CoilDesigner® Results

File Name: 26320m3h ▫ P38-16 AC 4R 28T 1430A 2.5Pa Cu/Al)
Heat Exchanger Type: Tube Fin Heat Exchanger
Description:

Dimensions

Rows:	28	Number Of Tubes:	112
Columns:	4	Heat Exchanger Height:	1066.8 mm
Spacing:	38.1 mm/33 mm	Heat Exchanger Width:	1430 mm
Fin Type:	FlatPlateFins	Heat Exchanger Depth:	132 mm
Fins Per Inch:	10.16	Face Area:	1.53 m²
Fin Pitch:	2.5 mm	Primary Area:	7.47 m²
Tube Length:	1430 mm	Secondary Area:	135.33 m²

Working Fluids

In Tube/Refrigerants: water
Secondary Fluid: AirMoist

Heat Load

Total Heat load:	169.66 kW	Sensible Heat load:	169.66 kW
Sensible Heat Ratio:	1	Latent Heat Load:	0 kW

Pressure Drop

Air Pressure Drop: 0.186 kPa (0.747 in. H2O)
Refrigerant Pressure Drop: 0.142 kPa

Air Side

Air Mass Flow Rate:	9.21 kg/s	Actual Air Flow Rate:	26320 m³/h
Average Air Velocity:	4.79 m/s	Air Standard Flow Rate:	27770.71 m³/h
Condensate:	0 kg/s		

Inlet Conditions

Dry-Bulb Temperature:	5 °C
Wet-Bulb Temperature:	3.84 °C
RH:	83.5 %

Outlet Conditions

Dry-Bulb Temperature:	23.24 °C
Wet-Bulb Temperature:	12.36 °C
RH:	25.55 %

Refrigerant Side

Total Refrigerant Mass Flow Rate: 0.643 kg/s

Inlet Conditions

Pressure:	350 kPa
Temperature:	90 °C

Outlet Conditions

Pressure:	349.86 kPa
Temperature:	26.93 °C

Heat Loads	Value	SI Units	English Units
Total Heat Load	169.6576 kW	169657.5839 W	578895.8441 Btu/hr
Sensible Heat Load	169.6576 kW	169657.5839 W	578895.8441 Btu/hr
Latent Heat Load	0 kW	0 W	0 Btu/hr
Sensible Heat Ratio	1	1	1
Ref. Liquid Heat Load	-169.6576 kW	-169657.5839 W	-578895.8441 Btu/hr
Ref. Two Phase Load	0 kW	0 W	0 Btu/hr
Ref. Vapor Load	0 kW	0 W	0 Btu/hr
Ref. Abs. Heat Load Sum	169.6576 kW	169657.5839 W	578895.8441 Btu/hr

Charge / Condensate	Value	SI Units	English Units
Refrigerant Charge	27.9144 kg	27.9144 kg	61.5408 lbm
Refrigerant Liquid Charge	27.9144 kg	27.9144 kg	61.5408 lbm
Refrigerant Two Phase Charge	0 kg	0 kg	0 lbm
Refrigerant Vapor Charge	0 kg	0 kg	0 lbm
Condensate	0 kg/s	0 kg/s	0 lbm/s

Flow Rates	Value	SI Units	English Units
Total Refrigerant Flow Rate	0.6426 kg/s	0.6426 kg/s	1.4167 lbm/s
Air Mass Flow Rate	9.2113 kg/s	9.2113 kg/s	20.3075 lbm/s
Air Flow Rate	26320.0029 m^3/h	7.3111 m^3/s	258.1895 ft^3/s
Standard Air Flow Rate	27770.7077 m^3/h	7.7141 m^3/s	272.4204 ft^3/s

Pressure Drop	Value	Alt.Value	SI Units	English Units
HX Air Side Pressure Drop	0.1861 kPa	0.747 in. H2O	186.119 Pa	0.027 psi
System Air-Side Resistance	0 kPa	0 in. H2O	0 Pa	0 psi
Total Air Side Pressure Drop	0.1861 kPa	0 in. H2O	186.119 Pa	0.027 psi
Refrigerant Side Pressure Drop	0.1419 kPa		141.8977 Pa	0.0206 psi
Refrigerant Saturation T Drop	0.0142 °C		0.0142 K	0.0256 °F

Outlet Conditions	Value	SI Units	English Units
Avg Air Outlet Temperature	23.2416 °C	296.3916 K	73.8349 °F
Avg Air Outlet Wetbulb Temperature	12.3598 °C	285.5098 K	54.2477 °F
Avg Air Outlet RH [%]	25.5461 -	25.5461 -	25.5461 -
Avg Refrigerant Outlet Pressure	349.8581 kPa	349858.1023 Pa	50.7426 psi
Avg Refrigerant Outlet Temperature	26.9349 °C	300.0849 K	80.4828 °F
Avg Refrigerant Outlet Quality	-0.219 [-]	-0.219 [-]	-0.219 [-]
Avg Refrigerant Saturation Delta	-111.9081 °C	-111.9081 K	-201.4346 °F

Heat Transfer	Value	SI Units	English Units
Primary Heat Transfer Area	7.4709 m^2	7.4709 m^2	80.4159 ft^2
Secondary Heat Transfer Area	135.3337 m^2	135.3337 m^2	1456.7195 ft^2
Total Air Side Heat Transfer Area	142.8046 m^2	142.8046 m^2	1537.1354 ft^2
Refrigerant Side Heat Transfer Area	7.5474 m^2	7.5474 m^2	81.2391 ft^2
Coil Face Area	1.5255 m^2	1.5255 m^2	16.4206 ft^2
Average Fin Effectiveness	0.78 [-]	0.78 [-]	0.78 [-]
Average Air Side HTC	78.2538 $W/m^2 K$	78.2538 $W/m^2 K$	13.7814 $Btu/h\ ft^2\ °F$
Average Refrigerant Side HTC	1127.4666 $W/m^2 K$	1127.4666 $W/m^2 K$	198.5606 $Btu/h\ ft^2\ °F$
Average Refrigerant Liquid HTC	1127.4666 $W/m^2 K$	1127.4666 $W/m^2 K$	198.5606 $Btu/h\ ft^2\ °F$
Average Refrigerant Two-phase HTC	0 $W/m^2 K$	0 $W/m^2 K$	0 $Btu/h\ ft^2\ °F$
Average Refrigerant Vapor HTC	0 $W/m^2 K$	0 $W/m^2 K$	0 $Btu/h\ ft^2\ °F$

Refrigerant Phase Distribution	Value
Percent Coil Liquid	100 %
Percent Coil Two Phase	0 %
Percent Coil Vapor	0 %

Heat Exchanger Material	Value	SI Units	English Units
Fin Material Volume	0.0145 m^3	0.0145 m^3	0.512 ft^3
Tube Material Volume	0.0039 m^3	0.0039 m^3	0.1377 ft^3
Fin Material Mass	39.1462 kg	39.1462 kg	86.3025 lbm
Tube Material Mass	34.7053 kg	34.7053 kg	76.5121 lbm

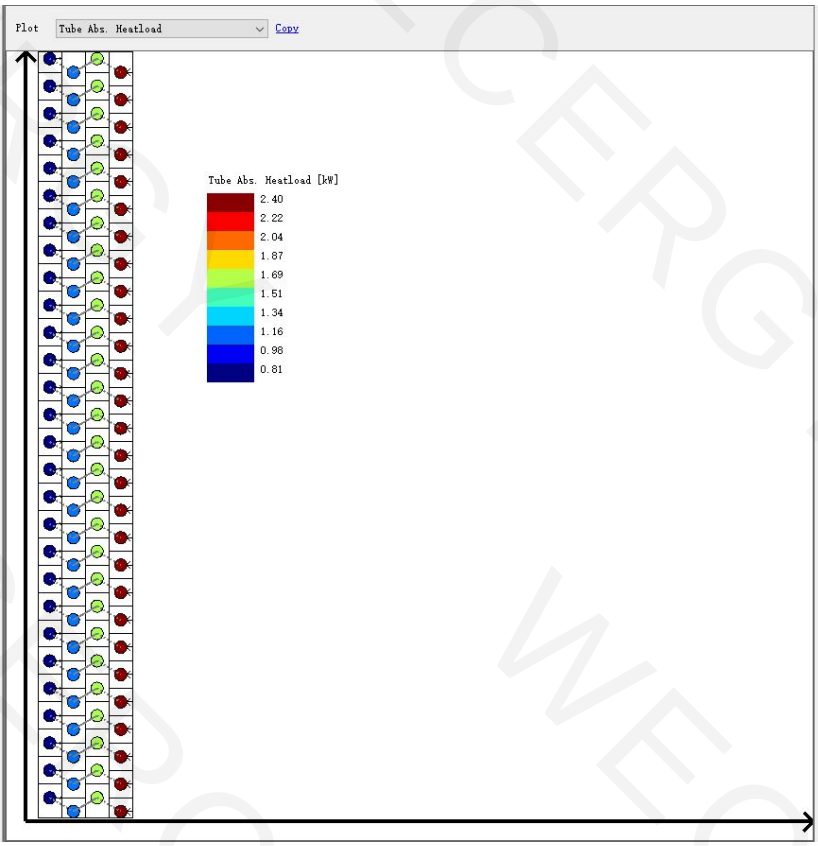
Heat Exchanger Dimensions	Value	SI Units	English Units
Coil Length	1430 mm	1.43 m	4.6916 ft
Coil Depth	132 mm	0.132 m	0.4331 ft
Coil Height	1066.8 mm	1.0668 m	3.5 ft

Iteration Info	Value
Time Required	0.17 [s]
Iterations	9

Tube	Mass Flow Rate[kg/s]	Sensible Heat Load [kW]	Latent Heat Load [kW]	Total Heat Load [kW]	Avg. HTC [W/m² K]	Avg. Re	Refrigerant Mass Flux [kg/m².s]	Tube Condensate [kg/s]
Tube 1	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 2	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 3	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 4	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 5	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 6	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 7	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 8	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 9	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 10	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 11	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 12	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 13	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 14	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 15	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 16	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 17	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 18	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 19	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 20	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 21	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 22	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 23	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 24	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 25	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 26	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 27	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 28	0.02295	-0.8055	0	-0.8055	884.1934	2497.8	129.8704	0
Tube 29	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 30	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 31	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0

Tube	Mass Flow Rate[kg/s]	Sensible Heat Load [kW]	Latent Heat Load [kW]	Total Heat Load [kW]	Avg. HTC [W/m² K]	Avg. Re	Refrigerant Mass Flux [kg/m².s]	Tube Condensate [kg/s]
Tube 32	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 33	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 34	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 35	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 36	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 37	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 38	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 39	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 40	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 41	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 42	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 43	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 44	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 45	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 46	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 47	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 48	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 49	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 50	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 51	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 52	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 53	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 54	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 55	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 56	0.02295	-1.1849	0	-1.1849	1061.3479	3078.4	129.8704	0
Tube 57	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 58	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 59	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 60	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 61	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 62	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 63	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 64	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 65	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 66	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 67	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 68	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 69	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 70	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 71	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 72	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 73	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 74	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 75	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 76	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 77	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 78	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 79	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 80	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 81	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 82	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 83	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 84	0.02295	-1.6703	0	-1.6703	1195.0786	3969.6	129.8704	0
Tube 85	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 86	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 87	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 88	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 89	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 90	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 91	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0

Tube	Mass Flow Rate[kg/s]	Sensible Heat Load [kW]	Latent Heat Load [kW]	Total Heat Load [kW]	Avg. HTC [W/m² K]	Avg. Re	Refrigerant Mass Flux [kg/m².s]	Tube Condensate [kg/s]
Tube 92	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 93	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 94	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 95	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 96	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 97	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 98	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 99	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 100	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 101	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 102	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 103	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 104	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 105	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 106	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 107	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 108	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 109	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 110	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 111	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0
Tube 112	0.02295	-2.3985	0	-2.3985	1369.2463	5349	129.8704	0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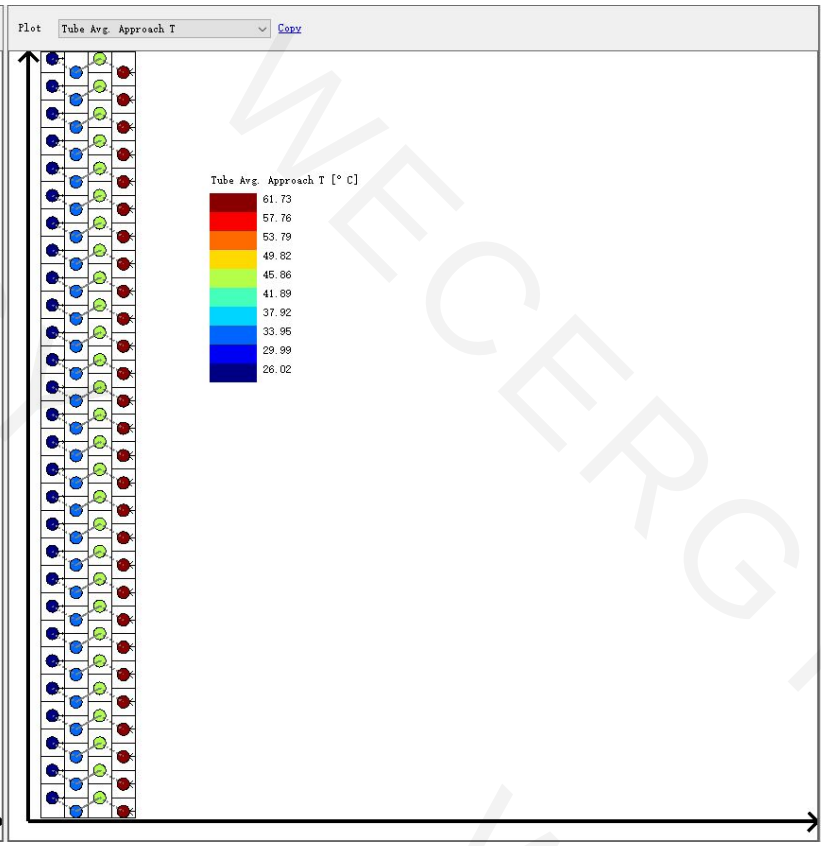
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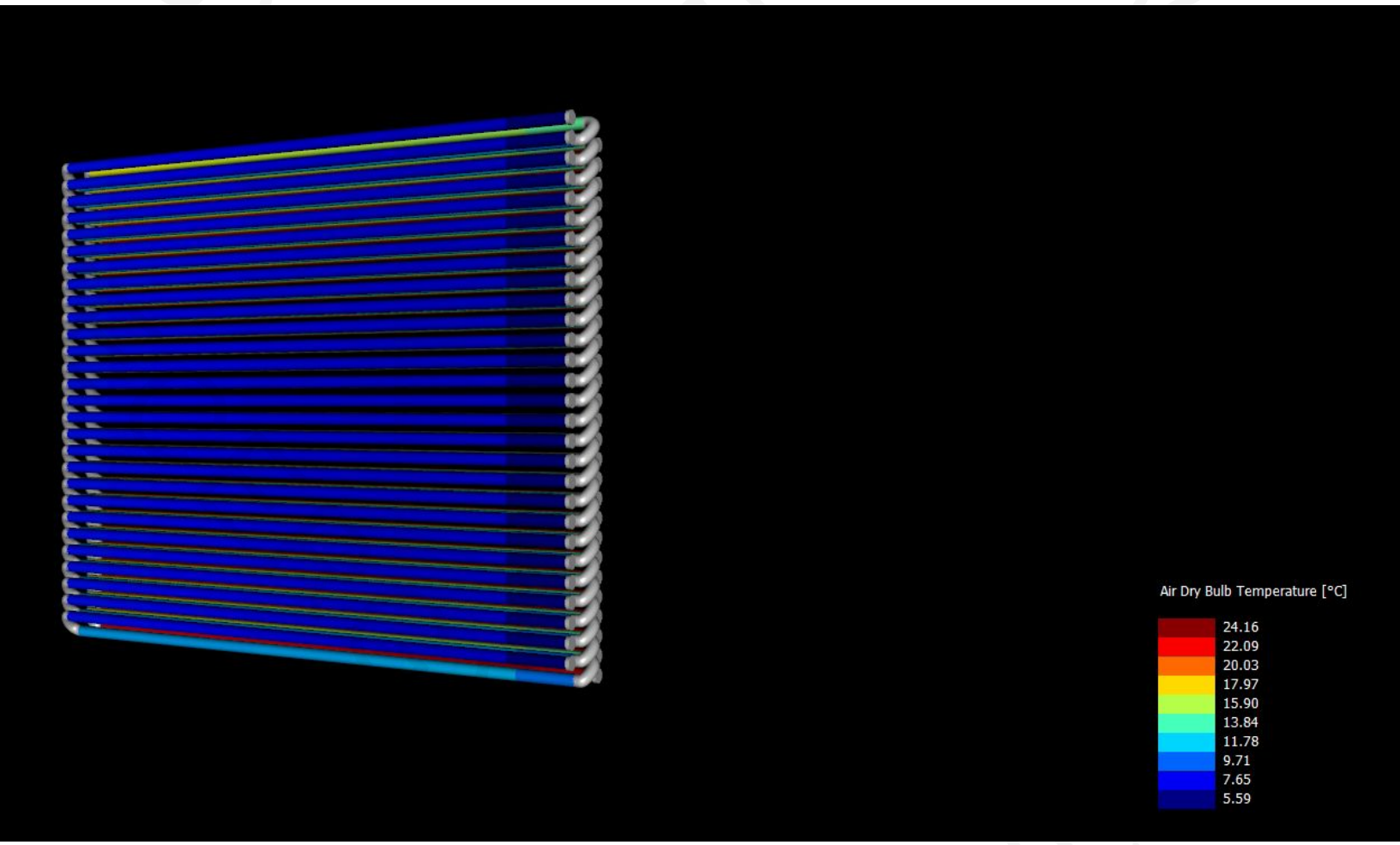
Air Dry Bulb Temperature [°C]
24.16
22.09
20.03
17.97
15.90
13.84
11.78
9.71
7.65
5.59

Tube Parameters		Material:Cu
Tubes Per Row (Normal to Air Flow)	28	
Number Tube Rows/Banks (In the direction of Air Flow)	4	
Number of Segments	10	
Tube Configuration	Staggered Convergent	
Tube Length	1430	mm
Tube Inner Diameter	15	mm
Tube Outer Diameter	16	mm
Tube Thickness	0.5	mm
Tube Horizontal Spacing	33	mm
Tube Vertical Spacing	38.1	mm
Fin Parameters		Material:Al
Fin Type	Plate Fin	
Fins Per Inch	10.16	
Fin Spacing	2.5	mm
Fin Thickness	0.18	mm