Australia...

...Do you want to get rid of the Cooling Towers?

Think LU-VE DRY & SPRAY

100% Cooling Tower

40% Hybrid Cooler

10% LU-VE DRY & SPRAY

Annual Water Consumption Comparison**

** FOR A GENERIC INDUSTRIAL INSTALLATION (ON AVERAGE FROM 3 TO 10 TIMES LESS THAN A TRADITIONAL COOLING TOWER)
WHO IS LU-VE?

The Lu-Ve Group is a world class manufacturing organisation that provides high quality dry cooler products with high Hygiene standards (eliminating the risk of legionella); additionally it counts with performance certification through Eurovent to ensure that the customer gets a product that performs to their thermal load requirements. There is significant investment in third party quality assurance.

The Lu-Ve group has a proven reputation for providing equipment for critical applications. When you see the global & local reference list, which includes organisations like Mercedes Benz, Porsche, Origin Australia, Telstra and Manningham City Council this clearly demonstrates the Lu-Ve group’s success with dry cooler products and applications.

The Dry & Spray Dry Cooler has a successful track record of performance. It was developed in co-operation with the “Polytechnic of Milan” along with extensive research and development by the Lu-Ve group to create a world class product.

When you choose to work with the Lu-Ve group, you are working with a real manufacturing company that has the capacity to provide the product to meet your application and has comprehensive factory testing available for your use, and is further able to meet all relevant standards. Please feel welcome to visit our web site: www.luve.it

Established in Italy in1928

Established in Australia1994
WHY LU-VE?

Certifications...

The first step towards providing guarantees to users is without doubt certification, which represents a safeguard for the final customer.

In 2000, LU-VE was the first company in Europe to achieve then the new important, “Certify All” certification for:

The entire range of condensers (March 2000).

The entire range of dry coolers (August 2000).

The entire range of industrial unit coolers (October 2000).

Eurovent verifies all the information given in the catalogue, such as:

- Power rating.
- Air quantity.
- Energy consumption.
- Noise level.
- Construction features


LU-VE has also obtained conformity with numerous other Standards and Directives, such as:

- European directives currently in vigor which permit the use of the CE mark.
- European machine directives.
- The Russian GOST certification.
- Politecnico di Milano certification for the Dry and Spray System.

The conformity certificates for our products can be downloaded from our website www.luve.it
WHAT IS DRY & SPRAY?

The Dry & Spray technology is the combination of the intelligent control of:

- Airflow
- Water Spray System (pressure and flow)
- Temperatures
- Unit performance considering ambient conditions

The products in the DRY and SPRAY series work as traditional dry coolers (or condensers) with dry fins for as long as the ambient air temperature is low enough to maintain cooling power and the temperature of the cooled liquid (or the condensation pressure) at the projected conditions (DRY operation).

However, once the ambient air temperature becomes too high to maintain cooling capacity and cooled liquid temperature at the projected conditions, the system automatically starts to spray the required amount of water onto the fins (WET operation).

The evaporation of the water sprayed on the fins dramatically increases the capacity of the unit, allowing it to maintain the temperature of the cooled liquid at the projected conditions at any ambient air temperatures.

This innovative technology also permits as a function of the wet bulb ambient air temperature, a cooled liquid temperature equal to or lower than the dry bulb ambient air temperature, with significant energy advantages (COP).

The ambient transition temperature from DRY operation to SPRAY operation is a design option and is generally set at around 20 °C.

It should be stressed that most of the water sprayed onto the fins evaporates off. This means that it is not necessary to fit a drain tray beneath the unit to collect and recirculate the sprayed water, with enormous health benefits.

This system has been a distinctive element of the company for more than a decade, with many installations in numerous countries. The new series is the result of long research activity and testing carried out in the LU-VE laboratories under the supervision of the Dipartimento di Energetica del Politecnico di Milano.

This study concentrated on various aspects:

- Improving nebulization efficiency and therefore increasing performance.
- Analyzing health aspects in order to offer a product with maximum guarantees.
- Studying the best combination of materials to be used and the quality of water to be nebulized in order to guarantee the highest level of term reliability.

Figure above represents the cumulative diagram of temperature distribution in a generic central European location. The blue area represents the portion of the year in which the units operates in Spray mode (930 hours). The yellow area shows the DRY operation period which represents the much greater part of the year.
HOW DO WE GET SO FAR?
RESEARCH & DEVELOPMENT

The research program has achieved the ambitious goal of developing an innovative product capable of combining the merits of DRY equipment (high efficiency exchange surfaces and minimum maintenance requirements) with the merits of evaporative units which are able to lower the temperature of the water to be cooled to levels close to the ambient air wet bulb temperature.

The factors which contributed to the successful attainment of the research goal were:

- The use of heat exchangers with high efficiency aluminum fins in both wet and dry applications.
- The method of water injection in a total loss system (without recirculation). This was the most critical part of the research as it required a solution which was capable of evaporating a very large part of the water sprayed on the fins, thus avoiding the necessity of having a drain tray for the recovery of water. The new configuration of the nebulizing nozzles allows very high performance to be reached.
- The Interactive control system which regulates the injection of water depending on the operating conditions, minimizing water consumption to the point of automatically shutting off the supply when DRY operation is able to render the required performance (a situation which is present for the greater part of the year).

The principle theoretical and experimental activities carried out were:

- Use of CFD (Computational Fluid Dynamics) codes for the study of the Thermofluid dynamic processes of the heat exchangers.
- Analysis of the process of atomization of the water sprayed on the fins and verification of the experimental performance of the unit.
- Experimental analysis in the laboratories of the Politecnico di Milano concerning the behavior of the materials of the exchangers as a function of the quality of the water sprayed.
- Experimental analyses at the Istituto Zooprofilattico di Pavia concerning bacterial contamination of sprayed water, in particular that caused by legionella.

The first two pictures (top to bottom) in the side of this sheet display an Experimental Analysis at the laboratories of the Politecnico di Milano on water quality and resistance of the materials, following by the Analysis Results on the fins using CFD software, next an Anemometric Analysis using doppler laser and finally a Dry & Spray testing Station at Lu-Ve Headquarters Italy.
HOW DOES THE SYSTEM WORK?

DRY and SPRAY equipment has these main components:

**Liquid cooler** (or condenser) with high efficiency heat exchangers with aluminum fins coated with a special material specifically for optimum performance with wet surfaces.

**Ramps with special atomization nozzles** for the distribution of water onto the surface of the coils.

**Solenoid valves** to open and close the water distribution ramps depending on the thermal load, temperature and humidity of the ambient air.

A sophisticated **system of electronic control** which optimizes the operation of the DRY and SPRAY system, varying according to the thermal load of the liquid cooler (or condenser) and the ambient air temperature, completely managing water injection and fan operation.

**During DRY operation**, fan rotation speed is regulated to the essentials with a consequent reduction of energy consumption and sound level.

During SPRAY function, the quantity of water to be sprayed onto the coils is regulated to the essentials with a consequent reduction of water consumption. This regulation operates in parallel with the regulation of the air velocity, which enables the consumption of water and electricity to be minimized at the same time.

**Water Evaporation**, during spray function not all the water is going to get evaporated, this is going to be related to nebulization efficiency selected during the unit design, the water not evaporated will be ending on the floor and because it is clean water can be disposed using the rain drains or can be recycle for toilets, gardening...

**Additional components**
Special equipment to treat the water to be sprayed onto the coils during SPRAY operation, if necessary, please check the water quality in the area, in most cases Melbourne and Sydney Tap Water quality already meets the LuVe requirements.

An special high pressure pump to supply the distribution ramps with water for the surface of the coils. These components must be installed in an enclosed place with a temperature above 5 °C. Their supply from LUVE is optional.
• WHY DRY & SPRAY?

HEALTH ASPECT...

Great attention has been paid to this aspect in order to offer a product which can guarantee absolute reliability. The principle aspects which characterize this product are:

Absence of recirculation of the atomized water; there is no tank to collect atomized water which once sprayed onto the fins, evaporates (for the most part) or rolls down the fins and falls to the ground where it is disposed as rain water.

The sprayed water quality requirements avoid the possible formation of any deposits or biofilm, typical areas for the formation of bacterial colonies.

Elimination of any air dispersal of water droplets; to arrive at this result, a solution was adopted providing the injection of finely atomized water at the temperature of the mains supply, upstream of the heat exchanger coils; checking in every operating condition that the relationship between the air flow and water flow is always above the values which could lead to saturation.

In fact, the optimization of the system means that the values of the relative humidity of the air at the outlet of the coils never exceed 65%. This therefore eliminates any possibility of the presence of water in liquid form. This projected data has been verified by numerous experimental tests, conducted under all kinds of conditions.

Specific tests were carried out to verify the absence of water droplet drag out at the fan outlets, using a sophisticated particle counter. Results show that even in critical conditions, the percentage of water droplets present in the air flow is negligible, less than 0.01% of the quantity injected.

The water supplied by the SPRAY system is drinking water and therefore by definition cannot be water that has been contaminated by bacteria (legionella) dangerous to health.

The water inside the racks of the SPRAY system could if the system remains unused, warm up due to the heat of the sun. From the specific tests carried out by the “Istituto Zooprofilattico of Pavia” (Italy), it clearly emerges that the softened water treated in accordance with LU-VE specifications, does not have any proliferation of legionella pneumophila. An automatic drain system for the racks is available at the request of the client for even greater safety.

In confirmation of its quality and safety, the DRY and SPRAY system has been awarded the Health Safety Certificate issued by the prestigious Domatec Laboratory in Germany (Above image).

Should there ever be any uncertainty about possible bacterial contamination of the drinking water supply to the system, LU-VE can provide upon request a kit including a special UV lamp capable of guaranteeing sterilization of the water.
WHY DRY & SPRAY?

ADVANTAGES...

Using DRY and SPRAY liquid coolers and condensers as an alternative to the traditional cooling towers and evaporative condensers has the following important advantages:

- Water consumption in SPRAY operation is limited to brief periods of the year. For long periods of the year, during DRY operation, water is not used; therefore, the total annual water consumption on average is from 3 to 10 times less than the traditional cooling tower.

- Absence of health hazards, as a result of not having a drain tray full of stagnant warm water beneath the coils. This excludes the possibility of any build-up of impurities in the water, above all any risk of environmental contamination (NO LEGIONELLA).

- Plant operation without any water drops being released into the environment and without the formation of ugly vapour plumes.

- Low energy consumption. Quiet operation.

- Amortization of the unit in a short time period.

- Possibility of high thermal capacity through free cooling.

The essential advantages deriving from the use of DRY and SPRAY liquid coolers and condensers as an alternative to traditional liquid coolers and condensers with dry surfaces are:

- Important overall reductions in the space taken up by the equipment (up to 1/3).

- Important air flow reduction (up to 1/3).

- Important energy consumption reduction (up to 1/3).

- Quieter running.

- The liquid can be cooled to a temperature below that of the ambient air dry bulb.
REFERENCES IN AUSTRALIA...

Manningham City Council Building
Melbourne - Doncaster
COGENERATION HEAT REJECTION 1500KW.
COMMISSIONED 2012

Manquarie Park
Sydney
AIR CONDITIONING HEAT
REJECTION 1000KW.
COMMISSIONED 2009
Think Forward…
Lu-Ve Whisperers

Overall average noise reduction by 5 dB(A).

Noise Reduction of Existing Installation

15% Capacity. Maximization in case of noise level space limitation.

11% Foot Print Recirculation.

Dimension is half of similar systems,
Whisperer Height: half of fan diameter.
All our products are manufactured from high quality materials and undergo severe final tests. They are therefore guaranteed against any construction defect for a period of two years. Damage caused by corrosive agents is excluded. Components or units found to be defective must be returned to our factory with prepaid freight where they will be checked and, depending on our judgement, replaced or repaired. We take no responsibility for leaks or damage caused by the use or misuse of our products. No guarantee is granted in the event of misuse or incorrect installation of the products. We reserve the right to make modifications in order to improve the performance or appearance of our products at any time without notice and without any obligation to previous production.

**please contact lu-ve for all the conditions.**