

**REFRION**  
COOL GENERATION

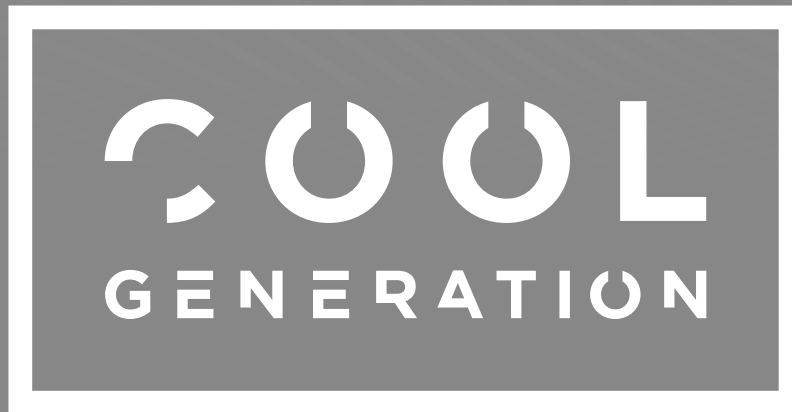
**ECOOLER**



Member of



# REFRION



Refrion is a **European market leader** in the **industrial refrigeration sector, data centres and the ventilated equipment sector**. Founded in 2002, the group employs over **100 professionals** in the manufacture of **Dry Coolers, condensers and heat exchangers**.

We have chosen to be a future-proof company, conducting our business in a way that **fully respects natural resources**. That's because we believe that caring for the planet isn't just common sense - it's a necessity.

We have opted for **progress that fully** respects the environment in which we live. That's why we were the first to introduce **an innovation that has revolutionised** the industrial refrigeration and data centre sectors: the **adiabatic system**. Adopting this **intelligent solution** allows water savings of up to 95% and a net reduction of **energy consumption and CO<sup>2</sup> emissions**.

**That's why Refrion is the First for Adiabatics.**  
**That's why Refrion is part of the COOL GENERATION.**

# WHY REFRION ECOOLER

## THE ECO-FRIENDLY ADIABATIC PRODUCT RANGE

Units designed to meet the increasing demand for free-cooling applications, they optimise the benefits coming from the adiabatic saturation of the air adopting a water recirculation system and electronically commutated fans. The water and power consumption are thus minimised, resulting in Energy Ratio maximisation and the possibility to use “free-cooling” applications throughout all the year.



## REFERENCE STANDARDS / EU DIRECTIVES

### EN 1048

(Air Cooled Liquid Coolers Performances)

### EN 378

(Safety and Environmental requirements)

### EN 60204-1

(Safety - Electrical equipment)

### EN 13487

(Sound Measurements)

### EN ISO 13857

(Fan Guards)

### CSA C22.2

No. 236-11- UL 1995

### EN ISO 12944

(Corrosion protection of the steel structure)



### MD DIRECTIVE 2006/42/EC

(Machinery Directive)

### PED DIRECTIVE 2014/68/EU

(Pressure Equipments Directive)

### EMC DIRECTIVE 2014/30/EU

(Electromagnetic Compatibility Directive)

### LVD DIRECTIVE 2014/35/EU

(Low voltage Directive)

### ERP DIRECTIVE 2009/125/EC

(Eco-Design Directive)



## HEAT EXCHANGERS

### WITH OVAL SECTION TUBES:

12 mm nominal diameter; staggered pitch pattern and high-efficiency fins.

### WITH ROUND SECTION TUBES:

12 mm or with 5/8" nominal diameter, staggered pitch pattern and high-efficiency fins. Standard fin pitch: 2.1 mm.

The pressure vessel is designed for a PS = 10 bar and a TS = 110 °C in accordance with EC Pressure Equipment Directive 2014/68/EU.



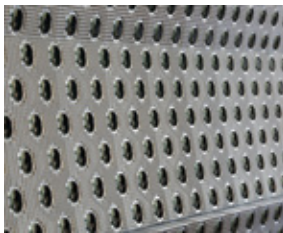
## TUBE MATERIALS

### STANDARD MATERIAL:

- **COPPER CU-DHP.** Suitable for environments classified as ISO 12944 C3 (e.g.: urban and industrial atmospheres, moderate sulphur dioxide levels, production areas with high humidity).

### ON REQUEST:

- **STAINLESS STEEL.** Suitable for corrosive environments or in case of fluids incompatible with copper. AISI 304 is suitable for installations in industrial atmosphere or in coastal region. AISI 316L is recommended in naval/offshore application and polluted environments.



## FIN MATERIALS

### STANDARD MATERIALS:

- **ALUMINUM ALLOY A8079 (pre-painted).** Suitable for environments classified as ISO 12944 C3.

### ON REQUEST:

- **ALUMINUM-MAGNESIUM ALLOYS.** They provide good resistance to corrosion in marine atmospheres. AlMg fins are available in AlMg2,5 (A5052) and AlMg3 (A5754).
- **STAINLESS STEELS.** When the concentration of aggressive agents and particles in the ambient air is significant, stainless steel fins are an alternative option to a corrosion protection painting. Stainless steel fins are available in AISI 304 or AISI 316L.



## AXIAL FANS

Maintenance-free, external rotor axial fans. Protective grid compliant with EN ISO 13857.

### STANDARD:

- **BRUSHLESS ENERGY-SAVING EC:** they combine excellent performance with extremely low consumption and noise levels.

### ON REQUEST:

- **HIGH EFFICIENCY DIFFUSERS:** they further improve the performance of EC fans.



## PROBLEM SOLVING ORIENTED

Tackling a wide range of problems and the most extreme conditions is our daily challenge: thanks to operational flexibility and our technical know-how, we offer solutions that maximise efficiency and energy savings.



## TECHNICAL KNOW-HOW AND FLEXIBILITY

Refrion products have been researched to meet the specific size and supply requirements of the system in which they will be installed. Each device is unique and tailor made.

# ECOOLER

The frame is designed to be stable and strong; overall dimensions designed for common means of ground transportation.

All the components are made of hot-dip galvanized steel and epoxy powder coating (standard colour: RAL 9002) suitable for medium corrosive environments classified C3 (EN 12944-2).

All the operations involved in the production of the components are performed before painting, guaranteeing the highest level of protection for the steel against corrosion.

The water recirculation system is self-draining and fully accessible for inspection. The main components (tank, distributors and drip trays) are made of aluminium; available in stainless steel on request.

All the internal components are accessible for servicing through the maintenance door protected by a security switch. If the door is opened, the power is completely disconnected and access to the inside of the unit is only possible after the fans have stopped.

Ecooler range is not covered by Eurovent certification.

**kW**

#### COOLING CAPACITY

Up to 3.500 kW\*



#### AIR FLOW

More Than 550.000 m<sup>3</sup>/h



#### NUMBER OF FANS

1-7 4-20



#### OVERALL LENGTH

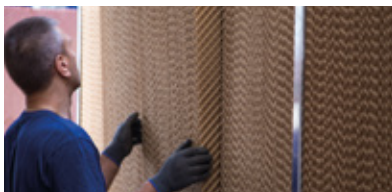
Single row 2284-11884 mm  
Double row 3184-12784 mm



#### FAN DIAMETER

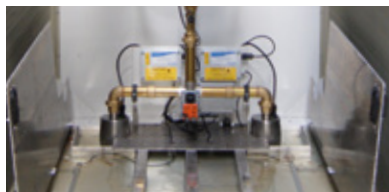
800-910-1250 mm

\* Standard conditions EN1048



#### EVAPORATIVE COOLING PADS

Panels made of pure cellulose imbued with resins and biocide and antibacterial agents.



#### RECIRCULATION PUMP

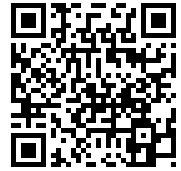
Submersible centrifugal pumps in stainless steel material. Enclosure class: IP 68



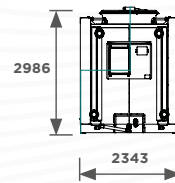
#### MAINTENANCE DOOR

Full access to the inside of the unit protected by security switch.

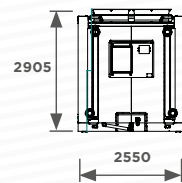
SCAN HERE FOR  
MORE INFO:



SINGLE ROW OF FANS



DOUBLE ROW OF FANS



**INSPECTIONABLE TOP GUTTER**  
Complete inspection possibility of the recirculation circuit for easy maintenance.



**FEED/DISCHARGE ACTUATED VALVES**  
IP54, maintenance free approvals: CE, UL, CSA.

**SUGGESTED BUSINESS LINES**



**AIR CONDITIONING**



**PROCESS COOLING**



**DATA CENTER COOLING**



**REFRIGERATION**

# REFRION HIGHLIGHTS



## HIGH EFFICIENCY EC DIFFUSERS

Compared to units equipped with standard EC fans, the high efficiency diffusers allow to:

- reduce the speed of the fans;
- reduce the sound level down to 3dB(A);
- reduce the energy consumption down to 15%;

or

- increase the air flow up to 9%;
- increase the thermal exchange up to 8%.



SCAN HERE  
AND WATCH MORE



## OVAL TUBES

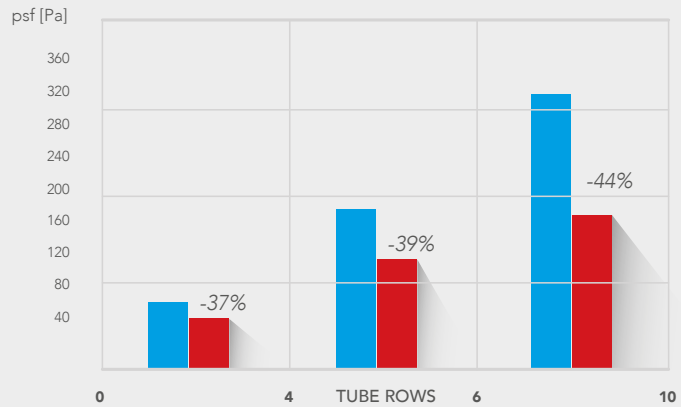
The revolutionary 3ISO geometry with oval tubes is the real innovation in the production of heat exchangers.

The 3ISO geometry enhances performances up to 15% compared to the round tube geometries. Air-side pressure drops can be reduced by 40%, allowing a better performance of the axial fans.

All this leads to a quieter operation and a lower energy consumption.

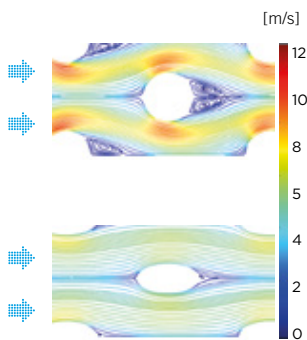


### ROUND AND OVAL TUBE COMPARISON

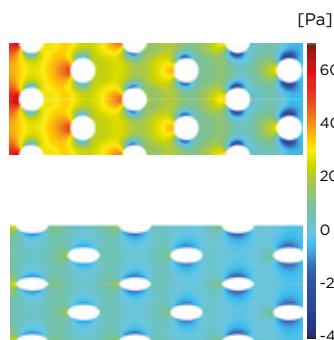


● ROUND TUBE

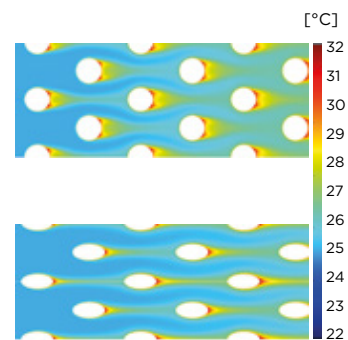
● OVAL TUBE



Reduced turbulances.



Lower pressure drop



Higher heat transfer distribution.



# MAIN COMPONENTS

## OVERVIEW

FULL CONNECTIVITY

MINIMISED  
SOUND  
LEVELS

MINIMISED  
ENERGY  
CONSUMPTION



### DEVICES

- 1 EC fans
- 2 Main electrical panel
- 3 Smartboard (Advanced Management System)
- 4 Feed actuated valve
- 5 Discharge actuated valve

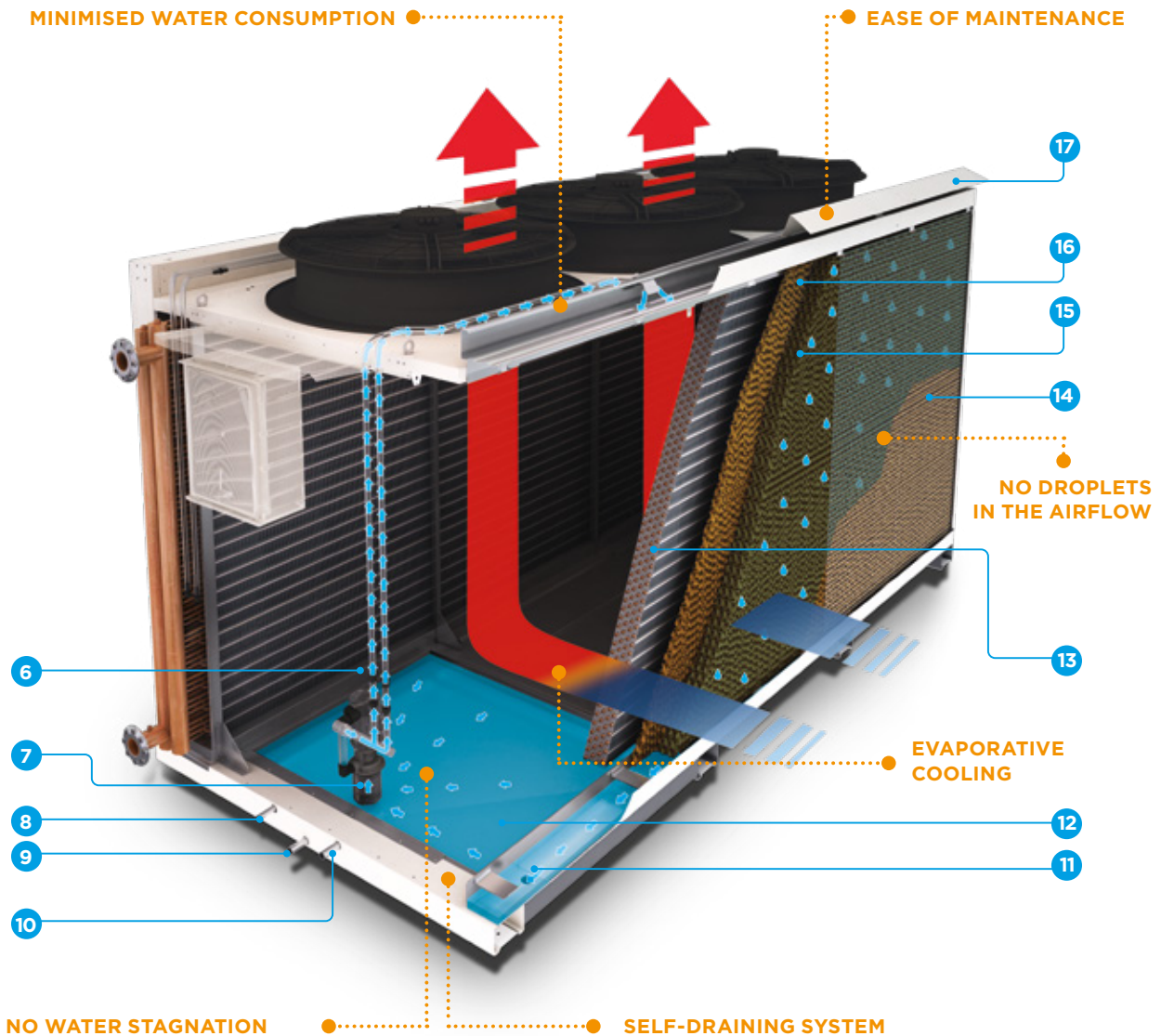
# RECIRCULATION SYSTEM

The guideline VDI 2047 Part 2 specifies the requirements for the hygienic operation of evaporative cooling systems, where water is trickled or sprayed or otherwise in contact with the atmosphere.



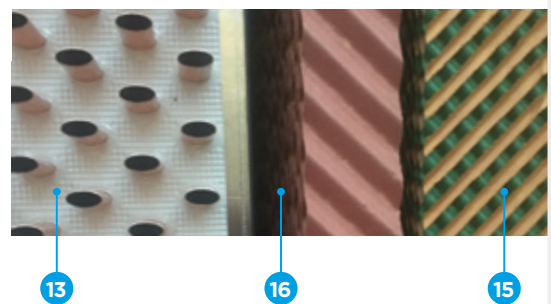
With the aim to minimize any hygienic risk, considerable relevance is given not only to the water cycle but also to the materials used and the mode of operation.

The design, the construction and the operation of all Refrion adiabatic coolers comply with VDI 2047 -2 guidelines.



## COMPONENTS

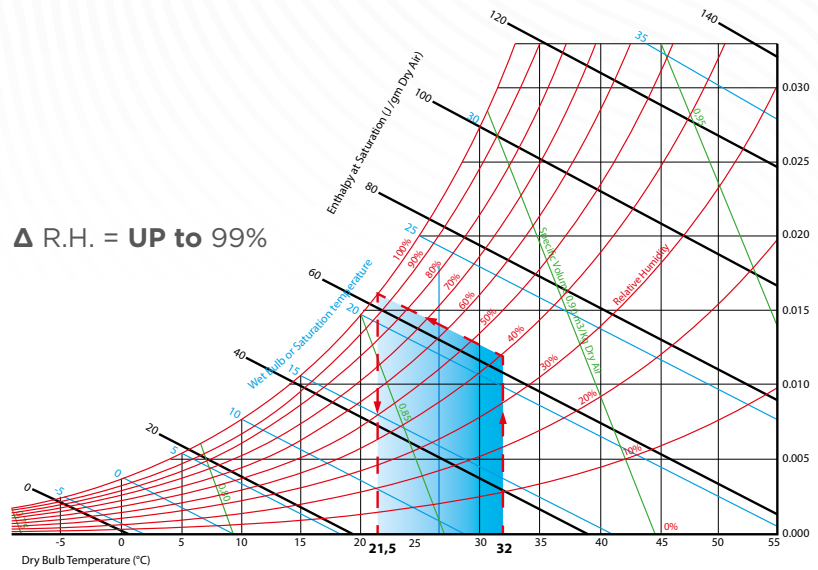
- |                                   |                                     |
|-----------------------------------|-------------------------------------|
| <b>6</b> Water distribution pipes | <b>12</b> Water tank                |
| <b>7</b> Recirculation pump       | <b>13</b> Heat exchanger            |
| <b>8</b> Overflow                 | <b>14</b> Protection grids          |
| <b>9</b> Drain                    | <b>15</b> Evaporative cooling pad   |
| <b>10</b> Make-up water           | <b>16</b> Droplet separator         |
| <b>11</b> Self-draining drip      | <b>17</b> Inspectionable top gutter |



# EVAPORATIVE COOLING

Due to the adiabatic saturation made possible by the Industrial Adiabatic System, the Refrion design model provides an increase in relative humidity of  $\Delta R.H. = +60\%$  up to a maximum of  $R.H. = 99\%$ .

$\Delta R.H. = \text{UP to } 99\%$



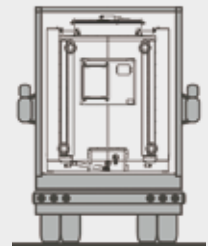
## BENEFITS

### PLUS

- ENHANCED HEAT EXCHANGE CAPACITY
- FULL CONNECTIVITY
- MINIMISED SOUND LEVELS
- EASE OF MAINTENANCE®

### NO BACTERIAL PROLIFERATION

- SELF DRAINING SYSTEM
- NO DROPLETS IN THE AIRFLOW
- NO WATER STAGNATION



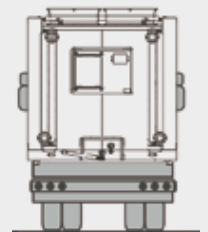
SINGLE ROW OF FANS

### DECREASED OPERATING COSTS

- MINIMISED WATER CONSUMPTION
- NO NEED FOR WATER TREATMENT
- MINIMISED ENERGY CONSUMPTION

### REDUCED INSTALLATION COSTS

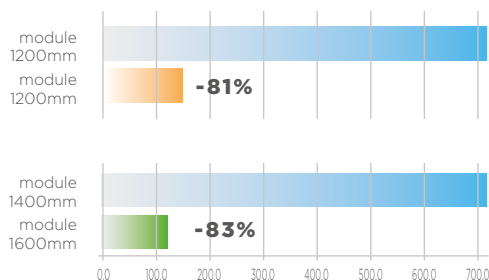
- SUITABLE FOR TRUCK TRANSPORT
- REDUCED WEIGHTS AND FOOTPRINT
- NO NEED FOR FINAL ASSEMBLY ON SITE



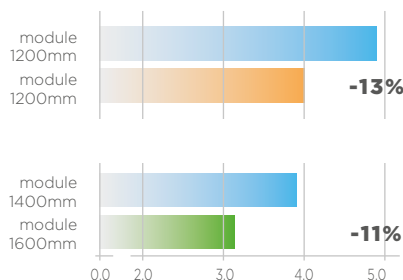
DOUBLE ROW OF FANS

## SAVING

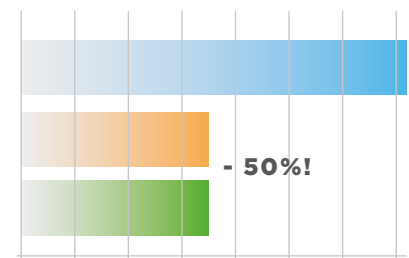
Specific water consumption  $\left[ \frac{\text{litres}}{\text{hours} \times \text{metres}} \right]$



Specific electrical consumption  $\left[ \frac{\text{kW}}{\text{metres}} \right]$



freight costs



■ SUPERJUMBO + INDUSTRIAL ADIABATIC SYSTEM (without recirculation system - open circuit)

■ ECOOLER single row of fans

■ ECOOLER double row of fans

# REFRION IN THE WORLD

Refrion's main market development has been in Europe, where it is supported by commercial branches in Switzerland, Germany and Russia, and by a sales office in France.

The company is now ready to expand its business in North America, where it has already started to export, installing a prestigious plant for an important IBM Data Centre in Canada. Refrion products can also be found throughout the world, with installations in Japan, South America, Mexico, Australia, South Africa and various other countries.



**DISCOVER OUR  
CASE HISTORIES  
IN THE WORLD**



# REFRION CLIMATIC CHAMBER

## THE FIRST LABORATORY IN EUROPE SPECIALISING IN PERFORMANCE TESTING OF EVEN THE LARGEST AND MORE POWERFUL LIQUID COOLERS.

The climatic chamber has been built on the site of the Talmassons (UD) headquarters and will be able to reproduce both the operating (temperatures, flow rates and pressure loss of refrigerant fluids) and the environmental conditions (temperature and relative air humidity) defined by our customers in the scale design phase of the unit. The intake and outflow temperatures and pressures of the operating fluids and their flow rate, the temperature, relative humidity and air flow inside the chamber are measured directly, as well as the electrical power and current consumed. Therefore, it is possible to accurately calculate the thermal exchange capacity and the energy efficiency coefficient. It is also possible to perform measurements of the noise level of the units through a sound intensity sensor (ISO 9614-1).

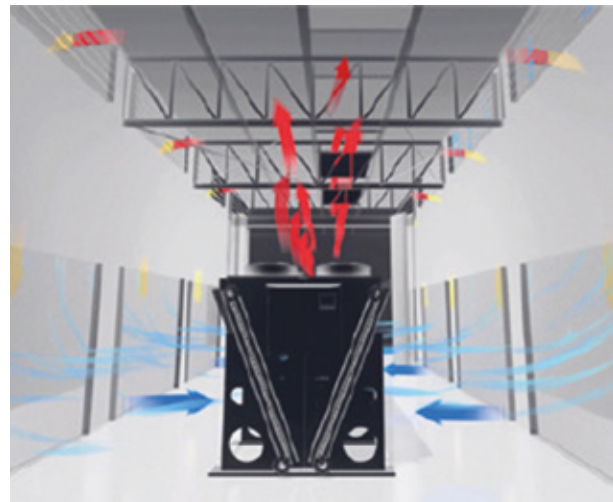
### MAX SIZE OF TESTABLE UNITS

LENGTH: 14 m  
HEIGHT: 3,5 m  
WIDTH: 3,0 m

### CHAMBER DIMENSIONS

LENGTH: 19,6 m  
HEIGHT: 8,5 m  
WIDTH: 12,3 m

SCAN HERE  
AND WATCH MORE



## PERFORMANCE TESTING AND ASSESSMENT

- Thermal exchange capacity according to Eurovent standards (EN 1048)
- Thermal exchange capacity under customer-defined conditions
- Thermal exchange capacity under free cooling conditions
- Thermal exchange capacity under high-temperature conditions
- Electrical power / current consumption
- Liquid side pressure drop
- Sound levels (ISO 9614-1)

## OPERATING RANGE (\*)

- Air temperature: 0°C to +45°C (\*\*)
- Relative air humidity: 40% to 70%
- Max intake liquid temperature: 50°C (with capacity up to 400m<sup>3</sup>/hr), 100°C (with capacity up to 30 m<sup>3</sup>/hr)
- Maximum measurable exchange capacity: 2.2 MW
- Maximum air flow processed: 700.000 m<sup>3</sup>/hr

(\*) The test conditions must be validated by the Refrion technical office.

(\*\*) A maximum variation in temperature of 25K on the same test day is tolerated.

# ST

## SELECTION TOOL

THE NEW REFRION CONFIGURATOR

### SELECTION TOOL IS THE NEW REFRION CONFIGURATOR

**Selection Tool** is the new **Refrion configurator** – designed and developed entirely by our **R&D** department. The software allows prospective clients to choose the **dry coolers** and **ventilated units** that best meet their needs, by calculating their performance under the actual working conditions to which the units will be subjected.

The **Selection Tool** is based on the results obtained from the tests performed in the Refrion Climatic Chamber, where we certify the performance of our **dry coolers** and **condensers** under standard test conditions (EN 1048) and the exact operating conditions defined by the client. The **Refrion Climatic Chamber** is one of the biggest dry cooler-dedicated performance testing laboratories in Europe.

The **Selection Tool** guarantees:

- a more reliable thermodynamic calculation;
- constant updates;
- a quicker calculation time.

Unlike the “Web Selector” – its predecessor – the new Selection Tool with its extremely powerful calculation engine, proves to be a versatile solution as it checks the performance of the selected unit under the exact working conditions, in an even faster and more precise manner.

Furthermore, the energy analysis is more reliable, due to the updated climatic condition database.

With the **Selection Tool**, prospective clients can also save the calculation results to return to the quote at a later stage; a feature that makes the design phase even easier and more convenient.

We also took our clients’ design requirements into account when creating the Selection Tool; in fact, the new interface is completely user friendly and ultra-intuitive to help guide the user through the calculation operations and allow them to easily compare the units in the Refrion range.

In addition to the latest innovations concerning first and foremost, the new distribution systems and reduced water consumption for the Refrion **adiabatic systems**, the Selection Tool will be regularly updated to include all the new Refrion products. The latest additions to the dry cooler and condenser range have already been added, such as the new Wall Super Jumbo and the new **Ecooler** that’s compact enough for container shipping.

ACCESS THE SELECTION TOOL



### REFRION SERVICE

#### SERVICE, MAINTENANCE, TRAINING AND WARRANTIES.

Refrion provides a range of professional after-sales training and support services to assist its customers throughout the entire lifecycle of their products.

In particular:

- System start-up service
- Scheduled and unscheduled maintenance service
- Technical support service
- Technical training for the installation and maintenance of the units.

Refrion offers a range of Scheduled Maintenance Contracts on new or existing systems, allowing you to outsource some or all service operations to our authorised technical personnel, and extend our standard 2-years warranty.



FOR MORE INFORMATION:



### EUROVENT CERTIFICATION PROGRAMME

Refrion participates at the Eurovent Certification Programmes “Heat exchangers for refrigeration” For Dry Coolers and Air Cooled Condensers.\* The purpose of Eurovent Certification Programmes is to create a common set of criteria for the rating of products. Through specification of certified products, the engineer’s tasks become easier, since there is no need to carry out detailed comparison and performance qualification testing.

Comparison of product performance by third party testing based on well-defined procedures ensures a healthy and solid competition on a market open to all manufacturers. Consultants, specifiers and users can select products with the assurance that the catalogue data are accurate.

\* The Ecooler range is not covered by Eurovent certification.



Check ongoing validity of certificate:  
www.eurovent-certification.com

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