

RAAL[®]
complete cooling solutions



Cooling solutions for
INDUSTRIAL EQUIPMENT

Starting from a simple cooler to a complete cooling system, RAAL always offers the best solution in terms of performance, profitability and compliance with environmental standards and it adds value to the products of its partners.

A permanent challenge for RAAL is to provide the OEMs dealing with industrial equipment, a wide range of standard and customised heat exchangers in different constructive solutions, that are ready to face the various operating conditions.

Flexibility, experience and innovation, as reflected in the RAAL products, satisfy the highest demands.

INDUSTRIAL APPLICATIONS

■ COMPRESSORS

- Stationary compressors
- Portable compressors



■ AIR DRYERS AND CHILLERS

- Compressed air dryers
- Chillers



■ POWER GENERATION

- Transformers, converters, rectifiers
- Stationary and portable gensets
- Windmills
- Heat recovery systems



■ ENGINES

- Gasoline and diesel engines
- Natural gas engines
- Marine engines



■ HYDRAULIC EQUIPMENT

- Hydraulic power units
- Hydraulic machines



■ HVAC-R COMPONENTS

- Heating, ventilation, and air conditioning systems
- Refrigeration systems



■ COMPRESSORS

- Stationary compressors
- Portable compressors



■ PRODUCT RANGE

COMPLETE COOLING SYSTEMS, composed of brazed aluminium heat exchangers and other components:

- Radiators, Oil Coolers, Charge Air Coolers, Compressed Air Coolers
- Metallic structures, including fan cowls and protection grids
- Fans, motors

Individual heat exchangers manufactured in different design solutions:

- **COMPRESSED AIR COOLERS** (Plate&Bar, Tube&Fin, Shell)
- **OIL COOLERS** (Plate&Bar, Tube&Fin, Shell)
- **RADIATORS** (Plate&Bar, Tube&Fin,Shell)
- **CHARGE AIR COOLERS** (Plate&Bar, Tube&Fin)



Features of the RAAL aluminium cooling systems for COMPRESSORS

- High cooling performance
- Various available constructive solutions&configurations
- High resistance to dynamic thermal and pressure loads
- High pressure resistance
- Low maintenance costs
- A wide range of sizes



■ AIR DRYERS AND CHILLERS

- Compressed air dryers
- Chillers

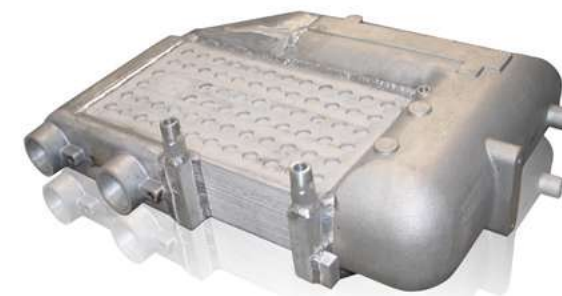
Features of the RAAL aluminium heat exchangers for AIR DRYERS and CHILLERS

- Compact construction
- Various available innovative constructive solutions
- High drying efficiency
- High pressure resistance
- Reliability



PRODUCT RANGE

- **COMBINED COOLERS** (air-refrigerant, water- refrigerant, air-air, water-water, manufactured in Plate&Bar and Brazed Plates design)
- **PARALLEL FLOW CONDENSERS** (Extruded tubes construction type)



■ **POWER GENERATION**

- Transformers, converters, rectifiers
- Stationary and portable gensets
- Windmills
- Heat recovery systems



■ **PRODUCT RANGE**

COMPLETE COOLING SYSTEMS, composed of aluminium heat exchangers and other components:

- Radiators, Oil Coolers, Charge Air Coolers, Heat Sinks
- Metallic structures, including fan cowls and protection grids
- Fans, motors

Individual heat exchangers manufactured in different design solutions:

- **OIL COOLERS** (Plate&Bar, Shell, Tube&Fin, Brazed Plates - water cooled)
- **RADIATORS** (Plate&Bar, Tube&Fin)
- **CHARGE AIR COOLERS** (Plate&Bar, Tube&Fin)
- **HEAT SINKS** (Extruded tubes)



Features of the RAAL aluminium cooling systems for POWER GENERATION

- Modular construction
- Various available constructive solutions & configurations
- Easy maintenance due to use anti-clogging fins
- High environmental resistance
- Reliability



■ ENGINES

- Gasoline and diesel engines
- Natural gas engines
- Marine engines

COMPLETE COOLING SYSTEMS, composed of brazed aluminium heat exchangers and other components:

- Radiators, Oil coolers, Charge air coolers, Fuel Coolers
- Metallic structures, including fan cowls and protection grids
- Fans, motors

Individual Heat Exchangers manufactured in different design solutions:

- **OIL COOLERS** (Plate&Bar, Shell, Tube&Fin, Brazed Plates - water cooled)
- **RADIATORS** (Plate&Bar, Tube&Fin)
- **CHARGE AIR COOLERS** (Plate&Bar, Tube&Fin)
- **FUEL COOLERS** (Plate&Bar, Tube&Fin, Shell)
- **WATER COOLED CHARGE AIR COOLERS (WCAC)** (Plate&Bar)
- **EGR COOLERS** (Tube&Fin)

Features of the RAAL aluminium heat exchangers for engines

- High cooling performance
- Various available constructive solutions & configurations
- Compact construction
- Reliability



■ HYDRAULIC EQUIPMENT

- Hydraulic power units
- Hydraulic machines

COMPLETE COOLING SYSTEMS, brazed aluminium **OIL COOLERS** (Plate&Bar, Shell, Tube&Fin construction types) and other components: metallic structures (including fan guards, fan shrouds, etc.) fans, motors.



Features of the RAAL aluminium heat exchangers for HYDRAULIC EQUIPMENT

- High cooling performance
- Various available constructive solutions & configurations
- High resistance to dynamic thermal and pressure loads
- High pressure resistance
- A wide range of sizes

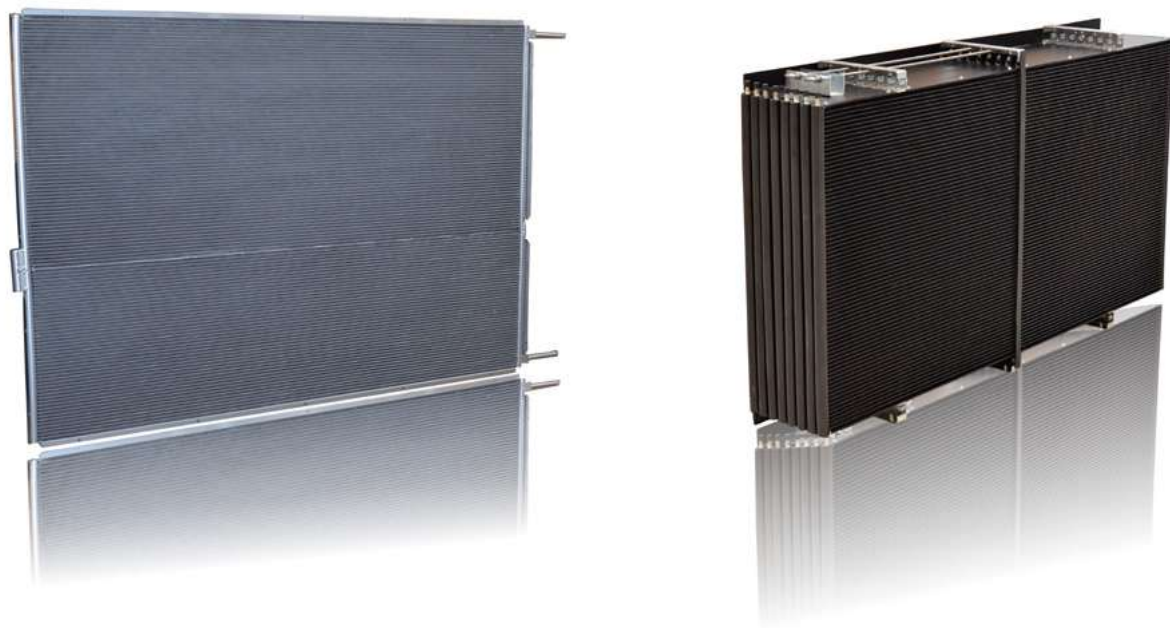


■ HVAC-R COMPONENTS

- Heating, ventilation, and air conditioning systems
- Refrigeration systems

Individual Heat Exchangers manufactured in different design solutions:

- **PARALLEL FLOW CONDENSERS** (Extruded Tubes, Shell)
- **EVAPORATORS** (Extruded Tubes, Shell)
- **HEATER CORES** (Plate&Bar, Tube&Fin)



Features of the RAAL aluminium heat exchangers for HVAC-R

- Compact and lightweight with high thermal efficiency
- Different cooling refrigerants
- Substantial refrigerant charge reduction
- A wide range of sizes
- High working pressure
- Low air pressure drop
- Reduced noise



■ ADVANTAGES AND BENEFITS OF RAAL'S CUSTOMERS

Flexibility and customized solutions

The modular heat exchangers and cooling systems are adapted to the customers' needs and are developed together with them.

- tens of thousands of different products
- 300 products of different sizes (from small to large) and types in production, monthly
- hundreds of applications
- batches from one to tens of thousands of units

Innovation, technology and performance

RAAL has a strong and creative research and development department that has been prepared to deliver performance.

- 150 engineers
- a well-equipped testing center
- patents for fin forming machines and new design /technology solutions
- investment in the latest equipment and technologies
- 50 prototypes per month
- 30-50 days for the development of a new product

Quality and reliability

RAAL meets the highest quality standards (ISO9001, ISO/TS16949, etc.) Years of uninterrupted operation of its products, with no operation failures, prove that **RAAL** can provide heat exchangers that withstand the various operating conditions.

- extended warranty terms (24 or 36 months)
- post-sale services.

Experience and expertise

Each customer and each application is important for **RAAL** and, in this regard, it has trained and specialized its teams in different fields and applications (R&D, tool and die design, manufacturing, sales, logistics, marketing) that reached 30 years of experience.

Short terms, competitive prices

RAAL is an integrated company that offers short-term product development / delivery at competitive prices.

Environment protection

RAAL offers compact and lightweight products with minimal impact on the environment due to reduced consumption of materials and fuel.

- advanced cooling solutions that comply with the new environmental regulations on polluting emissions
- 100% recyclable products
- Environmental Management System according to EN ISO 14001:2004.

Long-term partnership

The mutual trust, openness towards the latest technical solutions and customer approach are the core values of **RAAL**, that guarantee a long-term business relationship.

The **RAAL** cooling systems equip the top range equipment of major OEM customers.



ENGINEERING

RAAL is an integrated company, all activities (manufacturing, design, testing, etc.) being carried out "in house". This competitive advantage provides both a very short development and assimilation cycle in production of new products as well as short term manufacturing and supply of series production.

• Design, calculation and simulation

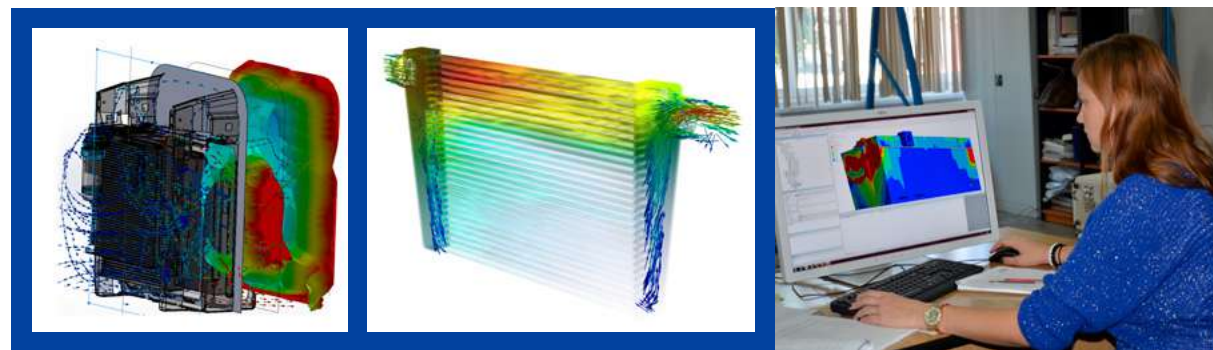
RAAL uses its own dimensioning software for heat exchangers, software developed in-house based on theoretical studies and thousands of tests performed.

RAAL uses FEA (Finite Element Analysis) to simulate the structural, flow and vibration stress conditions.

• Product design

RAAL has vast experience in designing heat exchangers and cooling systems. Starting from the specifications, dimensions or CAD data of the application, RAAL designers are able to find the best solutions for the most efficient use of the available space.

RAAL designers have the ability to continuously optimize the products, so as to fully meet the requirements of the application.



• Testing and validation

RAAL Testing Center is the facility where the validation of new products is performed. Based on technical specifications or on the parameters obtained by means of DAQ performed on customer equipment, the heat exchangers are tested for performance and strength.

RAAL Testing Center capabilities:

- thermal and fluid-dynamic performance tests on the wind tunnel
- burst pressure, performed at ambient or at high temperatures in the climate chamber
- durability tests: shock and vibration
- internal cleanliness tests
- durability tests: thermal cycle, pressure cycle,
- chemical and accelerated corrosion tests
- metallographic studies



• Tools and equipment

RAAL engineers have a vast experience in tool and die design, and in designing the specific equipment necessary for the manufacturing process.

RAAL places special importance on the design, manufacturing and optimization of the new generation of fin forming machines, which provide a wide range of fins and turbulators.

QUALITY

All RAAL products are manufactured in compliance with the following standards:

- ISO 9001:2008 and ISO/TS 16949:2009 - Quality Management System.
- EN ISO 14001:2004 - Environmental Management System
- OHSAS 18001:2007 - Occupational Health and Safety Management System

Main Factories



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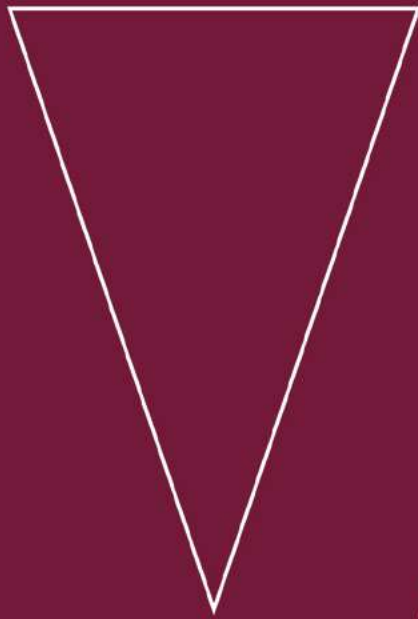
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