8 - 4		
38	Header Type - Corrosion Allowance		PLUG BOX **- 1/8"		
39	Header Material		SA-516 GR 70 - SPOT XR		
40	Shoulder Plug /Gasket Material		SA-105N / A-1008.		
41	Nozzles In - Out - Series / Bundle		4"(1)-4"(1)-300#RFWN,Front:Vent1"(1)-Drain 1"(1)RFWN - Rear:Vent 2"(1) - Drain 2"(1) -300#RFLWN W/BLD		
42	Tube Material		SA-179 SMLS		
43	Tube O.D. - BWG - Length		1" -0.109" MIN (0.097" UNDER FINS) -30.000'		
44	Fin Material - Bond Type		ALUMINUM - EMBEDDED		
45	Fin Height - No. Fins / Inch Tri	Pitch	5/8" - 10.0 - 2-1/2"		
46	**SPLIT FRONT HEADER				

	FAN SHARED)	MECHANICAL EQUIPMENT		MISCELLANEOUS
47	**FAN** SHARED)	**MECHANICAL EQUIPMENT**		**MISCELLANEOUS**
48	Mfr. MOORE-HD EC	SPEED REDUCER	DRIVER	1) Guards: Fan, Belt
49	Model 10K-36VE MAN ADJ	Type POLY CHN	Type ELECTRIC MOTOR	2) VibAccel/fan: Wilcoxon 786AD2
50	hp/fan 22.25 No. of Fans 2	Mfr. GATES	Mfr. GE	3) StrucPrep: Galva. All Cold Metal
51	Dia. 11.0 No. of Blades 5	Model No. 14MGT-3360-20	hp/Driver 30.0	4) Tube to TS Joint: Strength Weld
52	RPM 289 Pitch 6.7°	Ratio 6.05::1	Enclosure TEFC 841	Light Expansion.
53	Tip Speed 9,987.0 ft/min	Service Factor 1.80	Service Factor 1.15	5) 10% HDR Plugs & Gask
54	ACFM/Fan 120,500.0	No. of Belts 2	RPM 1,750	6) 2 Sets Blind Gask
55	Blade Material ALUMINUM	Support: Suspended	V 460 P 3 C 60	7) PE Stamp-California
56	Static Pressure 0.766 inH2O		Cl. 1, Div. 2, Gr B,C, D, T3C	8) -40f Dew Point, Weight Cert
57	SPL/Fan @ 3 ft = 81.2 dBA		1 motor only VFD rated,VFD by others	9) No Wlkways, Ladders

Kelvion

Date	2/26/2024	Rev.	5	By	ckha
Proposal	33295CKHA	Item No.	1		
Job No.	R-12961	Item No.	1.B		

No.					
1	Customer	AIR PRODUCT MANUFACTURING, LLC		Cust. PO No.	SM00002003.
2	Address	PARAMOUNT, CA		Plant Location	PARAMOUNT, CA
3	Service	PRODUCT FRACTIONATOR OVERHEAD CONDENSER		Weight/Bay	
4	Model		No. of Bays		No. of Fan Cells / Bay
5	Dimensions	L 32' 4"	W 13' 9"	H 14' 2"	

No.	Item	Unit				
6	**PERFORMANCE**					
7	Customer Item		18-XF-1502A (2 OF 2 ITEMS SHARING BAYS)			
8	Fluid Circulated		PRODUCT FRACTIONATOR OVERHEAD VAPOR			
9	Heat Exchanged	Btu/hr	11,930,000.0			
10	U External - Bare	Btu/hr·ft²·°F	2.72 / 4.47 / 3.66			
11	CLMTD	°F	73.8			
12	External Surface	ft²	59,407.0			
13	Bare Tube Surface	ft²	2,857.0			
14	**TUBE SIDE**					
15	Total Flow	lbs/hr	73,414.00			
16			**IN**		**OUT**	
17	Vapor	"	73,414.00		12,713.00	
18	Liquid	"	0.00		60,701.00	
19	Steam	"	0.00		0.00	
20	Non-Condensable	"	0.00		0.00	
21	Temperature	°F	249.5		150.0	
22	Pressure	psia	36.7		32.6	
23	Pressure Drop	psi	Allowed:	4.5	Calculated:	4.1
24	Density L|V	lbs/ft³		0.4220	39.2	0.2830
25	Viscosity L|V	cP		0.0090	0.226	0.0100
26	Vapor Molecular Weight		82.1		56.3	
27	Specific Heat L|V	Btu/lb·°F		0.510	0.567	0.469
28	Thermal Conductivity L|V	Btu/hr·ft·°F		0.0140	0.0570	0.0180
29	Fouling Resistance IS	hr·ft²·°F/Btu	0.00200			
30	**AIR SIDE**					
31	Temperature In - Out	°F	90.0 - 156.3		(Min. Amb. =	35.0)
32	Elev 69 ft	Air Quantity lbs/hr	750,000.0			
33	**CONSTRUCTION**					
34	Design Press. psig - Temp.	°F	125 - 385 / FV - 385		(MDMT =	32.0)
35	Codes		ASME VIII/1,API 7th Ed.			
36	No. Bundles - Tubes / Bundle		1 - 372			
37	No. Rows - Passes / Bundle		8 - 2 (1 PASS IN TOP 5 ROWS)			
38	Header Type - Corrosion Allowance		PLUG BOX- 1/8"			
39	Header Material		SA-516 GR 70 - SPOT XR			
40	Shoulder Plug /Gasket Material		SA-105N / A-1008.			
41	Nozzles In - Out - Series / Bundle		8"(2) - 8"(2) - 300# RF WN, Vent 2"(1) - Drain 2"(1) - 300# RFLWN W/BLD			
42	Tube Material		SA-179 SMLS			
43	Tube O.D. - BWG - Length		1" - 0.083" MIN -30.000'			
44	Fin Material - Bond Type		ALUMINUM - EXTRUDED			
45	Fin Height - No. Fins / Inch Tri	Pitch	5/8" - 10.0 - 2-1/2"			
46						

No.	**FAN** (SEE PAGE 1)	**MECHANICAL EQUIPMENT**		**MISCELLANEOUS**
47		SPEED REDUCER	DRIVER	
48	Mfr.			1) No Louvers for any Units
49	Model	Type	Type	2) Hdr Prep: Carbozinc 11
50	hp/fan No. of Fans	Mfr.	Mfr.	3) Strength Weld, Light Exp
51	Dia. No. of Blades	Model No.	hp/Driver	
52	RPM Pitch °	Ratio	Enclosure	
53	Tip Speed ft/min		Service Factor	
54	ACFM/Fan		RPM	
55	Blade Material	Support:	V P C	
56	Static Pressure inH2O			
57	SPL/Fan @ 3 ft = dBA			