

AEROEVAPORATORI INDUSTRIALI
INDUSTRIAL UNIT COOLERS
EVAPORATEURS INDUSTRIELS
INDUSTRIE LUFTKÜHLER
EVAPORADORES INDUSTRIALES
ПРОМЫШЛЕННЫЕ
ВОЗДУХООХЛАДИТЕЛИ
PRZEMYSŁOWE CHŁODNICE POWIETRZA

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Heat exchangers
for industrial and commercial refrigeration,
air conditioning
and industrial applications.



LU-VE S.p.A. is the holding company of **LU-VE** Group. In 1985 **LU-VE** S.p.A. acquired Contardo S.p.A., established in 1928. Production began in 1986.

LU-VE quickly made its mark thanks to high standards of quality, new solutions designed in its own laboratories and to the care taken with the appearance of its products. (Beautiful outside - Revolutionary inside).

LU-VE WAS THE FIRST COMPANY IN THE WORLD TO APPLY AVANT-GARDE SOLUTIONS TO COMMERCIAL AND INDUSTRIAL REFRIGERATION:

- GROOVED TUBE TECHNOLOGY
- SPECIALIZED HEAT EXCHANGE SURFACES
- CERTIFIED PERFORMANCE LEVELS
- INNOVATIVE MATERIALS AND COLOURS
- ADVANCED DESIGN.

The success of **LU-VE** in the international market stems from its research and development policy, its great respect for the environment and its rigorous ethical and commercial principles.

In 2000, **LU-VE** was the first company in Europe to attain the prestigious **Eurovent "Certify-All"** certification for the entire range of its products: unit coolers, condensers and dry coolers.

LU-VE and the Group have introduced new ways of conceiving and constructing products for refrigeration, air conditioning and industrial applications, creating new technologies which have then gone on to become the benchmark for the entire industry.



INDUSTRIAL UNIT COOLERS

LU-VE has a vast range of standard industrial unit coolers which can satisfy most industrial refrigeration installation requirements.

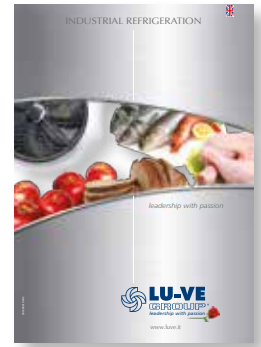
One of LU-VE's strengths is its ability to help both the refrigeration engineer and the designer to choose the best product for a specific refrigeration installation.

The industrial unit coolers, designed for the conservation of fresh or frozen goods and flash freezing/temperature reduction, are subdivided into:

- Cubic unit coolers for cold rooms (CHS-LHS-FHC 62/71).
- Dual discharge unit coolers for cold rooms (CDH).
- Special unit coolers for freezing (FF).
- Special unit coolers.**

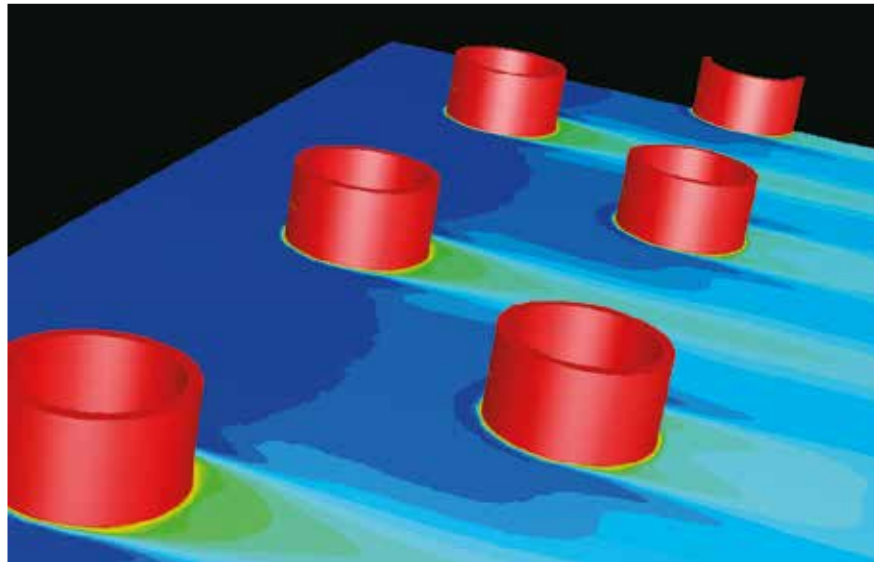
All the ranges have these special characteristics of size and function:

- extremely high efficiency of heat transfer.
- reduced dehumidification of the cold room.
- reduced frost formation.
- long air throw.
- extremely low internal volume of the circuit.
- low noise level.
- low energy consumption.
- greatly reduced footprint.

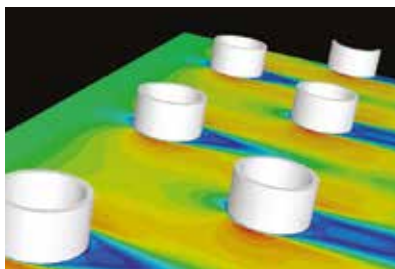


** Special Solutions from LU-VE for specific requirements can be found in the "INDUSTRIAL REFRIGERATION" document.

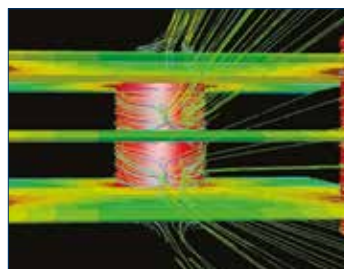
RESEARCH AND DEVELOPMENT



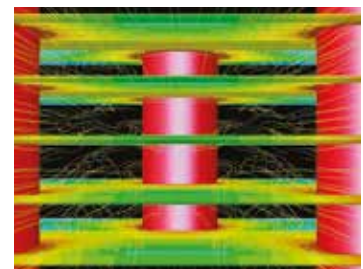
Temperature field - CFD output



Velocities - CFD output



Path lines - CFD output



Path lines - CFD output

CFD (Computational Fluid Dynamics)

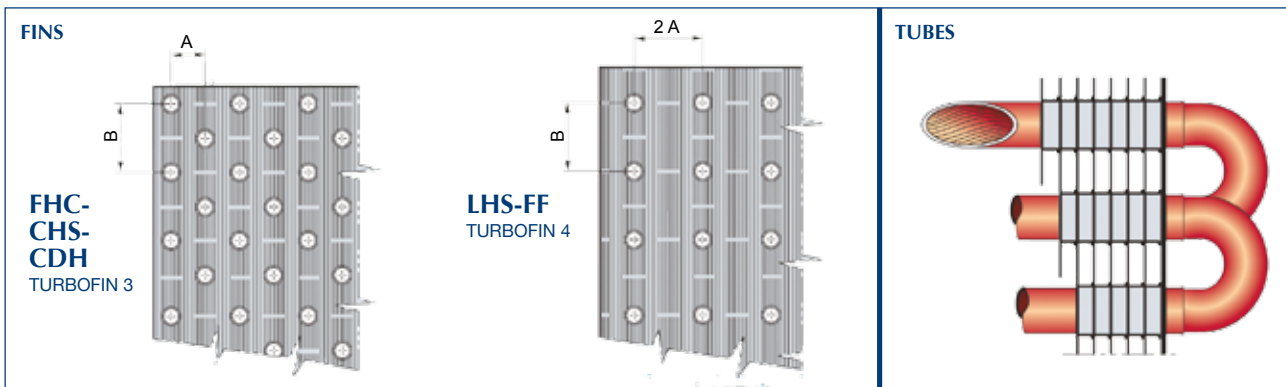
CFD codes have been used in the study of thermo fluid dynamic processes in heat exchangers.

When applied to finned heat exchangers, this permits better understanding of the fluid dynamic phenomena and the heat transfer processes.

As a result of this, the heat transfer characteristics of the geometries used (already of a very high standard), have been steadily improved by constantly renewing

the layers of air in contact with the fins and generating greater turbulence from the louvers. The more uniform air flow also prevents the deposition of humidity on the fins and consequently stops frost formation.

Results of CFD analyses are regularly confirmed by experimental tests carried out in the LU-VE laboratory.



HEAT EXCHANGER

The heat exchanger has been developed specifically for different applications in order to obtain the best possible capacity/cost ratio.

TURBOFIN 3 (FHC-CHS-CDH)

FHC, CHS and CDH heat exchangers, with staggered rows, are fitted with Turbofin 3 fins. They have an optimal ratio of secondary fin surface to primary tube surface which enables very high unit capacities to be reached. The thick aluminum fins have been optimally configured for industrial refrigeration applications.



TURBOFIN 4 (LHS-FF)

LHS and FF heat exchangers, with in-line rows, are fitted with Turbofin 4 fins. They have a high ratio of secondary fin surface to primary tube surface which (at equal primary surface) allows them to reach higher capacities than CHS units. The high-thickness aluminium fins have a surface area that is twice that of CHS unit coolers and are specially designed for applications where there is a lot of frost formation.

TUBES

The heat exchangers have high-efficiency copper tubes with internal helical grooves, low internal circuit volume and therefore reduced refrigerant charge.

FIN PITCH

Specific fin pitches are provided to satisfy the requirements for refrigeration at high, medium and low temperatures in different humidity conditions, by type of application:

- conservation at positive temperatures: 4.5 and 6.0 mm
- conservation at negative temperatures: 7.5 and 10.0 mm
- freezing: 10.0 and 12.0 mm.

DEFROST

Various types are available to ensure efficient and effective defrost depending on operating conditions (TC= Room Temperature):

- TC > 2°C air defrost (N)
- TC > -2°C water defrost (SB)
- TC > -35°C electric defrost (E)
- TC > -35°C hot gas defrost for coil and electric in the drain tray (G)
- TC > -35°C hot gas defrost for coil and drain tray (GB)

The stainless steel electric heaters, connected to the junction box, provide efficient and rapid defrost of the coil. For especially severe working conditions more powerful electric defrost is available, as is an electric heater for the fan shroud.

FAN MOTORS

The fans, balanced statically and dynamically, have integral thermal protection and are lubricated for life. They feature high efficiency and low consumption. Voltage: 3 ~ 400 V 50 Hz (Δ/λ), IP54, class F. EC fans are available on request, with special electrical motor.

CASING

Specially designed corrosion-resistant galvanized steel casing with epoxy-polyester powder coating.

FAN SHROUD AND GUARD

The guards comply with the most severe safety standards to guarantee maximum protection.

The optimized matching of fan shroud and guard gives:

- Uniform unidirectional air flow.
- Long air throw.

PRESSURE GAUGE VALVE

This measures evaporation pressure at the outlet of the unit cooler and checks that the machine is functioning correctly.

TESTING

The coil is tested at appropriate pressure, carefully degreased and dried with dry air.

CONSTRUCTION VARIANTS

Versions are also available for: Glycol-NH₃-CO₂.

- Alupaint fins and copper fins for fin pitch 4.5-6.0-7.5 mm.
- Stainless steel tubes.
- Hinged fan shrouds.
- Fan motor isolators.
- Wired fans.
- Special electric motors.
- Stainless steel casing.
- Insulated drain trays (recommended for TC < -20 °C).
- Device to reduce defrost time and energy consumption.
- Electric heaters for fan shroud mouth.
- Electric heaters for air reheat.
- Hot water or hot gas circuits for air reheat.
- Inspection-accessible coils for cleaning.

STANDARDS

The products are provided for incorporation in machines as defined in the EC Machine Directive 2006/42/CE and subsequent modifications.



- Directive 2014/29/CE and subsequent modifications, Electromagnetic Compatibility.
- Directive 2014/35/CE Low tension.
- PED 2014/68/CE.

PERFORMANCE

The capacities of unit coolers are tested in dry atmosphere (sensible heat) according to ENV 328. Total capacities (sensible heat plus latent heat) indicated in the catalogue (R404A) for the usual applications in dry atmosphere refer to a room temperature of 2.5°C and evaporating temperature of -7,5 °C (DT1=10K). They correspond to dry atmosphere capacities multiplied by a factor of 1.25 (latent heat factor) to take into account the increase of capacity (latent heat) caused by the condensation of water vapour on the surfaces of the unit cooler. This factor

depends on the operating conditions of the cold room. It increases for high room temperatures and decreases for low room temperatures as indicated in the table.

| Air inlet temperature | Latent heat factor |
|-----------------------|--------------------|
| 10 °C | 1,35 |
| 2,5 °C | 1,25 |
| 0 °C | 1,15 |
| -18 °C | 1,05 |
| -25 °C | 1,01 |

EUROVENT CERTIFICATION

- Capacity (ENV 328).
- Air quantity.
- Fan motor power draw.
- External surfaces.
- Energy class.



SELECTION

A Windows software programme is available for unit selection (REFRIGER®).



ENERGY MANAGEMENT SYSTEM

The LU-VE energy management system conforms to UNI CEI EN 50001:2011.



QUALITY ASSURANCE

LU-VE is certified to UNI EN ISO 9001:2008, which is the most important Quality Assurance qualification, covering Development, Testing, Production method and Inspection procedures.



2 YEAR GUARANTEE

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.

PACKING

Products are packed in recyclable materials (RESY).





PLUG & SAVE

This is the integrated solution which combines big energy savings and respect for the environment. From today the direct expansion unit coolers are also available in the PLUG&SAVE version which includes the electronic valve and electronic control unit already fitted and wired up.

• Important energy savings

Tests carried out in supermarkets in standard conditions have registered **energy consumption reductions of up to 25% on the entire refrigeration system.**

• Absolute protection

The unit cooler is fitted with an electronic control unit (sealed into a special resin overmoulding) to regulate the valve. This is a construction technique developed for the automotive industry which guarantees performance even in the demanding operating conditions of low temperatures.

• Saving installation time

The solution proposed by LU-VE drastically reduces the installation time of the electronic control units, which in traditional systems have to be positioned outside the cold room with a consequent increase of labour time.

SELECTION

See **REFRIGER®**.

• Compatible with all systems and easy to programme

The PLUG&SAVE version of the unit cooler is compatible with any and all other electronic systems commonly used for the management of refrigeration plant. It can be used with 24 different refrigerants, including CO2 and the special working pressures required.

• Pre-defined working parameters and Modbus connection

All working parameters are pre-defined and are simple to select on an easy-to-read display.

The only remaining setting actions required at the moment of installation are for:

- Refrigerant
- Superheating
- Function mode, choosing between high and low temperature.

PLUG&SAVE is equipped with MODBUS serial communications protocol.



The direct expansion unit coolers are available with electronic valve and electronic control unit already fitted and wired up (see ReFriger®).



Display for setting working parameters.

Electronic direct expansion valve and electronic control unit.

UNIT COOLERS FOR CO₂

In the refrigeration industry, the utilization of CO₂ fluid is becoming more and more popular as a radical solution to eliminate the greenhouse effect caused by halogenated hydrocarbons in the HFC category.

The GWP (Global Warming Potential) of CO₂ is in fact very low compared to HFCs (1 against several thousands); also, CO₂ does not present any problems of toxicity, flammability nor of impact on the ozone layer.

CO₂ is significantly different from all the traditional HFCs (R404A, R507,...) and it poses particular problems for heat exchanger designers; in addition, the appropriate choice of heat exchanger technology is fundamentally important in the realization of high efficiency CO₂ plants.

For these reasons, a specific project between LU-VE, Politecnico di Milano and some important customers was carried out in order to define the ideal product configuration to get the best out of the specific characteristics of this refrigerant and to obtain interesting benefits from it. Over time, LU-VE has in fact developed a line of products specifically for CO₂ unit coolers and, in an even more daring project, for sophisticated gas coolers which in transcritical CO₂ plants substitute traditional condensers in HFC installations.

Today LU-VE can state that it has the highest technical level and greatest experience in this particular field. Numerous unit coolers and gas coolers have been installed in different countries in recent years.

CO₂

FHC



CHS
LHS



CDH



UNIT COOLERS

A specific configuration with small diameter copper tubes and specialized fin geometry has been developed.

The use of copper tubes makes it possible to obtain high product efficiency and low CO₂ content.

Special circuiting for CO₂ has been designed for each model, taking into account the thermo-physical properties of CO₂ which are favorable to elevated heat transfer performance and low internal pressure drop.

The capacity of a CO₂ unit cooler is in the region of +8% compared to a corresponding model working with R404A (Tevap -8 °C) and about +12% compared to a corresponding model working with R404A (Tevap -30 °C).

The maximum operating pressure has the high value of 45 bar for the entire range.

PRODUCT RANGE

- Industrial cubic CHS, LHS, FHC.
- Industrial dual discharge CDH.

GLYCOL - Air coolers for Glycol Water

HEAT EXCHANGERS

The high-efficiency heat exchangers that characterize the TURBOCOOLER® range of air coolers are manufactured with the copper tubes and with the new aluminium fins.

COMMON DATA

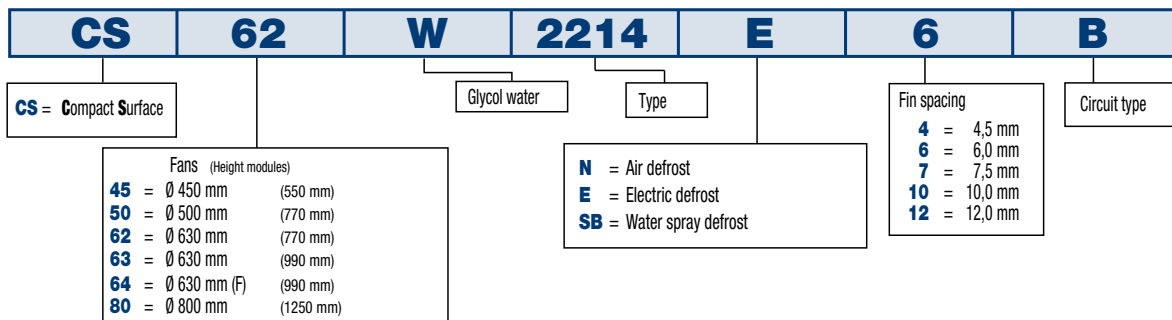
All other construction characteristics and dimensions are the same as stated for standard unit coolers.

GLYCOL

TURBOCOOLER®
by LU-VE



Ordering example



NH3 - Unit coolers for ammonia

HEAT EXCHANGERS

The high efficiency heat exchangers that characterize the ranges are manufactured with stainless steel tubes and with aluminium fins.

COMMON DATA

All other construction characteristics and dimensions are the same as stated for standard unit coolers.

NH₃

Ordering example

