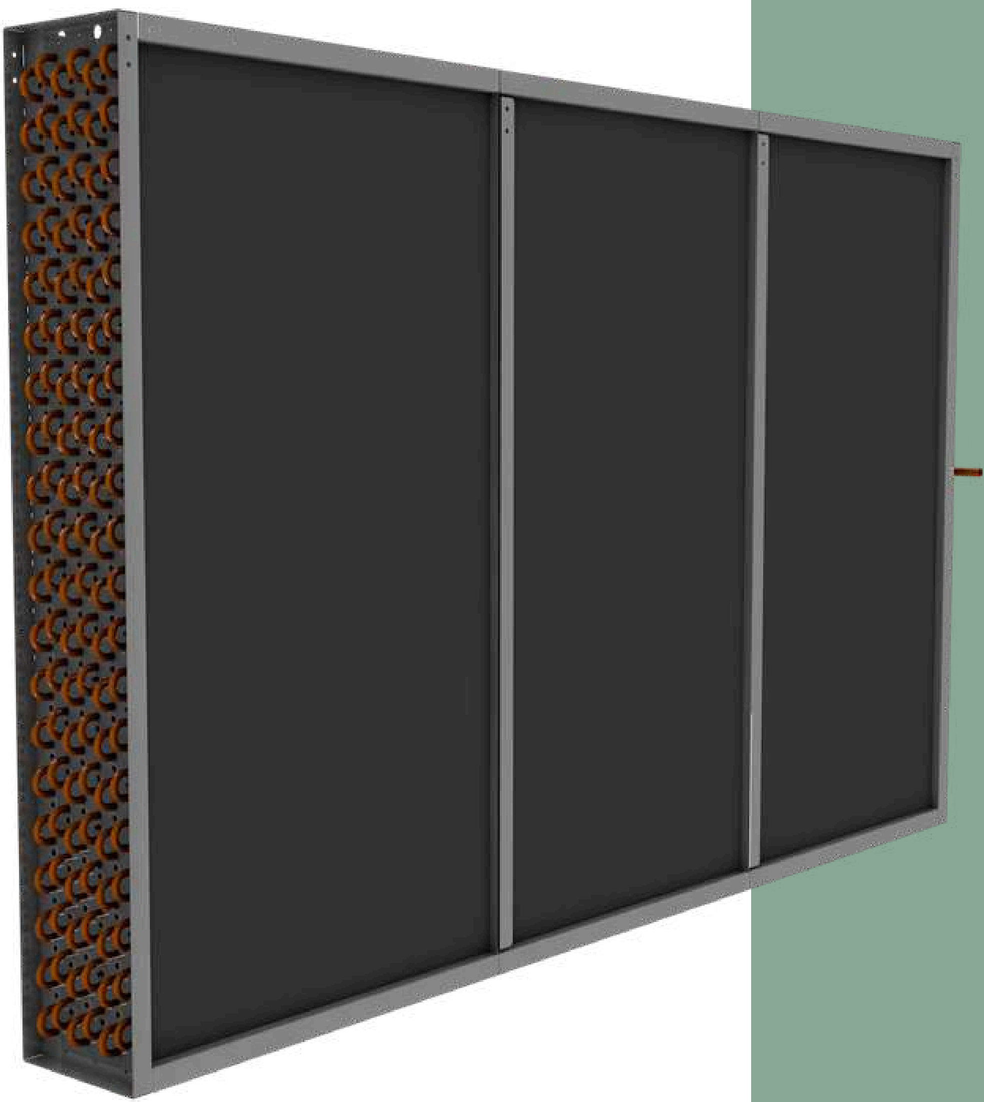
Technology and Trust

Finned Coils



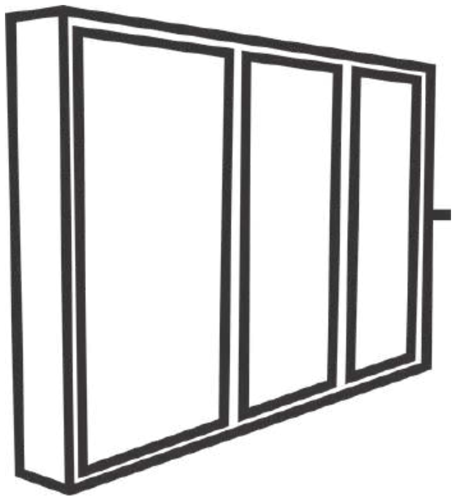
Finned Coils

january - 2023

Serpentinas
ALETADAS

60 a 740 Kcal/h
81 a 861 Watts

Finned Coils



Technical details

- To select the coil, it is necessary to know in advance the values of:
  • Sensible heat (Qs).
  • Total heat (Qt).
- Desired room temperature - air inlet temperature into the coil (tear)
- Air flow rate of the fan (V)
- Inlet temperature of the cooling element in the coil (te resf.)
- Outlet temperature of the cooling element in the coil (ts resf.)

Aplications

Dairy
Agribusiness
Beverages
Industrial
Pharmaceutical
Food
Wholesale and Retail
Civil Construction
Transport and logistics
Hospital

Benefits

- Built with high-quality materials, ensuring long durability.
- Corrugated fins, inducing continuous air turbulence, guaranteeing greater heat exchange and high performance
- Headers in aluminum or galvanized sheet
- Collectors in copper
- Proper circuiting, minimizing internal pressure losses
- Possibility of executing coils in various measurements, meeting diverse requirements and needs
- Non-aligned tubes, enhancing performance by altering the direction of airflow, avoiding "dead zones" in the fins
- Smooth copper tubes in 3/8", ½", or 5/8" with the option of grooving for 3/8".
- For 3/8" tubes, the arrangement is 25.4 x 22mm with a spacing of 1.6 to 5.5mm
- For 1/2" tubes, the arrangement is 31.75 x 27.5mm with a spacing of 2 to 10mm.
- For 5/8" tubes, the arrangement is 38.1 x 37.5mm with a spacing of 2.1 and 3.2mm or 50 x 48.99mm with a spacing of 2 to 10mm
- Bronze nipples for chilled water.
- When the coil is used with halogenated refrigerant in direct expansion, a liquid distributor will be installed at its inlet.
- Every piece undergoes a pneumatic testing process (30Kgf/cm²), washing, and final pressurization with nitrogen to ensure absence of moisture and removal of solid and liquid impurities at levels compatible with refrigeration systems

Supermarket Series and Horizontal

Fórmulas Gerais

QI = QII = Qs = Sensive Heatl (kcal/h)

$QI = \frac{V \times Cp \times Dt}{v}$ QII = U x S Dtm

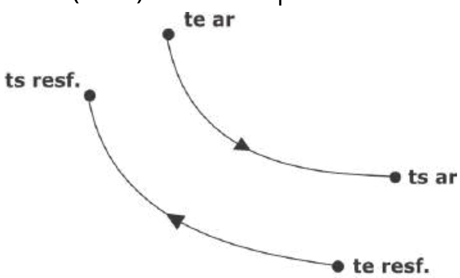
$S = \frac{Qs}{U \times Dtm}$ (m²)

V • Air flow rate of inflow in m³/h
v • Specific volume of air = in m³/kg (temperature dependent function)
Cp • Specific heat of air = 0.24 kcal/h x kg x °C
Dt • Temperature differential between the inlet and outlet of the air, in °C (tear - tsar)
S • Heat exchange area in m²
U • Overall heat transfer coefficient, kcal/h x m² x °C
Dtm • Logarithmic mean temperature difference between the air and the cooling element, in °C

Para o cálculo do Dtm

A =Inlet air temperature (Tear) - outlet temperature of the cooling element (Tout)
B = Outlet air temperature (Tout) - inlet temperature of the cooling element (Tin)

$Dtm = \frac{A - B}{\ln \frac{A}{B}}$



Para o cálculo do U

Fórmula Resume:

$\frac{1}{U} = \frac{1}{he} + \frac{M \times r}{hi}$, where

he = Air-side film coefficient. For a face velocity of approximately 2.50 m/s, 50 kcal/h x m² x °C

hi = Film coefficient on the cooling element side. For chilled water with a velocity between 0.7 and 1.3m/s. - hi = 2000kcal/h x m² x °C.

For halogenated refrigerants, for evaporation 0°C - hi = 1000 kcal/h x m² x °C

r	Aletas/polegada		
	8	10	12
3/8"	11,70	14,63	17,55
1/2"	13,80	17,25	20,70
5/8"	18,20	22,75	27,30

M = Multiplier factor

$= \frac{Qt}{Qs} = \frac{\text{Total Heat}}{\text{Sense Heat}}$

With these values in hand, one can calculate the radiating area - S, in square meters, and then determine the dimensions of the Mipal coil

Area Face Determination - Af (Length and fin height), for the face velocities off 2,5m/s:

$Af = \frac{V}{2,5}$ (m²)

•Determination of the number of fins
Number of fins =
$\frac{\text{Fin length (mm)}}{\text{Fin spacing}}$

•Determination of fin depth and number of rows (ROWS)
Depth = $\frac{S\ (m)}{\text{Number of fins} \times \text{height} \times 2}$

• For 1/2" diameter pipes, each row corresponds to a depth of 27.5mm.

• For 3/8" diameter pipes, each row corresponds to a depth of 22mm.

• For 5/8" diameter pipes, each row corresponds to a depth of 37.5mm.

Therefore, the number of rows ≥ depth 27,5 or 22 or 37,5

Obs: Mipal has fins (3/8" and 1/2") with louvers (shutters) that can increase the overall heat transfer coefficient by up to 25%

Important Considerations for Coil Calculations:

• Check if the psychrometric conditions are met for the desired cooling
• The water velocity in the tubes should be between 0.7 and 1.3 m/s to achieve maximum heat transfer without a significant pressure drop in the water
• The air velocity should be between 2 and 3 m/s. Typically, 2.5 m/s is used. Higher velocities cause water carryover

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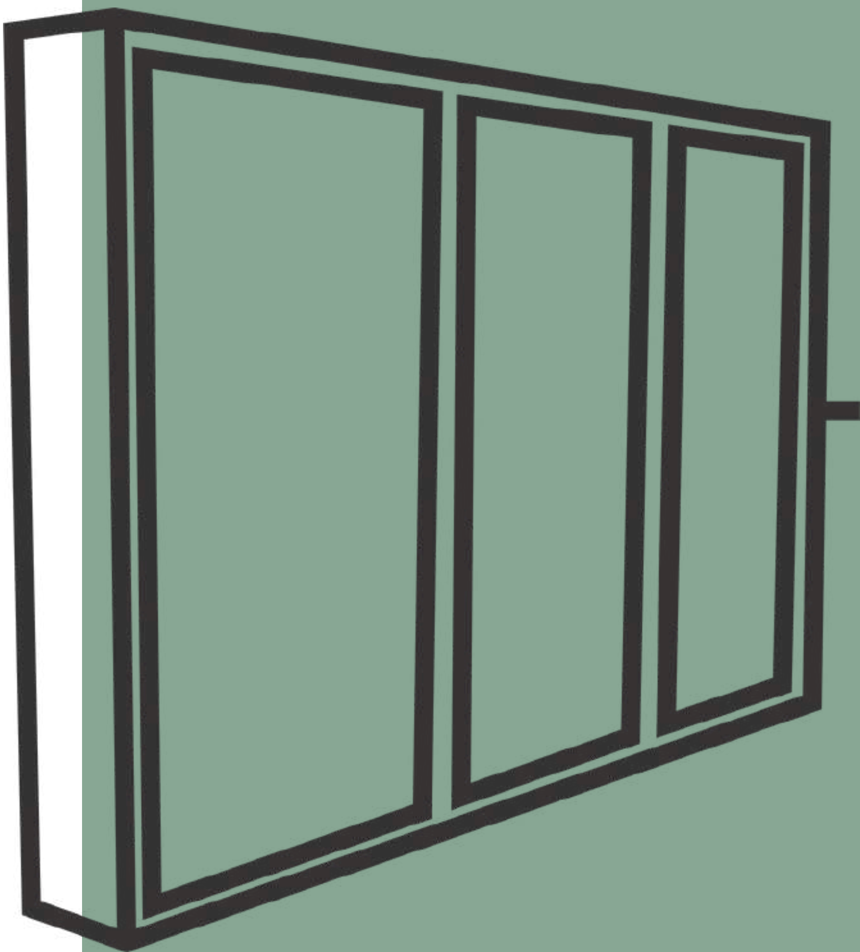

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