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

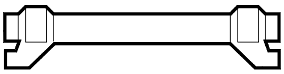
- High refrigeration capacity in evaporator
- Helps ensure vapour-free liquid ahead of the expansion valve
- HE 0.5-1.5: Compliant with ATEX hazard zone 2
- Maximum utilisation of the evaporator upon setting the thermostatic expansion valve for minimum superheat.
- Helps prevent sweating and frosted-up suction lines.

Approval GOST AN30

Technical data

Refrigerants	HE 0.5 - 1.5: HCFC, HFC and HC HE 4.0 - 8.0: HCFC and non-flammable HFC
Operating temperature	-60 – 120 °C
Max. working pressure	HE 0.5, HE 1.0, HE 1.5, HE 4.0: PS/MWP = 28 bar
	HE 8.0: PS/MWP = 21.5 bar
Max. test pressure	HE 0.5, HE 1.0, HE 1.5, HE 4.0: Pe = 40 bar
	HE 8.0: Pe = 28 bar

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.

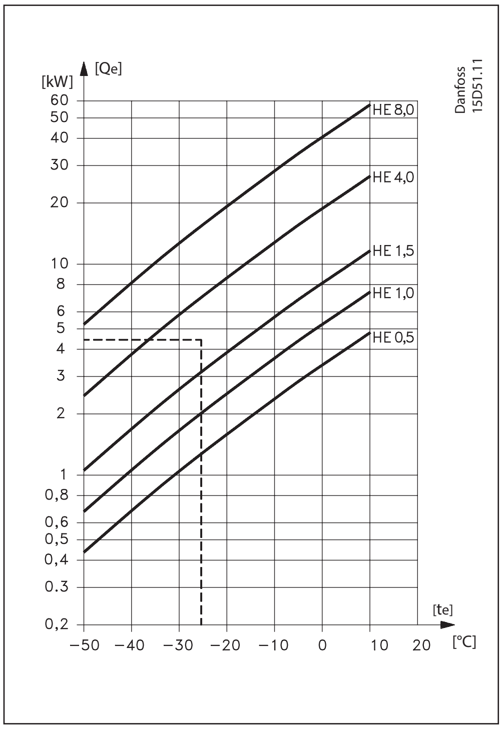
The design is such that normal suction gas velocities are achieved, with a subsequent small pressure drop. Thus the heat exchanger capacity will match plant capacity.

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

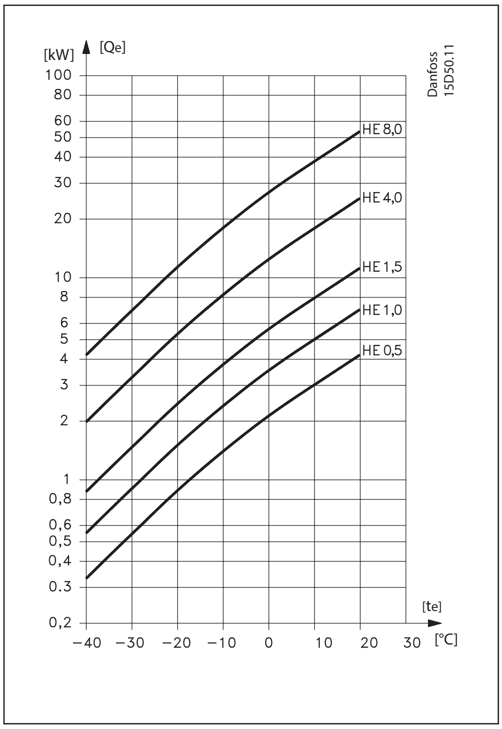
If the main object is to avoid sweating and frosting-up of the suction line, the HE can be chosen one size larger than the size determined by the capacity. An HE used as an auxiliary condenser must always be selected according to the connection dimensions.

Capacity

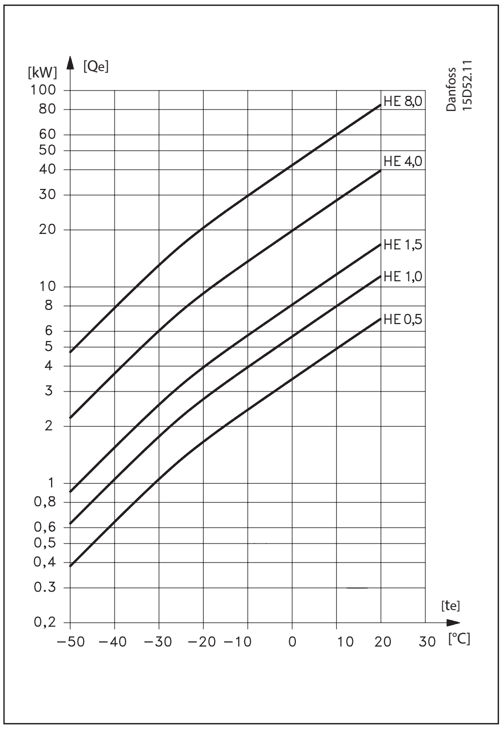
R22



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:

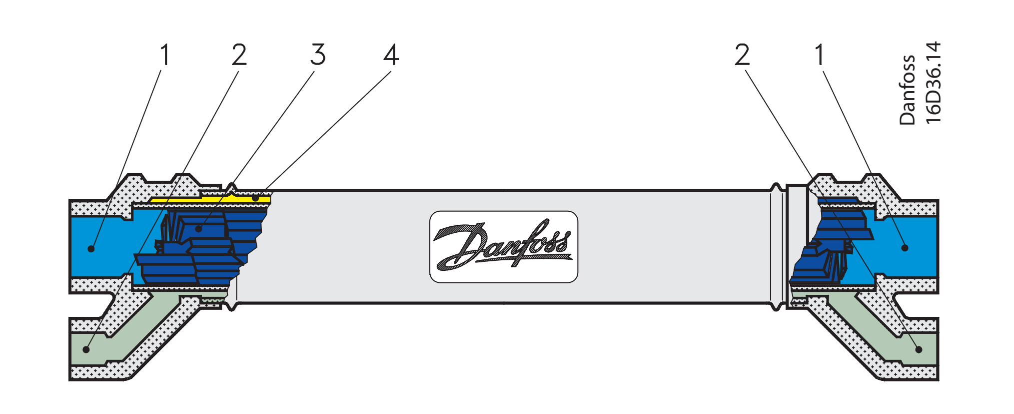
$$\Delta t_m = \frac{\Delta t_{max.} - t_{min.}}{\ln \dfrac{\Delta t_{max.}}{\Delta t_{min.}}}$$

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

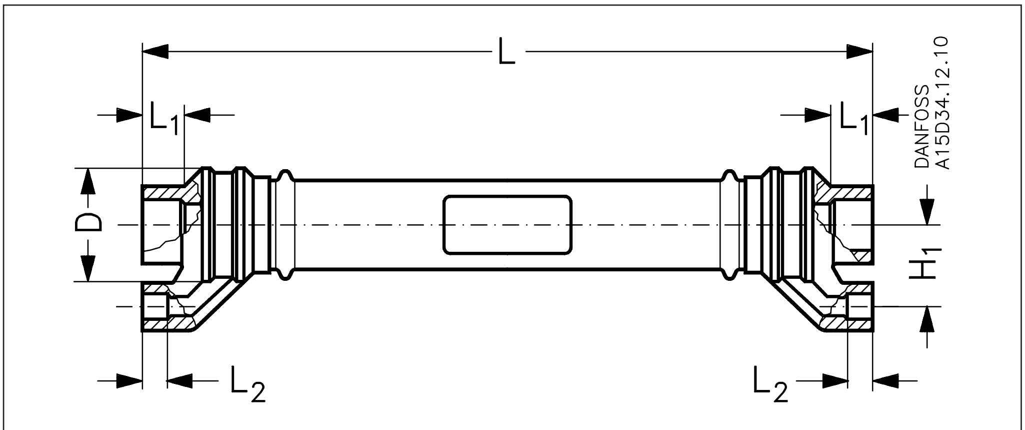


1. Suction line connection
2. Liquid line connection
3. Inner chamber
4. Outer chamber

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