

TECHNICAL GUIDE

Finned coil heat exchangers

Applications, materials, geometries and configurations

1 How to use this guide

This guide brings together the essential technical information needed to understand and configure finned coil heat exchangers. It is intended to support preliminary selection, requests for quotation and technical consultation in the SMC website download area.

Finned coil heat exchangers promote heat exchange between a fluid flowing inside the tubes and an air stream passing through the finned pack. The configuration depends on the application, fluid, temperatures, flow rates, allowable pressure drops, materials and dimensional constraints.

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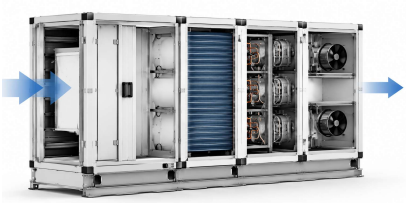
2 Main applications

Finned coil heat exchangers can be used in many plant engineering and industrial sectors. The same construction technology can be adapted to different contexts by varying geometry, materials, fin pitch and circuiting.

- HVAC and air conditioning
- Heat pumps
- Industrial and commercial refrigeration
- Condensers and liquid coolers
- Energy recovery systems
- Oil cooling
- Clean rooms and air handling
- Industrial processes
- Marine and offshore applications







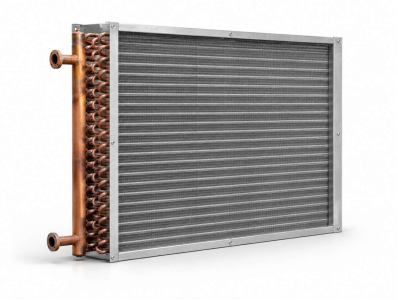
3 Construction types

Heat exchangers can be manufactured in different construction types, depending on the application, fluid and required performance.

Finned coils

Finned coils consist of tubes inserted into a pack of metal fins. The fluid flows inside the tubes, while air passes through the finned surface.

The fins increase the heat exchange surface and promote heat transfer on the air side. This solution is particularly suitable for HVAC, refrigeration, air handling and fluid cooling applications under standard operating conditions.



Spiral finned coils

These are made with tubes to which a spiral or helical fin is applied. This configuration increases the heat exchange surface while maintaining a robust structure suitable for specific applications.

They are used mainly in industrial applications, process gas and high-temperature duties, where dedicated materials, customised geometries and greater mechanical strength may be required.



Smooth tube coils

Compared with finned solutions, they offer a smaller heat exchange surface but provide easier cleaning and a lower tendency to clog.

They are therefore suitable where dirty air or gases, dust, fibres, oils, heavy condensates or processes requiring frequent maintenance are present.

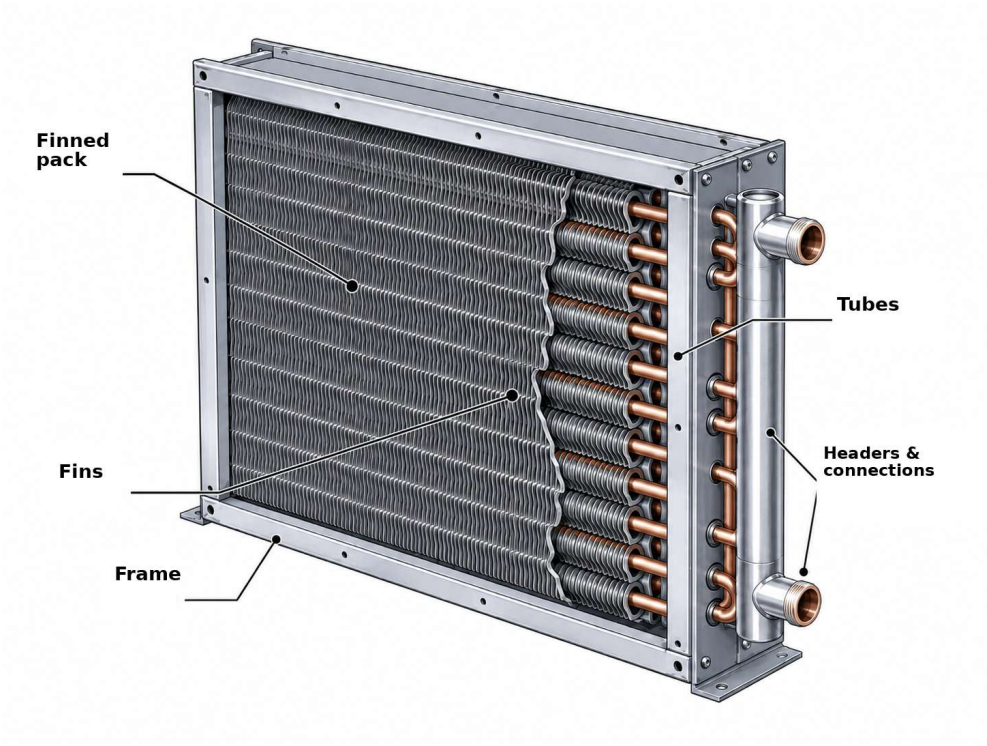


4 Main components

A finned coil heat exchanger is made up of several construction elements. Each element affects performance, durability, installation and maintenance.

Element	Technical function	Selection aspects
Finned pack	Increases the surface area available for air-side heat exchange.	Fin pitch, profile, cleanability, risk of frost or fouling.
Tubes	Allow the internal fluid to flow through the heat exchanger.	Material, diameter, thickness, pressure, chemical compatibility.
Fins	Promote heat transfer between air and tubes.	Conductivity, corrosion resistance, surface treatment.
Frame	Protects the finned pack, bends, tubes and headers.	Rigidity, operating environment, material, fixing method.
Headers and connections	Distribute the fluid through the heat exchanger circuits.	Connection side, orientation, diameters, connections and system layout.

The finned pack, tubes and circuiting must be assessed together. Any increase in heat exchange surface, for example, must be compatible with pressure drops, available dimensions and operating conditions.



5 Available materials

Material selection is one of the main aspects in configuring the heat exchanger. It must consider operating conditions, installation environment, compatibility with the fluid and corrosion-resistance requirements.

Category	Materials / configurations
Fins	Aluminium, copper, pre-coated aluminium, stainless steel and special materials on request.
Tubes	Copper, internally grooved copper, stainless steel and special materials on request.
Material combinations	CU/AL, STAINLESS/AL and special configurations for dedicated applications.
Treatments	Surface treatments or specific materials may be required in the presence of aggressive environments, humidity, corrosive agents or particular hygiene requirements.

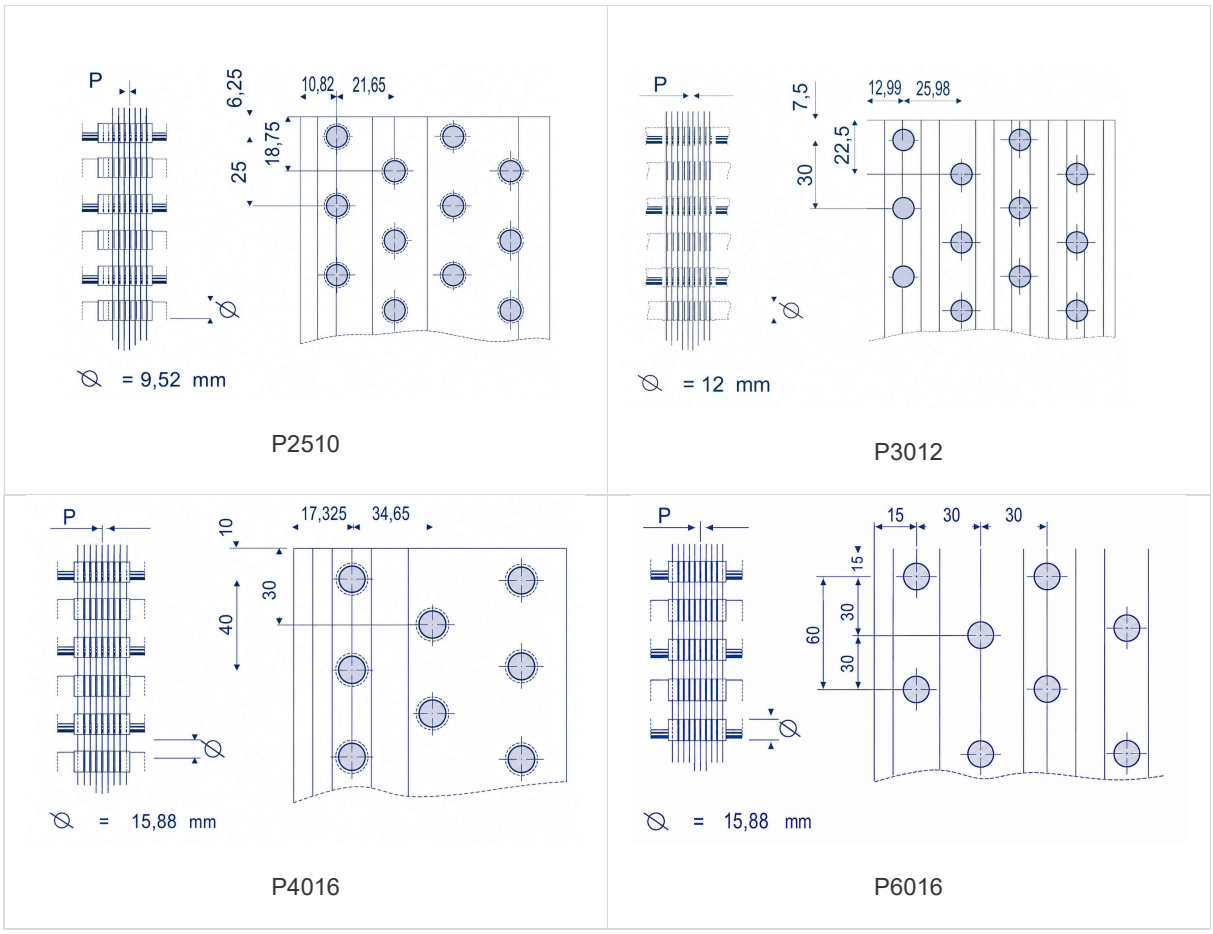
6 Geometries and configurations

The coil geometry defines the arrangement of tubes and fins. It affects thermal performance, pressure drops, overall dimensions and suitability for the application.

- tube diameter
- tube pitch
- row pitch
- number of rows
- number of tubes in height
- fin pitch
- finned pack length
- number and arrangement of circuits

6.1 Dimensional examples

Common geometries include P2510, P3012, P4016 and P6016. The choice should be based on the required performance, allowable pressure drops and design constraints.



Examples of dimensional configurations and hole/tube patterns derived from technical drawings.

7 Technical selection parameters

The technical configuration is defined through a series of system, mechanical and construction data. Each parameter affects the final heat exchanger selection.

Area	Data to collect	Impact on selection
Thermal data	Required capacity, air and fluid temperatures, flow rates, relative humidity if relevant.	Sizing of the heat exchange surface and performance verification.
Fluid	Type of fluid, glycol concentration, refrigerant, oil, steam or other fluids.	Material compatibility, circuiting and pressure drops.
Pressure	Operating pressure and allowable pressure drops on the air side and fluid side.	Selection of tubes, thicknesses, headers and circuit configuration.
Installation	Available dimensions, connection side, orientation, accessibility, maintenance.	Overall dimensions, frame, connections and ease of installation.
Environment	Indoor/outdoor, dust, corrosion, frost, condensate, aggressive atmosphere.	Fin pitch, materials, treatments and surface protection.

8 Fin pitch, circuiting and quality

Fin pitch is the distance between two consecutive fins. It affects heat exchange surface, air-side pressure drops, condensate drainage, frost formation and ease of cleaning.

Narrower fin pitch	Wider fin pitch
Increases the density of the finned pack and can improve heat exchange, but requires attention where dirt, condensate or frost are present.	Reduces the risk of clogging and facilitates cleaning. It may be preferable in industrial applications or where dirty air is present.

Circuiting defines the path of the fluid inside the heat exchanger. The number of circuits is selected according to flow rate, allowable pressure drop, required capacity and fluid type.

8.1 Quality and testing

Depending on the project specifications, heat exchangers may undergo dimensional checks, construction inspections and leak tests. Where required, the product can be supplied with conformity documentation and specific certifications.

- material inspection
- dimensional check
- inspection of welds or brazed joints
- leak test
- internal cleanliness check
- verification of required technical documentation

9 RFQ checklist

For accurate selection, it is useful to provide as much data as possible. The following table can be used as a basis for a technical request.

Data	Information to provide
Application	HVAC / refrigeration / heat pump / energy recovery / industrial process / other
Internal fluid	water / water-glycol / refrigerant / oil / steam / other
Required capacity	_____
Air flow rate	_____
Fluid temperatures	inlet _____ outlet _____
Air temperatures	inlet _____ outlet _____
Operating pressure	_____
Allowable pressure drops	fluid side _____ air side _____
Required materials	tubes _____ fins _____ frame _____
Configuration	rows _____ fin pitch _____ geometry _____ connection side _____
Overall dimensions	L _____ W _____ H _____
Environmental conditions	indoor / outdoor / dust / condensate / frost / corrosive environment
Required documentation	certificates / drawings / tests / other: _____

10 Final notes

Finned coil heat exchangers are highly configurable components. The correct choice requires a technical assessment of project data, materials, geometry, installation conditions and required performance.

SMC supports customers in selecting the most suitable solution by identifying the configuration that is consistent with the application and system requirements.

For a technical assessment

Send data relating to fluid, temperatures, flow rates, pressure, materials, available dimensions and operating conditions. Complete data collection enables more accurate selection and reduces technical definition times.

Contacts

Via G. Falcone, 173 - 22076 Mozzate (CO)

(+39) 0331 837210

info@smcanderboni.it