

# Applications of Misting Systems

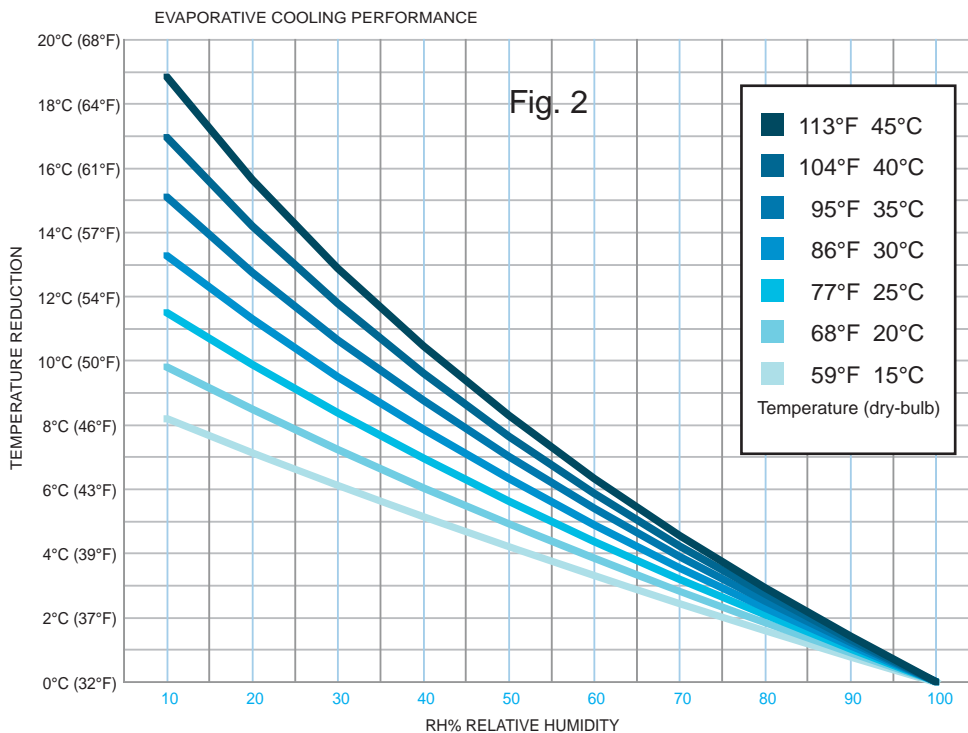
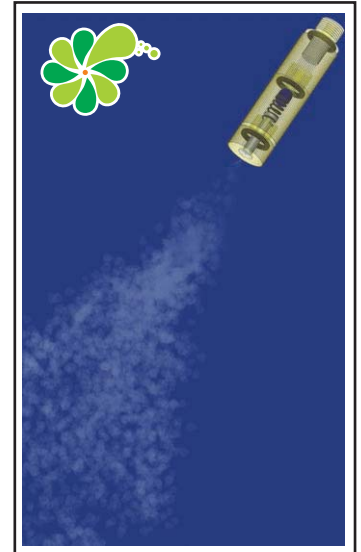


[WWW.MISTING-SYSTEMS.COM](http://WWW.MISTING-SYSTEMS.COM)

## COOLING PRINCIPLE OF MISTING SYSTEMS

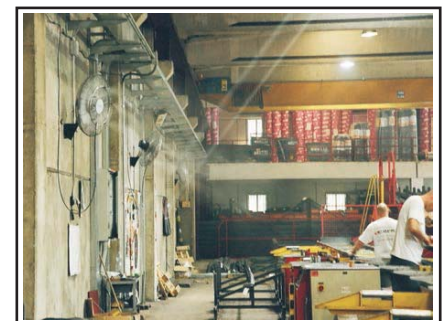
Evaporative cooling is responsible for the chill you feel when a breeze strikes your skin. The air evaporates the water on your skin, with your body heat providing the energy.

By forcing water, by means of a high pressure pump, through our specially designed misting nozzles, we create a fog of ultra fine water droplets with an average size of less than 10 microns. These tiny water droplets quickly absorb the energy (heat) present in the environment and evaporate, becoming water vapor (gas). The energy (heat) used to change the water to gas is eliminated from the environment hence the air is cooled.



Relative humidity is the amount of moisture in the air compared to the amount of moisture the air could absorb at the same temperature, is a crucial factor in determining cooling potential. The lower the relative humidity, the more water can be vaporized, and the more heat can be removed.

Evaporative Cooling can be used effectively in most geographical locations. This is because when temperatures reach their peak during the day, humidity is normally at its lowest point.





## Cooling in Outdoor Areas

- Reduces flying insects
- Fully expandable
- Lowers temperature
- Special effects
- Absorbs dust and pollen

Misting a simple, inexpensive and appealing way  
to lower temperature by 10-12 °C  
outdoors without wetting.

Treat your guests and yourself to a refreshing oasis,  
like a cool breeze on a hot day.



### COOLING PRINCIPLE

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Gardens  
Swimming pools  
Bars & Restaurants  
Special effects



Our systems can be used successfully to keep away unwelcome guests in gardens, bars, restaurants, swimming pools, factories, food food storage warehouses and more...

Contact us for more information about insects birds and rodents suppression.

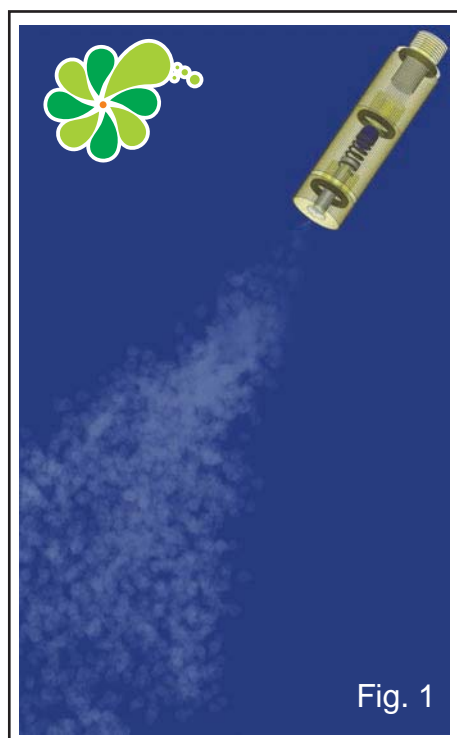
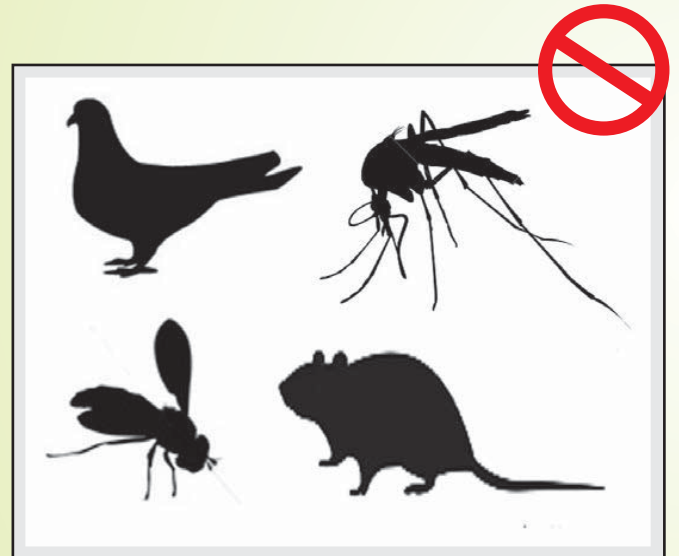
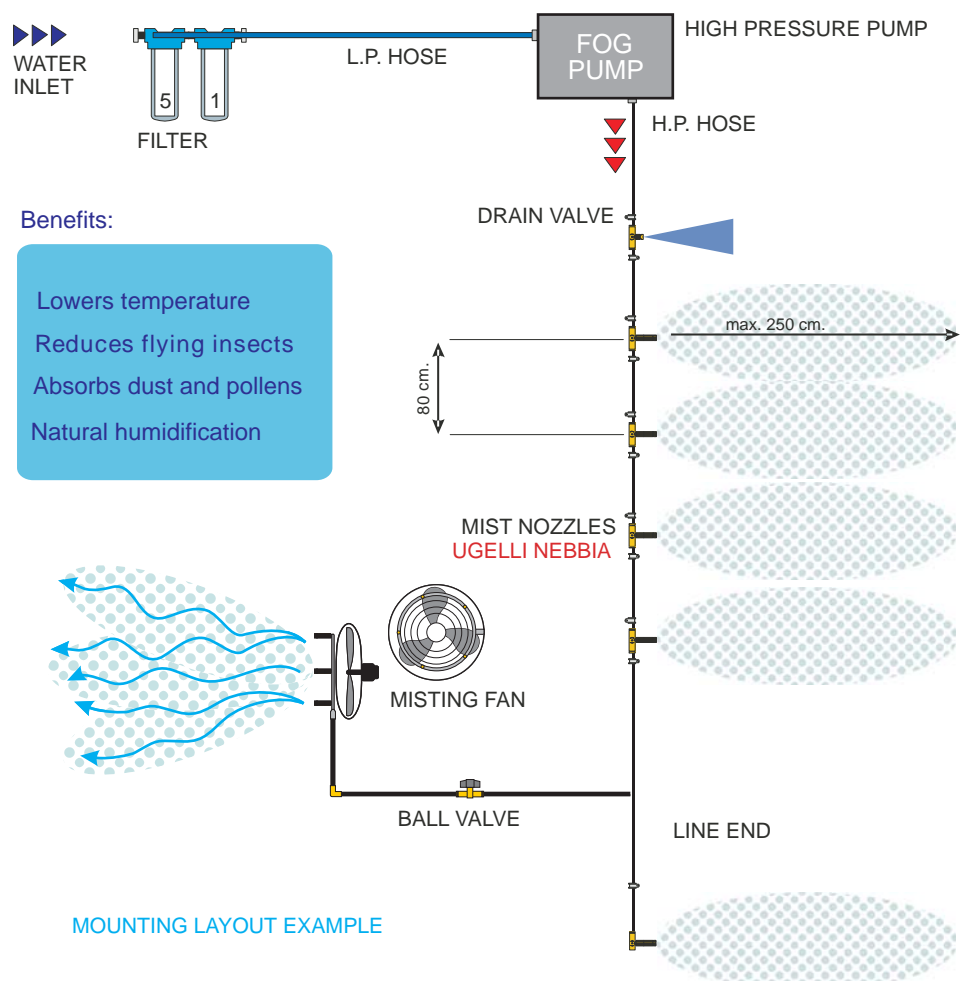


Fig. 1

Millions of less than 10 microns droplets sprayed by our fog nozzle.





Misting systems are installed with enormous advantages for air-conditioning of large indoor areas due to high benefits and reduced energy consumption.

Air conditioning of large industrial warehouses, including those which need to operate with open doors and windows, was until now impossible with conventional systems.

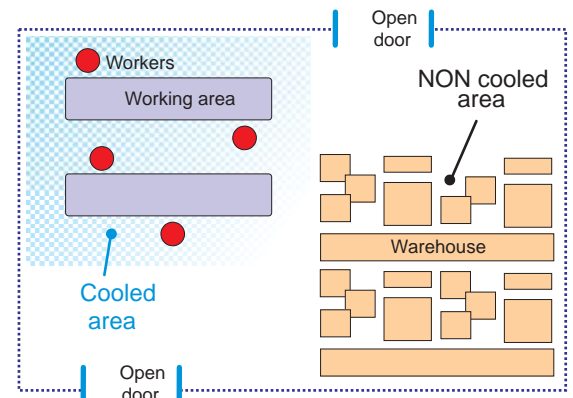
Today, however, our misting systems becomes ideal for cooling large areas (industrial sheds, garages, workshops) or to dissipate high heat emissions from industrial processes (foundries, machinery). Cooling effect can also be combined with humidity control to increase productivity in specific industries (paper, wood, textiles).

Water is sprayed under pressure by special patented nozzles capable of generating very fine droplets, of less than 10 microns, which are immediately absorbed by the air without wetting surfaces and objects below. The results are significant: low cost of installation and operation, immediately effective, cooling effect is located only in areas of interest, possibility of installation in an enclosed, semi-open and open environment.



## LOCALIZATION = SAVINGS

It is possible to locate the cooling effect where needed, without necessarily cover the whole area, saving on installation costs.



**Immediate cooling**



## ADVANTEGES

Benefits arising from the use of misting for industrial cooling are considerable:

- Increase overall productivity of your staff
- Air conditioning in localized areas of interest
- Control of dust, gases, fumes and other emissions
- Immediate temperature reduction
- Installation costs reduced by 75%
- Considerable energy savings
- Easy and cheap maintenance
- Reduction of heat stress(see EC rules)



**The convenience you can see immediately**

## MINIMUM COSTS

Important aspect of misting systems are highly limited costs if compared to traditional industrial air conditioning.

Installation is easy and fast since systems are supplied in modular kit, with polyamide tubing and quick couplings.

Our systems are designed to operate at low running cost and requires minimum maintenance requirements.

**Minimum operating costs**

**less Kw less Maintenance**

Comparison between traditional industrial air conditioning systems and Cooline mist cooling (example values)

System type	System cost	Installation time (hours)	Electric power consumption	Maintenance costs	Volt	Performance with opendoors
Traditional adiabatic	**	24	6 Kw	**	380	BAD
Heat exchange	****	36	40 Kw	***	380	BAD
Cooline Misting	*	8	2 Kw	*	230	GOOD

Birds and animals, like humans, are happier and more productive when comfortable. Misting reduces heat stress and increase productivity.

Misting provides heat stress relief for all categories of poultry. Mortality is dramatically reduced. Stress-free broilers continue to eat and grow. Layers produce more eggs. Breeders are more active and produce higher quality eggs.

In the hog world, misting increases the farrowing sow's appetite, which improves milk production. This, in turn, boosts the litter weight at weaning, increases the size of future litters and allows the sow to go back into heat quicker. Cool conditions increase sex drive and sperm count, as well as sexual development.

Cattle are also subject to heat stress. This condition can affect milk production, weight gain and breeding cycles. The misted cow is the contented cow is the productive cow.

Mother Nature has an unpleasant way of telling humans and horses to slow down when working in extreme heat, and if those warnings go ignored for too long, disaster can result. But races and heats and rounds and shows are held in all kinds of weather, and if we want our horses to do their best while competing in the heat, then we have to do our best to condition and acclimate them to withstand high temperatures.

## MINIMAL OPERATING COSTS

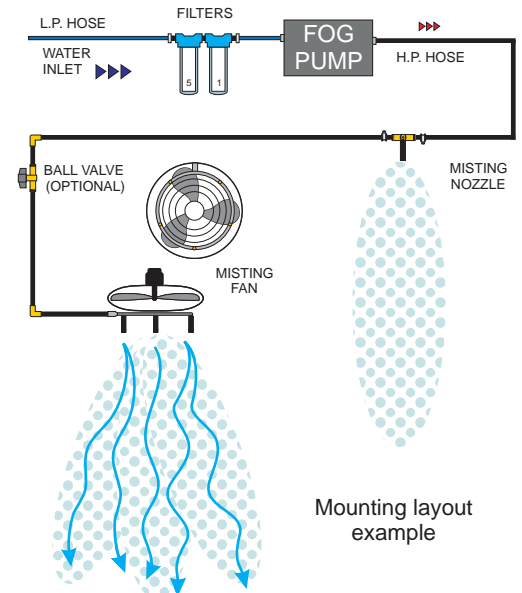
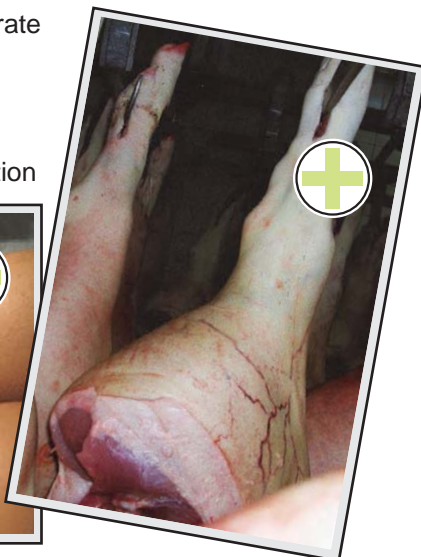
Easy installation, minimum maintenance and low energy consumption. There are many proven cost-effective uses for evaporative cooling that make it the preferred choice. The installation and operating cost of EuroCooling systems can be much lower than traditional air conditioning.

"The system cools the inhabitants without creating a wet environment."

## BENEFITS

- Increases egg, milk, and meat production
- Reduces animal heat stress
- Extends breeding period and growth rate
- Results in cleaner, drier surroundings
- Dust suppression
- Odor control
- Reduces water and energy consumption

+ MORE Weight  
+ MORE Health  
+ MORE Milk  
+ MORE Meat  
+ MORE Eggs



## Comparison to phase-change (standard) air conditioning

Less expensive to install

Estimated cost for installation is 1/8 to 1/2 that of refrigerated air conditioning

Less expensive to operate

Estimated cost of operation is 1/4 that of refrigerated air. Power consumption is limited to the fan and water pump vs. compressors, pumps, and blowers.

Fresh air

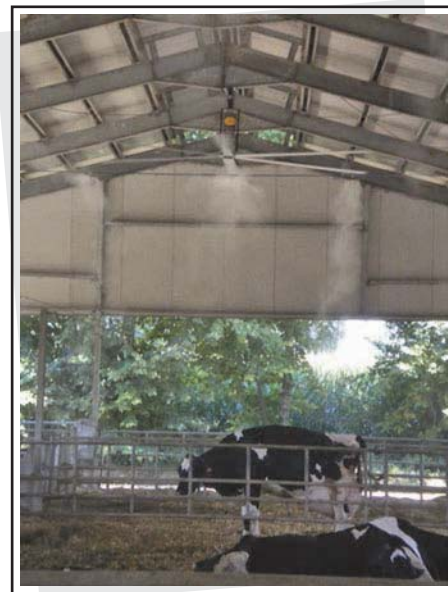
The constant stream of air from intake to vent through the building freshens the air in the building.

Cattle without water misting have a physiological and behavioral stress response to heat which negatively affect on behavior, physiology, performance, and carcass traits.

Studies have found that at temperatures as low as 79°F, dairy cows will begin to cut feed intake and lose body weight. Milk production falls. Reproductive performance, health, and lactational performance are affected. Heat stress will continue to affect performance even in the cooler months ahead. High yielding cows are most susceptible to heat stress. All of this quickly impacts your pocket book!

The degree of heat stress suffered by the cow will depend on the combination of environmental conditions - air temperature, relative humidity, air movement, and radiation from the sun. Dairy men use shades, fans, and ample fresh drinking water to help herds beat the heat; but often shade and ventilation are just not enough. In southern states, where heat and humidity are more severe, dairy men have also used sprinklers to provide added cooling effects.

Research has shown that intermittent misting in combination with shade and forced air movement is a very effective method of cooling dairy cows, thereby reducing the production losses experienced during hot humid weather conditions. By using a high pressure, misting nozzles, enough water can be applied to fully cool the cows to the hide. The water is then allowed to evaporate, which pulls heat from the air and the animal, just like sweating. Increased air movement provided by fans, makes this system most efficient.



These results indicate that cooling cows with water applied through either a mist or spray can increase milk production if the system is installed properly. Overall, the combination of mister and fan cooling system provided the best choice in several studies, because water use and waste-water runoff were reduced compared to standard spray system.

### Effects of ventilation and misting on behaviour of dairy cattle in the season

**Milk Yield**  
kg/head/day

**+4kg/day**

Published by the American Society of Agricultural and Biological Engineers, St. Joseph, Michigan [www.asabe.org](http://www.asabe.org)  
Citation: Pp. 303-311 in Fifth International Dairy Housing Proceedings of the 29-31 January 2003 Conference (Fort Worth, Texas USA) 701P0203. Authors: F. Calegari, L. Calamari and E. Frazzi

This research evaluated the effectiveness of the ventilation and misting equipment on three farms with Italian Friesian cows in the South of Italy. This research was carried out in the hotter period (May - September) during two consecutive years.

At each farm there were two homogeneous groups of animals with respect to production, number of calving and lactation phase. The first group was raised in a pen with environmental conditioning system limited to the feeding area and carried out with the use of ventilation and misting (FM). The second group, which was the control group (C), was not conditioned. The microclimatic parameters (temperature and relative humidity) were recorded continuously at each farm by electronic probes which were put at animal height and connected to a data logger. Weekly individual measurements were performed on milk yield and behaviour observing the animals in different areas two times a day. The difference in milk yield between C and FM group ranged between 1-3 kg/head/day and, in the hottest period, ranged between 2-4 kg/head/day. Animal behaviour changed as the climatic conditions varied. On average, in the conditioned pen, we noticed higher values in the rate of standing animals in the feeding area (18.6 % in FM vs. 12.9% in C) and lower values in the rate of lying animals in the resting area (31.3% in FM vs. 34.0% in C). These results show the value of the treatment with the use of ventilation and misting of water.



When the hot weather hits, eating a big meal is the last thing on anyone's mind. With temperatures in the 30s and 40s, pigs are probably too busy dreaming of a distant mud puddle to worry about their next meal.

The growth performance of animals is often affected by extreme environmental conditions. In the case of swine, generally a cold environment will increase feed intake as the pig strives to maintain body temperature, while warmer environments may reduce growth, increase body maintenance demands, and subject the animal to environmental stress.

All animals have a thermoneutral zone, the range of temperatures at which they are most comfortable and their body temperature remains constant. Summertime temperatures often exceed the thermoneutral zone for pigs. Since air conditioning is much too expensive to be a practical consideration, spraying pigs with water is one option that can help to reduce stress.

Past research has proven that high environmental temperatures (>25°C) adversely affect feed intake and subsequent performance. As temperatures rise, physiological changes in the pig also occur, including increases in rectal temperatures, respiration rates and pulse rates. Appreciating the physiological response of the pig at high temperatures provides additional insight into ways to minimize misting, and therefore water usage. Researchers theorize that misting may only be necessary during those events that are most likely to raise the pig's body temperature, like during a meal.

Misting has proven to be an effective method to reduce heat stress during peak summertime temperatures in swine facilities. Using misting or sprinkling to wet down pigs directly improves evaporative cooling efficiency since the process occurs at the skin's surface, rather than trying to cool down the pig indirectly by cooling the air. Think of how much cooler it feels when you step out of a pool on a breezy day. The same concept applies to evaporative cooling for pigs.

Researchers have clearly demonstrated that it is essential to consider both the physiology of the pig as well as the housing constraints when using misting as a strategy to improve performance during hot weather. They assessed the impact of synchronizing misting and meals on feed intake and meal duration. The experiment studied eighteen 70 kg crossbred grower-finisher pigs (all barrows) for 30 days to observe the effect that misting, synchronized with meals, had on performance.



Three misting strategies were compared: 1) misting just prior to a meal, 2) misting between meals and 3) no misting. The air was held at 30°C and 50% relative humidity. The assessment was based on two variables, feed intake and meal duration.

The results are summarized in Table 1.

Treatment	Feed intake (Kg)	Meal duration (h)
No mist	0,623	0.233 = 14 min.
Prior to meal	0,701	0.263 = 16 min.
Between meals	0,619	0.210 = 13 min.

Table 1.  
Effect of misting on feed intake and meal duration of grower-finisher pigs.

## CONSIDERATIONS

Pigs misted just prior to a meal had significantly greater feed intake (13%) and ate significantly longer (19%) compared to the pigs on the other treatments. The effects appear to be the result of cooling the pig, therefore reducing the temperature spike that normally occurs during an activity, such as a meal.

This moderation of the body temperature seems to allow the pig to eat for a greater length of time before thermoregulatory controls restrict the meal duration and, as a result, the amount consumed.

While the short length of the present experiment did not allow an assessment of the whole grow-finish phase, the researchers suggested that increased feed intake should benefit growth performance over the long term.

**Feed Intake**  
Better Growth Performance

**+13%**

Dealing with summertime heat is a great challenge for poultry. Under conditions of severe heat stress, poultry will have a reduced growth rate, decreased feed intake, poor feed conversion, decreased egg production, reduced hatchability rate, reduced egg shell quality, reduced egg size and reduced internal egg quality. Additionally, heat stress can cause increased mortality.

Dealing with summertime heat is a great challenge for poultry. All types and ages of poultry are susceptible to heat stress, but older poultry face a bigger risk. As poultry get older, they increase in size as well as insulation (feathering). This makes it harder for them to dissipate heat.

The most obvious sign of heat stress in poultry is panting. Poultry do not have sweat glands that can cool their skin, so instead they must use evaporation from their throat and respiratory system as a means of cooling themselves.

Panting takes a lot of energy which, in turn, generates an appreciable amount of body heat for poultry.

Ultimately, if poultry are not relieved of heat stress, their body temperature can continue to rise and increase the possibility of mortality. Fortunately there are several things you can do to help your home poultry flock handle heat stress.

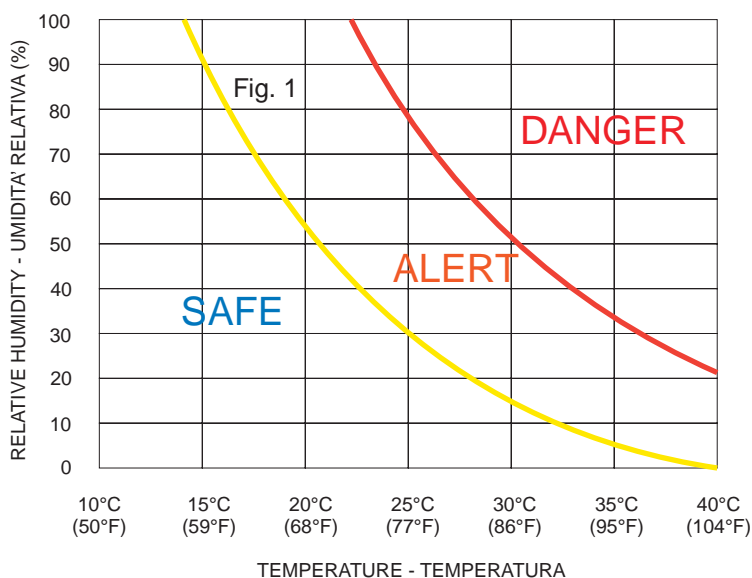
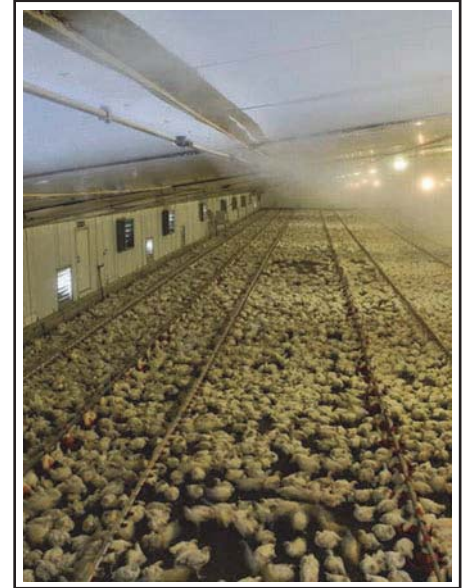


Fig 1. Thermal comfort zones.



## Effects of thermal stress on birds

Birds are able to regulate their body temperature by controlling heat loss through:

- their skin and feather cover
- evaporation by panting

This ability to thermoregulate is compromised if the birds are confined in close proximity to one another. This reduces their ability to lose heat by radiation, convection and conduction. Additionally, their ability to lose heat by evaporation is reduced if there is a high humidity. If the birds' ability to lose heat is reduced, their body temperature will rise and they will suffer from thermal stress, dehydration and exhaustion. This compromises their welfare and can lead to a reduction in meat quality by causing:

- alteration to the acid-base balance
- alteration to hydration state
- fatigue and depletion of energy reserves including liver and muscle glycogen loss

Ultimately, if body temperature rises by 4°C or more, the bird will die.

Placing poultry in a well-ventilated area will help reduce the incidence of heat stress. In addition, a misting/fogging system can be used in a well-ventilated area to help the birds cool themselves.

**Bird Loss**  
Due to high temperatures

**-99%**



Misting systems are used with enormous advantages to keep the right climate inside greenhouses of any dimension.

Misting systems (or Fog systems) play an important role in the greenhouse climatic control. Our systems are also used with enormous advantages to keep the right temperature and humidity in the environment, under conditions of forced or natural ventilation.

In summertime the quick evaporation of the fog will cool the greenhouse due to the principle of evaporative cooling, meanwhile it humidifies the environment in case of low relative humidity.

During the wintertime the system keeps the correct humidity rate preventing the dehydration of the crops caused by heating systems.

The environment produced by our system is appropriate for the most delicate crops (ex. the growing of young seedlings, the cultivation of tropical plants and in bloom plants) where it is not possible to use traditional spraying methods like standard spraying.



Our fog system works on a pressure of 1000 PSI (70 Bar) and it is designed to produce water droplets smaller than 5-10 microns diameter that, for their dwarfish size remains suspended in the air for a long time producing the fog effect.

## BENEFITS

The consequential benefits from the implement of fog systems in greenhouses can be resumed as follows:

- Increased general productivity
- Speeds up plants growth
- Keeping of constant humidity levels
- Less humidity need
- The correct micro-climate in any season
- Lower water consumption for the irrigation
- Less shading needed
- Growing of a reproduction plants stock in the greenhouse
- Suitable for chemical spreading (fertilizers, insecticides)



A modern fogging system that is an ideal way to apply nutrients, fertilizers etc and a perfect way to create the perfect environment.

Typically all growers have the problem of low humidity and high temperatures. Serious problems occur when the humidity in the greenhouse environment drops below 30% RH. Plants will suffer and typically slow or halt the growing process.

In fact, many greenhouses in arid conditions close down for the summer months until ambient temperatures will reduce to an acceptable level.

## LOW COST SYSTEMS

Very low cost of our systems are an important aspect of misting in greenhouse, if compared to other solutions for the climate control. The energy costs are low, simple and fast installations, considering that the systems are supplied in various solutions or D-I-Y Kits, or by the simple solutions of quick couplings. Our systems are designed to operate with very low costs and with a minimum maintenance.

## TOTAL CONTROL

Our systems also supply any electronically controlled task thanks to special devices like thermostats, hygrometers and remote timers.



Misting systems are used with enormous advantages, to keep the right humidity and temperature levels inside wine cellars.

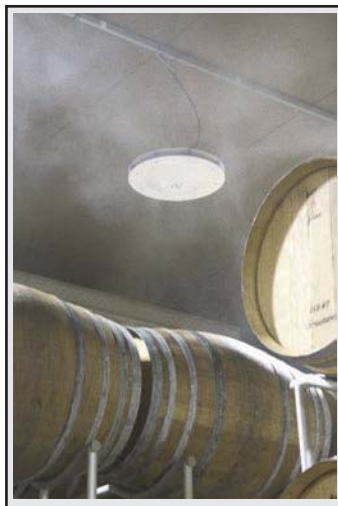
Wine cellars during the whole year or in some periods don't reach a good humidity level and are subject to various problems. A low humidity level is the main factor that causes natural evaporation of wine with the consequent loss of quality and money, not only for the product time and manpower due to the consequent essential re-filling of wine into barrels. Moreover wood barrels are subject to dehydration of their external board structure which compromises the quality and efficiency in same time.

Our fog systems resolve naturally and in economic way, all these problems by regulating the humidity in the wine cellars and keeps its temperature. The water sprayed by the system is atomized by special patented nozzles able to produce thin droplets of a diameter smaller than 5-10 microns, which are immediately absorbed by the air without wetting things and underlying on surfaces. The results are notable: barrels are kept efficient for longer, preserving the quality of the wood, allowing an excellent production and preventing the natural evaporation of the product. They allow such a costs saving that the system refunds the investment in few months.

## ADVANTAGES

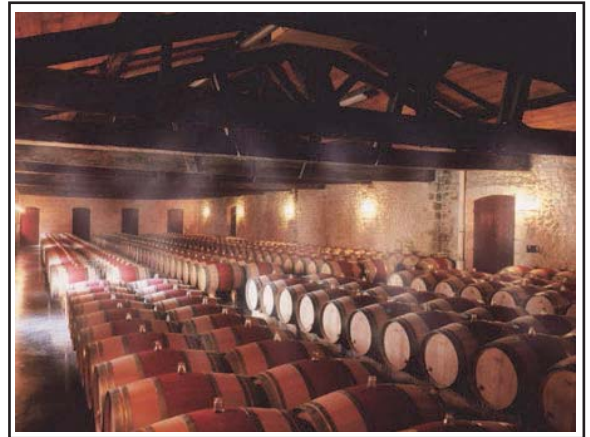
Benefits from the implement of fog systems in wine cellars are considerable:

- Increased general productivity
- Keeping of constant humidity levels
- Eliminates the dehydration of wood barrels
- It prevents the natural evaporation of the wine
- It reduces the costs of manpower of periodic refilling
- It helps to keep the right temperature
- It is economic if compared to other solutions



## TOTAL CONTROL

Our systems also supply several electronically controlled task thanks to special devices like thermostats, hygrometers and remote timers. In this way it is possible to keep the desired environment, during the whole day, independently from the external climatic conditions.



Barriques must be stored in a place protected from draughts and light. Optimal humidity level oscillates among 65% and the 85%. Under 65%, the risk of dehydration of barrels is very high while over the 85% they could develop fungus and moulds. A humidity level among 80% and 85% allows to reduce dramatically the "wine loss".

The entire structure of barrels takes advantage from a right humidity level. To prevent any risk of barrel dehydration and opening of their joints during the storage, it is recommended to avoid the airflow and the excessive ventilation in the wine cellars. With the right humidity level the barriques will feel "ease"!

A modern fog system required by winemakers who desire a greater return both in quantity and in quality for premium wines aged in wood barrels.

## LOW COST SYSTEMS

Very low cost of our systems are an important aspect of misting in wine cellars, if compared to other solutions for the climate control. The energy costs are low, simple and fast installations. Systems are supplied in various solutions or in D-I-Y Kits, with the simple solutions of quick couplings. Our systems are designed to operate with very low costs and with a minimum maintenance.



## HOW TO SAVE MONEY WITH HUMIDIFICATION

Our misting systems are easy to install and their payback is within few months. Winemakers report that wine loss is dramatically cut and the result are great savings in a very short time.

A brief calculation in support for the need to install COOLLINE MISTING for HUMIDIFICATION:

A typical Barrel contains 225 liters of wine.  
There is an evaporative loss of 15% annually, which comes to 33 liters.  
Taking Cost per liter of spirit as €10,00.  
The loss comes to €330 / barrel / year.  
So, if there are 100 barrels, there will be a total loss of €33000 per year.

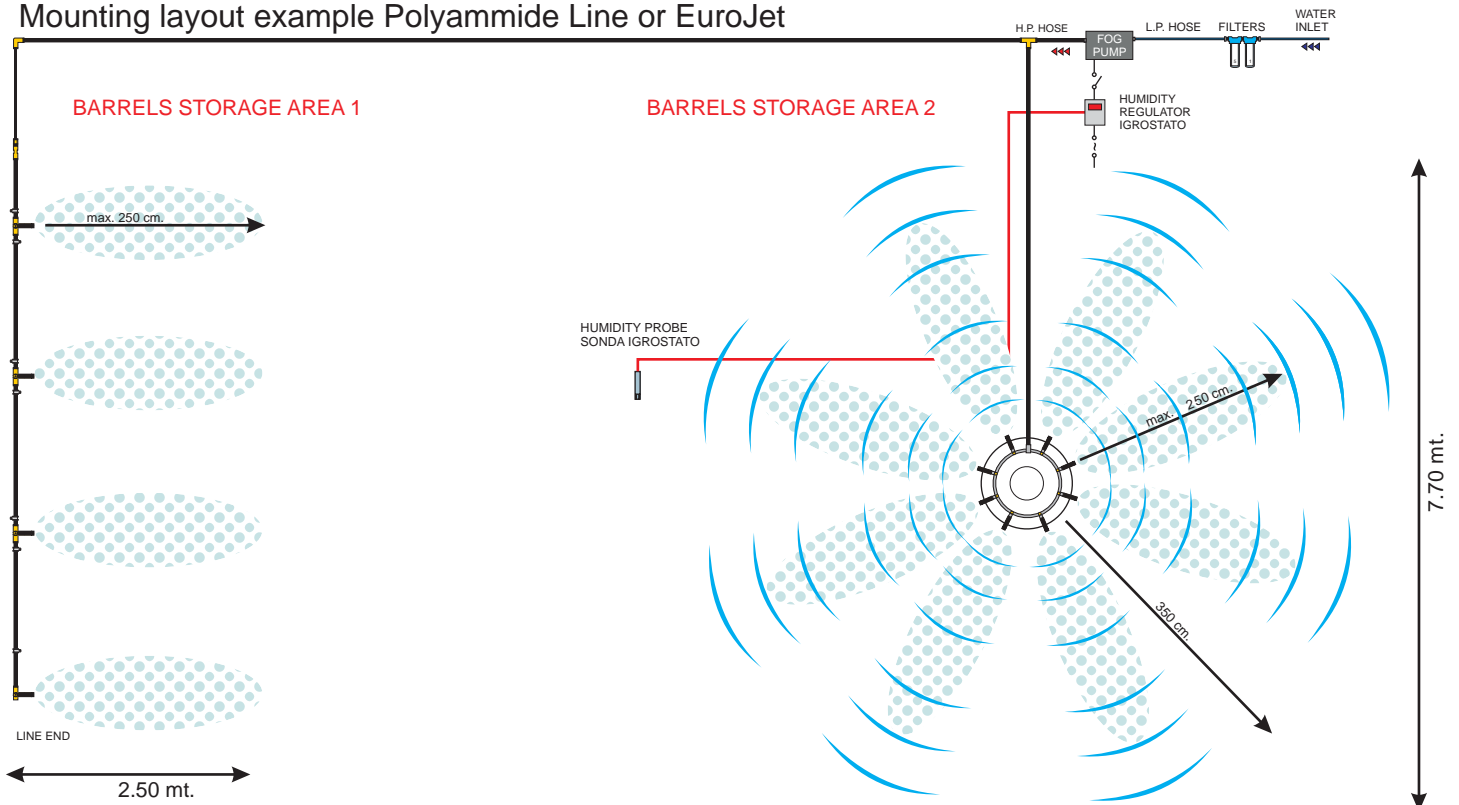
Considering the cost of our misting system and its running cost, the payback for the system is within first six months of its installation. And after that you start saving a very large substantial amount, every year, each year.

Aging time	Wine loss per standard	Sale price (example)	Money loss without	Standard saving with
	225l Barrel		Misting System	Misting System
(months)	(liters)	€ / liter	€ / Barrel	€ / Barrel
6	16,9	10	€168,75	€84,38
12	33,8	10	€337,50	€168,75
18	50,6	10	€506,25	€253,13
24	67,5	10	€675,00	€337,50
36	101,3	10	€1.012,50	€506,25
48	135,0	10	€1.350,00	€675,00
60	168,8	10	€1.687,50	€843,75

Example data - Tested with an average temperature of 20°C and RH lower than 60%

Wine cellar total saving		
(no. of barrels)		
10	20	40
€844	€1.688	€3.375
€1.688	€3.375	€6.750
€2.531	€5.063	€10.125
€3.375	€6.750	€13.500
€5.063	€10.125	€20.250
€6.750	€13.500	€27.000
€8.438	€16.875	€33.750

### Mounting layout example Polyamide Line or EuroJet



Misting system re-establishes to optimal values the humidity level, blocking dehydration process, keeping the freshness of food for longer time.

Fruit and vegetables are largely composed of water. The loss of freshness is mainly due to a quick dehydration of the product, further to the evaporation of the water. Water evaporates, due to a difference between its values contained into the vegetables and in the surrounding air. By means of a misting system, the humidity level in the air re-establishes its optimal values, blocking the dehydration process. Additionally, a fog system, following the adiabatic principle, reduces the temperatures and cools the products displayed at the counters.

Fish products are also subjects to the loss of freshness by dehydration, as they are composed of water in the measure higher than 70%. Moreover, the misting system can control the spread of smells in the surrounding areas.

Some types of meat, cold cuts and cheese are subjects to dehydration, too: our fog systems can restore naturally their suitable special microclimate, to preserve or keep seasoning them. Misting system can be easily assembled inside refrigerators and automatically checked by means of humidity control.

### BENEFITS

The advantages resulting from using our misting systems on fruit, vegetables, meat and fish products are:

- Dehydration block
- Decrease in the weight loss of the product
- Longer freshness
- The temperature cools naturally down
- It facilitates the process of ripeness of some kinds of fruit
- It controls the spread of odours

### APPLICATIONS DOMAINS

- Grocery department stores
- Butchery shop in supermarkets
- Fish markets
- Refrigerators and cold rooms
- Growth and seasoning rooms
- Fruit and vegetables wholesalers stocks
- Food processing industry
- Fishing boats and harvesting machines

Very interesting is the application on fruit and vegetables harvesting machines, either, to block the process of dehydration from their first harvest.



**Weight loss**

Result with ideal conditions

**-95%**

### HOW IT WORKS

Misting system periodically emit an ultra light mist of water directly onto the product, usually for 1 to 5 seconds every 10-15 minutes. Due to their teeny dimensions, these small water droplets evaporate without wetting, keeping humidity and coolness in the environment air, reducing dehydration and maintaining product weight and condition.





Like many other industries textiles processes can also obtain significant benefits from the environmental control system with a misting humidification system.

The yarns, until the transformation in tissue, must balance their own moisture and that contained in the surrounding air.

A lack of moisture in the air is unpleasantly noticeable.

Non air-conditioned factories or with a different humidification system frequently encounter production difficulties during embroidery, weaving and spinning yarns due to breakage and high static electricity levels.

The American Institute of Textile Technology found that wool, by increasing relative humidity from 60 to 70% during storage and processing, shows a 15% increase of its elasticity, which drastically reduces breakage during processing. Adjusting humidity levels with a Our misting system increases the tensile strength of all natural fibers, removes static electricity improving the workability of the yarns and fibers, controls the suspended residual and improves comfort of work areas.



## HUMIDITY AND YARN PROPERTIES

Water is an important part of yarns weight. About 7% of dry cotton weight is made by water, in a dry synthetic yarn such as Nylon it is 2-3%. The specific weight of wool is made by water up to 18%.

## DUST CONTROL

With our humidification systems it is possible to reduce the problem of suspended particulate. When the air is humidified, the yarn and so the dust absorb much moisture, this means increasing the weight of the dust particles, preventing them from spreading easily.

## STATIC ELECTRICITY

It is well known in the textile industry that the relative humidity, and hence the moisture regain (content) of textile fiber plays a very important role in the reduction of static electricity.

Virtually all textile fibers, when completely dry, have very high electrical resistances. However, as the relative humidity increases, the fibers absorb moisture and their electrical resistance decreases with a consequent reduction electrostatic charges generation.

## ADIABATIC COOLING

Textile industry can also benefit from the cooling effect provided by our high-pressure humidification system. The mist water droplets are quickly absorbed by the air, evaporation lowers summer temperatures and the result is a natural cooling system.

## WORK ENVIRONMENT

The problem of dry air is found especially during winter months when heating systems are used in working areas. The environment also affects our well-being and a work environment with dry air can cause several problems:

- Dry nose and eyes, burning irritation, pain
- Danger of infection, dry nostrils are very sensitive
- Creates headache after light dehydration
- Enhances evaporation and suspension of solvents, paints and glues
- High concentration of airborne dust
- Static Electricity
- Affects processing, without noticing it, because of frequent stoppages for repeated failure or manufacturing problems, work stress is increased

The right humidity level, usually between 55% and 70% RH offers as a result a better product quality with minimum downtime and production waste, increasing profits.



Cooline misting systems provide with extremely effective solutions to airborne dust suppression and air filtration.

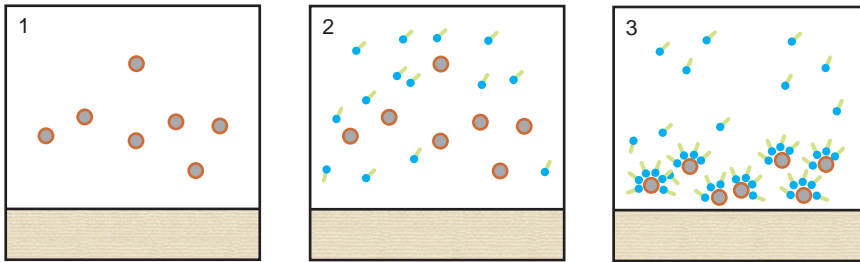
High pressure misting systems are the most appropriate solution for outdoor and indoor small and large areas, to suppress dust generated by materials handling or manufacturing processes in general.

Our Misting systems create a high concentration of ultra thin water droplets with an average diameter of 10 microns (with the possibility to add surfactants in some cases), having the ability to capture and suppress PM10 and smaller particles.

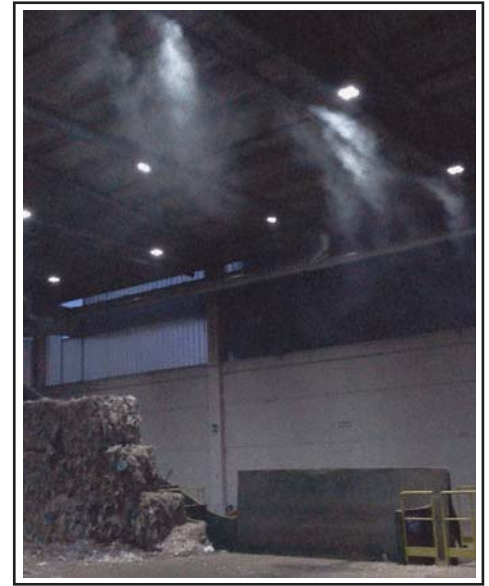
Surfactants instantly blanket suspended dust particles, increasing their weight and driving them to the ground.

Misting system helps removing effectively 0,1-1000 micron breathable dust particles: dust agglomerated in thick mist has few way of escape! Thanks to their modular structure, Our systems allow a very easy installation, unlike some other dust control technologies that require upgrading the production sites and consequently resulting expensive in costs and poorly flexible on the whole.

## Dust suppression process



1. Airborne particulates that are naturally exist in the environment or resulting from production processes.
2. Millions of ultra thin water droplets are atomized in the environment.
3. Droplets capture dusts particles, driving them to the ground.



Misting systems are installed in painting units, quarries, mines, stone crushers, gravity flow places to conveying belts, truck yard ramps, hoppers unloading, suppression of dust produced by steel mills and cement factories, ships loading and unloading points, ores, rocks and coal storages, recycling plants and inert processing. Units will be placed near materials gravity drop places, where the concentration of fugitive dust particles is larger in diffusion and in surface.

## BENEFITS

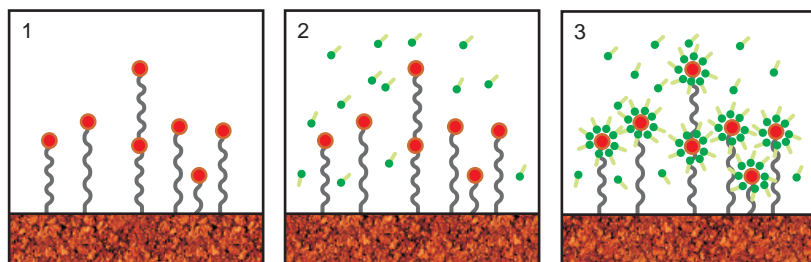
- Cooline misting system is customized and modular, as regards every particular situation, according to: the configuration of the emission point the typology of the machinery to treat, the quantity and quality of dust produced. Easiness and small-sized nozzles and tubing allow an easy-to-handle mounting near machinery to treat
- Mounting is easy and does not require neither special planner projects nor permits. While mounting a system, industrial plants do not require to be neither stopped nor modified.
- The working is completely automatic and does not need any special attention. Furthermore, in the event of production process stop, Cooline misting system is interrupted with resulting saving.
- Due to their special design, nozzles can be fully cleaned.
- Maintenance is minimum and unit components are not subjects to particular wear.
- It is possible to treat yards and heap storages.
- Surfactant is biodegradable.
- The required quantity of water used in dust suppression is low and the residual humidity on materials at the end of the process is quite null.



Coolline misting systems are the best tool for odour treatment and odour control in large areas, for industrial and commercial applications.

Our systems are effective on both solid and liquid waste and the process involves the atomization of neutralizing chemicals (to block the odor perception), odour absorbers (which modify the compounds that cause odors) or completely natural bio-neutralizers that modify the natural decomposition and prevent the formation of odour by means of biodegrading action.

## Odor control process



1. Environmental odors as a result of chemical or biological processes.
2. Millions of ultra thin water droplets are atomized in the environment.
3. The neutralizer droplets gather around the gas odor, eliminating it.



It is possible to operate in large outdoors and surround with the misting sprayers the entire landfill area or inside buildings where waste treatment processes occur, water treatment plants, livestock, chemical industry, petrochemical refineries.

## BENEFITS

The advantages are the low costs if compared to other odour control systems based on water atomization.

Energy costs are very low and the installation is very fast considering that the systems are supplied in various solutions, or pre-assembled with simple quick couplers.

## NATURAL ODOUR DESTRUCTIVE REAGENTS

Odour desctructive reagents are completely natural extracts of plants (essential oils and similar), these are not perfumes or masking agents but products that once sprayed close to odorous gases, absorb them and transforms them into biodegradable or non-odorous compounds. These products are environmentally friendly, non-toxic, non-polluting, non-flammable, non corrosive, biodegradable. They consist of elements also commonly used in food and cosmetics industry.

The system for the spreading of odor neutralizers, consists of a high pressure pump that pressurizes the liquid solution at 70 bar pressure, which is pushed by a Polyamide or Noxide tubing, and sprayed in the environment by patented mist nozzles.

Reagents in the form of thin mist with 10 microns diameter droplets, remain suspended in the air and then evaporate without wetting or dripping, making the system very efficient.

Neutralizer's molecules combines physically with the odour molecules and destroys them completely.



## 'KEM PUMPS: THE SPECIFIC SOLUTION

The new 'KEM' pumps are a specific solution to clean up and odour treatment. Pump materials in contact with fluids are particularly resistant to wear and corrosion and thus suitable to work in conditions of maximum stress. The result is no blockages and droplets at an uniform size to suppress odours even in the most challenging environments. Check our catalog for technical features.



Cooline fogging systems are the best solution for hvac condenser cooling.

Air conditioning systems perform at their worst in hot summer days, just when they are needed the most. The cooling capacity decreases by 14-15% and the power draw increases by 31%. The problem occurs in condensers which has to change vapors refrigerant into liquid forcing the air through the unit and absorbing heat from the refrigerant causing it to condense.

Applying water fogging system to air-cooled chillers can improve the efficiency under most of the working conditions, as the water mist could lower the air temperature entering the condenser.

On typical air-cooled chillers, a reduction in condenser air temperature of 6 °C will result 14% improvement in efficiency and 12°C about 25-30%.

Tests have shown that this power absorbing reduction is achievable, although it depends on external factors such as saturation level.

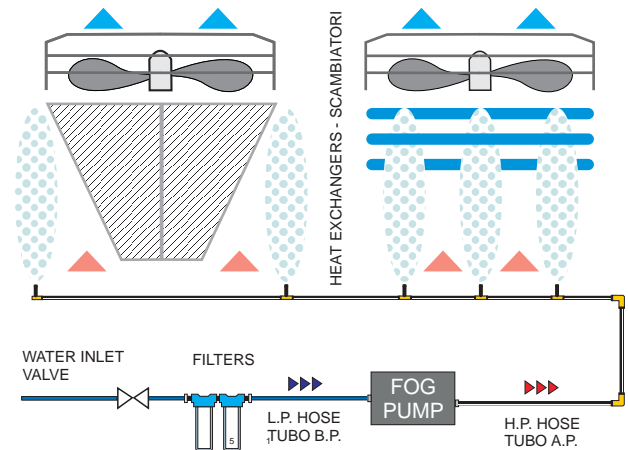
**Better performances  
and energy savings.**

## BENEFITS

- Air temperature outside the unit lowered by up to 12 °C
- Energy consumption decreased, as much as 30%
- Increase the efficiency of HVAC units up to 30%
- Life of the whole system extended
- Low start up and operating costs
- Quick installation



**efficiency**  
Lower energy consumption **+30%**



Schema installazione tipica Pre-cooling scambiatori  
Heat exchangers mounting layout example

### Evaporation efficiency

10 micron droplets have an area 3 times higher in relation to the volume of 30 micron droplets produced by low pressure systems. This means more efficiency and faster evaporation.



30  $\mu$



10  $\mu$





Paper production and woodworking, such as their storage, either, benefit from environment control.

### WOOD:

Wood is a hygroscopic material, that absorbs or releases water depending on the relative humidity.

In high relative humidity conditions, wood absorbs humidity, until obtaining the same level of the surrounding air.

During the 2/3rds of the year, the relative humidity is insufficient for manufacturing and varnishing processes. Misting systems maintain the proper moisture content inside the wood fibers and efficiently reduce many of the quality problems associated with woodworking, preventing: shrinkage, swelling, deformations, splits and cracks. These situations are caused by different humidity values, varnish diffusion problems, static electricity and dust.

A relative humidity in the measure of 50-55% RH is of great importance:

- The dimensions of wood hold steady
- Manufacturing process is more efficient
- Increase in processing speed
- Increase in tool life
- Shorter production stops

The result is a higher quality of the product with higher profit margin. Dust explosions and fire considerably reduce, by increasing humidity levels.

Airborne dust can be reduced in the measure of more than 70% and in some cases totally eliminated.

In addition, the resulting evaporative cooling guarantees a better working environment and a well-being feeling more effective than the conventional cooling methods.



Humidification systems:  
low energy consumption, minimum operating costs, low noise level.

### PAPER:

The paper-based products gain and lose moisture rapidly: for this reason a properly stabilized humidity level is crucial to obtain an excellent steady quality final product.

A proper humidity level is very important to the entire printing process.

As far as paper, board and other cellulose-based products, the best climate is 20-21°C and a relative humidity moving from 50% to 55%. Heating and heat produced by machinery themselves create, during winter months mainly, critical levels of humidity in the environment and consequently serious complications to the manufacturing process.



### BENEFITS FOR PAPER MILLS

- Increase in output speed
- Removal of static electricity
- Minimization of scraps and downtime
- Reduction in curl and deformations
- Improvement in quality folding mechanical process as regards paper and board
- Improvement in flexibility and dimensional stability
- Better ink transfer
- Dust reduction
- Better climate conditions