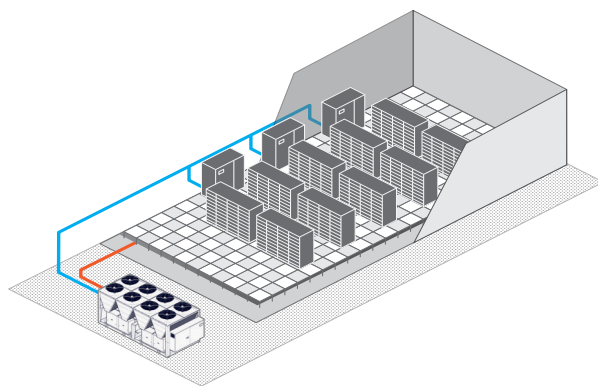




AERMEC DATA CENTRE SOLUTIONS

The complete range of Aermec solutions for data centres

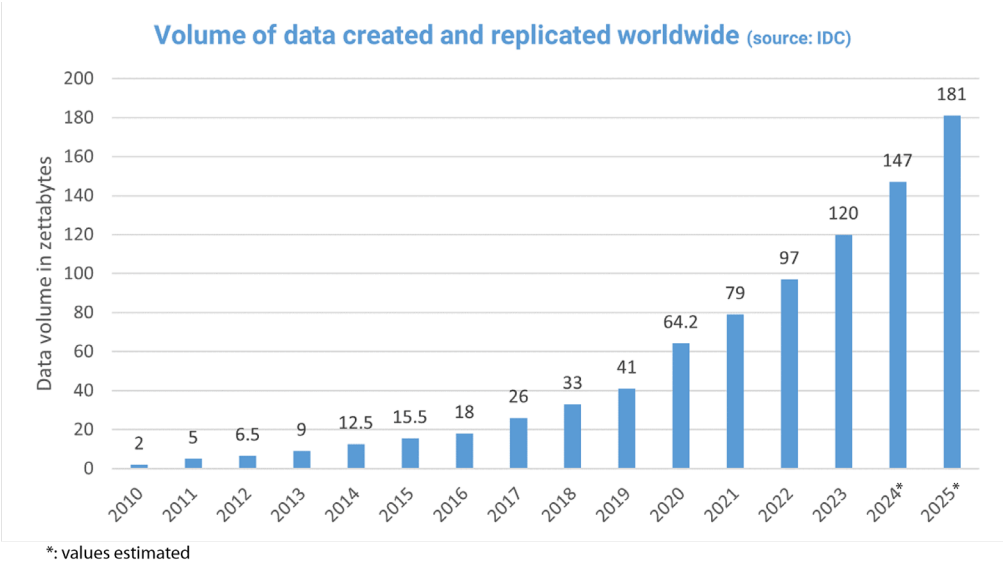
Solutions with excellent energy efficiency designed to ensure strict temperature and humidity control in data centres.



GLOBAL DATA CENTRE IP TRAFFIC WILL TRIPLE WITHIN 5 YEARS

The global IP traffic of data centers is constantly increasing. The total amount of data created, acquired, copied and consumed globally is expected to quick increase, reaching over 180 zettabytes in 2025.

In 2020, the amount of data created and replicated reached a new peak, due to the increased demand during the COVID-19 pandemic. The growth was higher than previously expected, as more people worked and learned from home and used “home entertainment” options more often. All these aspects created the need for a rapid mobilization of cloud computing to cope with the increase in data and pushed all the organizations towards digital transformations.



The huge demand for data recorded by all countries around the world during the pandemic has increased the strategic importance of digital technology and data centers even further. All these factors together lead to forecast that the demand for data centers will increase with a CAGR of 7.5% in the period 2024-2032, with a significant growth of data centers air conditioning systems.

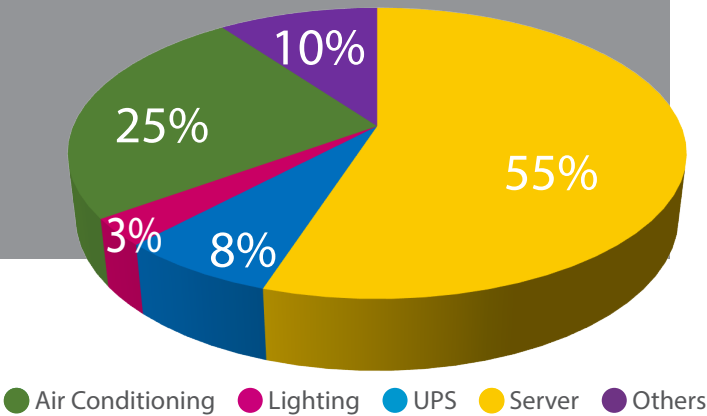
A HIGH ENERGY CONSUMPTION APPLICATION

Data centres represent a high-density building typology, with a consequently very high power density. A data centre requires an average of 10-15 times more energy than a standard office building, at times reaching 40 times. In addition, the field of “Information and Communication Technology (ICT)” is one of the main causes of growth in energy consumptions in Europe. The density of the servers is in fact growing rapidly, and as a consequence so is the power demand of the air conditioning systems dedicated to them.

The air conditioning of a server room represents a significant portion of the total energy consumption of the data centre, representing 25% of the total energy usage of the entire data centre.

It is thus of paramount importance that the air conditioning system applied within data centres achieves the highest efficiencies and lowest energy consumptions. In fact an optimised data centre air conditioning solution represents a significant cost saving and powerful contribution to global carbon footprint reductions.

Distribution of energy consumptions in a data centre

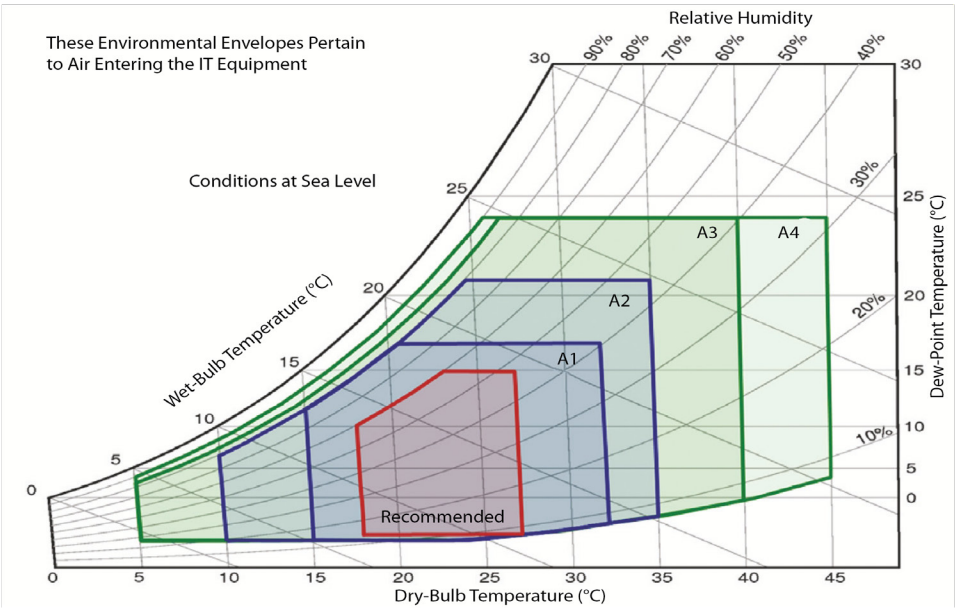


DATA CENTRE COOLING REQUIREMENTS

Data centre cooling systems represent a significant portion of a facility’s capital expenditure and use a substantial amount of energy. ASHRAE (American Society of Heating, Refrigerating, and Air-conditioning Engineers) publishes periodically specific guidelines for temperature and humidity control within data centres.

The last Edition of the Thermal Guidelines for Data Processing Environments defines a recommended operating window and four allowable ranges, designated A1 through A4.

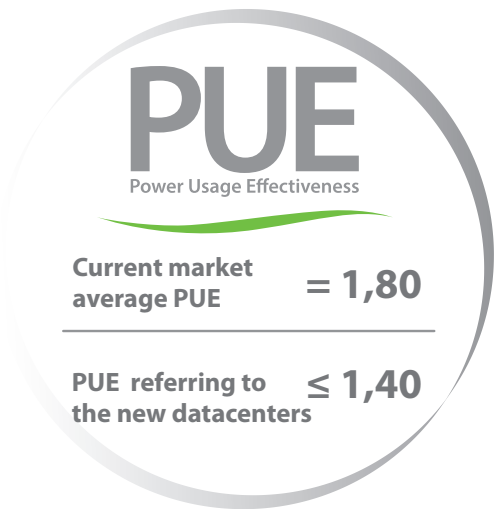
The new allowable ranges (A3 and A4) are intended to remove obstacles to new data centre cooling strategies such as free cooling systems. Free-cooling takes advantage of a facility’s local climate by using outside air to cool IT equipment either directly or via a cooling medium, avoiding the use of mechanical refrigeration whenever possible.



ENERGY EFFICIENCY & PUE LEVELS: A MARKET SURVEY

PUE (Power Usage Effectiveness) is a measure of how efficiently a computer data centre uses energy. Specifically, it measures how much energy is used by the computing equipment (in contrast to cooling and other overheads). It is defined as the ratio of the total amount of energy used by a data centre facility to the energy delivered to the computing equipment. The closer to a PUE of 1,0 the more efficient the data centre.

From an independent market research conducted in 2023 it is estimated that the PUE of the new datacenters have a PUE value between 1.20 and 1.40.



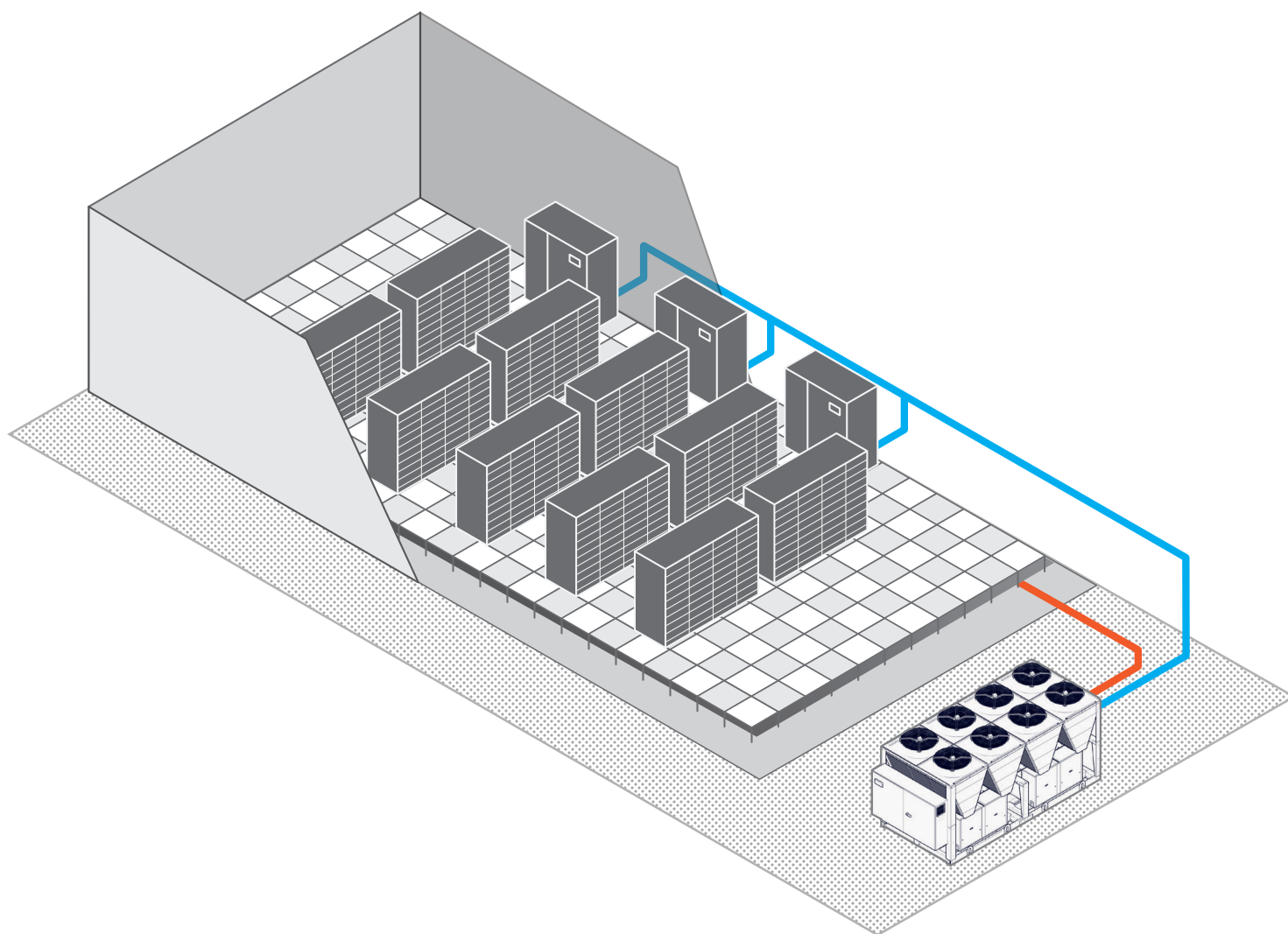
AERMEC: TECHNOLOGY YOU CAN TRUST

Aermec, founded in 1961, counts amongst Europe's longest established Air Conditioning suppliers. A true pioneer, with over 60 years of innovative customer focused solutions, Aermec is present on all continents worldwide and with Subsidiaries and Affiliates in France, Germany, Italy, the Netherlands, Poland, North America and South America, Spain and the UK.

The Aermec Group of companies includes a total of 8 centres of excellence spanning the full air conditioning portfolio, with a turnover in excess of €500m and over 1800 employees. A total of 8 Group manufacturing locations create the advanced product solutions Aermec offers its clientele.

Aermec is well established in the data centre market, with a multiple year experience and prestigious projects aimed at reducing the overall cost of ownership of modern data centres. This process is achieved by applying state-of-the-art product solutions with a strong focus on integrated design and sophisticated analyses of individual data centre customer requirements, with the aim of achieving a personalised and optimised solution for each and every individual installation site.

Product quality is an Aermec hallmark. Premium components are utilised throughout, each unit exiting the Aermec factories undergoes meticulous testing processes, and numerous certifications including Eurovent, MCS, cUL and AHRI testify to Aermec's attention to detail.





Aermec's 2MW testing facilities

2MW TESTING FACILITIES

Aermec's advanced labs extend to 2MW cooling capacity per single unit in what is one of Europe's largest test facilities, which will offer Eurovent certification. Specific labs within Aermec also cater for extreme temperature testing, ventilation and heat exchange measurements, noise level verification and vibration testing.

Aermec furthermore utilizes a simulated data centre installation including both a data hall simulator and an ambient air simulator recreating typical ambient temperature and humidity conditions.

AERMEC & DATA CENTRES

Aermec's experience in data centre cooling technologies spans many years and countless individual projects in more than 17 nations.

Aermec's expert professional project approach, combined with system efficiency and reliability, renders Aermec a natural choice in data centre applications.



**Aermec's main
manufacturing
facilities near
Verona, Italy**



EXPERT SUPPORT AT ALL TIMES

Aermec offers a focused technical support during all stages within the project, accompanying its customers in strategic data centre decisions and providing a full portfolio of services at every stage, including:

- System energy efficiency analysis using innovative energy simulation softwares; Aermec allows customers to evaluate the overall system efficiency in order to obtain the lowest possible PUE.
- Accurate real operation condition witness tests in Aermec's advanced testing laboratories, allowing customers to validate the performance of the units prior to start-up.
- Safety in time: evolved devices supplied with the system allow 24/7 control and supervision of the systems, even remotely, ensuring maximum reliability and peace of mind.
- Aermec service personnel are available at all times for fast and efficient troubleshooting and on-site interventions.

DATA CENTRE DESIGN SOLUTIONS

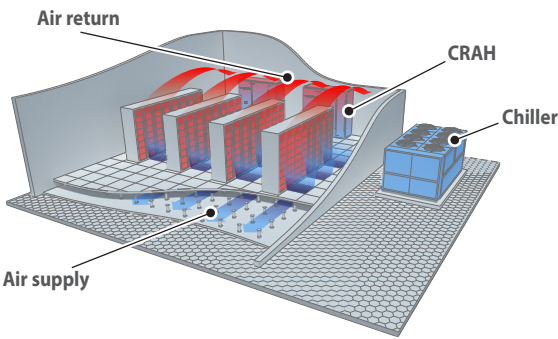
According to the specific data centre characteristics, the geographical and thus ambient conditions in which the data centre is located, and the individual target requirements of the User, differing data centre cooling typologies can be applied.

CHILLED WATER SYSTEMS

Precision Air Conditioners featuring one or more chilled water coils (CRAH), operating in combination with one or more external water chillers. The water chiller can be in standard or free-cooling configuration.

In alternative to the CRAH units, which are generally positioned peripherally to the server rack, In-Rack conditioners can be utilised, which supply air conditioning within the server racks themselves.

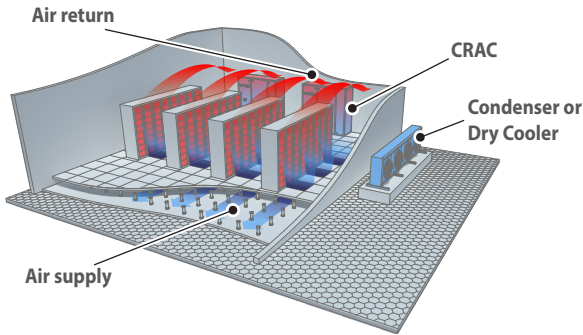
Also fan wall units can be placed inside, fed by one or more water chillers.



DIRECT EXPANSION SYSTEMS

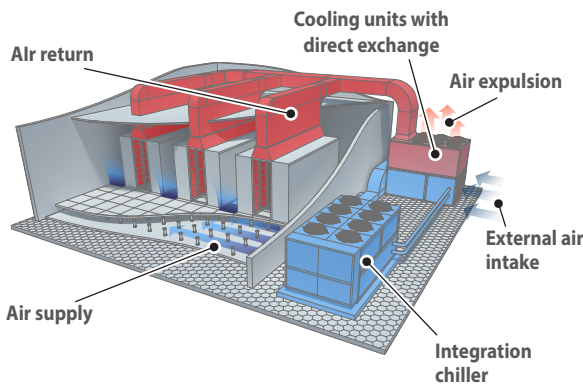
Precision Air Conditioners featuring one or more direct expansion circuits (CRAC), either in air-cooled configuration with external condensers or in water-cooled configuration with external dry coolers.

In alternative to the CRAC units, which are generally positioned peripherally to the server rack, In-Rack conditioners can be utilised, which supply air conditioning within the server racks themselves.



DIRECT COOLING SYSTEMS

Air Handling Units featuring a cooling circuit which introduces cold air directly into the data centre and expels hot air to ambient. Fresh air is mechanically distributed into the data centre via ducting. Direct cooling systems are integrated with filters and may feature additional forms of adiabatic cooling or dehumidification.



DESIGN YOUR OPTIMIZED DATA CENTRE

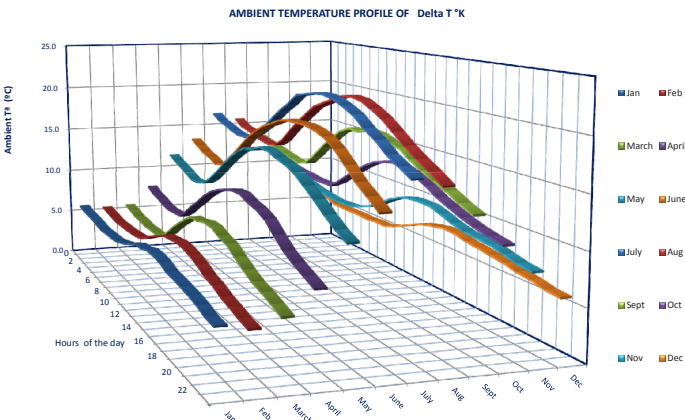
An optimized data centre starts with a clear vision as to overall project objectives; Aermec’s energy simulation softwares support the process by evaluating the performances of different data centre solutions.

In these simulations variable loads and all year round operation are taken into account, evaluating climate profiles and cooling loads. The load demand profile is defined by the specific server requirements, including primary circuit pumping.

These energy analyses calculate the efficiencies of each individual main component and the resulting efficiency of the whole system, taking into account all the factors involved: installation site design, required cooling load, climatic profile, potential renewable energy sources integrations, the available space, the noise performances required, redundancy, maintenance needs and more beyond.

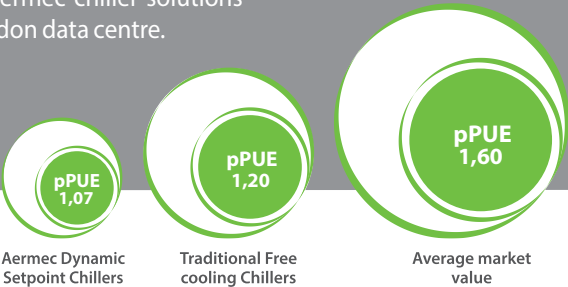
AERMEC energy simulation softwares (ACES and NRGCalc) are able to cross compare the performance of multiple chillers, PAC system, AHU and server control devices, primary and secondary pumping equipment, system lay-out, etc., in order to find the best specific solution available for the customer.

The instantaneous efficiencies of each proposed system are calculated using complex algorithms which account for both differing loads and water and ambient temperatures, maximizing efficiency and chiller cycling whilst accounting for the total Precision Air Conditioner (PAC) load needs at specific ambient temperatures and load levels. All factors causing possible efficiency losses are accounted for, including chiller switching sequences, pump input powers and PAC operation.



ACHIEVING THE LOWEST pPUE

Aermec data centre systems are capable of achieving market leading pPUE levels, offering significant reductions in carbon footprints and energy consumptions. More specifically Aermec chiller solutions applying Dynamic Setpoint can achieve a pPUE down to 1,07 in a London data centre. Traditional free cooling chillers by contrast generally achieve pPUE = 1,20, with the market average being 1,60.



THE AERMEC DATA CENTRE SOLUTIONS

WATER CHILLERS

Aermec water chillers offer a wide range of cooling capacities to meet the needs of small, medium and large data centres. Free-cooling technology exploits the favourable environmental conditions to supply chilled water without the use of mechanical cooling, maximizing efficiencies and energy savings.



BSM (200 - 350 tons)

Chillers with screw compressors with shell & tube heat exchangers
Water produced from 39°F to 64.5°F - Outdoor air temperature -4°F to 115°F
Standards, free cooling and glycol free configurations



TBA (90 - 340 tons)

Chillers with Turbocor compressors featuring magnetic levitation
Shell & tube heat exchangers
Water produced from 41°F to 64.4°F - Outdoor air temperature 14°F to 115°F
Standard and free-cooling configurations



NYG 1000 (80 - 140 tons)

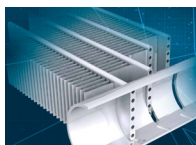
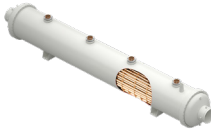
Chillers with scroll compressors, brazed plate heat exchanger, R454B low GWP refrigerant fluid
Water produced from 41°F to 64.4°F - Outdoor air temperature 14°F to 107.6°F
Standard and free-cooling configurations



NYG 500 (30 tons)

Modular chiller with scroll compressors and microchannel coils
Brazed plate heat exchangers
Water produced from 41°F to 64.4°F - Outdoor air temperature 14°F to 107.6°F
Standard and free-cooling configurations

TECHNOLOGY, COMPONENTS AND ADVANCED CONSTRUCTION DETAILS



Double screw stepless and inverter compressors with high SEER and SEPR values and extended operating limits (up to 30°C chilled water outlet)

Optimized Shell&Tubes evaporators for reliable and efficient operation

Shell&Tubes spray evaporator: -50% refrigerant charge

Turbocor centrifugal compressors: max efficiency, low working and starting currents, low noise

Micro-channel coils allow up to 30% reduction in refrigerant charge compared and up to 20% weight to Cu/Al coils

R513A (XP10) and R454B refrigerants available for low GWP requirements

Inverter fans available for higher efficiency seasonal performances

Integrated hydronic kits with various configurations and pumps available: single or double, high or low head, with inverter on demand, and with independent power supply on request.

Electronic expansion valves

FAST RESART: Restoration of 100% power operation in a short time in the event of a power failure.

Scroll compressors: compact and reliable design, high part-load efficiency, low maintenance requirements, and excellent performance across a wide operating range

OTHER DETAILS:

- Differential pressure probe able to report the water flow value to BMS System
- All units are subjected to drying of the hydraulic circuit with nitrogen at the end of the line test
- Digital outputs reporting the status of the main components and the main operation settings

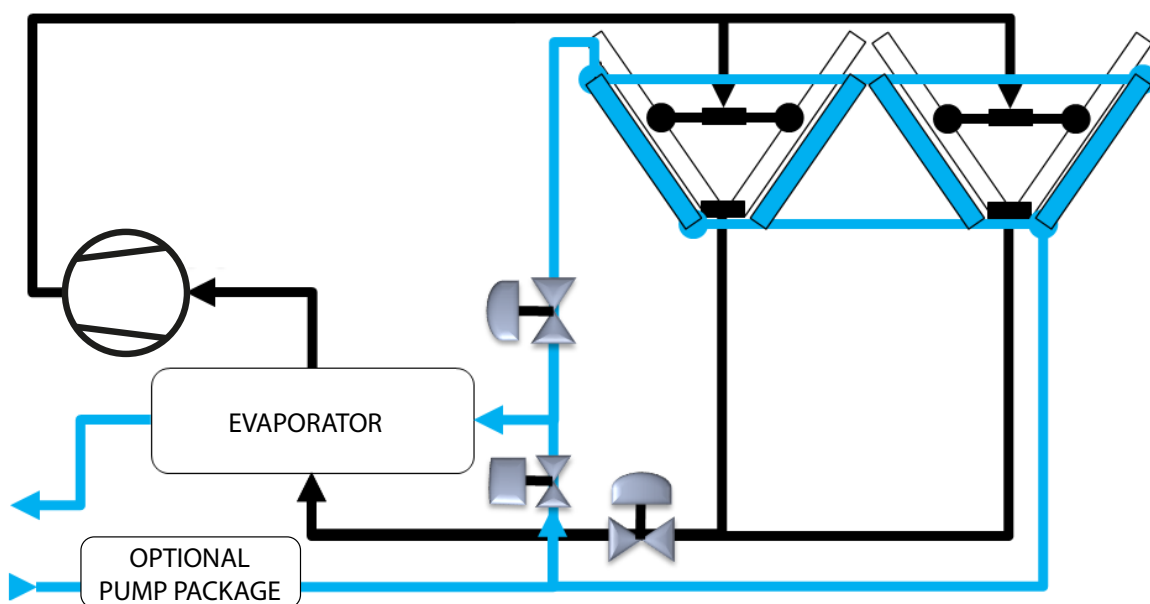
For specific compatibility, refer to the technical documentation or contact us.

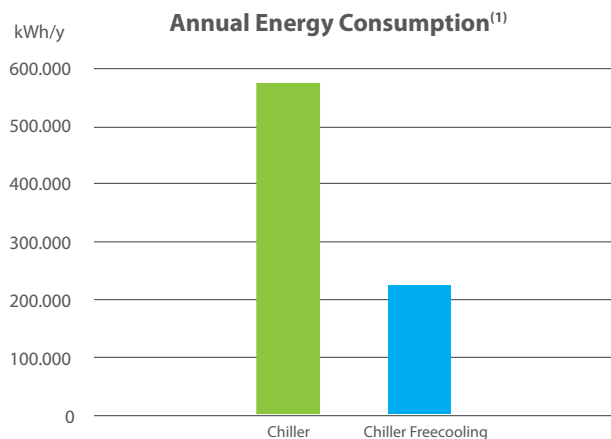
AERMEC CHILLERS ENSURE LOWEST PUE'S

The most evolved free-cooling technologies

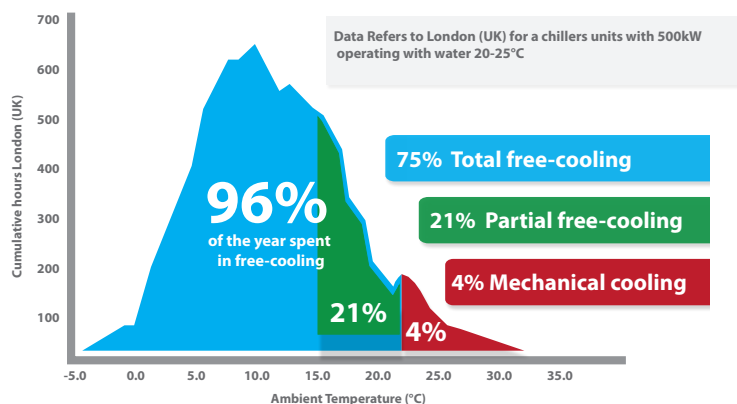
Free-cooling translates into cooling for free, the more this can be exploited the higher the energy savings. Aermec optimises free-cooling, a concept whereby ambient air is used for cooling when the ambient temperature is lower than the data hall air (direct free-cooling) or the chilled water (indirect free-cooling). In hydronic solutions free-cooling starts when external conditions are ~4F below the entering water temperature (EWT). Thanks to the application of modulating free-cooling to maximize the free external source, the percentage of free-cooling increases proportionally in relation to the temperature difference between the internal and external environments, thus notably reducing the contribution of mechanical cooling and maximizing overall system efficiency. Free Cooling is even more effective with high water temperatures, ensuring maximised energy savings in data centers. The ASHRAE standards with the new permitted operating fields make it possible to work within the Data Centre with higher temperatures, so the use of Free Cooling and different cooling technologies compared with the traditional ones becomes even more advantageous.

Free Cooling Hydronic Circuit





⁽¹⁾ The Free Cooling chiller solution is always the most advantageous, maximising the energy savings in both relative (compared with the other solutions) and absolute terms.



The percentage of hours over the year in which the load is met purely by mechanical cooling is minimal: most of the load profile is covered by total Free Cooling.

Dynamic Set Point



The Free Cooling chiller solution can be optimised with the innovative dynamic set-point (DSP), that provides a further 10% reduction in consumption.

Dynamic Set Point (DSP) automatically and continuously optimises chilled water outlet temperatures as ambient and IT loads vary, ensuring the highest amount of free cooling is achieved all year round.

DSP's control algorithm affords maximum efficiency across the widest operating spectrum. By optimising the efficiency characteristics of single compressor, DSP ensures each compressor works at its peak performance (as opposed to systems where each compressor is loaded up once the full load per circuit is reached). Free-cooling is maximised by allowing chilled water outlet temperatures to rise to 30°C using uniquely developed compressors. Furthermore,

specifically redesigned Precision Air Conditioner water coils cater for low load scenarios, overcoming laminar flow issues, with DSP fully exploiting the resilience designed into the system at low load conditions.

DSP noticeably reduces Carbon Footprints whilst allowing flexibility in build programs and load profiles, with a plug and play philosophy allowing modules to be added as and when client IT loads increase. DSP is rapidly proving itself to be the most energy efficient chilled water system available.

Supervision & Connectivity Solutions

Multichiller sequence controlling manages the entire system, evaluating the effective load request to achieve the best overall system efficiency, optimising free-cooling and ensuring tight temperature control. Aermec data

centre solutions can furthermore be easily and fully integrated with BMS and Supervisor systems (LONWORKS, BACNET, MODBUS, etc.) to ensure an optimised and simplified system overview.

CUSTOMIZED EXECUTIONS

AERMEC has always been close to the needs of the designer and the customer and is able to provide special executions and options on request.

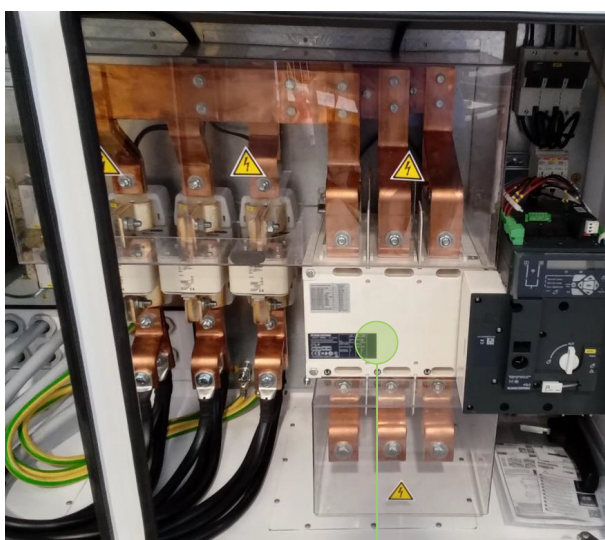
Our Technical Department is able to study and develop solutions that can adapt AERMEC units to severe environment conditions or special applications.

- Special option In-built UPS for minimum time to restart after power failure



Possibility to install inbuilt UPS for control board
Minimum time to restart after
Power failure reduced by: -60 seconds!

- Special option inbuilt ATS (Automatic Transfer Switch) for double power supply



Possibility to install inbuilt ATS Automatic Transfer Switch
for double power supply

- Max efficiency, low working and starting currents, low noise, long therm technology
- Ultracap: by means of ELDC (Electric Double Layer Capacitors) technology this device is able to provide safe valve shut off in case of power failure. Available on BSM and TBA.

