ENGINEERING
TOMORROW

Data sheet

Tube-in-tube heat exchanger
Type HE

Tube-in-tube heat exchanger type HE is used primarily for heat transfer between the liquid and suction lines of the refrigeration plant.

The purpose is to utilise the cooling effect, utilise which without a heat exchanger is otherwise lost to the ambient air via uninsulated suction lines.

In the heat exchanger, this effect is used to subcool the refrigerant liquid.

Features

- High refrigeration capacity in evaporator
- Helps ensure vapour-free liquid ahead of the expansion valve
- HE 0.5-1.5: May be used in the following EX range: Category 3 (Zone 2)
- Maximum utilisation of the evaporator upon setting the thermostatic expansion valve for minimum superheat
- Helps prevent sweating and frosted-up suction lines

Approval EAC

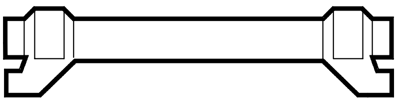
Technical data

Refrigerants	R22, R1270*, R134a, R290*, R404A, R407A, R407C, R407F, R448A, R449A, R450A, R452A, R507A, R513A, R600*, R600a* *) HE 0.5 - 1.5 only
Operating temperature	-60 – 120 °C
Max. working pressure	PS / MWP = 28 bar
Max. test pressure	Pe = 40 bar

This product (HE 0.5 - 1.5) is evaluated for R290, R600, R600a and R1270 by ignition source assessment in accordance with standard EN ISO80079-36.

For complete list of approved refrigerants, visit www.products.danfoss.com and search for individual code numbers, where refrigerants are listed as part of technical data.

Ordering



Type	Solder connection ODF				Code no.
	Liquid line		Suction line		
	[in.]	[mm]	[in.]	[mm]	
HE 0.5	–	6	–	12	015D0001
	1/4	–	1/2	–	015D0002
HE 1.0	–	10	–	16	015D0003
	3/8	–	5/8	–	015D0004
HE 1.5	–	12	–	18	015D0005
	1/2	–	3/4	–	015D0006
HE 4.0	–	12	–	28	015D0007
	1/2	–	1 1/8	–	015D0008
HE 8.0	–	16	–	42	015D0009
	5/8	–	1 5/8	–	015D0010

Generally, the size of an HE heat exchanger can be determined from the connections corresponding to the pipe dimensions of the refrigeration plant.

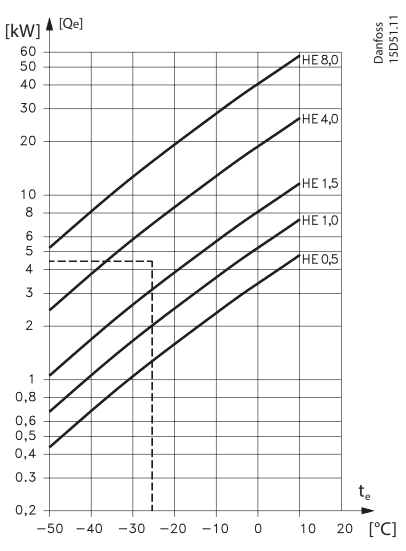
The design is such that normal suction gas velocities are achieved, with a subsequent small pressure drop. Thus the heat exchanger capacity will match plant capacity.

At the same time, oil return to the compressor is ensured.

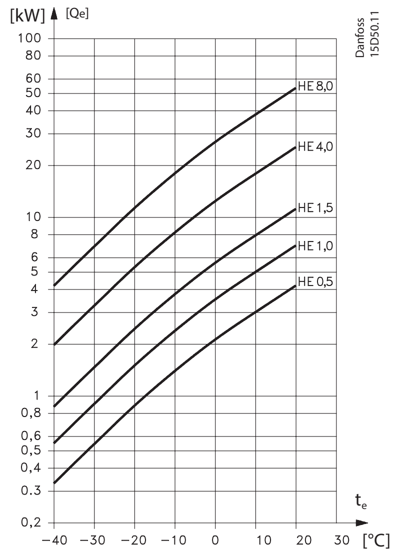
If the main object is to avoid sweating and frosting-up of the suction line, the HE can be chosen one size larger than the size determined by the capacity. An HE used as an auxiliary condenser must always be selected according to the connection dimensions.

Capacity

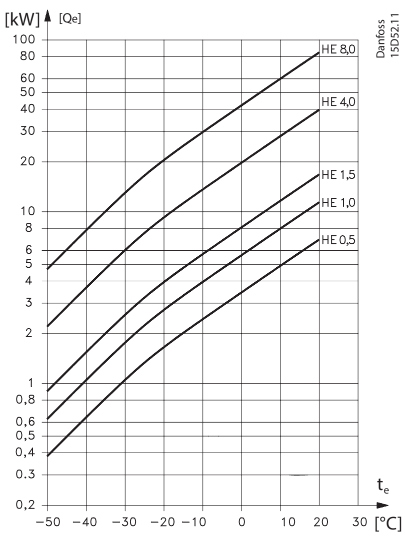
R22



R134a



R404A



Capacity
(continued)

Precise heat exchanger sizing can be obtained from the curves which show plant capacity Q_e for R22, R134a and R404A depending on evaporating temperature t_e.

Example

Plant capacity Q_e = 4.5 kW
Refrigerant = R22
Evaporating temperature t_e = -25 °C

The curve for R22 shows that an HE 4.0 is suitable. The curve for HE 4.0 lies immediately above the intersection of the lines through Q_e= 4.5 kW and t_e= -25 °C.

Heat flow Q during heat exchange is calculated from the formula: $Q=k \times A \times \Delta t_m$

Q heat flow in [W]
k heat transfer coefficient in [W/m²] [°C]
A transfer area of the heat exchanger in [m²]
Δt_m average temperature difference in [°C], calculated from the formula:

$$\Delta t_m = \frac{\Delta t_{max.} - t_{min.}}{\ln \frac{\Delta t_{max.}}{\Delta t_{min.}}}$$

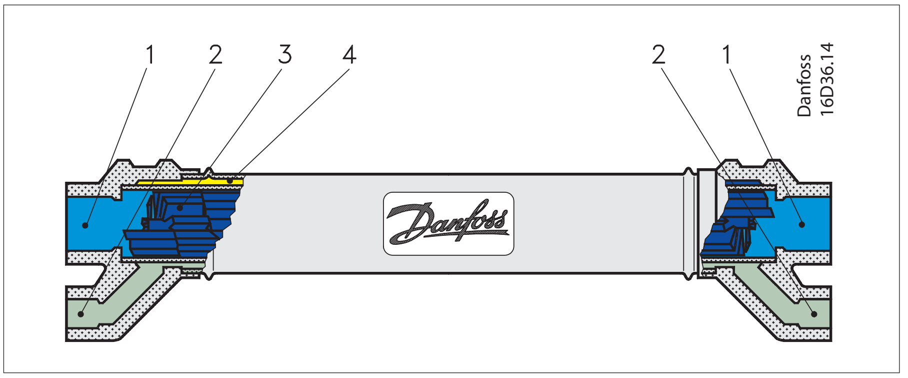
k × A values
Determined by experiment (see table).

Type	K × A Dry suction gas / refrigerant liquid [1]) (normal use in refrigeration plants with fluorinated refrigerants) [W] / [°C]
HE 0.5	2.3
HE 1.0	3.1
HE 1.5	4.9
HE 4.0	11.0
HE 8.0	23.0

[1]) These figures apply to dry gas only.
Even if a thermostatic expansion valve is used, the suction gas will carry very small liquid drops into the suction line.
The fins of the HE catch these drops which then evaporate.
This may result in a smaller superheat than the theoretically calculated value.

Design / Function

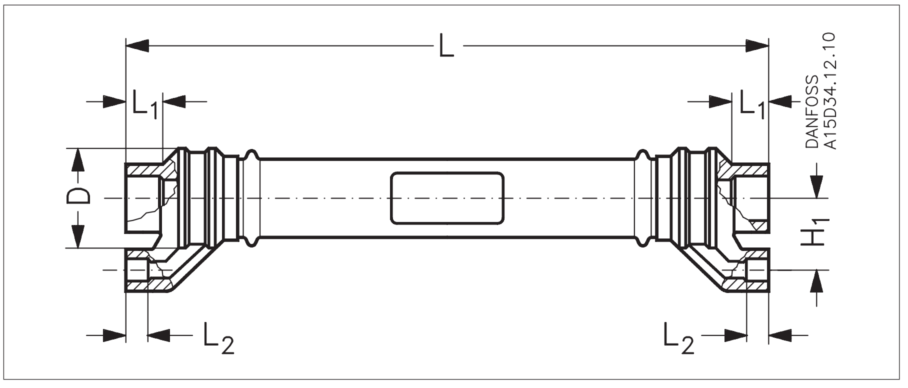
1. Suction line connection
2 . Liquid line connection
3. Inner chamber
4. Outer chamber



Offset fin sections are built into the inner chamber (3) and result in a turbulent gas flow with minimum flow resistance.
The gas flows straight through without changing direction and without oil pockets.

Refrigerant liquid flows in the opposite direction to the gas, through the small outer chamber (4).
The flow is guided by a built-in wire coil so that maximum heat transfer is achieved.
The hot liquid flowing through the outer chamber normally protects the outer tube from “sweating”.

Dimensions [mm] and weights [kg]



Type	H_1	L	L_1	L_2	øD	Net weight	Volume	
							Outer chamber [cm³]	Inner chamber [cm³]
HE 0.5	20	178	10	7	27.5	0.3	8.5	23.0
HE 1.0	25	268	12	9	30.2	0.5	25.0	45.0
HE 1.5	30	323	14	10	36.2	1.0	40.0	100.0
HE 4.0	38	373	20	10	48.3	1.5	80.0	260.0
HE 8.0	48	407	29	10	60.3	2.3	175.0	475.0