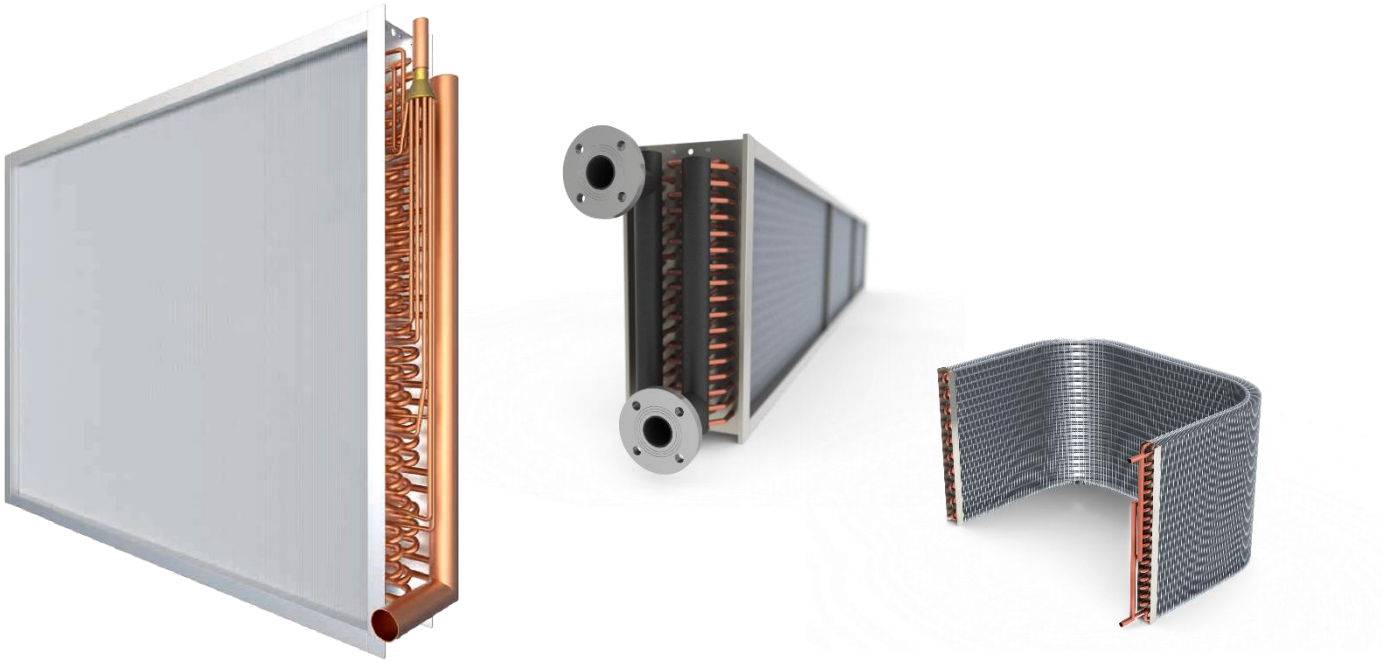
ROENEST
HEAT EXCHANGERS NATURALLY
AN ENEX TECHNOLOGIES COMPANY

Release June 2022

FIN & TUBE HEAT EXCHANGERS

COILS Series

Finned pack heat exchangers, for single phase and phase changing fluids, specifically designed for Heating, Heat Recovery, Air Conditioning, Process and Refrigeration equipment



ROEN EST presents its wide range of finned pack heat exchanger COILS Series, which ranks among the most complete in Europe, suitable for all residential, commercial, industrial and process heating, air conditioning, heat recovery and refrigeration applications. ROEN EST is the solution provider for the design, manufacturing and supply of heat exchangers with particular focus in HVAC&R.
Founded in 1983 for the production of finned pack coils, today the company is a reference point for technology and capacity for solutions in air conditioning, refrigeration, heating and cogeneration. The Group's production structure is divided into two locations in Italy and Slovakia: two complementary and strategic factories, centers of excellence for the production of specific products. The Italian headquarters represents the heart of the company and is the driving force of innovation and technological development.

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LEADING IN THE FIN & TUBE HEAT EXCHANGERS INDUSTRY

Heat exchangers are devices largely used in the HVAC&R (Heating, Ventilating, Air Conditioning & Refrigeration) sector in which two fluids at different temperatures exchange energy in the form of heat, without production or consumption of mechanical or electrical energy from the outside. Fluid refers to any substance in the liquid or gas state. Heat is transferred by convection, between the fluids and the corresponding solid surfaces these come into contact with, and by conduction through the wall that separates the two fluids.
Heat exchangers must be designed so as to extend contact between the two fluids, maximising the amount of energy exchanged. Consequently, the materials used feature high thermal conductivity, such as copper, aluminium, steel, etc. and construction is aimed to expanding the heat exchange surfaces between the two fluids as much as possible in order to maximize the thermal exchange with the minimal need of materials, both for the environment preservation and the overall economy of the heat exchanger. The two most commonly-used types of heat exchanger in the HVAC&R systems are finned pack heat exchangers (commonly called coils) and shell &tube heat exchangers.

Present document is fully dedicated to finned pack heat exchangers which can be segmented into 4 main types:

	PHASE CHANGING COILS	SINGLE PHASE COILS
HEATING COILS	Condensers	Hot water
COOLING COILS	Evaporators	Cold water

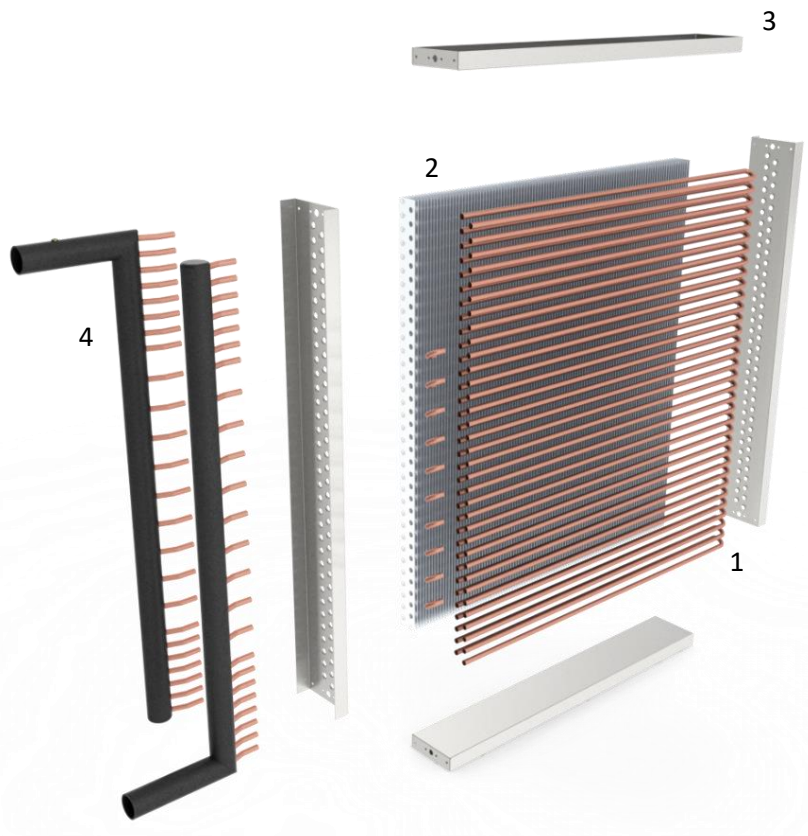
Finned pack heat exchangers are made up of a series of tubes carrying the refrigerant, and a compact group of fins, placed perpendicular to the tubes, crossed by air either due to natural or fan-forced ventilation. Heat is usually exchanged by counterflow. Using the example of an evaporator, warm air first comes into contact with tubes carrying the “hotter” refrigerant leaving the coil, which is superheated and changes state to gas, and then the tubes carrying the colder refrigerant at the inlet, that is, in the liquid state before evaporating. This optimises heat exchange, both whether the coil is used as an evaporator or a condenser.

ROEN EST with its 2 European manufacturing sites provides to HVAC&R manufactures a secure source for a strategic component like coils are, with an history of design, production and distribution of more than 35 years in over 50 countries

DISTINCTIVE FEATURES

With 7 diameters available in 16 geometries, ROEN EST can optimize heat exchangers for any specific application. The ROEN EST range effectively meets every heat exchange requirement: water and oil coils, evaporators and condensers.
Distinctive features are:

- Fully customizable in order to meet customers requirements;
- 16 geometries available to meet all the needs related to performance and internal volume reduction;
- 50 tubes available, smooth and IGT;
- 5 fins materials available to meet all thermodynamic and product life requirements;
- Availability of high efficiency tubes and high efficiency fins to increase the heat exchange while keeping the exchanger dimensions compact;
- Various materials available for the frame, including galvanized steel, aluminum, stainless steel, copper;
- Maximum pressure up to 80 bars;
- Possibility of testing with helium test machine;
- 10 surface treatments available to increase the life of the product in aggressive environments;
- Very large dimensional possibilities (H x L x W):
    - MINIMUM FINNED PACK DIMENSIONS - 50 x 80 x 22 mm
    - MAXIMUM FINNED PACK DIMENSIONS - 2500 x 11500 x 800 mm



Main parts of the finned pack heat exchangers are manufactured entirely in ROEN EST manufacturing facilities

1. TUBES
2. FINS
3. MATAL FRAME
4. HEADERS

MATERIALS & PARTS

Finned pack
The finned pack consists of drawn tubes mechanically expanded into fins provided with self-spaced collars, to ensure optimal heat exchange between tubes and fins, and regular spacing between fins.

Tubes
ROEN EST heat exchangers are manufactured with high quality tubes, which can be smooth or internally grooved on all available diameters: 7 mm, 5/16", 3/8", 12 mm, 1/2", 5/8" and 16mm.
The tubes are resistant to the vast majority of primary fluids, in heating and cooling applications alike.

Fins
Fins are the result of high precision molding of aluminium, prepainted aluminium, hydrophilic, hydrofobic aluminium, and copper strips. The fins manufactured by ROEN EST are corrugated so as to improve the secondary heat transfer coefficient without heavily affecting the air pressure drops. Furthermore, this type of structure allows for condensate drainage and prevents dirt from obstructing the finned pack. Also available are high precision molded louvered fins, the structure of which increases heat exchange efficiency.

Frame
The frame can be of galvanized steel, aluminium, copper, brass, or stainless steel, and is manufactured through a process of punching and deep drawing. The frame protects the finned pack and fastens the heat exchanger to the rest of the system.

	Copper	K65	Aluminium	Aluminium Prepaint	Aluminium Hydrophilic	Aluminium Hydrophobic	Galv. Steel	Stainless Steel	Brass
Tubes	✓	✓							
Fins	✓		✓	✓	✓	✓			
Frame	✓		✓	✓			✓	✓	✓

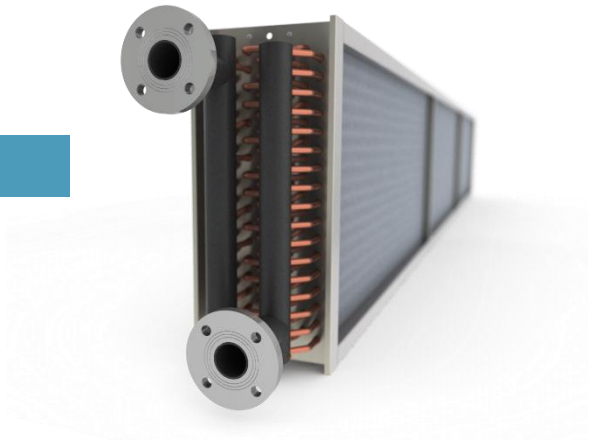
Headers
Headers are made of carbon steel or copper drawn tubes. The header collects all of the coil's parallel circuits into one tube that will be connected to the main circuit of the equipment.

Distributors
ROEN EST offers Venturi-type distributors made from brass disks by turnings and drilling. Along with the welded copper capillary tubes, these distributors optimize coolant distribution in the parallel circuits of evaporators.

Refrigerants
In light of its long-standing commitment to product improvement and sustainability, ROEN EST uses materials that are compatible with new generation refrigerants, which ensure lower environmental impact and excellent performance.

MAIN PRODUCT GROUPS RANGES

Water coils



The image is for illustrative purpose
and it is referred to a flanged connections coil

ROEN EST "Water coils" are manufactured as per the customer's specific request both in terms of thermodynamic performance and frames shape, so that they can be perfectly integrated into the customer's machine or system.

Main characteristics:

- Compatible with most fluids in the liquid state as an example water, water-glycol mixtures, oil, diathermic fluids, etc.;
- Wide variety of fittings and vents;
- Wide range of fin thickness and fins spacing.

Phase changing coils

The image is for illustrative purpose
and it is referred to a direct expansion coil

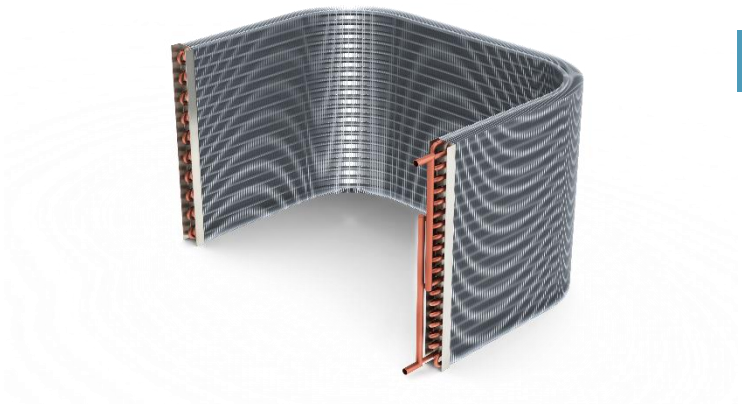
ROEN EST “Phase changing coils” are compatible with all the design requirements deriving from the current low GWP refrigerants available on the market. They are made as per the customer's specific request both in terms of thermodynamic requests, structural needs, frame shape and performance. So that they can be perfectly integrated into the customer's machine or system.

Main characteristics:

- Evaporators, condensers, reversible for heat pumps;
- Compatible with all synthetic refrigerants (including A2L), propane and CO_2;
- Cat. II PED certification available;
- Maximum design pressure 80 bar for use as CO_2 evaporator.

SPECIFIC FEATURES

Bent coils



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and it is referred to a C shape bended coil

ROEN EST “Bent coils” are suitable for use in encased outdoor/indoor units. The “C” or “L” shape allows to optimize the available space guaranteeing the required capacity to be perfectly integrated into the customer's machine or system. The exchanger can be configured according to the customer's request both as regards the dimensions and the materials used.

Main characteristics:

- Evaporators, condensers, reversible for heat pumps;
- Compatible with all synthetic refrigerants (including A2L), propane and CO_2;
- Cat. II PED certification available;
- Very large dimensional limits (H x L x W), max 1700 x 3000 x 65 (pre bending).

Surface Treatments

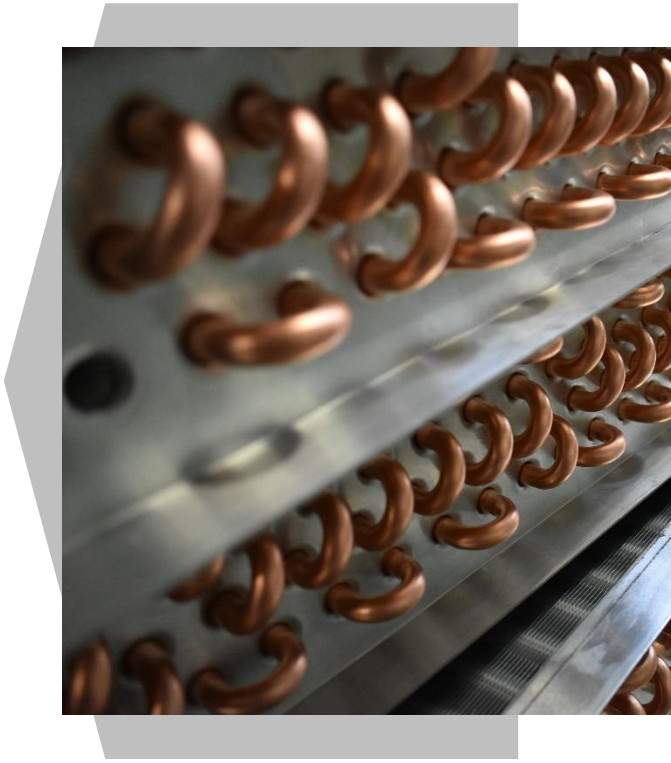
As the market is becoming more and more demanding in the field of coils protections against corrosion, ROEN EST developed a strong ability in selection, quotation and supply of different types of coils protections, in order to respond to customers requirements, such as (exemplificative and non-exhaustive list):

- Heresite;
- Heresite + UV;
- Epoxy painting – Pulver;
- Epoxy painting – Cataphoresis;
- Epoxy painting – Cataphoresis + UV;
- Electrofin;
- Electrofin + UV;
- Thermoguard finguard;
- Blygold.

The image is for illustrative purpose
and it is referred to a protected coil

FINNED PACK MANUFACTURING GEOMETRIES, QUALITY & INSPECTION

Code	Pattern	Diameter [mm]	Tubes pitch [mm]	Rows pitch [mm]
A	S	7.00	25.00	21.65
B	S	7.94	25.00	21.65
C	S	9.52	25.00	21.65
D	S	9.52	25.40	22.00
E	S	12.00	31.75	27.50
F	S	12.70	35.00	30.31
G	L	9.52	35.00	35.00
H	L	12.00	35.00	35.00
I	S	12.00	37.50	32.48
J	S	15.88	45.00	39.00
K	L	15.88	45.00	45.00
L	L	12.00	50.00	25.00
O	L	16.00	55.00	27.50
P	L	15.88	55.00	27.50
Q	L	16.00	55.00	55.00
S	L	12.00	70.00	50.00



Quality assurance
Product quality is ensured by inspecting the proper mechanical expansion of tubes into the fins; the welding of bends, nipples, and headers in an inert atmosphere; and the final pressure leak test in a water bath. During the final inspection, the product is checked against the customer's dimensional and qualitative specifications to ascertain its compliance.

Inspection
For coils working at high pressures (e.g. CO_2), the test is carried out at a maximum of 90 bar.

ONLINE SELECTION TOOLS

Thermodynamic calculation SW

REcalc
executable and free downloadable calculation software

Coil design check
Web based PED and dimensional check software

Feasibility Check SW

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Publication: Commercial Brochure COILS Series | Version June 2022 | ENG

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