Data sheet



Tube-in-tube heat exchanger

HE

Increases the system efficiency and protects the system against liquid entering the compressor

Description

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.

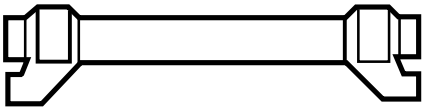
Features & benefits

- High refrigeration capacity in evaporator
- Helps ensure vapor–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 utilization of the evaporator upon setting the thermostatic expansion valve for minimum superheat
- Helps prevent sweating and frosted-up suction lines

Ordering

Product code numbers

Figure: Type HE



Type	Outlet size [in]	Outlet size [mm]	Inlet size [in]	Inlet size [mm]	Code number
HE 0.5		6.00		12.00	015D0001
HE 0.5	1/4 in		1/2 in		015D0002
HE 1.0		10.00		16.00	015D0003
HE 1.0	3/8 in		5/8 in		015D0004
HE 1.5		12.00		18.00	015D0005
HE 1.5	1/2 in		3/4 in		015D0006
HE 4.0		12.00		28.00	015D0007
HE 4.0	1/2 in		1 1/8 in		015D0008
HE 8.0		16.00		42.00	015D0009
HE 8.0	5/8 in		1 5/8 in		015D0010
HE 1.5	1/2 in		3/4 in		015D0116

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.

Media

Refrigerants

Refrigerants	R22, R1270[(1)], R134a, R290[(1)] , R404A, R407A, R407C, R407F, R448A, R449A, R450A, R452A, R507A, R513A, R600[(1)], R600a[(1)]

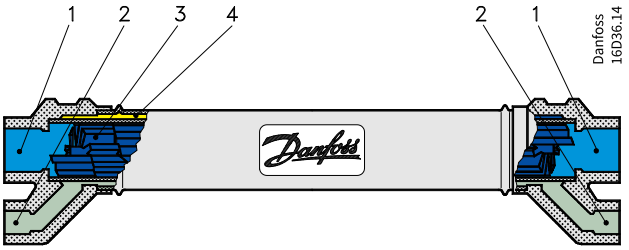
[(1)] HE 0.5 – 1.5 only

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.

Product details

Design



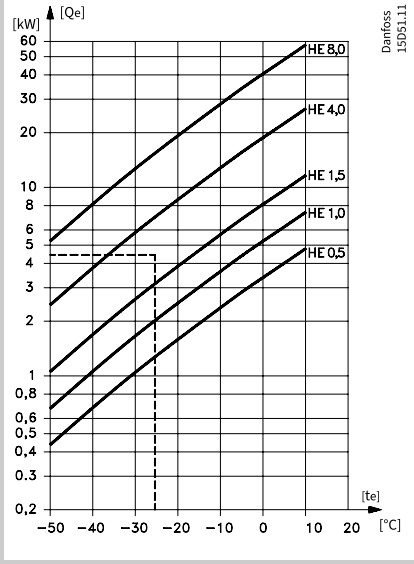
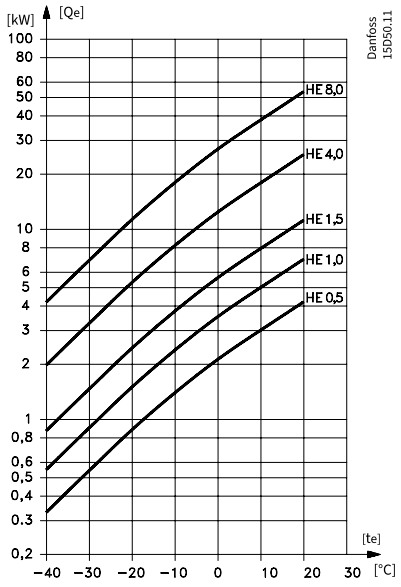
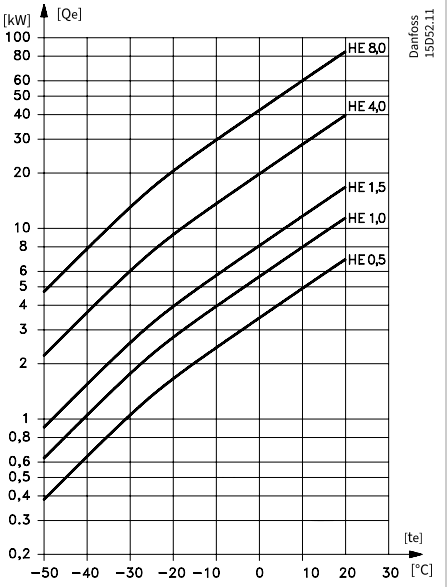
1.	Suction line connection
2.	Liquid line connection
3.	Inner chamber
4.	Outer chamber

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".

Capacity

Table: Capacity

R22	R134a	R404A
		

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:

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

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.

Pressure and temperature data

Operating temperature	-60 – 120 °C
Max. working pressure	HE 0.5, HE 1.0, HE 1.5: PS/MWP = 35 bar 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: P_e = 52 bar HE 4.0: P_e = 40 bar HE 8.0: P_e = 32 bar

Dimensions

Figure: Dimensions [mm] and weights [kg]

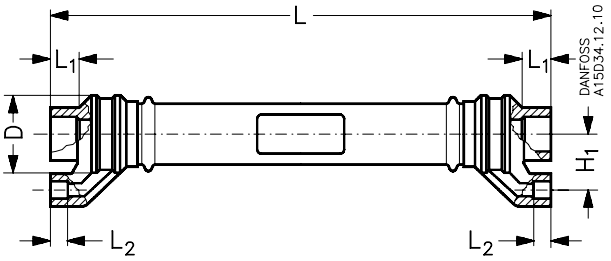


Table: Dimensions [mm] and weights [kg]

Type	H_1	L	L_1	L_2	øD	Net weight	Volume	
							Outer chamber [cm^3]	Inner chamber [cm^3]
HE 0.5	20	178	10	7	27.5	0.3	8.5	23
HE 1.0	25	268	12	9	30.2	0.5	25	45
HE 1.5	30	323	14	10	36.2	1	40	100
HE 4.0	38	373	20	10	48.3	1.5	80	260
HE 8.0	48	407	29	10	60.3	2.3	175	475

Certificates, declarations and approvals

The list contains all certificates, declarations, and approvals for this product type. Individual code number may have some or all of these approvals, and certain local approvals may not appear on the list.

When you click on the link you will be directed to the latest version of the 'Declaration of Conformity'. Products developed and sold before this date of issue conform to the directives/standards in force at the time of their sale.

Approval type	Title	Certification body	Approval topic
Manufacturer's Declaration	Danfoss MD 040B0625.AB	Danfoss	PED, Pressure
Export Control Declaration	Tube-in-Tube heat exchangers	Danfoss	
Manufacturer's Declaration	Danfoss MD 034R9541.AA	Danfoss	China RoHS

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