CARLIEUKLIMA
ENERGY AND COMFORT

EUCOLD

ADIABATIC EVAPORATIVE COOLERS

TECHNICAL MANUAL

Constant development in search of product improvement may lead, without advance notice, to changes or modifications of the contents and descriptions herein.

Cooling and ventilation

The EUCOLD adiabatic evaporative cooling system represents the most modern technology to cool and ventilate large premises:

- Industries,
- Foundries,
- Handicraft laboratories,
- Warehouses and deposits,
- Commercial premises,
- Sport centres,
- Gyms,
- Exhibition pavilions,
- Tension structures,
- Greenhouses,
- Public halls,
- Pub and fast food,
- Bakeries,
- Food markets,

and many other premises where the traditional air conditioning system would imply high installation costs and large energetic consumptions.

The EUCOLD system permits to provide large premises with a summer cooling system to improve the workers comfort, increase their wellness and their productivity, without having to invest large amounts of money, without having to encounter high costs for energy consumption, without any impact with the environment and without contributing to black-out events.

The technical issue

1) Inside microclimate

Inside of a big hall, for example an industrial one, during hot season, a microclimate is established and it's difficult to be bear from the person who work in it.
The heat created by the process machinery, the lighting, the many structures inside the building that, when they are hit by the sun, transmit to the inside air a high thermal energy, all these situations create an uncomfortable environment inside the building.
Furthermore when the premises are closed during the night, the heat stagnates inside the building and the following morning the ambient is already unbearable.

To all this it must be added that usually the correct air changes to get rid of the stale air are not provided.

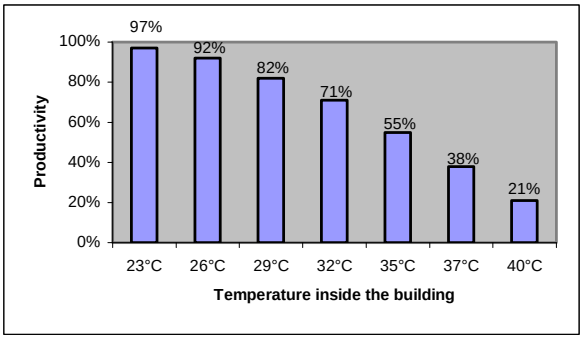
2) Security and productivity

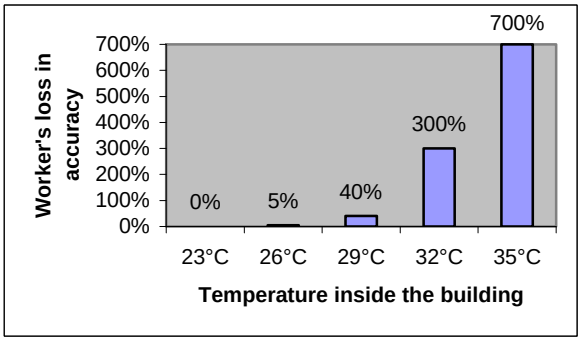
Unhealthy working conditions created by high industrial temperatures cause heat stress. Heat stress, which begins at effective temperatures over 27°C, creates:

- **Low Morale, caused by heat discomfort**
- **Delay and Absenteeism**
- **Reduced attention to Safety**
- **Potential Health Issues**

It has been demonstrated by various researches that excessive heat can affect the worker performances both in productivity and accuracy as reported by NASA research:

NASA Report CR-1205-1							
Effective temperature	23°C	26°C	29°C	32°C	35°C	37°C	40°C
Loss in work output	3%	8%	18%	29%	45%	62%	79%
Loss in accuracy	---	5%	40%	300%	700%	---	---





NASA Report CR-1205-1 shows for example that when temperatures inside the building rise over 29°C, productivity drops by 18% and accuracy suffers from a 40% increase in error.

Technical and economical solution

It is necessary to change often the air in the building to prevent the accumulation of heat and avoid the excessive rise of temperature inside the premises.

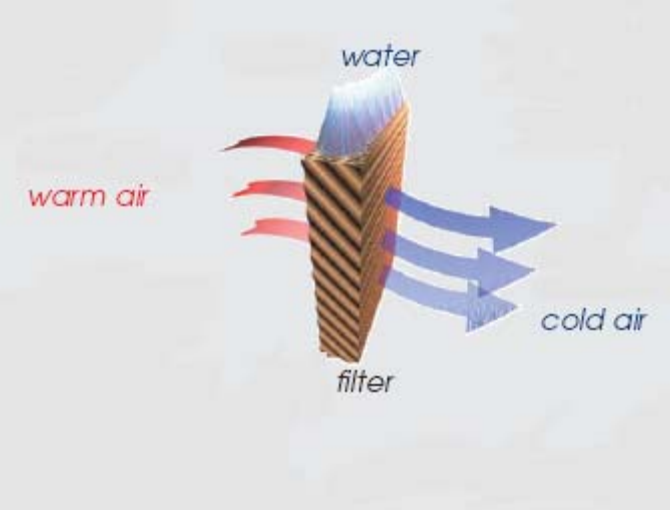
A good result is obtained by providing the building with 10 air changes per hour.

The air changes are necessary to improve the hygiene level and to eliminate eventual smells or particles harmful for people's health.

The choice of a traditional air conditioning system is not advised for the following reasons:

- **huge air volumes to be treated**
- **impossibility to keep closed the building doors for logistic reasons**
- **expensive installation of refrigeration units and air distribution systems**
- **high and expensive energy engagements, both for the system and for running the system**
- **high maintenance costs**

Much more adapt to this situation and more economically accessible is the use of a EUCOLD cooling and ventilation system that cools the air using a natural and not mechanical principle



The EUCOLD evaporative cooler is a product that cools the air by reducing the sensible heat contained in the air.
The evaporation process of the water that comes in contact with the treated air, provides the reduction of the sensible heat in that air:

the external air passes through specially structured cellulose filters wet with water, it loses part of its heat during the water evaporation process and lowers its temperature.

The fan, installed inside the cooler, supplies the building with the cooled air.

The result and the advantages

The absence of refrigerating units **reduces the system cost of 70% and electrical energy consumption of 80%**, the only energy needed is the one necessary for the fan, reduces the dimension of the system and simplifies the installation, the use and the maintenance.

Generic advantages:

- **treatment of large volumes of air to grant many air changes**
- **air filtering**
- **air cooling**
- **possibility to only ventilate in the cooler seasons**
- **possibility to cool only specific areas or have different cooling in various areas**
- **low cooling system costs, low running costs, low maintenance costs**
- **low energy engagements**
- **no refrigerant gas, no environment impact**
- **improvement of the inside environment hygiene**

Functions of the EUCOLD system

Ventilation and "cleaning" of the inside environment

The EUCOLD adiabatic evaporative cooling system works in a dynamic way based on a natural principle:
it introduces into the building big quantities of cooled external air and expels the stale warm air through doors, windows and other evacuation openings.

INPUT COOL AIR **OUTPUT WARM AIR**

A very simple principle. If the system can evacuate the same amount of air introduced, it will work at its maximum efficiency.
The ideal installation condition, if allowed by the spaces on the roof, would be positioning the air diffuser far away from the windows. Opening a window far away from the air diffuser it will permit to the air to travel in all the room resulting in cooling it down. By calculating correctly the doors and windows openings it is possible to reach the maximum efficiency of the unit.
The system must manage to expel all the new air introduced to not reduce the efficiency of the system.
If the openings existing in the building are not sufficient it is necessary to install a forced air extraction system. Not following these conditions will lower the designed air changes, reduce the cooling effect and make rise the inside relative humidity of the air.

Function and efficiency of the unit

The EUCOLD adiabatic evaporative cooling system uses the process of adiabatic air saturation:

a humid air does not saturate, comes saturated carrying it in contact with water, in this way the exchange of heat are only between air and water without any other exchange externally for the system.

All the heat that the water receives is used to make it evaporate so that the enthalpy and the temperature of the remaining water remains the same. The consequence is that even the enthalpy of the air remains the same.

The temperature of the air, instead, decreases maximum as the temperature of the water while its humidity grows.

Because the enthalpy of the air is given by the sum of elements of its temperature (sensitive heat) and of its humidity (latent heat), if the air temperature decreases and the humidity increases it means that the sensitive heat is decreased and the latent heat is increased.

Obviously the system increases its cooling capacity when the external air relative humidity decreases:

The more the external air is dry, higher is its possibility of being saturated, more is the possibility of decreasing the sensitive heat contained, major is the lowering of the temperature of the air.
The efficiency of cooling the air is even given by the characteristics of the evaporation support (the evaporator) of its saturation efficiency: in fact the more time and contact surface between the air and the water more the water evaporates and the temperature of the air (sensitive heat) decreases.

The EUCOLD evaporative cooler has a high saturation efficiency evaporative group that gives a good level of cooling even when the relative humidity of the external air is around 70% (Efficiency table).

The temperature of the air inputted in the building is regulated by the different external air conditions, following this table:

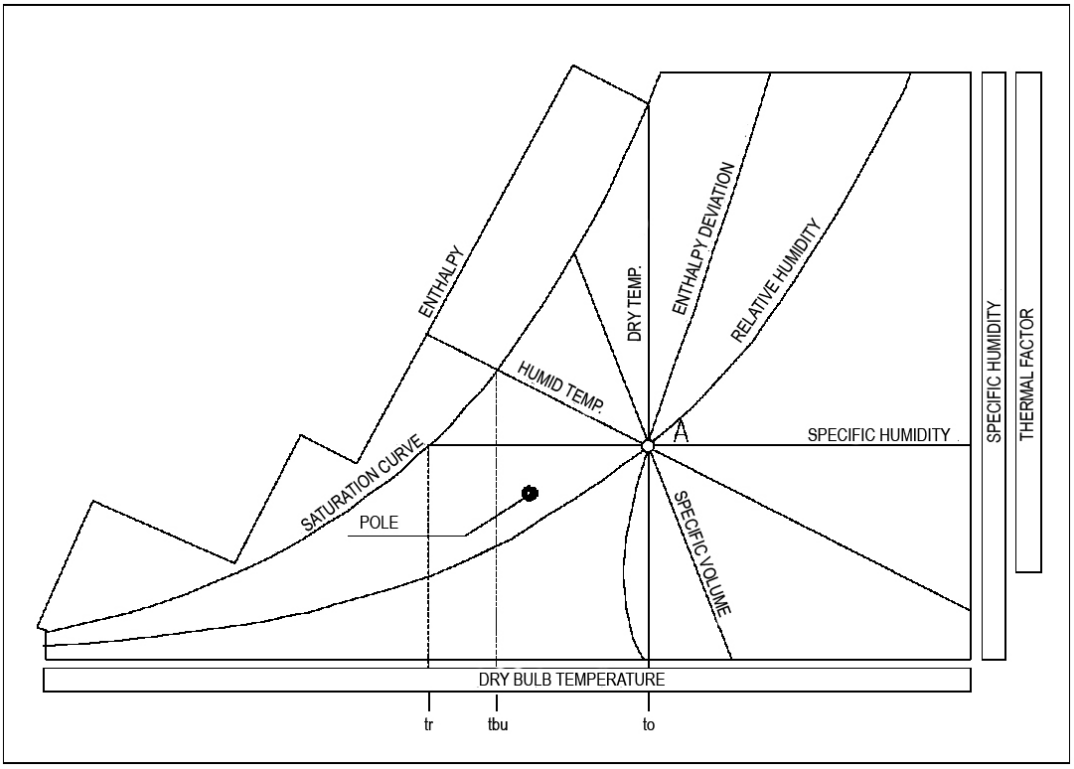
	External Relative Humidity				
	30%	40%	50%	60%	70%
Ext. Temp.	Int. Temp.	Int. Temp.	Int. Temp.	Int. Temp.	Int. Temp.
30°C	19.0°C	21.0°C	23.0°C	24.5°C	26.0°C
35°C	22.5°C	25.0°C	27.5°C	29.5°C	31.0°C
40°C	26.0°C	29.0°C	31.5°C	33.5°C	36.5°C

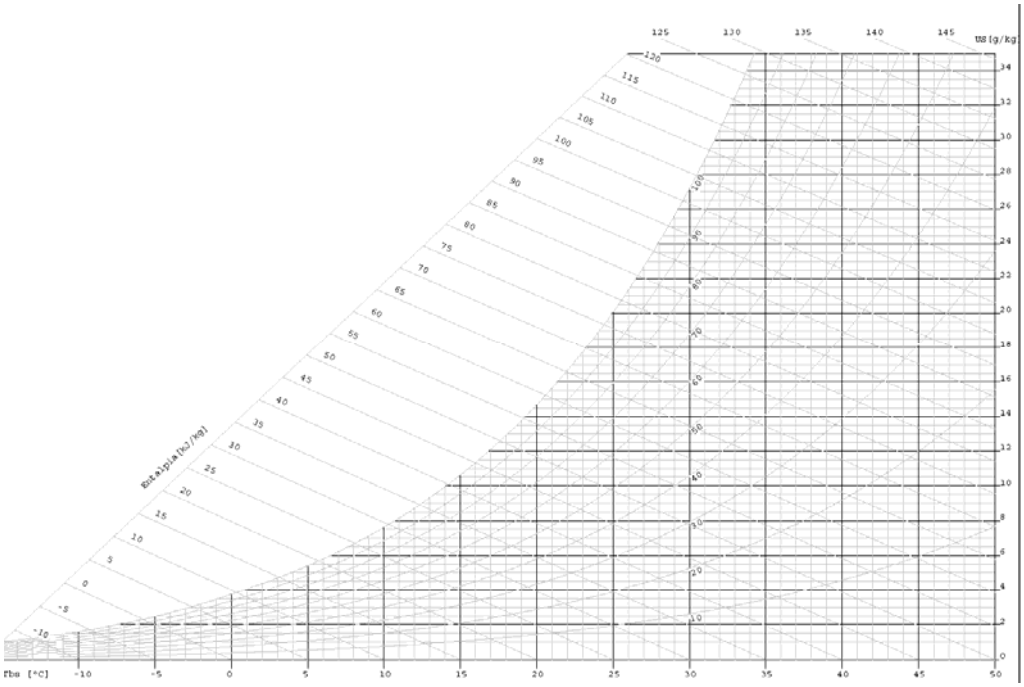
Efficiency table

These efficiencies are obtained with the use of EUCOLD adiabatic evaporative coolers with high saturation efficiency (80%).

DIAGRAM OF HUMID AIR

As described above the efficiency of an adiabatic evaporative cooling system changes depending on the conditions of the treated air, on the saturation efficiency of the "evaporative group" and can be obtained by reading the below diagram of humid air.





It must be pointed out that the EUCOLD evaporative cooling system, when the external air physical characteristics change, gives a different grade of comfort and cannot grant a stable and programmed temperature and humidity of the inputted air in the building.

The adiabatic evaporative cooler

The EUCOLD adiabatic evaporative cooler is a unit that must be supplied with electrical connection and current water, it can be installed on the roof or through a wall or window in the premises that must be cooled and ventilated.

The system is completed by attaching channels and air distributors to the unit.

Two versions are available:

- **HT for roof installation**
- **HP for wall or window installation**

Model HT

Model HP

All the models are supplied with the ABS external structure that is granted for outdoor installations and its particularly light, very important aspect because of the limited amount that roofs and walls can sustain.

All models have the following equipments:

- **Low consumption electric fan,**
- **Water upload system with an electro valve,**
- **Water distribution system with an electro pump,**
- **High efficiency evaporative panels,**
- **Automatic water discharge system,**
- **Automatic cleaning of all hydraulic system and of the evaporative panels,**
- **Positioning and sustaining equipment,**
- **Winter cover,**
- **Electronic controller.**

Evaporative cooler functions

The EUCOLD evaporative cooler is equipped with an electronic controller, to control the speed of the air and for some other function that you can select for

- **Ventilation only - ventilation and cooling**
- **Environment temperature control – Environment humidity control**

The electronic controller is equipped with a unit system that permits you to set many function of the cooler from which the automatic washing system of the evaporative filter and the washing and discharging at the end of working.

These functions are essential to maintain the high efficiency of the unit over a long period of time and to prevent situation that allow the bacterium proliferation.

The electronic controller permit you to manage every area as you want, depending on the necessities of the moment, the season and the people's perception, using the clock timer weekly and daily, the air speed controller, the thermostat and the humidity regulator.

When the unit is turned on the water discharge valve normally open shut down, the water upload valve open and permits the tank to be filled with water. The floater device will limit the amount of water uploaded to what is necessary for the cooling cycle.
The recirculation electro pump provides to pulls up the water till the distribution system that wets the evaporative filter.
The electric fan starts and intake the external air that passes through the wet evaporative filter and the diffuser will provide to put the air into the environment
The water that evaporates during the cycle is replaced automatically by command of the floating device.
By using the electronic controller it is possible to switch the unit from cooling to only ventilation to grant however the air changes necessary.
By using the electronic controller it is possible to setting the speed of the fan and to personalise the quantity of the air inlet in the environment
By using the thermostat is possible to setting a temperature of minimum satisfaction, under this value the cooler automatically changes the speed of the fan at the minimum value. This mode reduces at a minimum the evaporation and the consumption of the water and of the electrical energy.

By using the hygrostat is possible to setting the maximum relative humidity in the environment, over that value the cooler switches off automatically the cooling function and maintains the ventilation functioning. This mode allows to limit the maximum level of relative humidity in the environment at the target value.

Technical description of the automatic cleaning system

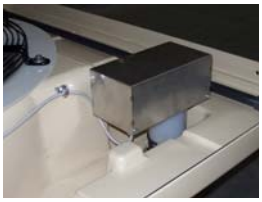
The EUCOLD evaporative cooler is equipped with an exclusive and special automatic washing system of the internal circuit and of the water tank, this system is essential to maintain the high efficiency of the unit over a long period of time.
An automatic cleaning of the filters is set every 3 hours (standard): the unit stops its cooling cycle for a few minutes, the water in the cooler is drained out and exchanged with new fresh water that will rinse and clean the filters from any dirt or mineral residuals. When the cooling system is shut off (automatically or manually), the unit will automatically start a cleaning cycle as described above; as final process the tank will be emptied of the water and left clean and dry to exclude the possibility of formation of bacteria or lime scale.

The constant repeating of the cleaning cycle prevents the formation of lame scale and other elements on the evaporative panels and in all the circuit, this grants long lasting and high efficient evaporative panels.

When switching off the unit (automatically or manually) the unit proceeds with the wash described above.

At the end it empties the circuit and the water tank to avoid the possibility of development of bacteria and lime scale.






- Cellulose evaporative panels, Celdek 50/90, thickness 100 mm –saturation efficiency 80% - Irrigation circuit
- Recycling pump
- Automatic cleaning and discharging device

Ordinary maintenance

The ordinary maintenance of the EUCOLD evaporative cooler is limited to the cleaning of the cellulose filter irrigation circuit, the re-circulation pump and the water tank.

It is necessary to empty the water connection line to the unit from all water to avoid damages created by freezing.

The EUCOLD evaporative cooler must be covered in the winter with a winter hood (provided) to protect the unit form the weather conditions and to avoid EUCOLD entering the building.

It is suggested to change the cellulose filters every three years.

Designing a cooling and ventilation system

The objective of the project is to cool and ventilate a big volume building during the hot seasons, by lowering the inside temperature and by giving the necessary air changes to improve the internal microclimate.

The lowering of the inside temperature will help to neutralize the heat provided by the building structure, by the sun radiation, and by the process plants.

The air changes will help to eliminate the stale air and eventual fumes, vapours, smells, various elements in the air that are often harmful for the health of the employees.

To design the system there are four important elements that must be kept into consideration:

- **1) Designing external summer conditions**
- **2) Air diffusers installation height in the building**
- **3) Number of air changes required depending on the type of activity in the building**
- **4) Air evacuation openings**

1) Designing external summer conditions

The EUCOLD adiabatic evaporative cooling system works in a dynamic way based on a natural principle:
It introduces into the building big quantities of cooled external air and expels the stale warm air through doors, windows and other evacuation openings.

The temperature of the air inputted in the building is regulated by the different external air conditions, following this table:

	External Relative Humidity				
	30%	40%	50%	60%	70%
Ext. Temp.	Int. Temp.	Int. Temp.	Int. Temp.	Int. Temp.	Int. Temp.
30°C	19.0°C	21.0°C	23.0°C	24.5°C	26.0°C
35°C	22.5°C	25.0°C	27.5°C	29.5°C	31.0°C
40°C	26.0°C	29.0°C	31.5°C	33.5°C	36.5°C

Efficiency table

The following tables (Italian norm UNI 10339) give the values of the design summer external thermal-hygrometric conditions for the conditioning systems, in different Italian cities:

DESIGN SUMMER CONDITIONS				
CITY	TEMPERATURES AT DRY BULB OF EXTERNAL AIR (°C)	INTERVAL OF DAILY THERMAL RANGE (°C)	RELATIVE HUMIDITY (%)	HYGROMETRIC ABSOLUTE CONTAIN (10-3Kg/Kg)
BERGAMO	31.0	13.0	50	14.1
BRESCIA	32.0	15.0	48	14.4
COMO	32.0	8.0	50	15.0
CREMONA	33.0	12.0	45	14.2
MANTOVA	33.0	12.0	45	14.2
MILANO	32.0	12.0	48	14.4
PAVIA	32.0	12.0	50	15.0
SONDRIO	30.0	14.0	50	13.3
VARESE	29.0	10.0	50	12.6
ALESSANDRIA	30.5	11.0	50	13.7
ASTI	32.0	11.0	50	15.0
CUNEO	29.0	12.0	55	13.7
TORINO	30.5	11.0	50	16.4
VERCELLI	32.0	11.0	55	16.4
BELLUNO	31.0	13.0	45	12.6
PADOVA	32.5	13.0	50	15.4
ROVIGO	31.5	11.0	55	16.0
TREVISO	32.0	13.0	52	15.4
VENEZIA	31.0	9.0	51	14.4
VERONA	31.5	11.0	53	15.4
VICENZA	32.5	12.0	45	13.8
AOSTA	29.0	13.0	50	12.6
BOLZANO	31.5	13.0	45	13.0
TRENTO	31.0	12.0	45	12.6
GORIZIA	30.5	11.0	50	13.7
PORDENONE	33.0	10.0	45	14.2
TRIESTE	31.0	8.0	50	14.1
UDINE	31.5	11.0	52	15.0
GENOVA	30.0	6.0	60	16.0
IMPERIA	29.0	6.0	55	13.7
LA SPEZIA	30.0	6.0	60	16.0
SAVONA	29.0	6.0	55	13.7
BOLOGNA	33.0	12.0	43	13.6
FERRARA	32.0	12.0	45	13.3
FORLI'	32.0	10.0	45	15.0
MODENA	32.0	10.0	50	15.0
PARMA	31.0	10.0	55	15.4
RAVENNA	31.0	10.0	50	14.1
REGGIO EMILIA	31.5	10.0	55	16.0
RIMINI	30.0	10.0	60	16.0
AREZZO	31.5	12.0	50	14.6
FIRENZE	33.5	13.0	45	14.6
GROSSETO	33.0	13.0	42	13.1
LIVORNO	31.0	10.0	55	15.4
LUCCA	32.5	12.0	50	15.4
MASSA CARRARA	32.5	11.0	50	15.4
PISA	31.5	10.0	55	16.0
PISTOIA	31.5	12.0	50	14.6
SIENA	31.0	13.0	50	14.1

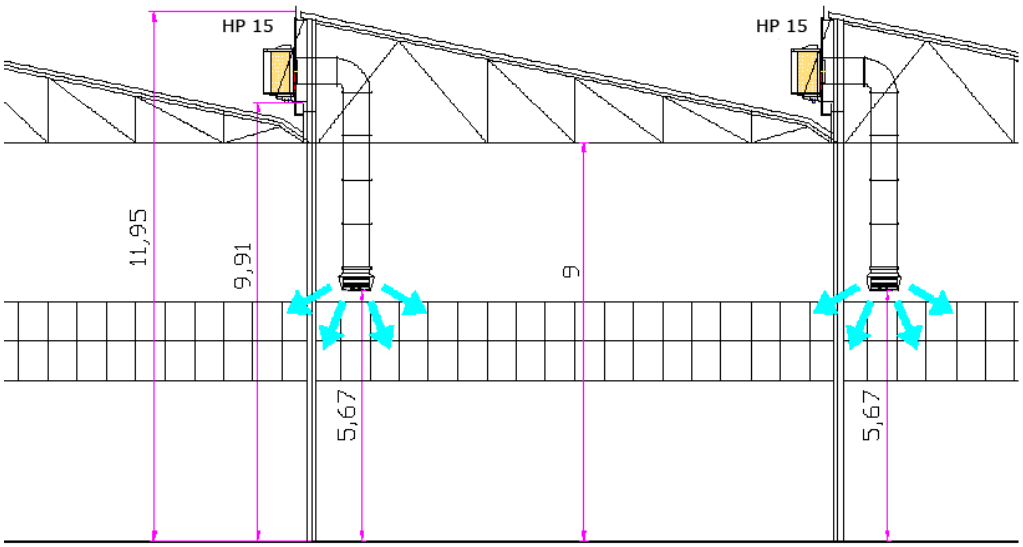
DESIGN SUMMER CONDITIONS				
CITY	TEMPERATURES AT DRY BULB OF EXTERNAL AIR (°C)	INTERVAL OF DAILY THERMAL RANGE (°C)	RELATIVE HUMIDITY (%)	HYGROMETRIC ABSOLUTE CONTAIN (10-3Kg/Kg)
PERUGIA	30.5	10.0	40	11.0
TERNI	32.5	9.0	35	10.6
ANCONA	29.5	5.5	63	16.2
ASCOLI PICENO	33.0	10.0	45	14.2
MACERATA	31.0	12.0	50	14.1
PESARO-URBINO	30.5	9.0	60	16.6
FROSINONE	31.5	12.0	45	13.0
LATINA	33.0	10.0	40	12.6
RIETI	29.5	10.0	40	12.6
ROMA	33.0	11.5	60	16.6
VITERBO	31.0	12.0	45	12.6
L'AQUILA	29.0	10.0	50	12.6
PESCARA	31.5	10.0	55	16.0
TERAMO	32.0	8.0	40	12.0
CAMPOBASSO	29.0	9.0	50	12.6
ISERNIA	30.0	10.0	45	11.8
AVELLINO	30.0	11.0	50	13.3
BENEVENTO	32.0	11.0	50	15.0
CASERTA	32.0	11.0	50	15.0
NAPOLI	32.0	10.5	45	13.3
BARI	32.0	8.0	50	15.0
BRINDISI	31.5	8.0	60	17.5
FOGGIA	34.0	13.0	33	11.0
LECCE	33.0	12.5	40	12.6
TARANTO	33.0	8.5	43	13.6
MATERA	33.0	10.0	35	11.0
POTENZA	28.5	9.5	40	9.8
CATANZARO	33.0	10.0	40	12.6
COSENZA	33.5	8.0	40	13.0
CROTONE	33.5	10.0	42	13.6
REGGIO CALABRIA	34.0	9.0	40	13.4
AGRIGENTO	32.5	10.0	40	12.3
CALTANISETTA	34.0	9.0	35	11.6
CATANIA	33.5	10.0	48	15.7
ENNA	29.0	7.0	40	10.0
MESSINA	32.0	6.0	48	14.4
PALERMO	31.5	5.0	60	17.6
RAGUSA	34.0	8.0	65	17.3
SIRACUSA	33.0	7.0	45	14.2
TRAPANI	31.5	7.5	60	17.6
CAGLIARI	32.0	9.0	52	15.4
NUORO	31.0	9.0	50	14.1
ORISTANO	33.0	11.0	50	16.0
SASSARI	30.5	8.0	50	13.7

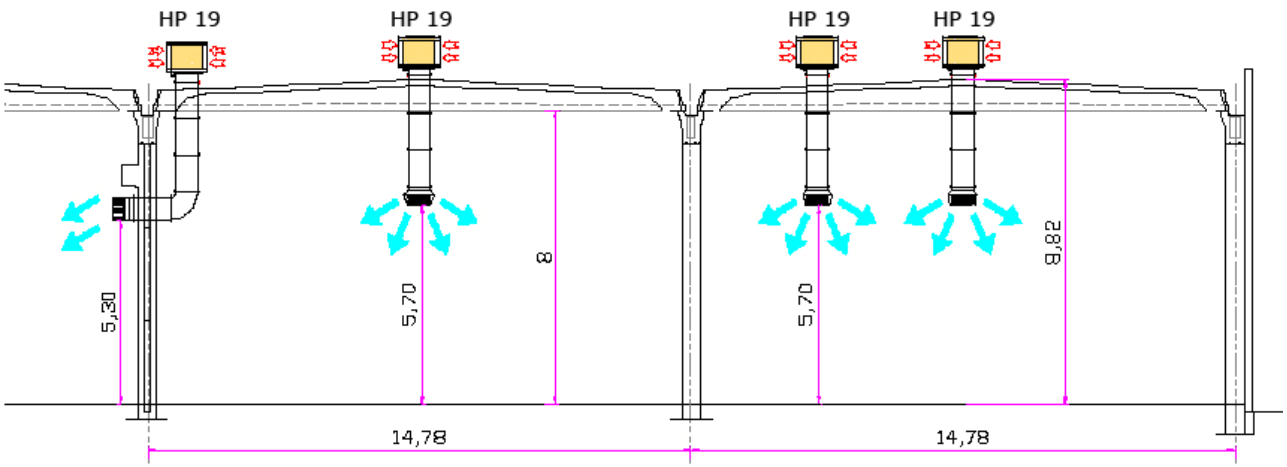
2) Air diffusers installation height in the building

The cool air provided by the EUCOLD units tends to go to the floor and to push high the warmer air.
The area of interest to be cooled is the one where there are the workers, so the volume of air to be cooled is between the floor and a few meters high.

To not interfere with the working activity it is necessary to install the air diffusers not lower than 4 meters of height and to not cool the useless top part of the building, it is suggested to not install the air diffusers higher than 6 meters of height.
The more the air diffusers are installed high the less cooling effect will be near the floor area.

So the volume to be cooled is equal to: surface of the floor multiplied the height of installation of the air diffusers.





3)Number of air changes required depending on the type of activity in the building

Once established the volume that must be cooled it is necessary to multiply it by the number of air changes necessary depending on the type of activity. From this results the amount of air that is necessary to input in the building to obtain the necessary air changes and cooling of the internal environment.

Following table shows the minimum air exchange needed for the different activities:

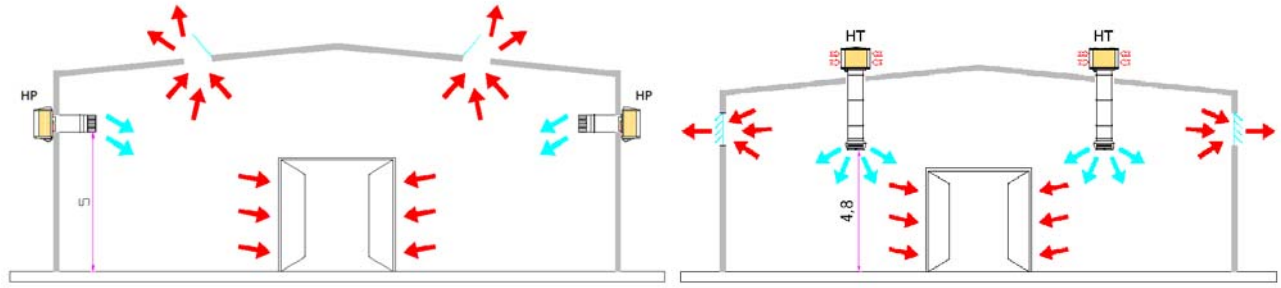
TABLE OF EXCHANGE VOLUME PER HOUR BASED ON ACTIVITIES DONE		
HOSPITALS		
DELIVERY ROOMS, EMERGENCY DEPARTMENTS, MEDICATIONS, POST OPERATORIES	5.00	vol.amb/h
OPERATING THEATRES, ANAESTHESIA	10.00	vol.amb/h
LABORATORIES, AUTOPSY ROOMS, RADIOLOGY, DARKROOMS	6.00	vol.amb/h
ROOMS, WARDS	2.00	vol.amb/h
CORRIDORS	4.00	vol.amb/h
INTENSIVE CARE, ISOLATION INFECTION DISEASES	6.00	vol.amb/h
KITCHENS	20.00	vol.amb/h
LAUNDRIES	10.00	vol.amb/h
BATHROOMS	10.00	vol.amb/h
SCHOOLS		
NURSERY SCHOOLS, PRIMARY SCHOOLS	2.50	vol.amb/h
INTERMEDIATE SCHOOLS	3.50	vol.amb/h
SECONDARY SCHOOLS	5.00	vol.amb/h
BATHROOMS, GYMNASIUM, REFECTORIES	2.50	vol.amb/h
CORRIDORS	1.50	vol.amb/h
PUBLICS ENVIRONMENTS		
RESTAURANTS, DANCE HALLS, BILLIARDS HALLS, MEETING ROOMS	6 or 8	vol.amb/h
CINEMAS, THEATRES (SMOKING FORBIDDEN)	12.00	vol.amb/h
CINEMAS, THEATRES (SMOKING NOT FORBIDDEN)	25.00	vol.amb/h
REFECTORIES	5.00	vol.amb/h
BATHROOMS	15.00	vol.amb/h
WORKING ENVIRONMENTS (minimum values, ventilations depends on activities)		
WORKSHOPS	15.00	vol.amb/h
LABORATORIES	15.00	vol.amb/h
PAINTING HALLS	45.00	vol.amb/h
FOUNDRIES	25.00	vol.amb/h
LAUNDRIES	25.00	vol.amb/h
THERMAL SPA AND HYDROTHERAPIC CENTRE		
SWIMMING POOL HALLS	1.00	vol.amb/h
WAITING ROOMS	1.00	vol.amb/h
SHOWERS AND BATHROOMS	2.00	vol.amb/h
STEAM BATH	3.00	vol.amb/h
TEPIDARIUM	2.00	vol.amb/h
SUDATORIUM	4.00	vol.amb/h
RESIDENTIAL BUILDINGS		
RESIDENTIAL BUILDINGS IN GENERAL	0.50	vol.amb/h

4) Air evacuation openings

Once established the quantity of air to input in the building it is necessary to calculate the dimensions of the necessary openings to evacuate the stale air.

The EUCOLD cooling system considers that the cooled air that is inputted in the building must be all evacuated through natural openings or forced air extraction.
The evacuation of the same amount of the air inputted grants the calculated air changes, to grant the cooling effect and to avoid the rising of the relative humidity in the building.

The air produced by the evaporative coolers contains a percentage of relative humidity that is higher than the external air and of the air in the building:
It is in fact this characteristic that produces the cooling effect but, it must go through the building and exit from it. In this way the percentage of relative humidity inside the building will not increase and the cooling effect is granted.



To manage to evacuate the air it is necessary to have openings for 1m^2 each 1.000 m^3 of inputted air.
If we need to evacuate 10.000 m^3 of air it is necessary to have 10 m^2 of natural openings.

It is important that the openings (windows, doors, skylights…) are not all in one position or just at one side of the building, but they should be distributed in various areas to permit at the cooled air to pass in all the building and not only in one side of it.

The best result is obtained when there are openings in the roof, as skylights or natural extractors: through these openings it is possible to evacuate the stale air that is underneath the roof and usually stays there for a long time.

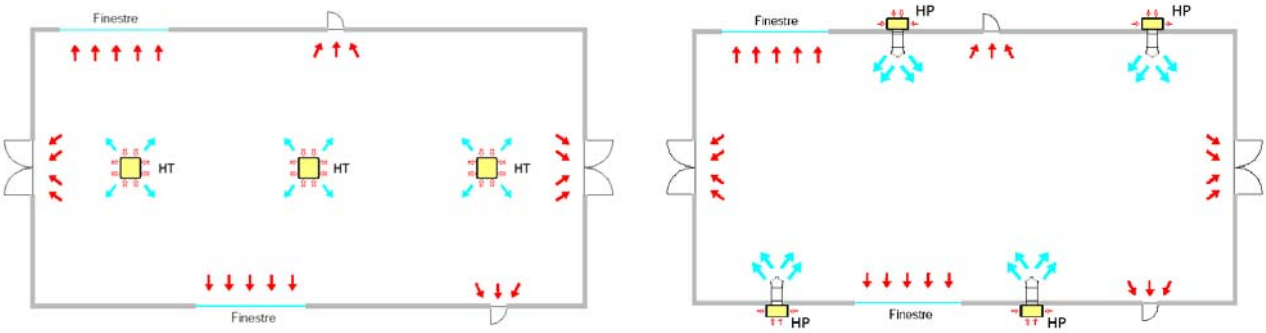
WARNING: if the natural openings are more than necessary for the evacuation of the air it could happen that some warm external air will be brought inside and limit the cooling effect.
If in the building there are mechanical extractions these must be considered in the calculation of the openings necessary for the evacuation of the air.
It is absolutely necessary to ensure the correct balance between the inputted and evacuated air.

Number and model of coolers to be installed

The choice of the model and number of coolers to be installed depends on the needs of the customer and on the different installation possibilities and air ducting, without forgetting that the height of installation cannot be more than 6 meters from the ground.
The ideal installation is to position the cooler on the roof and enter through the skylight with the channel. In this case the HT models will be chosen for the installation on the roof.

In case the installation must be done through a window the models HP will be adopted.

The number of units to be installed depends on the volume of air necessary reminding that the cooled air must be distributed as uniform as possible in all the building. It is then suggested to never opt for a solution with one powerful unit but more units of less power.



EXAMPLE

To cool an industrial building of 800 m^2, installing the air diffusers at 5m of height from the floor, we have to consider a treated volume of air of 800 m^2 x 5 m = 4.000 m^3.

If the necessary air changes are of 10 volume/hour, the quantity of input air we must consider is 40.000 m^3/h.

If it is decided to have a roof installation the models to be chosen are the HT 158, with an air flow of 13.000 m^3/h, and must be installed 3 units.

If it is decided to have a window/wall installation the models to be chosen are the HP 108, with an air flow of 10.000 m^3/h, and must be installed 4 units.

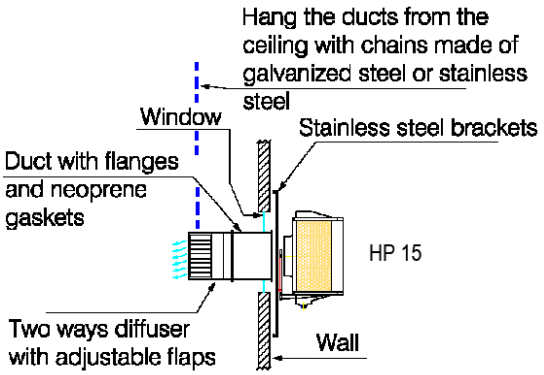
The openings surface necessary to evacuate the inputted air is of 40 m^2

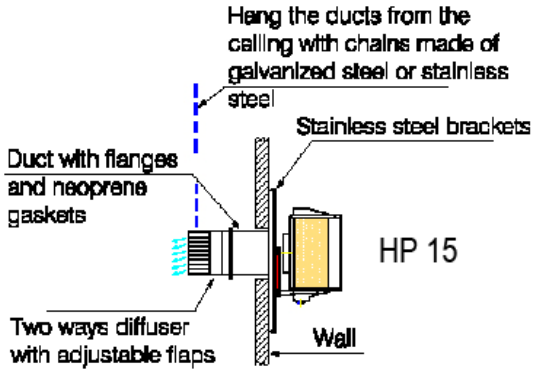
Evaporative cooler installation

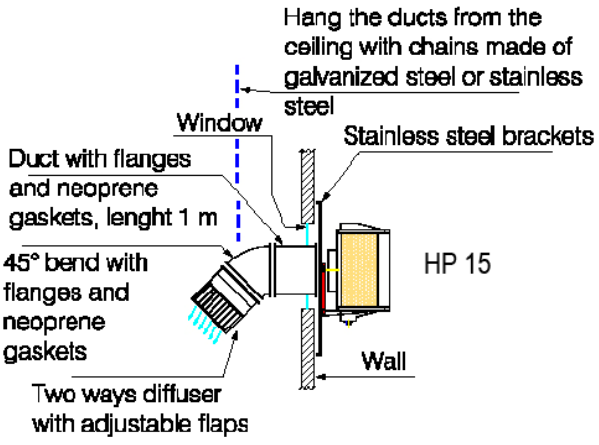
The installation of the EUCOLD evaporative cooler is very simple, and consists of sustaining and positioning of the units, connection of the air ducts, the electrical and water supply network, connection of the electronic controller.

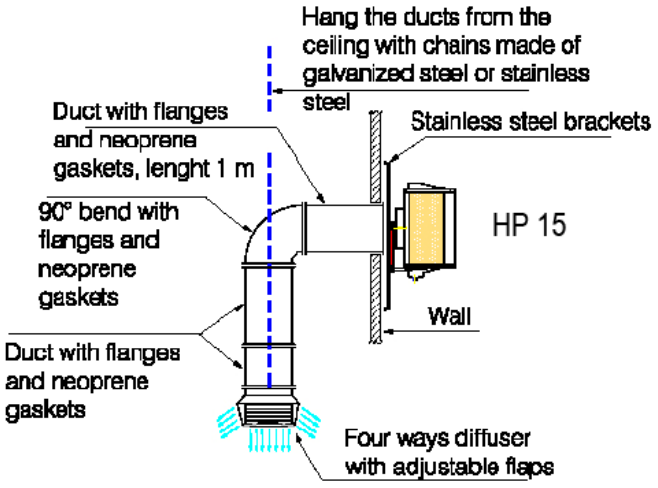
For different types of installations follow the schemes below:

Window / wall installation, model HP

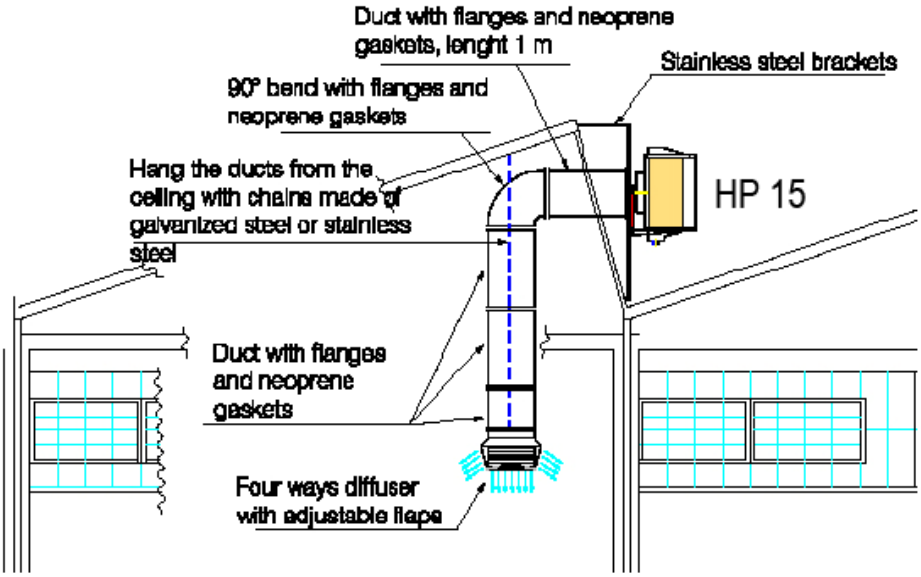


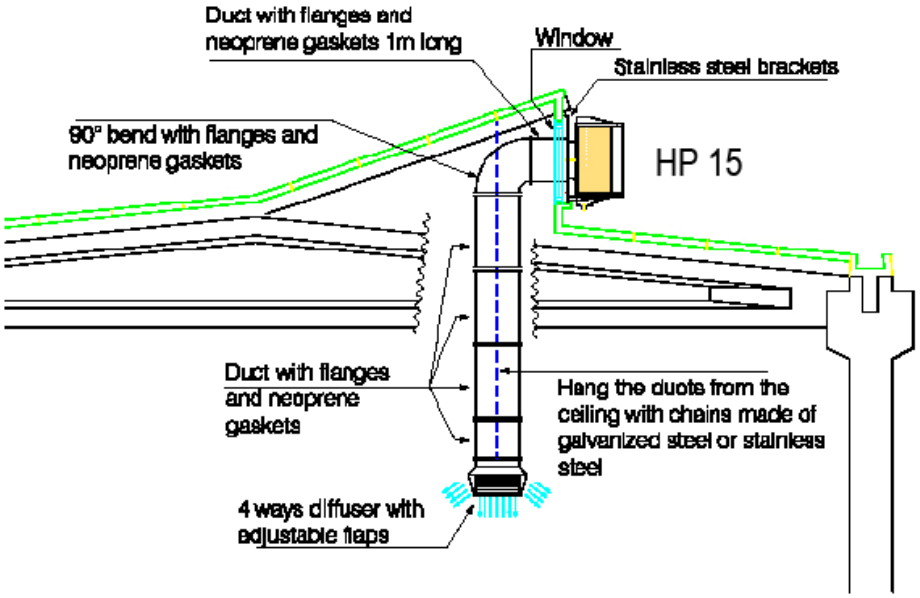




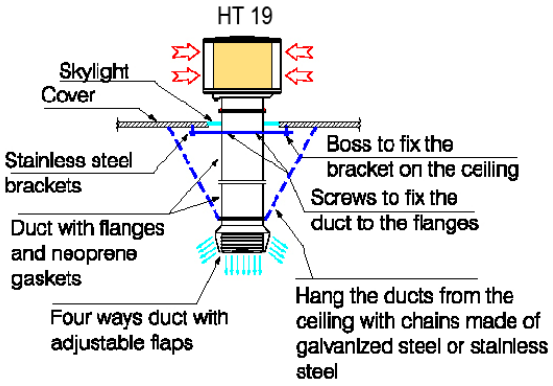


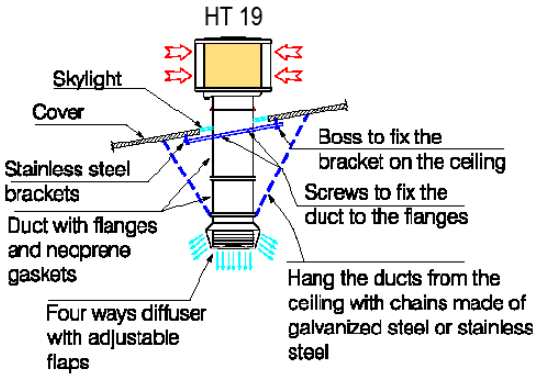
I Roof shed installation, model HP

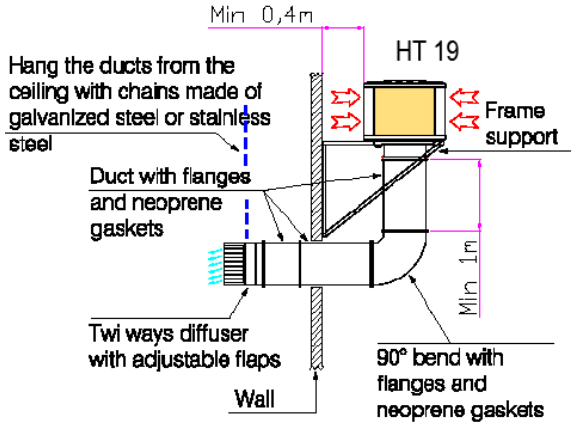


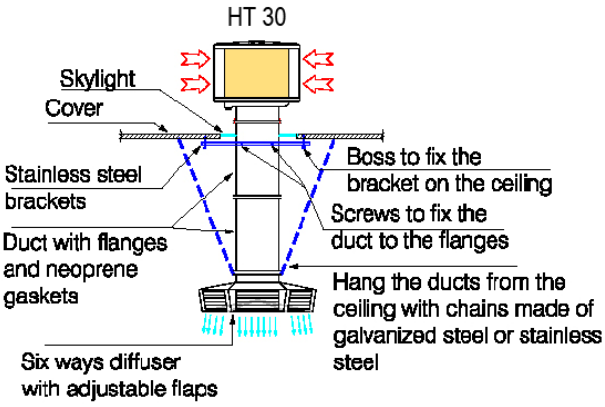


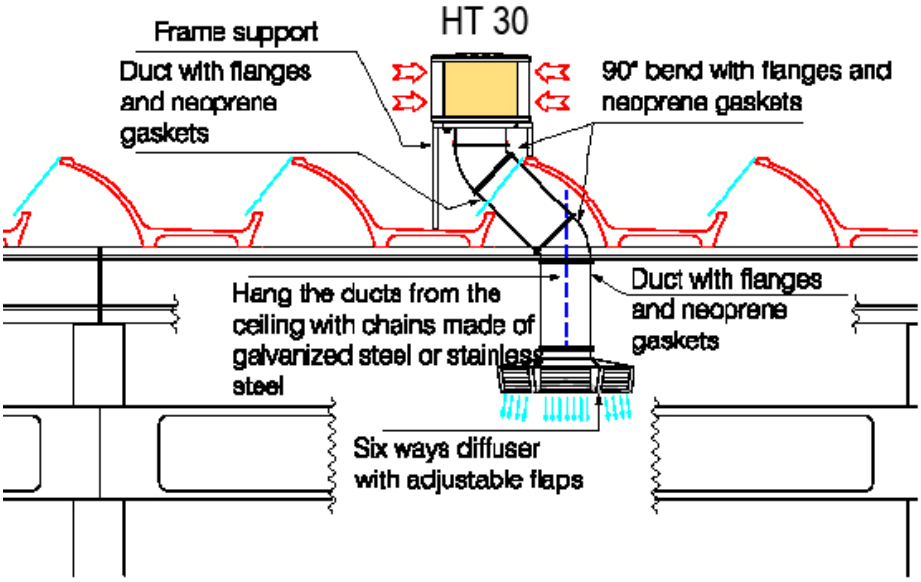
Roof or wall installation, model HT

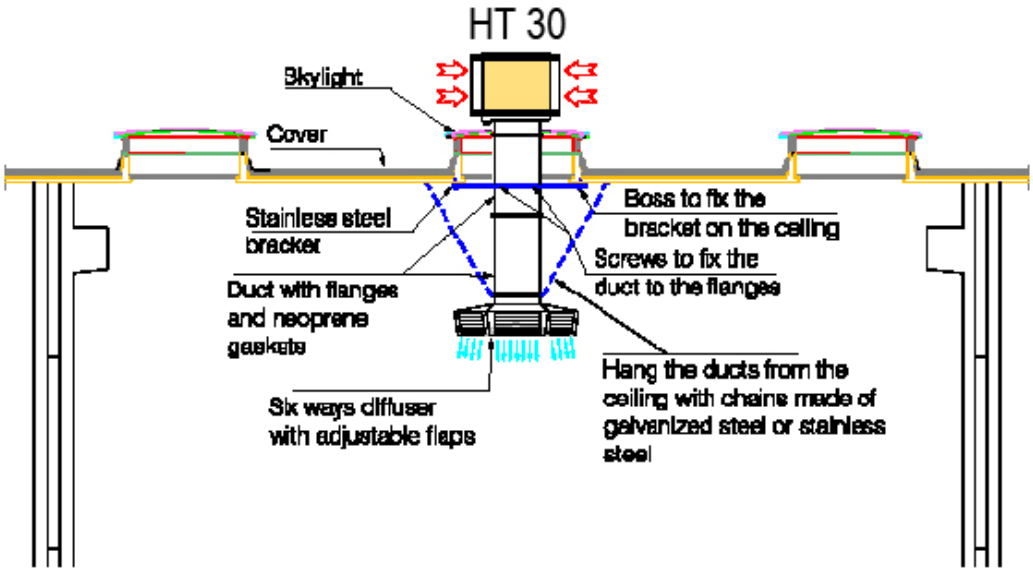









HT 30
Frame support
Duct with flanges and neoprene gaskets
90° bend with flanges and neoprene gaskets
Hang the ducts from the ceiling with chains made of galvanized steel or stainless steel
Duct with flanges and neoprene gaskets
Six ways diffuser with adjustable flaps


HT 30
Skylight
Cover
Stainless steel bracket
Duct with flanges and neoprene gaskets
Six ways diffuser with adjustable flaps
Boss to fix the bracket on the ceiling
Screws to fix the duct to the flanges
Hang the ducts from the ceiling with chains made of galvanized steel or stainless steel

Electrical and water supply network

Water supply network.

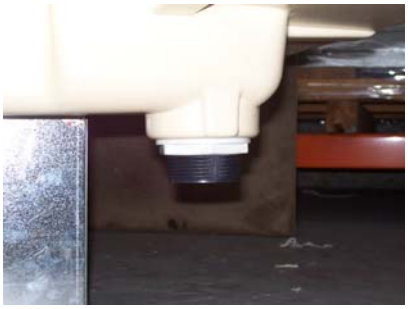
The water necessary for the functioning of the EUCOLD evaporative cooler must be drinkable and can be withdrawn directly from the local water network.
No special treatment must be done to the water as the cooler periodically has the automatic cleaning of the internal circuits to avoid the formation of limescale and the crystallizing of the minerals contained in the water. If the water supplied is thought to be particularly “hard” it is possible to program more frequent automatic washes.
It is suggested to build the water supply network inside the building to protect it from freezing in the winter and the sun rays in the summer; in case it is not possible it is suggested to use an insulated piping.

The water supplied to the cooler must be calculated to grant a capacity of minimum 7 l./minute and a pressure of 1.5 ÷ 3 bar. (maximum pressure: 6 bar)
It is necessary to put a filter to the water network to block the passing of solid objects as earth and sand.

The EUCOLD evaporative cooler has a connection for the water supply network positioned on the lower part of the external structure of the unit.
It is suggested to install an intercepting tap at the entrance of the unit and to connect to the water supply network with a stainless steel flexible pipe.
It is recommended to foresee the emptying of the water supply network before the beginning of the winter to avoid damages due to freezing.

The EUCOLD evaporative cooler has a joint positioned on the bottom of the external structure of the unit to connect the piping for the discharge of the water at the end of the cycle.

For the dimensions of the water connections and water consumptions refer to the technical characteristics table.



Electrical network supply

The EUCOLD evaporative cooler voltage supply is: **230 V ~ 50 H**z
The electrical supply network must be done respecting the current norms in the country of installation of the units.

The EUCOLD evaporative cooler must be connected to the electronic controller that usually is installed inside the premises.

Each cooler can be controlled singularly or in groups to maximum four units, by using the CABS system (EUCOLD Bus System), that controls up to four units connected in series through only one electronic controller.

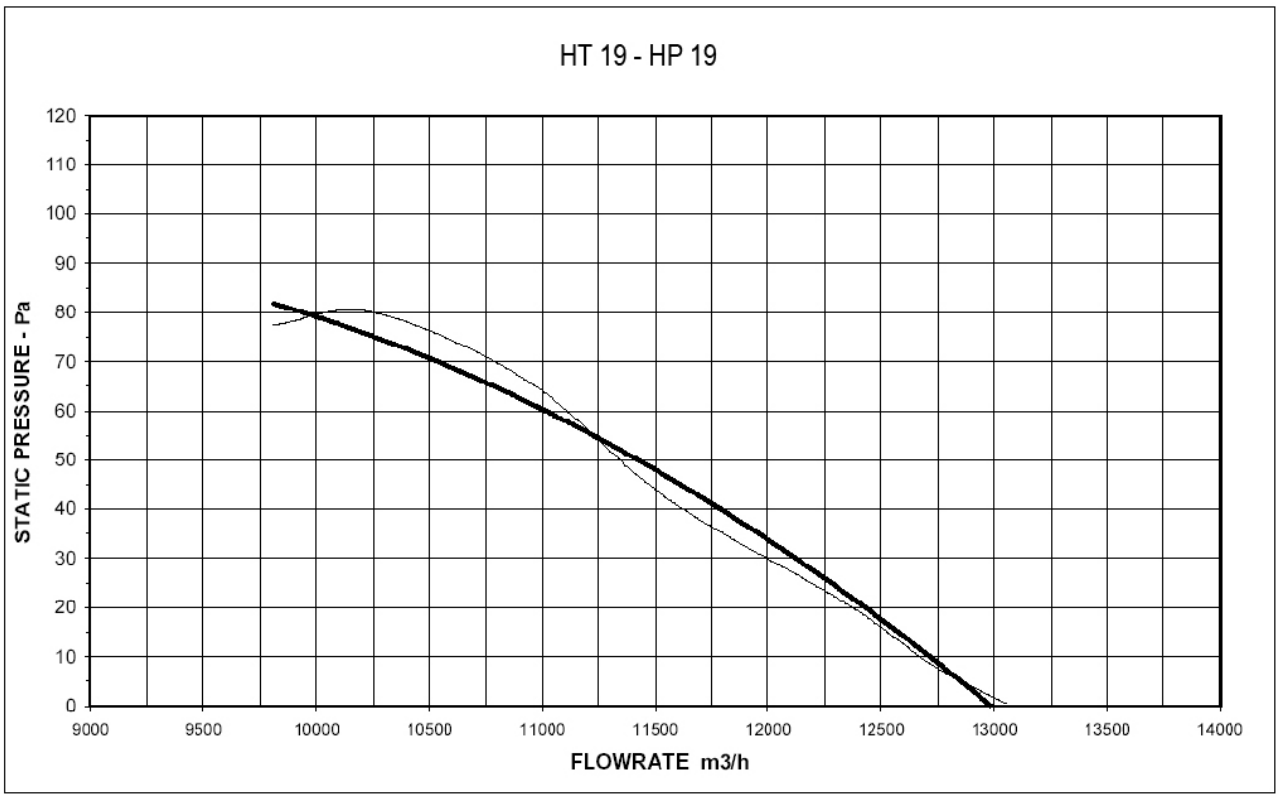
For the electrical characteristics of the EUCOLD evaporative coolers refer to the technical characteristics table

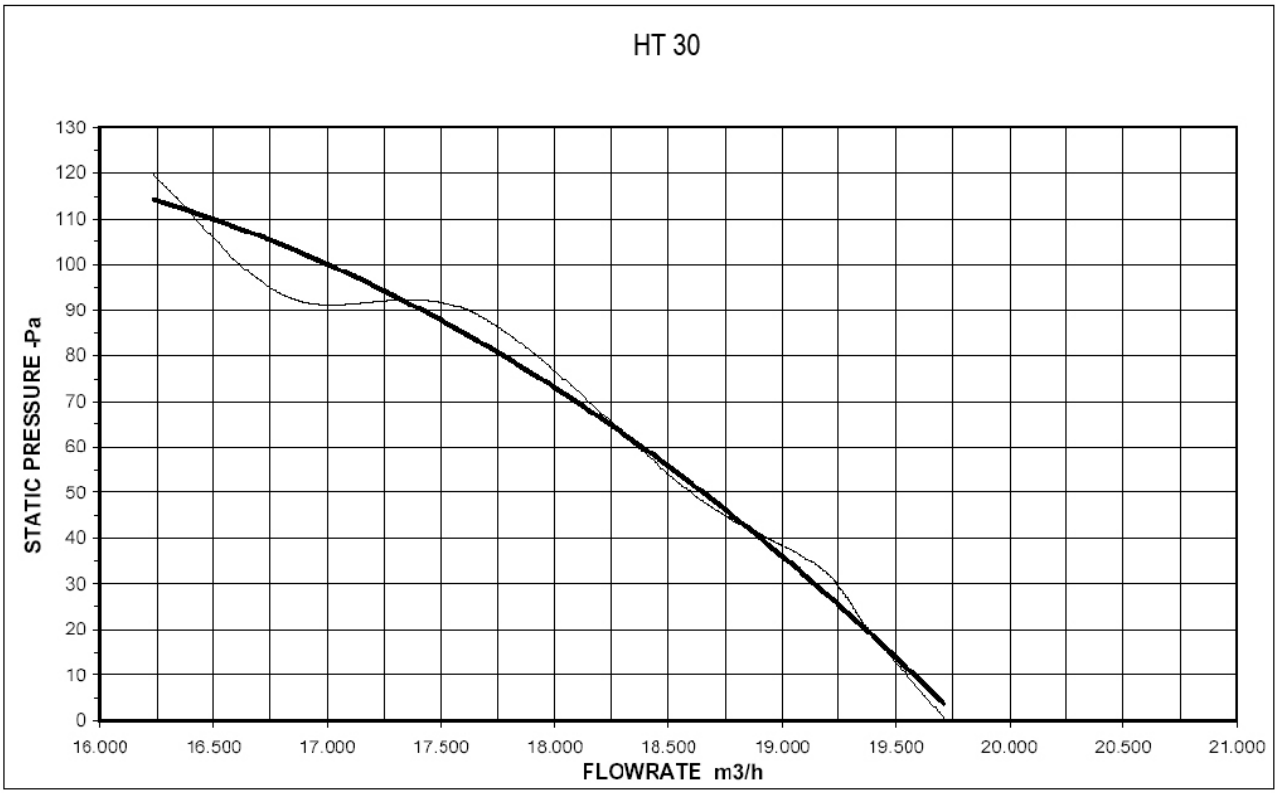
TECHNICAL CHARACTERISTICS TABLE

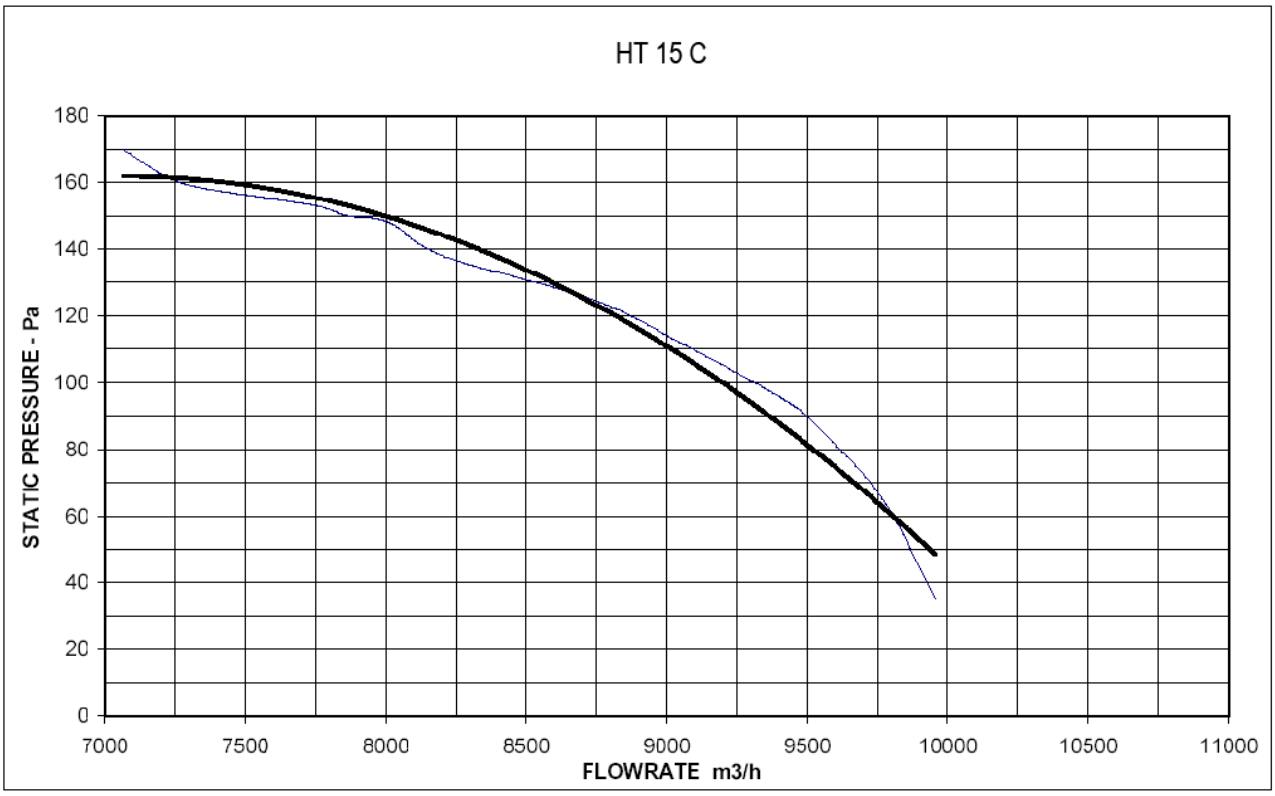
		u.o.m.	**HP 15**	**HP 19**	**HT 19**	**HT 30**
Flow rate	Max Med Min	m^3/h	10000 7500 5000	13000 9700 6500	13000 9700 6500	20000 15000 10000
Cooling capacity *		kW	15	19	19	30
Voltage supply		V	230V – 50Hz	230V – 50Hz	230V – 50Hz	230V – 50Hz
Current		A	4.1	4.8	4.8	8.2
Total electrical power		kW	0.85	1.1	1.1	1.9
Water consumption (average)*		l/h	37	48	48	74
Input water connection Ø		"	3/8	3/8	3/8	3/8
Drain water connection Ø		mm	63	63	63	63
Air duct dimensions L x W		mm	600x600	600x600	600x600	600x1150
Duct maximum length		m	5+1curva	5+1curva	5+1curva	5+1curva
Cellulose pads : Thickness Area Average saturation efficiency		mm m^2	 100 2 88%	 100 2 88%	 100 2.7 88%	 100 3.4 88%
Dimensions : L x W x H		mm	1300x670x1300	1300x670x1300	1150x1150x1050	1650x1150x1050
Weight (empty-full)		kg	60 - 75	60 - 75	67 - 88	120 - 146
Noise : - Outdoor ** - Indoor		dB A	vel.min / vel.max 49 / 65 49 / 66	vel.min / vel.max 49 / 65 49 / 66	vel.min / vel.max 50 / 66 50 / 67	vel.min / vel.max 53 / 68 53 / 70

* - Test conditions : outdoor temperature 33°C – relative humidity 60 %
** - Open field test, 4 m distance


HP 15
STATIC PRESSURE - Pa
120
110
100
90
80
70
60
50
40
30
20
10
0
7000
7500
8000
8500
9000
9500
10000
10500
11000
FLOWRATE m3/h


HT 19 - HP 19
STATIC PRESSURE - Pa
120
110
100
90
80
70
60
50
40
30
20
10
0
9000
9500
10000
10500
11000
11500
12000
12500
13000
13500
14000
FLOWRATE m3/h


HT 30
STATIC PRESSURE -Pa
130
120
110
100
90
80
70
60
50
40
30
20
10
0
16.000
16.500
17.000
17.500
18.000
18.500
19.000
19.500
20.000
20.500
21.000
FLOWRATE m3/h


HT 15 C
STATIC PRESSURE - Pa
180
160
140
120
100
80
60
40
20
0
7000
7500
8000
8500
9000
9500
10000
10500
11000
FLOWRATE m3/h

CARLIEUKLIMA S.p.A.

Via Fossaluzza, 12
33074 Fontanafredda (PN) ITALY
Tel. +39/0434/599311
Fax +39/0434/599320
info@carlieuklima.it
www.carlieuklima.com