

Aquaflair

Air-cooled chillers and free-cooling chillers with screw or “oil-free” centrifugal compressors equipped with adiabatic system

BREC/F and BCEC/F

350-1350 kW

**Dualism for evolution:
the combination of air with water**



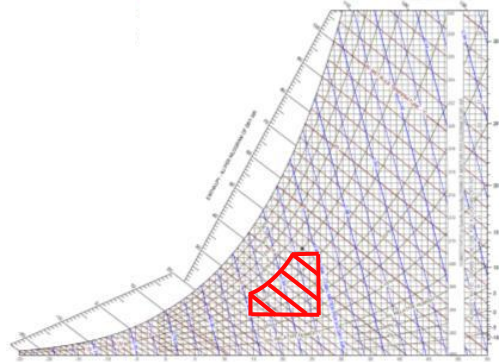
- > Aquaflair™ adiabatic chillers designed to guarantee Total Cost of Ownership (TCO) reduction and complete integration in Tier III and IV mission-critical installations.
- > The “all-in-one” packaged solution, completely tested and ready to install; it includes the latest technologies for efficiency and continuous operation.
- > Optimized and enhanced free-cooling (economization) system to match with the latest cooling datacenter guidelines for maximized efficiency at any latitude.

Guidelines for datacenter cooling

Temperature and water flow rate design

1 ASHRAE Guidelines

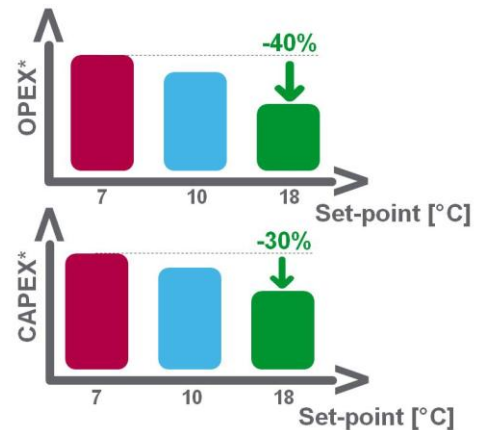
- > ASHRAE guidelines permit to operate with higher operating temperatures in order to maximize system efficiency
- > CRAC/CRAH units need to be designed for discharge temperature and moisture control
- > CRAC/CRAH units need to be optimized according to the recommended water temperature range and a higher delta T



2 An effective route to saving OPEX and CAPEX. High water temperatures:

- > are mandatory to comply with ASHRAE standards
- > improve OPEX since they optimize the cooling circuit and extend economization
- > allow for CAPEX reduction since chillers can be downsized

* Paris climate conditions, constant thermal load 1MW, data refer to chiller only



3 The next frontier – Wide DeltaT Operation

- > This new generation of cooling units allows for the application of optimum theoretical temperatures
- > High water temperatures save both CAPEX and OPEX
- > Adiabatic cooling reduces energy consumption and, combined with wide deltaT, it further improves the total OPEX

What does it mean to shift design *
from 18/24°C → to 18/28°C

OPEX saving

- > Pump power saving: -15%
- > Extended economization: +4°C
- > Less power consumption on fan side: -20%

CAPEX improvement

- > Saving on hydraulic infrastructure
- > Reduced pressure drop up to 70kPa

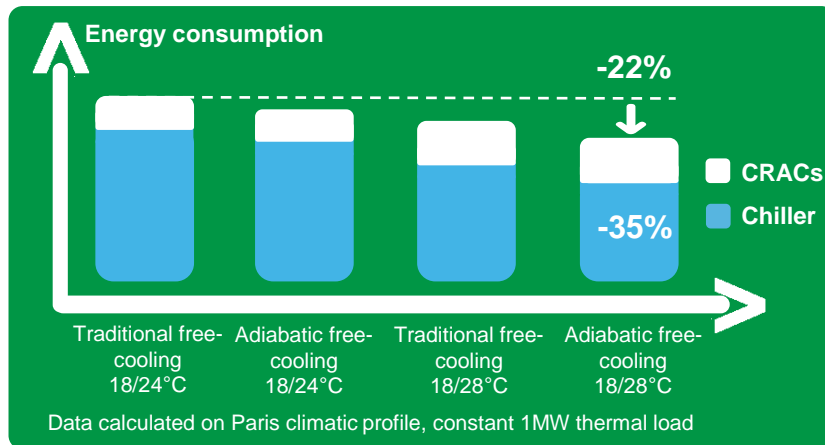
* Site: Paris, Unit: BREF2812A, Unit Capacity: 1000kW, Design water temperature: 18°C

Make your Data centers 'cool'!

Adiabatic system

The system exploits the natural process of water evaporation to shift the average suction condensing and free-cooling coils air temperature to the wet bulb conditions.

As water evaporates, energy is dissipated by the air and temperature is reduced, which means operating conditions are improved and energy efficiency is maximized.



Benefits

- > Improved cooling capacity with lower CAPEX (up to 10% saving)
- > Increased efficiency in summer mode, lower OPEX (10/15%, depending on the climatic zone)
- > Extended economization capability, optimized OPEX (up to 3°C more economization hours)
- > No additional air suction pressure drop

Applications

- > the system is available for large air-cooled and and free-cooling Aquafclair chillers (>300kW)

Installations

- > completely factory fitted, tested and ready to be installed. The system is embedded in the unit footprint and therefore ready for standard ISO container shipping

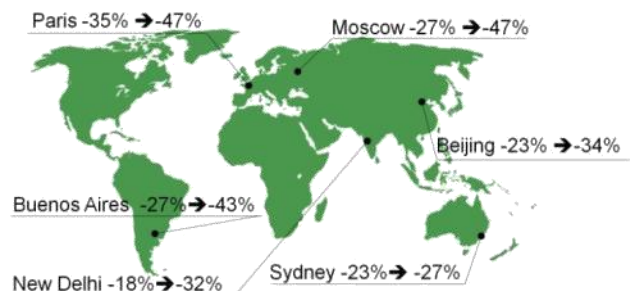
Operation Maintenance

- > the adiabatic system is completely managed by the unit control board
- > maintenance is easy since the unit is completely accessible and limited to some components only

An enhanced solution for economization

Free-cooling chillers can further improve the energy saving with an enhanced free-cooling surface*

- > Free-cooling mode maximization
- > Integration with adiabatic system
- > Factory-fitted and tested solution
- > Footprint improvement, compared to a solution with chillers combined with dry-coolers (-30%)



Data calculated comparing traditional free-cooling units at 18/24°C water temperature with enhanced free-cooling adiabatic chillers at 18/28°C water temperature

*On request, unit dimensions increase

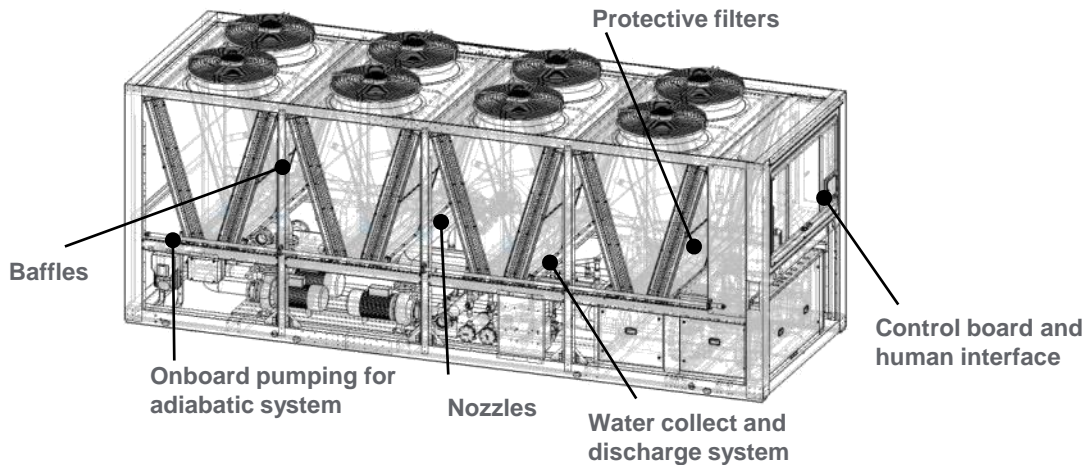
How it's made

Exclusive arrangement

The exclusive Schneider Electric system is designed to improve unit efficiency in any condition without affecting unit operation, footprint, maintenance and reliability

The adiabatic solution on large chillers is based on:

- > **Nozzles:** their position has been defined in order to optimize the drop distribution
- > **Layout:** the "V" shape arrangement for coils and free-cooling coils allows for integrated installation
- > **Protective filter:** prevents non-evaporated water from damaging the internal components and the coils
- > **Embedded control system:** it monitors, controls and optimizes the unit operation, including adiabatic



A comparison with current available systems

- > wet net and spray nozzle system
- > wet medium in front of the heat exchangers
- > nozzle system and pumping station

	Schneider-Electric	Nozzle	Wet media	Wet net + nozzles
Adiabatic effect	● 20µm drop size	●	●	●
Additional pressure drops	● negligible	●	●	●
Easy to install / can be retrofitted	● integrated	●	●	●
Fouling/corrosion on heat exchangers	● cleanable	●	●	●
Water consumption	● 2.5l/h	●	●	●
Operational EXpense	● Up to 10/15% less	●	●	●
Biochemical pollution	● available solution	●	●	●
Maintenance costs	● complete access	●	●	●

Technical details

System description

The system is completely integrated in the unit, managed and controlled by the onboard control system and related sensors.

Units with adiabatic system are fitted with the following additional devices on the standard unit.

Frame

- > The frame is equipped with lateral baffles, finished in epoxy powders (color RAL9022), to contain the adiabatic effect in the event of lateral wind
- > Each condensing coil is protected by a specific filter and equipped with a pan to collect the unevaporated water
- > A discharge water circuit drains unevaporated water to a single connection point

Control board and human interface

- > The unit control board is connected to the adiabatic system to activate the pre-cooling effect on the dry bulb/wet bulb temperature difference. This arrangement activates the system only under suitable outdoor conditions, optimizing water usage
- > The unit is fitted with embedded outdoor temperature and relative humidity probe to continuously monitor the outdoor conditions
- > All the operating parameters are visualized on the unit human interface and transmitted to the BMS, if required

Adiabatic system

The Adiabatic pre-cooling system includes:

- > High pressure pumping station
- > Embedded water filter upstream the pumping station
- > Water distribution systems to each coil
- > Stainless steel nozzles supporting bars
- > Pan to collect the unevaporated water, complete with discharge water circuit
- > Polyurethane coils protection panels
- > Biocide water treatment (or request)

Main maintenance and water quality recommendations

Water provided to the system must have the following characteristics:

Feature	Limit
Conductibility	< 1000 μ S/cm
PH	6.5 ÷ 8.0
Chloride	< 50 ppm
Sulphate	< 90 ppm
Iron	< 0.1 ppm
Manganese	< 0.1 ppm
Aluminium	< 0.1 ppm

The following components need specific maintenance, in addition to the general recommendations included in the Operation and Maintenance manual.

Component	Average Frequency
Protection panels	12 months(*)
Pump station filters	4 months (**)
Biocide	(**)

(*) Panels can be cleaned or replaced depending on the clogging rate

(**) The frequency depends on water quality

To learn more about Schneider Electric cooling solution visit www.schneider-electric.com

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