High
Efficiency
Solutions.

CAREL

success story

Optimum all-seasons air-conditioning and energy saving

where

Hotel Parchi del Garda

- cooling in summer and humidification in winter;
- Pacengo del Garda (VR) - Italy.

what

humiFog multizone installation

- cooling and humidification with six adiabatic atomisers for six air handling units.

why

- energy saving;
- low running and maintenance costs;
- hygienic safety: system compliant with VDI 6022, VDI 3803, DIN 1946;
- high efficiency ensured by very fine atomisation of water;
- summer/winter operation;
- reduced cooling coil dimensions, capacity and energy consumption;
- easy to install;
- multilanguage interface;
- rack made-to-measure
- temperature stability.

Hotel Parchi del Garda
innovative hospitality for families and meetings

Hotel Parchi del Garda is a brand-new four-star structure set against the magnificent natural backdrop of Lake Garda, strategically located between the area's main theme parks. Split into five wings, the hotel offers an enviable lakefront location and has 233 rooms, including 15 suites.

For business clients, an innovative offering is available based on large spaces and a range of post-conference activities (teambuilding at the parks and in the hotel). For special events there is an open space conference room holding around 850 people, with natural lighting, and two additional meeting rooms with a capacity of 130 people each. The hotel, which opened on 30 April 2010, even before its inauguration was a member of the Parchi del Garda Experience Network that for the last year has seen various theme parks in the Lake Garda area (Parco Natura Viva, Parco Giardino Sigurtà, Movieland Park & Park Jungle Adventure...) join forces to promote their business, including internationally. Together these parks have a turnover of 27 million euro a year and attract 2 million visitors.

The hotel's owner, Giulio Bonizzato, aware of the problems of energy saving and protecting the environment, wanted to install an innovative air-conditioning system that could adapt to the needs of the complex. B & B from Verona, a heating technology consulting firm, suggested a cooling system using atomised water so as to achieve significant energy savings.

Air-conditioning is thus provided using a primary air handling unit (AHU) with a capacity of 35,000 m^3/h installed in the basement for the reception area, restaurants and one conference room, plus five additional 4,500 m^3/h air handling units for the rooms, installed under the roof, each fitted with a humiFog adiabatic atomiser featuring two distribution racks, one for cooling the hotel rooms in summer and the other for humidification in winter. The primary air introduced into the rooms is constantly kept at 25 °C, with integration by direct expansion fan coils that use engine driven heat pumps operating on natural gas.
A further five independent AHUs serve the other meeting rooms and use humiFog for humidification in winter.

humidification-for-life.com

The right climate in every room

The installation guarantees maximum comfort in the various hotel environments:

- 3 restaurants, total 500 seats, ideal for working breakfasts, buffet dinners and gala events;
- conference room: capacity of around 850 people, fitted with an air quality control system (CO_2);
- two meeting rooms for 130 people each with large foyer;
- children's entertainment room, with afternoon and evening service;
- hotel rooms, each with primary air inlets, kept at a constant neutral temperature, and a fan coil for integration. The installation can heat/cool at the same time and allows individual operation of each indoor unit.

Domestic hot water is produced by boilers that recover heat from the cooling water to the gas engine driven heat pumps.

bedroom

conference room

Indirect evaporative cooling

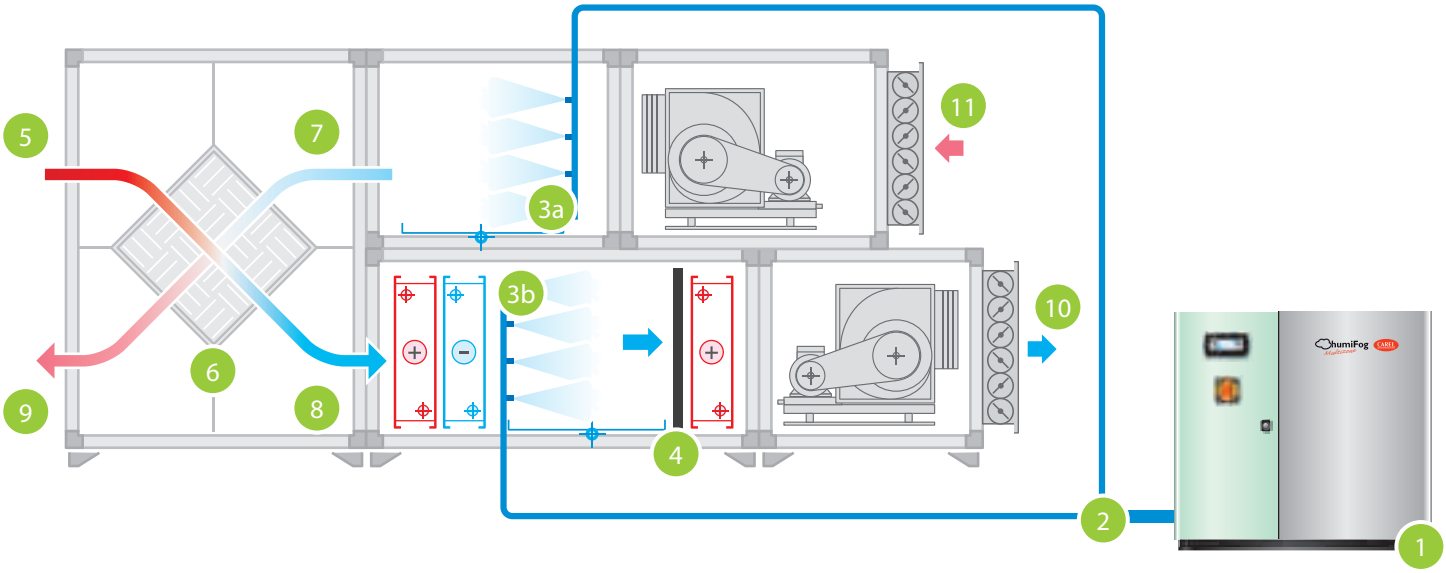
The indirect evaporative cooling system for the reception hall and restaurant adopts a pumping unit that can be used to humidify the air introduced into the room in winter and cool outside air in summer without increasing humidity.

The air is cooled due to the spontaneous evaporation of the droplets of water: the change in state, from liquid to vapour, is brought about using the energy in the air, which as a result is cooled. Indeed, 100 kg/h of water when evaporating absorbs 69 kW of heat from the air. Heat from the exhaust air is partly recovered using a heat exchanger in the AHU. This recovered heat is used to cool and/or heat the fresh air and allows a reduction in the size, capacity and energy consumption of the cooling coil and chiller.

Main specifications:

- total cooling capacity (6 AHUs) in summer (heat exchanger efficiency 55%): 113 kW;
- equivalent power saving (EER= 2.8): 33 kW;
- humidification capacity in winter: 395.9 kg/h;
- humiFog power consumption at maximum capacity: 1.15 kW (single-phase).

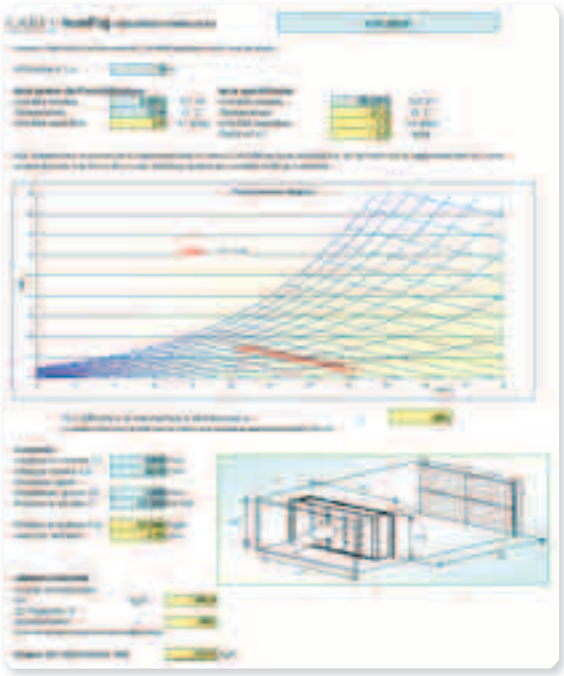
1. *pumping unit*
2. *pressurised water line*
3. *a: rack for cooling in summer*
   b: rack for humidification in winter
4. *droplet separator*
5. *outside air*
6. *heat exchanger*
7. *exhaust air*
8. *cooled outside air*
9. *air to outlet*
10. *outlet air*
11. *return air*



Simple design tool

The humiFog sizing tool made available to system designers automatically calculates, based on the design specifications (temperature, air flow-rate, initial and final relative humidity) and the rectangular cross-section of the air handling unit, the features of the complete humidification system:

- size of the humiFog atomiser;
- cooling capacity;
- power and water consumption;
- absorption efficiency (up to 95%).



humiFog tool

humiFog installed on site

reverse osmosis demineraliser

rack with nozzles and droplet separator

A powerful and complete solution

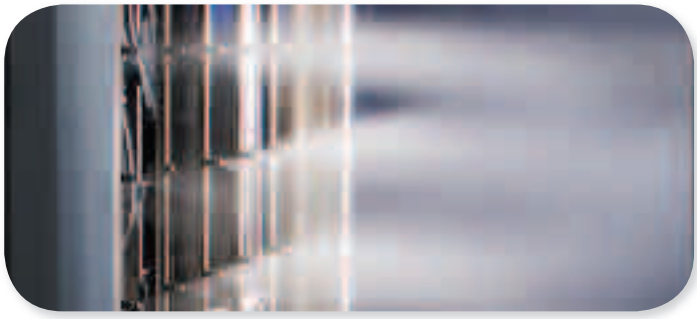
CAREL provides all components ready for assembly, including pipes and fittings. The racks is supplied to measure and tested with pressurised water before being delivered to the customer. The capacity control and drain valves ensure maximum hygiene through an automatic washing procedure. The cooling system consists of:

- humiFog atomiser;
- rack with manifolds, nozzles, valves, supplied with pre-assembled and tested components;
- stainless steel mesh droplet separator, certified in accordance with DIN 1946 and directives VDI 6022 and VDI 3803;
- reverse osmosis demineraliser for treating the water (WTS).

Material supplied for a 35,000 m³/h AHU

Code	Description
UA250HD211	
Pumping unit + controller + inverter, 230 V 50 Hz	
Water flow-rate (kg/h)	250
Pump material	AISI 316
Damper	yes
Semi-assembled rack	
Atomising rack with manifolds, solenoid valves and nozzles	
Number of solenoid valves	8
Number of nozzles	63
Type of nozzles	2
Width (mm)	2220
Height (mm)	1450
Distance between nozzles - droplet separator (mm)	2260
Droplet separator	
separator modules	1
droplet separator material	AISI 304

humiFog in equipment room



evaporative cooling with atomised water

Conclusions

The six air handling units are cooled and humidified by six humiFog units controlled by Climaset air handling unit software. This software, based on outside conditions, decides whether to implement freecooling or freecooling + evaporative cooling. The exhaust air is humidified up to a relative humidity (RH) of 94% to maximise cooling of the outside air; in any case, a minimum temperature limit is maintained at the outlet. The CAREL PlantVisorPRO supervisory system, developed and customised by Climaset S.r.l., provides remote monitoring and management of the complete installation via WEB. The temperature and humidity set points are maintained according to the design requirements, as demonstrated during the inauguration of the hotel, with an attendance of 850 people in the conference room.

The project was developed thanks to the active partnership between CAREL HQ in Italy, the "Termotecnica B & B snc" design firm represented by Messrs. Bissoli Umberto and Biolo Luciano, and "Climaset S.r.l.", system integrator and CAREL agent, proprietor Diego Bissaro.
This ensured a high level of customer satisfaction that, as well as excellent products in terms of quality and reliability, identified an excellent partner for its hotel air-conditioning applications.

Umberto Bissoli
TERMOTECNICA B & B

Diego Bissaro
CLIMASET

+4000006EN - 1.0 - 22.10.2010

Headquarters ITALY

CAREL INDUSTRIES HQs
Via dell'Industria, 11
35020 Brugine - Padova (Italy)
Tel. (+39) 0499 716611
Fax (+39) 0499 716600
carel@carel.com

Sales organization

CAREL Asia
www.carel.com

CAREL Australia
www.carel.com.au

CAREL China
www.carel-china.com

CAREL South Africa
www.carelcontrols.co.za

CAREL Deutschland
www.carel.de

CAREL France
www.carelfrance.fr

CAREL Iberica
www.carel.es

CAREL HVAC/R Korea
www.carel.com

CAREL Russia
www.carelrussia.com

CAREL India
www.carel.in

CAREL Sud America
www.carel.com.br

CAREL U.K.
www.careluk.co.uk

CAREL U.S.A.
www.carelusa.com

Affiliates

CAREL Czech & Slovakia
www.carel-cz.cz

CAREL Korea (for retail market)
www.carel.co.kr

CAREL Ireland
www.carel.com

CAREL Thailand
www.carel.co.th

CAREL Turkey
www.carel.com.tr