EcoCooling Evaporative Cooling

EcoCooling Ltd

## Server Room and Data Centre Cooling

Evaporative cooling provides a simple, safe and low cost solution to the cooling of people and processes. This technology can produce up to an amazing 50KW of cooling for every 1.5KW of electricity consumed.

The EcoCooling range of evaporative coolers has been specifically designed to take into account the UK's climate, water quality, and health & safety regulations.

The basic specification of the all plastic ECP cooling units is given below.
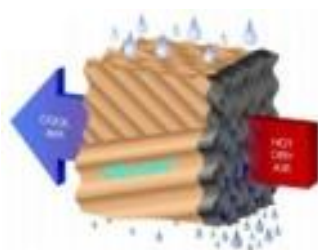
➤ Maximum airflow 14,000 m³/hr
➤ Cooling performance
   DT 9°C @ 30°C 30%RH

➤ Average usage 20 L/hr
➤ Power consumption 1.5 KW single phase
➤ Five speed fan
➤ Cooling or ventilation modes
➤ Warranty
   o Cabinet corrosion 25 yrs
   o Structural components 10 yrs
   o All parts 2 yrs

Why Consider the EcoCooling CREC (Computer Room Evaporative Cooler)

The use of electricity in the IT sector has both financial and environmental significance.

Many data centres consume as much electricity in their cooling systems as in their servers. This has both cost and power availability implications.

It is believed the IT sector has a bigger carbon footprint than air travel and consumes over 5% of the developed world's electricity. Many operators want to reduce their impact on the environment by consuming less energy. An EcoCooling CREC system can reduce your cooling cost by up to 90%, comply with ASHRAE 9.9 and produce PUES of under 1.1.

For more information and our full range of cooling solutions please visit **www.ecocooling.org**

Temperature and humidity

The amount of cooling is dependent upon the temperature and relative humidity of the air. In the UK the maximum theoretical air off temperature is 22C. In practice the actual temperatures achieved using evaporative coolers in UK data centres can approach 24C on the very warmest days. This allows full compliance with ASHRAE temperature standards.

Since the ambient temperature is low for much of the time in the UK it is possible, for no additional operating cost, to cool at the lower end of the ASHRAE standards with 18.5C being a typical set point. This permits a more comfortable environment for operators and also reduces temperature related failures. ASHRAE claims typical temperature failure rates to be over 25% less at 18C compared with 25C.

Experience has shown that it is low temperatures which can cause the greatest problems in a data centre using fresh air systems. The attemperation of air on very cold days is essential to provide a constant flow of air at temperature compliant conditions. Some servers automatically shut down when low temperatures are detected. Correctly controlled ventilation systems can achieve +/- 0.5C temperature accuracy.

Maximum Humidity can be controlled by dynamically changing the air supply set point if this is required.

Installation

EcoCooling CRECs (Computer Room Evaporative Coolers) are installed as part of a ventilation system which is carefully sized to provide a constant flow of fresh air to the IT equipment. During cool periods a patented attemperation system raises the air temperature.

During warm and hot periods evaporative cooling is used to cool the air.

CRECs are normally installed as 35kW, 70kW or 100kW modules. Installations can be phased to reflect the populating of the data centre. Low cost services and control infrastructure can be installed initially to support future expansion. Over 150 Installations have now been completed in the UK with many clients now on their 2nd or 3rd project.

Air Flow

Regardless of the operating standards it must be remembered that IT equipment requires a substantial amount of air to keep it cool. A typical 100kW data centre requires a minimum of 8.5 cubic metres per second – this is over 250 million cubic metres of air per annum! The lowest energy ventilation systems use Electrically Commutated (EC) axial fans. The 100kW data centre can be ventilated using EC fans which consume less than 5kW. This means the system will only add a maximum of 0.05 to the PUE of the data centre. This is a key stage in achieving a PUE of less than 1.1.

Minimising fan speeds greatly reduces energy use. As a rule of thumb a fan running at half speed uses 12.5% of the full speed power. When data centres are partly populated then variable speed EC fans exploit this and energy use is even further improved.

Redundancy

Flow and extraction fans are normally sized so either can support the full flow rate required. This provides a 2N redundancy for the air flow. Conventional redundancy principles are then applied to determine the number of modules.

Filters

EcoCooling have developed a range of installation solutions to provide pre-filtering and G4 standard final filtration.

Should the local air contain a level of particulates requiring higher levels of filtration or gaseous contamination be at a level which could result in corrosion then it is unlikely the use of a fresh air system is appropriate.

Control

There are many aspects to the control of evaporative cooling systems in data centres. Programmable controllers are used to control the evaporative coolers, vary the speed of fans and position dampers. Links to fire systems and refrigeration backup are incorporated into a single control system which has appropriate levels of redundancy. The latest ventilation control systems incorporate network communications

Resilience

All key sensors are duplicated and monitored. Where refrigeration is used as a backup this is automatically enabled in fault conditions. For larger systems a Master and Slave arrangement is used.

Fire Systems

Many data centres employ gas based fire suppression systems. The correct deployment of these requires a room which is effectively sealed and therefore a ventilation system cannot be used during a suppressant release condition. The standard solution to this is to use refrigeration as a back-up. In a fire condition the ventilation system is stopped, dampers close to seal the building and the refrigeration is enabled.

EcoCooling CRECS (Computer Room Evaporative Coolers)

What happens if my data centre is under populated – how will this affect the PUE ?

The CREC system can produce PUE's of less than 1.1 even for partly populated data centres.
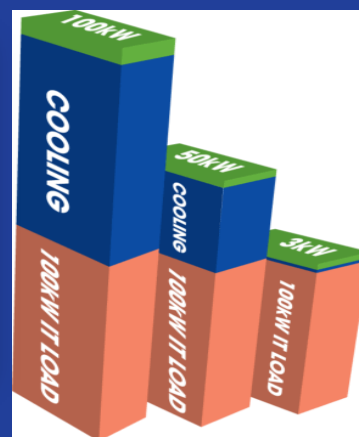
An EcoCooling CREC system can reduce your cooling cost by 95%, comply with ASHRAE 9.9 and produce a PUE of under 1.1.

Main advantages

The key benefits of using EcoCoolers compared with conventional refrigeration based air conditioning are:

Cost

- Over 90% reduction in electricity usage
- Lower capital costs
- Lower maintenance costs
- EcoCoolers qualify for Salix schemes.
- Energy use is typically 3% of installed capacity
- Low cost spare parts holding

Engineering

- Can provide ASHRAE and manufacturing Compliant conditions
- Uses Low energy axial fan technology
- Dynamic control of air supply temperature creates 100% ASHRAE RH Compliance
- No F gas compliance costs
- Simple technology
- Ability to cope with very hot days
- Allows release of available power for other activities

Operational

- Hot and cold aisle arrangements are ideal for EcoCooling systems
- External access for maintenance.
- No internal space used
- Modular system achieves required redundancy
- Simple expansion through modular design

Environmental Benefits

- No refrigerants
- Less than 10% of the carbon footprint of conventional air conditioning
- Can fit into Carbon Reduction Commitment energy reduction scheme.

Legionnaires' disease

Many potential end-users are concerned with Legionnaires' disease. Sophisticated process controls and a low water operating temperature provide a low risk cooler. Full documentation is available to fulfill all requirements of ACOP L8.

The simple controls provide both peace of mind and confidence that all legislative responsibilities have been fulfilled. 2006 saw the first installation of EcoCooling evaporative coolers in a UK hospital at Queens NHS Trust, Burton on Trent.

Energy Consumption

Running Costs for a Single Unit based on an average airflow of 12,000 m³/hr

Utility	Usage and cost per hour		
Electrical consumption	1.5KW	@8p/KWhr	£0.120
Water Consumption (typical average during hot period)	20L	@100p/m³	£0.020
Total Cost per Hour			£0.140
Total Cost per 168 hour continuous working week			**£23.52**

At under 14p per hour to run an EcoCooling evaporative cooler is typically less than 10% of the running cost of a comparable air-conditioning system.

Maintenance

It is recommended that an EcoCooling CREC system should be maintained every 3 months. This will be quoted separately by your installer.

CPD seminars

CPD seminars are available please visit our web site for further details

Warranty

2 years parts only warranty on all components.