Case Study Telecom

Evaporative cooling in Telecommunications Environments

The Freecool-AD cooling solution

AIRSYS

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Abiabatic Cooling
Freecool-AD Case Study

About the Client

The client is a large telecommunications provider headquartered in the UK, and Airsys UK has installed over 1000 Freecool-AD evaporative cooling units for them throughout the UK. This case study helps illustrate the rationale for change and highlights some real-time data from one of these sites in the South of England.

The Goal

Whilst reducing operating costs where possible is incredibly important for any business, energy efficiency is also of paramount importance for our client. As part of their CSR strategy, the client has committed to reduce their carbon footprint by 87% by 2030, and Airsys is proud to help them achieve this. They have already reduced their carbon emissions by 57% since 2016, and have reduced their emissions by 14% in only the last year, in part due to their use of our Freecool-AD adiabatic technology.

Our Solution
2 x Freecool-AD
30kW units

Yearly Savings
- Over £7,088,800
- 47,000 tonnes C02

Replacing Legacy Equipment

Historically, the telecommunications estate was heavily populated with legacy packaged cooling equipment, which were typically fixed speed direct expansion cooling solutions with fresh air cooling capabilities in low ambient conditions.

When considering the age of legacy equipment and the type of cooling technology utilised, the operational cost to ensure the equipment remains in service rises year on year. More importantly, the impact to the environment in terms of global warming potential from the refrigerants used and the carbon footprint via power consumption of inefficient mechanical cooling needed to be addressed. The aim of this joint initiative was to replace the old legacy equipment with direct evaporative cooling technology, in order to reduce both the electrical consumption and substantially reduce the environmental impact. As a result, both the operational expenditure and carbon footprint were greatly reduced, within the telecoms estate.

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Legacy equipment vs Freecool-AD

The legacy equipment was fitted with fixed speed fans and fixed speed compressors, which although technically advanced for their time is considered inefficient by today's standards. By comparison, the Airsys Freecool-AD units feature EC variable speed fans and a small water pump. The Freecool-AD operates as a direct fresh air free cooling system modulating the air flow to maintain the setpoint. As the ambient temperature increases during summer periods, mains water is utilised, recirculating the water through a wetted media to lower the supply air temperature. Control measures are installed to mitigate the risk of bacteria. By installing such a system, the client has seen a significant improvement in energy saving, and therefore has reduced power consumption across the whole estate. This is considerably helping their goal of carbon footprint reduction, and, as a further benefit, the reduction in electrical load for cooling could enable an increase in IT load where required, without additional infrastructure investment.

Technical evidence

For performance management purposes, a number of sites were monitored across the course of 12 months, and the real time kWh and water usage were recorded and compared against the design heat load data.

Example figures from a site in South London:

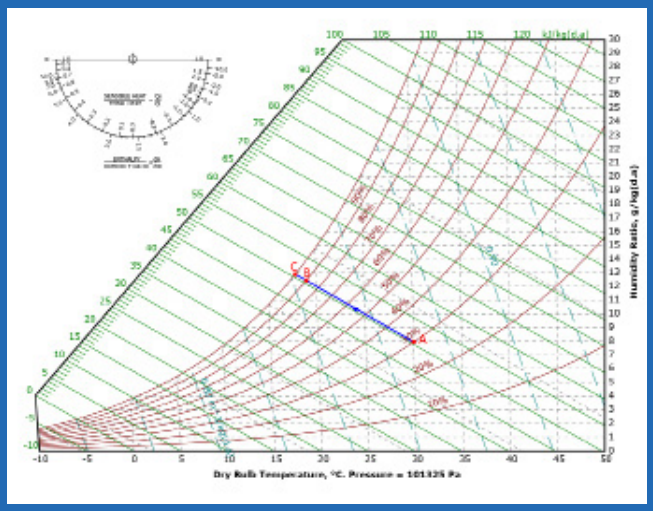
- Total peak heat load – 55.23kW
- Units installed – 2 Airsys Freecool AD units each with a 30kW sensible cooling capacity
- Total absorbed power for a 12 month period – 3,478 kWh
- Water usage for a 12 month period – 57.67 m^3
- Calculated pPUE (including water usage) based on an averaged load of 75% of peak – 1.02

As a comparison, a legacy packaged fresh air and DX cooling unit would be expected to have a pPUE of circa 1.25. For sites with legacy CRAC units, with fixed speed fans and compressors and without free cooling the pPUE would be circa 1.5.

When comparing the Airsys Freecool-AD units, as installed at the South London site, against the existing legacy solution, with a pPUE of 1.25, can mean an effective reduction in energy costs in the region of £8,861 per annum, based on £0.15 per kWh and £3.2 per m3 water. Applying this impressive reduction in energy consumption across the whole telecoms estate where evaporative cooling has replaced legacy equipment, means that our client has been able to realise potential energy savings in excess of £7,088,800 per annum. This equates to a saving in CO2 of around 47,000 tonnes per annum.

Airsys Evaporative Principle

Under normal operation the Airsys Freecool-AD unit draws fresh air from outside and uses this to purge heat from the conditioned space, with hot air being extracted either through a simple pressure relief flap, or via a dedicated extract fan. The cooling is obtained by the difference in dry bulb temperature between the indoor and outdoor air – as long as outdoor air is colder than the design indoor temperature set point then cooling will be available, with the design duty of the Airsys Freecool-AD unit being 100% achieved when the outdoor air is 10°C or more below the room set point. When the outdoor air is above 20°C then the adiabatic function is activated. The unit mounted water pump starts to circulate water through the wetted pad media, and as the warm outdoor air is drawn in (example point A on the psychrometric chart below) so it is adiabatically cooled down the wet bulb line, towards the saturation line (point C, 100%RH). In practice, the air will never be fully saturated by the process and will finish at around 90%RH (point B) where it is discharged into the space. It should be noted that the water is fully absorbed by the air and there is no threat of carry over of water droplets. In addition, the inbuilt controls adjust the fan speed and damper positions, to guard against high/low humidity conditions.



Frequently Asked Questions

How do we prevent Legionella?

The sump water is drained when the temperature reaches 20, to prevent legionella growth. All connected pipework is self-draining, and wetted media are self-cleaning. Water is regularly sampled at site to check minerals, and add a water softener if needed. The unit enters a dry cycle for at least an hour per day to completely dry the wet pads and the sump. The unit also includes alarms for slow draining, high water temperature, pump fail and low evaporation. The leading legionella consult have categorised the Airsys Adiabatic as no risk.

How do we prevent water leakage?

There are two water sumps, the primary sump to circulate water, and the secondary sump to catch an unlikely leak from the primary, including external and internal leak detection. All supply pipework has three layers of pipe with mechanical protection for impact situations, to prevent any leaks.

Unit reliability

The Airsys Adiabatic unit is very resilient, and is manufactured using well-known European components such as Carel, Ziehl Abegg, Danfoss and ABB.

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