



# FLEXCOOLER

Adiabatic Cooling System



**Technology for the Future  
Available Today**



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**Evapco** is a worldwide leader in Cooling Technology. In 2009, Evapco added to its strength by adding **Flex coil** to its family. The acquisition of Flex coil creates a perfect fit and now allows Evapco to offer dry cooling, hybrid cooling and fin coil technology to its product range. Flex coil has a well established reputation as a quality driven manufacturer with diverse capabilities to answer industry needs.

Located in Aabybro Denmark, Flex coil has a newly expanded factory available to visit any-time.



# FLEXCOOLER

Technology for the Future  
Available Today



**The FlexCooler** by **Evapco**, manufactured and sold by **Flex coil**, is a highly engineered adiabatic cooling product designed to permit the most flexible, economical and hygienically safe cooling system available today.

The product allows for cost effective dry cooling during applicable temperatures combined with economic pre-cooling of the entering air to achieve operating temperatures similar to evaporative equipment.

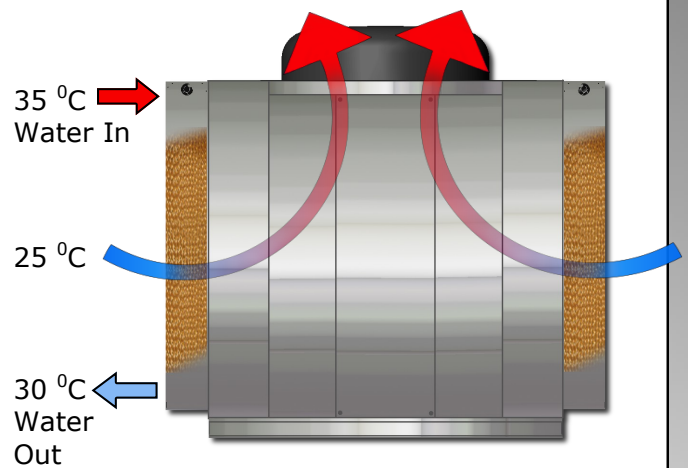
The control sequence is designed to enable the unit to adjust accordingly to achieve the lowest energy and water use as ambient conditions change.

# FlexCooler Principle of Operation

## **Dry Operation:**

During dry mode, EC fan motors adjust speeds to reach the required leaving water set point.

Ambient Air Temp. 25 °C  
 Fluid Entering Temp. 35 °C  
 Fluid Leaving Temp. Set point 30 °C  
 Fan Speed 0-100% as needed

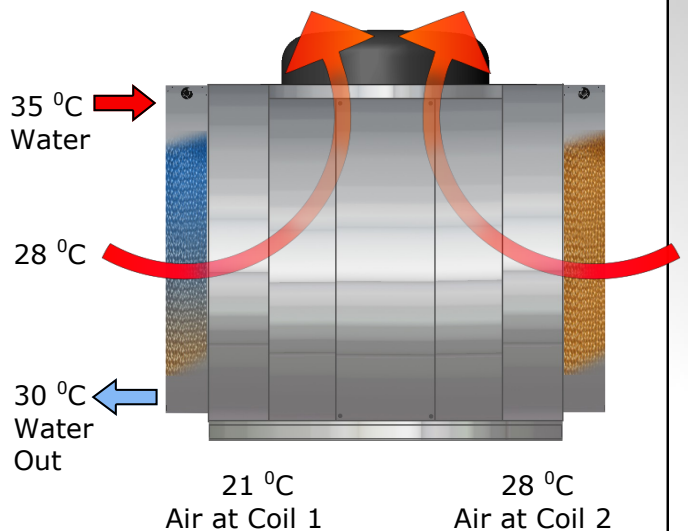


## **Dry Operation**

### **with Adiabatic pre-cooling step 1 :**

The first Adiabatic pre-cooler is energized once all fans reach 100%. Fan speeds are reduced and begin to increase as needed

Ambient air Temp, 28 °C  
 Wet Bulb Temp. 19 °C  
 Fluid Entering Temp. 35 °C  
 Fluid Leaving Temp. set Point 30 °C  
 Fan Speed 0-100% As needed  
 Adiabatic Pre-Cooler Pad 1

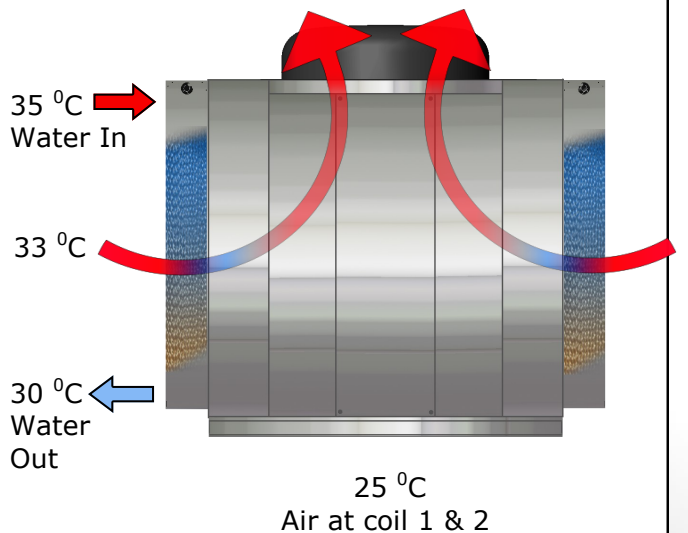


## **Dry Operation**

### **with Adiabatic pre-cooling step 2:**

The second Adiabatic pre-cooler is energized once all fans again reach 100%. Fan speeds are reduced and begin to increase as needed

Ambient air Temp, 33 °C  
 Wet Bulb Temp. 21 °C  
 Fluid Entering Temp. 35 °C  
 Fluid Leaving Temp. Set Point 30 °C  
 Fan Speed 0-100% as needed  
 Adiabatic Pre-Cooler Pad 2





# FLEXCOOLER

## Design Features and Benefits

### EC Motor with Low Sound, High Efficiency Fan as Standard



EC or Electronically Commutated Motors are the latest development in energy savings and speed control. Power input loss is reduced by 1/3 compared with conventional AC motors. The high efficiency wing tip fan operates up to 3 dB less than conventional blade fans with the lowest energy consumption. The motor comes with a standard 3 year warranty



### Factory Programmed Controls



From the factory, your unit is pre-programmed to your design conditions. The controls are specifically designed for the FlexCooler with EC motors. The optional touch pad makes viewing and changing the settings easy for the user



### Large Access Door

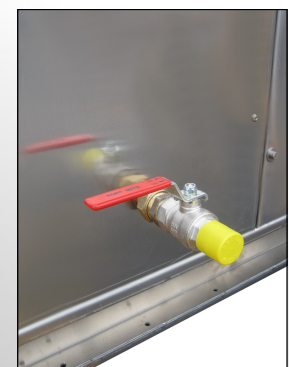


Opposite the control end is a large access door for entry into the coil air plenum. The door allows for visual inspection of the inner coil fins and access to the fan motor if needed. Each cell can be separated by internal divider plates.

### Fully Integrated Electro-Mechanical Valve Body



Water is delivered to the adiabatic pre-cooler by the electro-mechanical valve body. The valve assembly is complete with pre adjusted setter devices to assure correct flow rate. The valve body is integrated into the control sequence and pre wired from the factory.



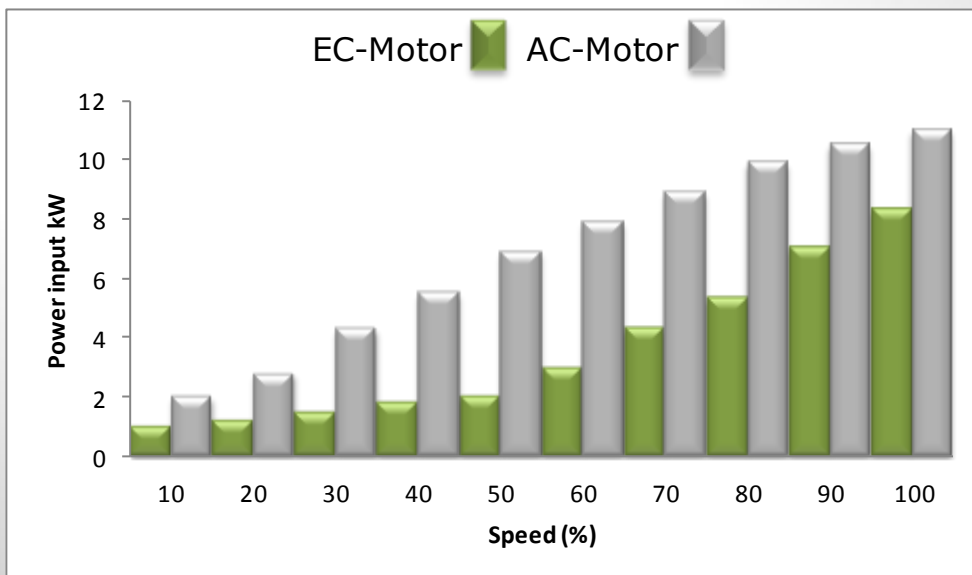


# FLEXCOOLER

## Design Features and Benefits

### Energy Usage

The FlexCooler was designed to answer the growing need to maximize energy and water savings compared to conventional evaporative cooling products. The use of EC fan motors as standard allows for the most efficient arrangement. The motor internally runs as a DC motor, powered via a three phase 400VAC supply. The motor uses voltage transformation internally. The permanent magnet, non rotating stator is extended to host an electronic PCB board which transforms the power from AC to DC. The result is minimum power consumption and better efficiency compared with a standard AC motor. The speed of the motor is 100% controllable with a simple 0-10V DC control signal.

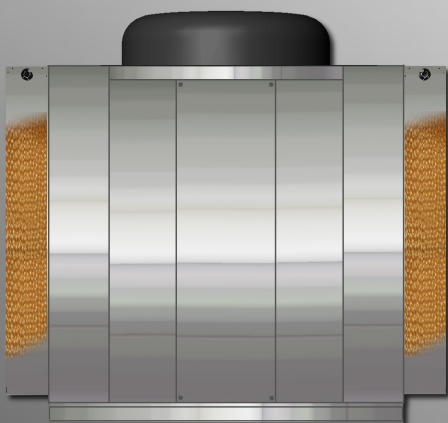


Since the motor does not use brushes, it operates at a lower temperature and has a longer life than standard AC motors. Combined with the wing tip fan, the combination allows for the most energy efficient fan and motor pairing in the industry. For that reason, we offer the FlexCooler with a **standard 3 year motor warranty**. The chart to the left is showing the energy use compared to standard AC motors.

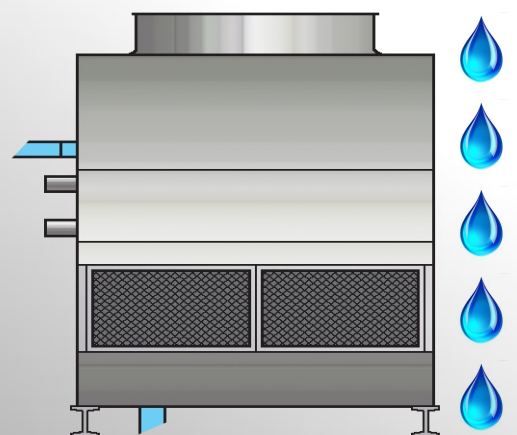
**25-30% Energy Saving - Up to 60% Savings at partial load**

### Water Savings

The FlexCooler incorporates the most intelligent, easy to use control system available today. The controls were developed to limit water consumption and are pre-programmed for your application, at the factory. When compared to a traditional evaporative cooling installation, the FlexCooler will save more than 80% of the water on a yearly basis. Pre-gauged setter devices control the set point. The rate is pre-set to allow saturation of the adiabatic pre-cooler pad and keep the pad rinsed to prevent scale build-up. Excess water is drained to the sewer avoiding any pooling, thus eliminating the risk of micro-biological growth.



**The FlexCooler uses 80% less water than standard evaporative cooling devices**



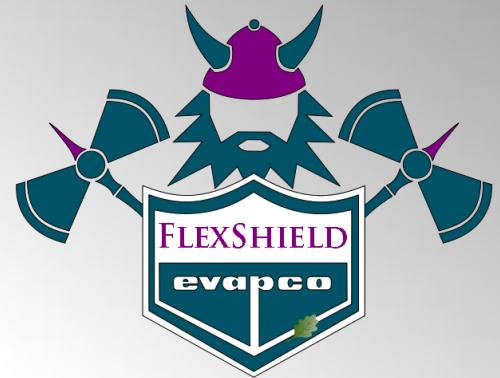


# FLEXCOOLER

## Material and construction features

### **FlexShield CPS**

The FlexShield Corrosion Protection System is offered to allow the design engineer complete flexibility in material selection best suited for the application. The standard FlexCooler is manufactured with Alu-Zinc-185 Casing Panels with Aluminium Magnesium Adiabatic pre-cooler pad frame. Standard Coils are Copper Tube with Aluminum Fins. The Coil-Calc selection program allows the designer to choose the type of material for his specific needs.



# FlexShield CPS \* Material Options



## **Casing and Adiabatic Pre-Cooler Material options**

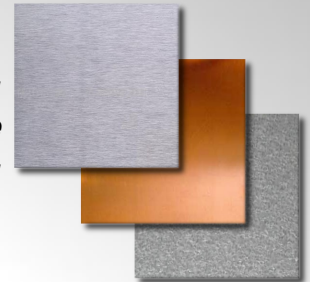
**AlZn -185** -Offers more protection than Z275 Galvanized with epoxy coating.

**AlMg** -Light weight material, provides extra protection above AlZn

**AISI 304** -Good choice for highly corrosive environments.

**AISI 316** -Chosen for more harsh environments.

***The Standard FlexCooler is manufactured with AlZn Casing and AlMg Adiabatic pre-cooler frame. Any combination of the above material options is available that best suit the application.***



## **Coil Tubes and Headers**

**Cu** -Excellent thermal and corrosive properties for most applications.

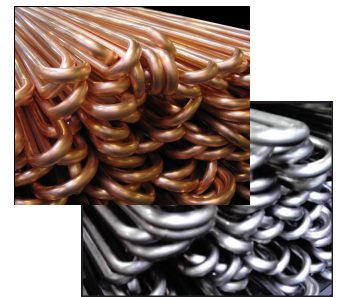
**Al** -Excellent choice for special applications such as deionized water.

**AISI 304** -Choose for severe environment applications.

**AISI 316** -Chosen in food processing or more harsh environments than 304 AISI.

**Titanium** -Very durable and lightweight. Ideal for use with sea water cooling systems where sea water is circulated inside the tubes.

***The Standard FlexCooler is manufactured with Copper Tubes***



## **Fins**

**Al** -Excellent mechanical and thermodynamic properties.

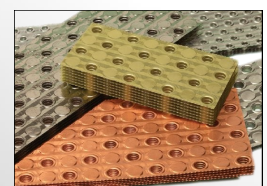
**Cu** -Greater fin heat transfer, but not the most economical solution.

**CuSn** -Offers extra protection over ordinary copper.

**AlMg** -Good corrosion resistance in sea water environments. Perfect substitute for Aluminium with added protection from the magnesium content.

**AlEp** -Better heat conductivity than AlMg and better suited for certain corrosive environments.

***The Standard FlexCooler is manufactured with 0.12mm Al fins***



\*Contact Flex Coil to determine the best material selection based on site and application conditions.

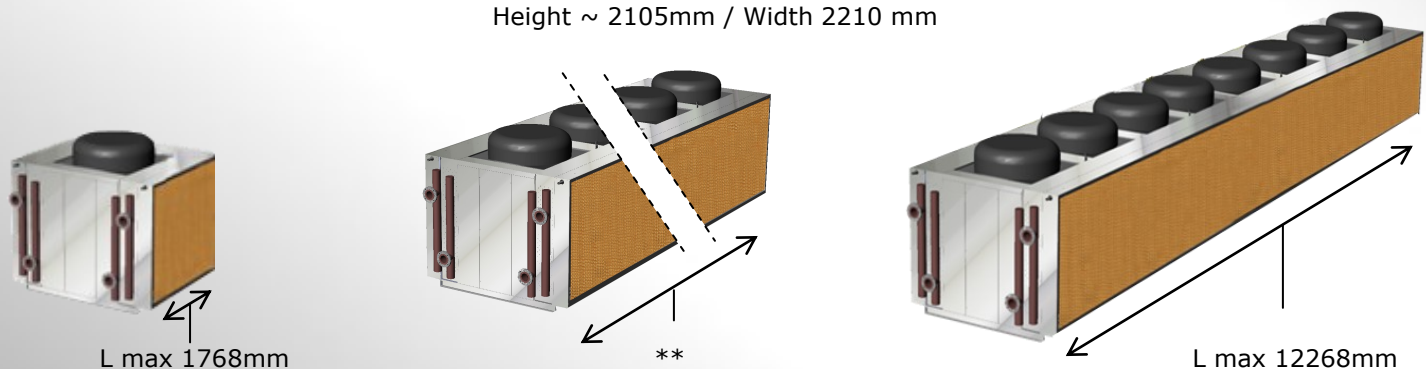


# FLEXCOOLER

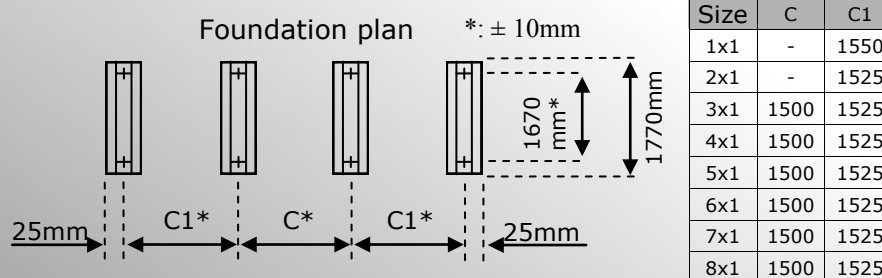
## Engineering Data

Model	# Fans	Nominal Capacity	Air Volume	Surface Area	Noise Level	Coil Volume	Shipping Weight
		kW	m <sup>3</sup> /s	m <sup>2</sup>	dBA	dm <sup>3</sup>	kg
VHC100MLEC-131	1	160	8.58	391	52	72	675
VHC100MLEC-161		180	7.96	782		140	800
VHC100MLEC-231	2	320	17.2	782	55	136	1300
VHC100MLEC-261		355	15.9	1565		252	1550
VHC100MLEC-331	3	495	25.7	1174	57	193	1930
VHC100MLEC-361		530	23.9	2347		366	2300
VHC100MLEC-431	4	645	34.3	1565	58	250	2550
VHC100MLEC-461		710	31.8	3130		487	3050
VHC100MLEC-531	5	825	42.9	1955	59	311	3175
VHC100MLEC-561		890	39.8	3910		590	3800
VHC100MLEC-631	6	910	51.4	2347	60	373	3800
VHC100MLEC-661		1065	47.8	4694		702	4550
VHC100MLEC-731	7	1085	60.1	2737	61	432	4425
VHC100MLEC-761		1240	55.7	5474		814	5300
VHC100MLEC-831	8	1260	68.6	3130	61	490	5050
VHC100MLEC-861		1420	63.6	6260		926	6050

Height ~ 2105mm / Width 2210 mm



\*\* : L max = (# fans x 1500mm ) + 268mm.



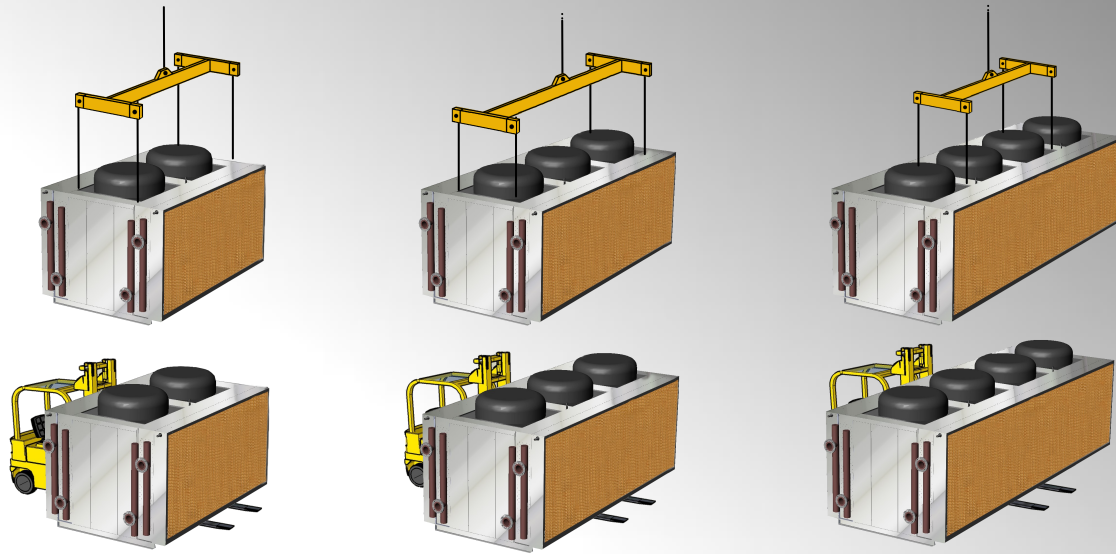
### NOTE:

- Capacity rated with 20% ethylene glycol solution at 40/35°C and ambient 25°C & running at full speed
- Sound data relates to the overall average A weighted sound pressure level L<sub>pA</sub> at 10m (EN13487)
- FlexCooler ships fully assembled
- Multiple FlexCooler products can be interconnected to operate in a Master/Slave arrangement
- Minimum design approach, temp 2.5 K

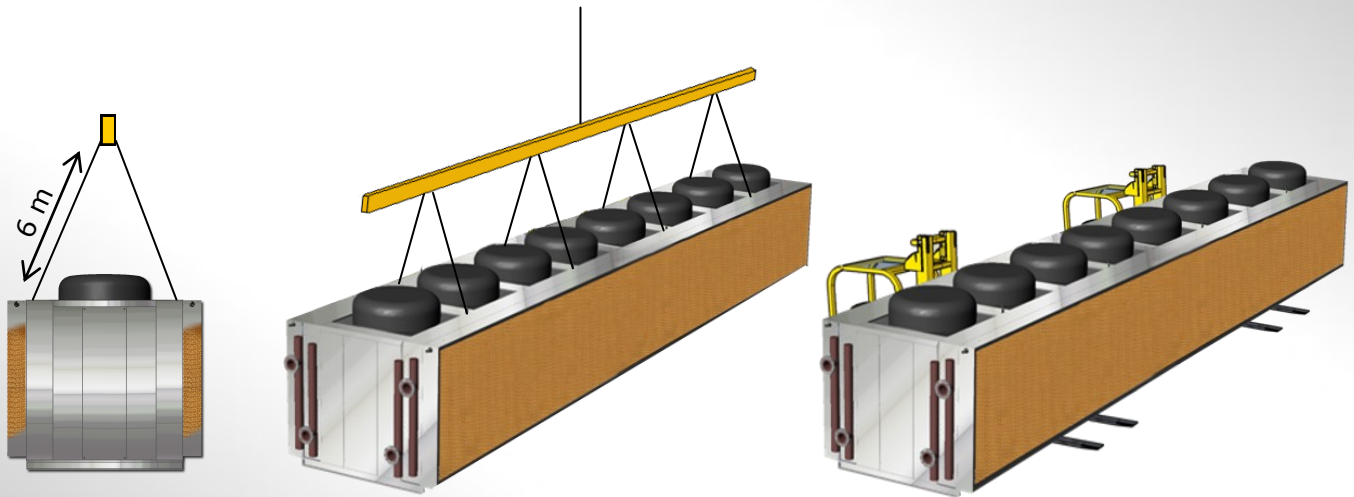


# Recommended Rigging Method

Standard Lifting Devices installed for Crane Lift

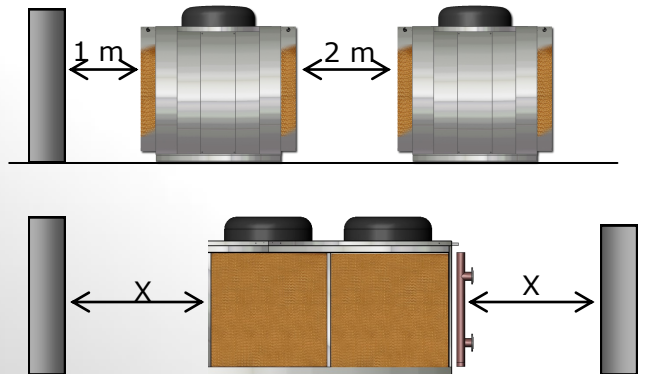


## 5 to 8 fan units



## Layout recommendation

**Note :** Distance based on downward air velocity of 3 m/s. Consult Flex coil for special layout considerations.



Control panel at end	Connection end only	Opposite connection end blank
<b>X = 1 meter</b>	<b>X = 0.6 meter</b>	<b>X = 0.5 meter</b>
Panel can be on either end	As allows by piping	For access if needed

Consult Flex coil for special layout considerations.

# **Specification: Base Unit FlexCooler**

## **Heat Exchanger:**

The finned coil heat exchanger to be manufactured from  $\varnothing$ 15mm seamless copper tubes and 0.12 mm thick Aluminum Fins. The tube and fin combination selected will be chosen in the most optimal geometry to provide peak performance. Fins have fully formed collars to allow consistent fin spacing and maximum surface contact with the expanded tube. Inlet and outlet headers to be seamless copper tubing. Headers supplied with either BSP(m) or loose flange connections plus air vent and drain. Coils are circuited for optimum performance based on the design criteria. Coil frame material to be AlZn

## **Air Delivery**

Air delivery to the pre-cooling pads and coils is accomplished by an integrated, matched fan motor and cowl assembly. The assembly is housed in a coated fan cowl equipped with a coated fan guard. The motors are EC, Electronically Commutated Permanent magnet type to allow for maximum energy savings and long motor life. The motor will have a 3 year warranty as standard. The fan will be an Owllet blade designed for low sound emission. Fans are pre-balanced for vibration free performance.

## **Casing Material**

Casing material of the coil plenum to be C4 compliant AluZn-185 for maximum corrosion protection. A man sized access door for entry into the air plenum to be installed on the end opposite the control panel. Access to all internal components on the control panel end is through a removable access plate. Lifting points for crane rigging provided as standard.

## **Adiabatic Pre-Cooling Section**

Adiabatic pre-cooling section to consist of AlMg frame. Frame bottom to be sloped and fitted with a drain connection. The pre-cooling pad to be specially impregnated cellulose paper sheets to prevent shrinking and deterioration by UV rays, fungus, bacteria and algae. In addition, the pad is totally recyclable. The pad should have a minimum rated saturated efficiency of 80%. The pad is self supporting and mounted into the frame for tight fit. Pads are held in place with a removable support connected to the frame. A distribution pad is located above the cooling pad to assure even coverage during operation. The wetting bar located above the distribution pad delivers the water to the section. The wetting bar is fully accessible and provided with end plugs for cleaning. All water must stay in the pad or pad frame to prevent carryover. Unused water is led to the drain. The system is self draining after each use.

## **Electro-Mechanical Valve Body**

Water is delivered to the adiabatic pre-cooler when the electromechanical valve body is activated. The valve assembly is complete with pre-adjusted setter devices to ensure correct flow rate. The valve body is integrated into the control sequence and pre-wired from the factory.

## **Electrical Controls**

The unit is supplied with pre-programmed factory controls at the specified temperature set points. The control panel will consist of intelligent controls capable of operating in the desired sequence. The panel will control the speed of the EC motors and monitor the leaving water temperature from the coil. Based on the settings, the panel will regulate the motor speed to achieve the desired temperature. When the fans are at 100% speed, the panel will then trigger the adiabatic pre-cooling process. Fans will modulate down at the start of the adiabatic cycle, then increase in speed as needed throughout the cycle. Adiabatic pre-cooling will stop after a set time period and temperatures are met. As an option, each motor will be wired via a factory fitted safety switch. All components are pre-wired from the factory.

## **Specification: FlexCooler Options**

**As part of the FlexShield CPS, the following material options are available.**

### **Heat Exchanger**

Coil tubes can be manufactured from AISI 304 or AISI 316 Stainless Steel, Aluminium or Titanium. Fins can be manufactured from thicker Aluminium up to 0.25 mm, Epoxy Coated Aluminium, 304 or 316 AISI Stainless Steel, Aluminium Magnesium or Copper.

### **Air Delivery**

Fan assemblies available with C5M rated coating for corrosive or harsh environments. Corrodibility classes are listed from C1 (very low protection) to C5-M (Very High-Marine Environment). C5-M is the same corrodibility rating given to AISI 304 Stainless Steel

### **Casing Material**

The air plenum casing is available in Aluminium Magnesium and 304 or 316 AISI Stainless Steel. The casing is available with disposable fork lift channels for fork truck lifting and rigging.

### **Adiabatic Pre-Cooling Section**

The adiabatic pre-cooling section is available in AISI 304 or AISI 316 Stainless Steel.

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## **FlexCooler and Drift**

In traditional water cooling system using a cooling tower or evaporation of water over tubes, drift has to be managed. Drift loss is the amount of water droplets that are carried over with the air stream. The water carried out of the equipment will contain chemicals and eventually bacteria, (Legionella bacteria can be a major concern in public health).

For that reason, the FlexCooler adiabatic cooling device is a much better choice. The FlexCooler has undergone extensive testing by the Danish Technological Institute and has been confirmed to have **no measurable drift loss**.

The Danish Technological Institute (DTI) is a public institution recognized by the European authorities. The test was conducted in accordance with CTI ATC 140 test method which is the industry standard for drift measurement.

DTI develops, applies and disseminates research and technology based knowledge for international business sectors. They participate in projects which are of use to society in close collaboration with leading research and educational institutions around the world. Most importantly, DTI is committed to ensuring that new knowledge and technology can quickly be converted into value in the form of improved products, processes and methods for use in today's world.

The DTI drift test results are available from Flex coil upon request



Danish Technological Institute  
**TEKNOLOGISK**  
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