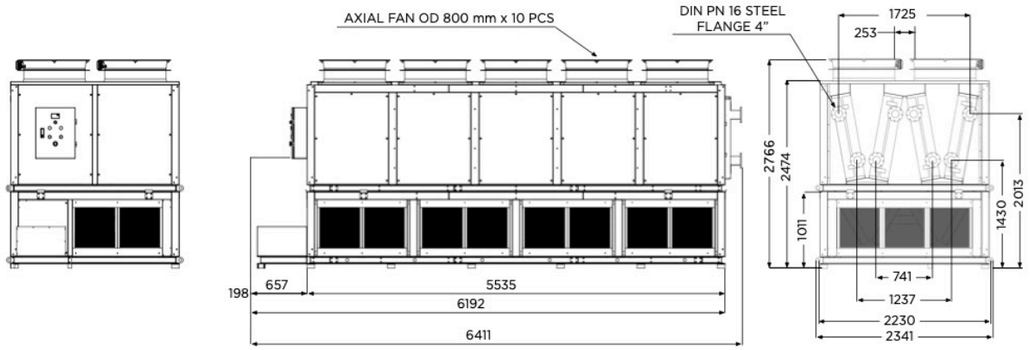
CLOSED LOOP ADIABATIC LIQUID COOLING

SAVE-Cool ™
CCUSC-150

C.I. Group
Public Company Limited

SAVE-Cool™ CCUSC-150



Model Save Cool ™	FAN pcs	Capacity * Heat reject kW	Total Fan Power kW	Water flow LPM	Dimension mm	Weight ** kg	Power V
CCUSC-150	10	527.5	19	600	W 2230 L 6411 H 2766	4800	380 / 50 Hz

Note:

- Adiabatic Exchange Surface 2,000 m2
- Coil Whish D-Coat UV (optional) Prevent Coil From Environment , Corrosion , UV Solar , Humidity
- Nominal Capacity Range shown at 10°F TD water Inlet temp 100 F / Outlet Temp 90 F
- Coil 4 PCS : Tube copper 5/8" , 4 Row , 12FPI , 0.150 mm AL fin thickness
- Adiabatic capacity: The adiabatic cooling effect and resulting depressed dry bulb entering the coil
- Dimensions can change
- Water flow 600 LPM

Coil Selection

Unilab Coils 8.0 ev - build 201112|P

C.I. GROUP PUBLIC COMPANY LIMITED

Head Office:
1/1 Moo 7 Bangkoowad Road, Bangkoowad,
Amphoe Muang Pathumthani 12000 Thailand

Telephone: (66) 0-92-463-2366, (66) 0-2976-5299
Fax : (66) 0-2976-5023
E-mail: cigcare@blusolutions.com

Customer:
To the k. a. of Your Reference

Date: 20/07/2020
Our Offer: Adiabatic Coil
Description: 42"x5334mmx4R_12FPI

HEATING COIL - 0-5/8" 1.5"x1.3" 28T 4NR 5334A 2.11P 28NC

Geometry	0-5/8" 1.5"x1.3"	Coil Length	5534	mm	Nr. of baffles	0
Nr of Tubes per Row	28	Fin Pitch	2.11	mm		
Nr of Rows	4	Nr of Circuits	28			

Capacity	40,198	ton(ref.)
Exchange Surface	629.68	m2
DTML	4.9	°C
Fins Material / Tubes Material	Aluminium / Copper	

AIR SIDE

Atmospheric Pressure / Altitude	1.01 / 0.00	barA/m
Volumetric Air Flow	58382.6	m3/h
Mass Air Flow	66910	kg/h
Face Velocity on the Coil	2.85	m/s
Inlet Air Temperature	30.0	°C
Inlet Air Relative Humidity	98.00	%
Outlet Air Temperature	37.2	°C
Outlet Air Relative Humidity	65.44	%
Pressure Drop	110	Pa

FLUID SIDE

Fluid	WATER (1 bar A)	
Volumetric Fluid Flow	2.5	l/s
Mass Fluid Flow	8930	kg/h
Fluid Velocity	0.50	m/s
Inlet Fluid Temperature	46.0	°C
Outlet Fluid Temperature	32.4	°C
Pressure Drop	7.857935	kPa
Tubes Material	Copper	

Note:
- Capacity40tonfor1coil (40tonx4coil=160Ton)
- Watervolumetricflow2.5l/sx60=150LPMfor1coil(150LPMx4coil=600LPM)

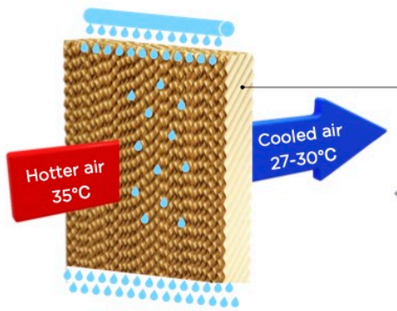
Adiabatic Cooling System

How does an adiabatic cooler work?

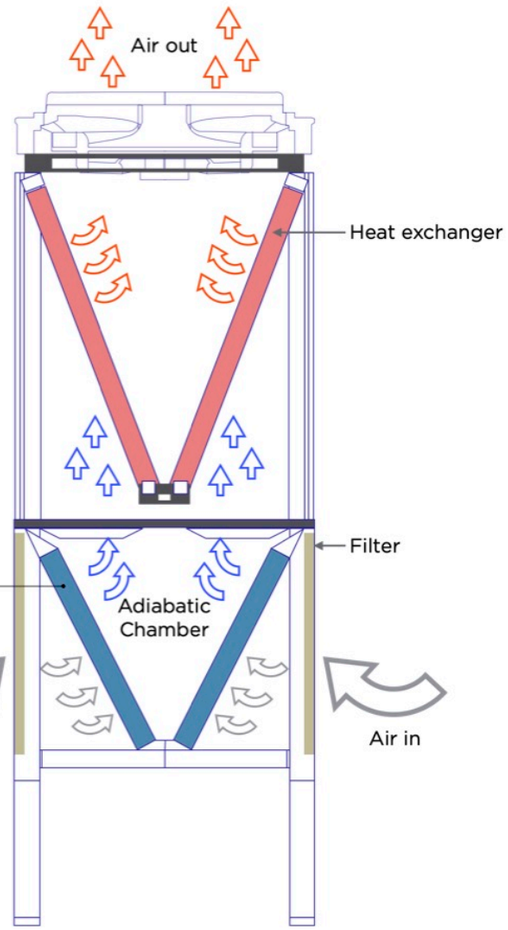
As soon as the temperature of the ambient air becomes too high, this will appliance will automatically switch over to wet mode and make additional use of the cooling effect of evaporating water to significantly lower the temperature of the air drawn in.

As result, the liquid to be cooled can be cooled to a lower temperature than the dry temperature of the ambient air.

An evaporative cooler it use fan that draws warm air through water-moistened pads. As the water in the pads evaporates, the air is chilled before pass to coil heat exchanger.



In the chamber: water high pressure sprayed through nozzles create a fine mist of water apply to adiabatic system.



Reduced Water Consumption

Compared to traditional evaporative systems (cooling tower), the "**SAVE-Cool**™" will either eliminate or dramatically reduce water consumption. Adiabatic mode only use water when the ambient conditions and load require it. Reducing water consumption also reduces the ongoing expenses related with the cooling equipment such as purchasing, treating, and disposing of water.

Reduced Maintenance

Corrosion, and water born bacteria concerns are minimized or eliminated with dry and adiabatic cooling equipment. The **SAVE-Cool**™ Series reduces the maintenance traditionally associated with fully evaporative systems.

The **SAVE-Cool**™ cooling is designed as sprayed through nozzles create a fine mist of water system, which further reduces the time required for maintenance. Additionally, the adiabatic pads filter the air before reaching the coil, limiting the exposure of dirt and debris to the tube and fin heat transfer surface.

Intelligent control system
(Option)

When used in conjunction with **ARII** intelligent controller system and monitoring data real time on web cloud. we can save water conservation is maximized.

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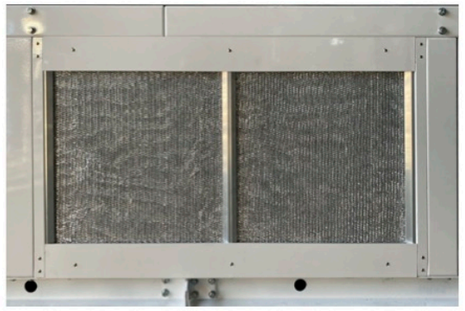
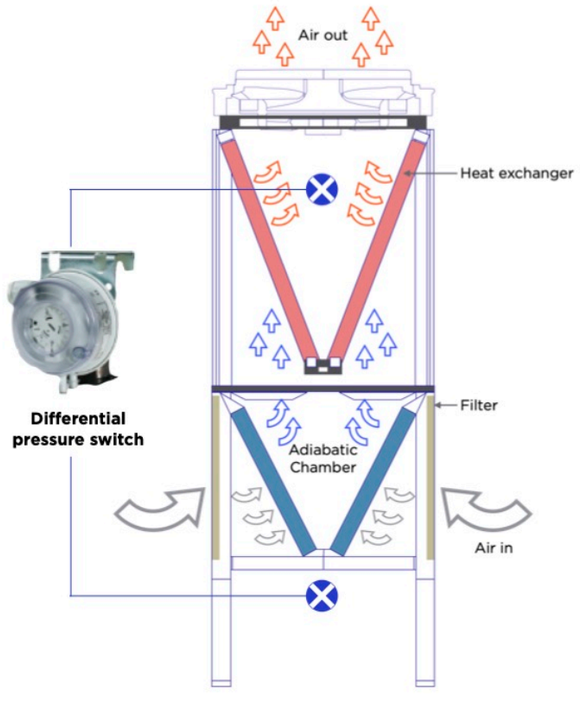
Dust filter

The dust filter will protect dust and various objects of air before entering the adiabatic system. Prevent the occurrence of mud on surface adiabatic and easy to clean. Extend long life of adiabatic system.



Differential-pressure-switch



Differential pressure switch is an electro-mechanical device which is used for sensing a difference in pressure between two points.

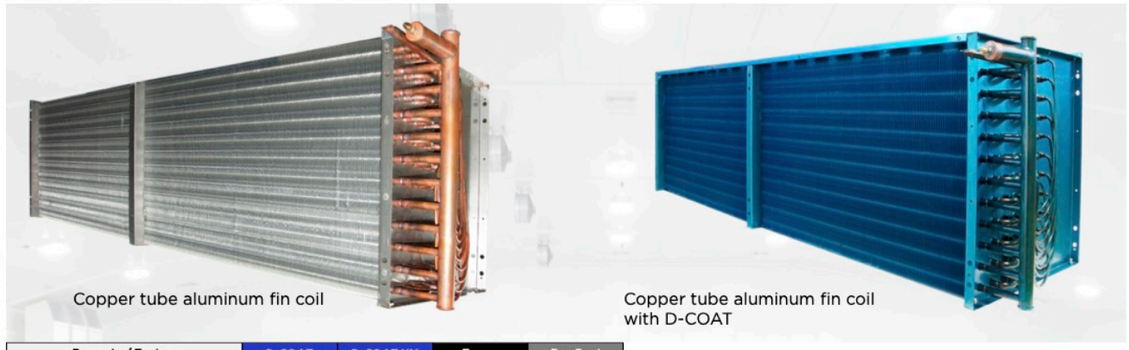
- When connected to two pressure sources, the differential pressure switch can be used as an alarm to make or break a circuit as the pressure rises or falls beyond the preset value. The internal diaphragm within the differential pressure switch deflects under pressure to make the contact to alarm signal

- Monitoring air filters for blockages. As the filter clogs or blocks up, the pressure on the high side will rise and once at the activation point, the pressure switch will change state.

Heat exchanger coil

Coil is designed based on maximum utilization of available area Cooling and heating coils are manufactured from 0.013" (0.340mm) wall thickness,1/2",5/8" seamless copper tubes with a minimum of 0.0045" (0.115mm) thickness corrugated type aluminium fins (8, 10 or 12 FPI), bonded to the tubes through mechanical expansion. Coil casing and coil plate shall be fabricated from galvanized steel, as a standard construction.

Steel headers come with threaded male pipe connections (BSPT) and include drain plug and air vent as standard. Standard coils are pressure tested to 350 PSIG (2400 KPa), with a maximum design operating pressure of 380 PSIG (2620 KPa). Capacity, water pressure drop and selection procedure is designed in accordance to ARI Standard 410. Standard design for coil face velocity should be less than 800FPM (4m/s).



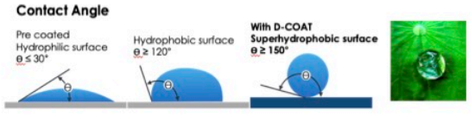
Copper tube aluminum fin coil

Copper tube aluminum fin coil with D-COAT

Property / Feature	D-COAT	D-COAT UV	Epoxy	Pre-Coat
Composition	Water-based		Solvent - based	-
Color	Light blue	Grey	Black	Blue
Gloss Level	Full	Half full	Half full	Half full
Film thickness: Micron (dry film on fin)	6-20		50-100	-
Application method	Total coil immersion		Sprey	-
Coating surface	Hydrophobic		Hydrophobic	Hydrophilic
Corrosion protection: entire coil	✓	✓	x	x
Corrosion resistance test / Salt spray test: ASTMor JIS	+10,000 Hrs ASTM B117		750 Hrs ASTM B117	960 Hrs JIS Z2371
2000 Hrs modified salt spray test: ASTM G85	✓	✓	x	x
Food grade: NSF Standard 51	✓	✓	x	x
Resistance to Fungi: ASTM G21	✓	✓	x	x
Resistance to Bacteria: ASTM G22	✓	✓	x	x
Moist SO2: ASTM G87	✓	✓	x	x
UV Protection	✓	✓	x	x
Bending resistance	✓	✓✓✓	x	✓
Nano Anti-Microbial	✓	✓	x	x
Reduce dirt and dust consolidation / Reduce maintenance and cleaning cycle	✓	✓	x	x
Maintain heat exchange efficiency	Excellent		Poor	Poor
Affect heat exchanger or air flow	Excellent		Poor	Good
Chemical resistance	Excellent		Good	Good
Silicone free	✓	✓	-	-
Paint adhesion test on aluminum fin (Cross cut): ASTM D-3359	5B	5B	4B	5B
Cleaning	Easy		Poor	Poor

D-Coat UV (Option)

- Improved long term cooling capacity of heat exchangers
- Increased life of heat exchange unit
- Increased energy efficiency of heat exchange unit
- Reduced maintenance of heat exchange
- Reduced POWER consumption



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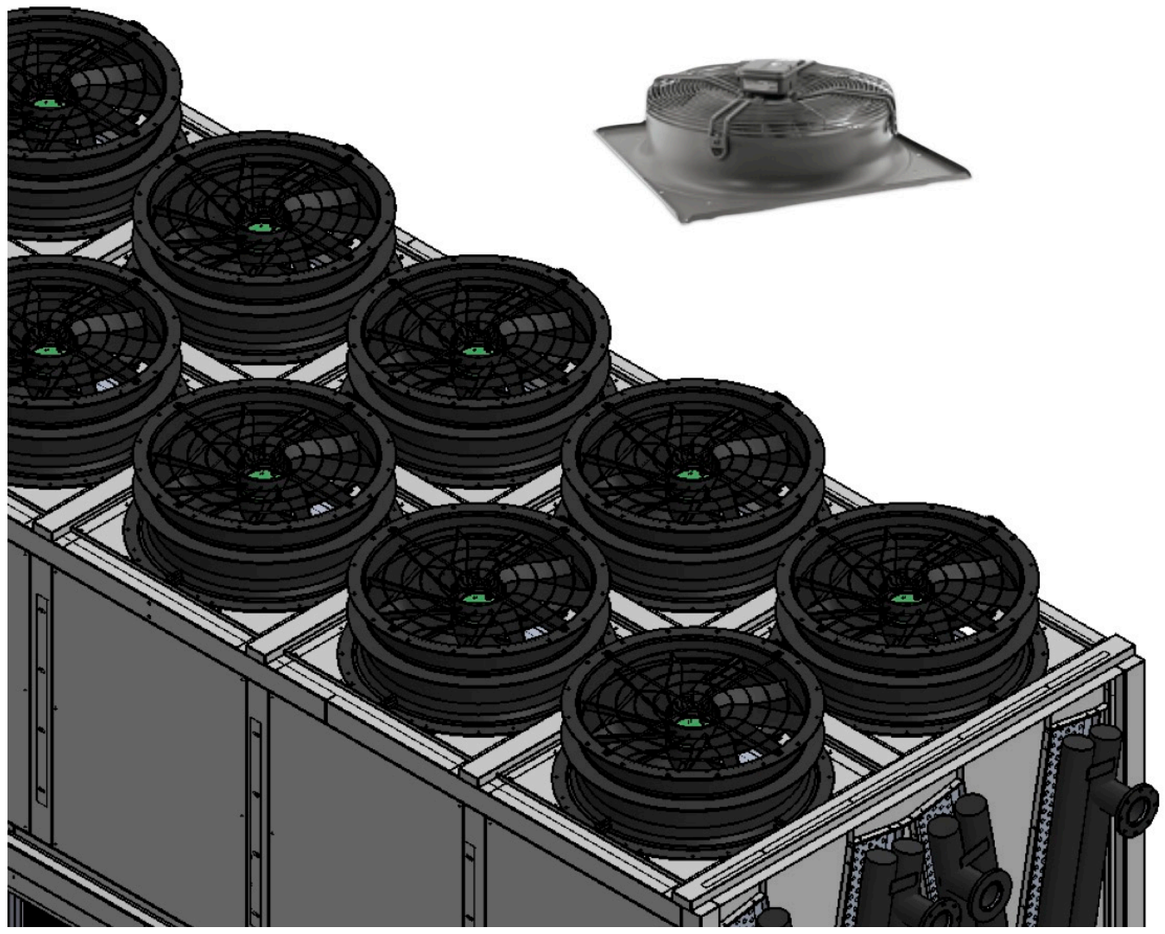
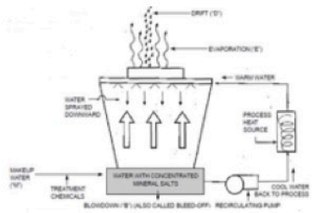
Fan and motor
Germany technology

- motors are the latest development in energy savings and full speed control.
- High efficiency
- Zero maintenance
- High efficiency direct drive - Savings energy
- No corrosion in the casing

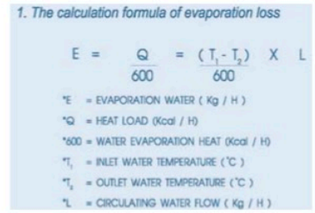


Loss Calculation
Make-up water of cooling tower



The Total Water Loss of Circulating Water is Equal to:

M = E + C + D (B)
M = Make –up water
E = Evaporative Loss



E = Evaporative Loss

E = ((37-32))/600 x 8,930 kg/h

= 74.4 kg/h or 74 LPH

C = Drift Loss

C = 0.3% of Circulating Water

= 27 kg/h or 27 LPH

D (B) = Blow-Down Loss

D (B) = 0.3% of Circulating Water

= 27 kg/h or 27 LPH

Cooling tower
Water Loss = 737,280 liter / year

SAVE-Cool™ CCUSC-150
Water Loss = 400,000 liter / year

Water Save = 337,280 liter / year

The Total Water Loss of Circulating Water is Equal to:

M = E + C + D (B)
= 74 + 27 + 27
= 128 LPH

Operate 16 hr. / Day, 360 Day/ Year
= 128 LPH x 16 hr. x 360 day

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Head Office:
1/1 Moo 7 Bangkoowad Road, Bangkoowad,
Amphoe Muang Pathumthani 12000 Thailand

Telephone: (66) 0-92-463-2366, (66) 0-2976-5299
Fax : (66) 0-2976-5023
E-mail: cigcare@blusolutions.com

www.cigblusolutions.com