HANSA-FLEX

TECHNICAL INFORMATION
OIL-AIR COOLERS

REV. A / 10 / 2024

WWW.HANSA-FLEX.COM

Technical information for oil-air coolers

Table of contents

1. General information about oil-air coolers

The installation, commissioning and maintenance of hydraulic systems or their components may be carried out only by suitably qualified personnel and in strict observance of all the relevant safety regulations.

Oil-air coolers are used for cooling the medium in hydraulic circuits. Ambient air is used as the coolant. A blower driven by an electric or hydraulic motor moves the ambient air through the cooling element. This element normally consists of a high-strength aluminium alloy and is manufactured using vacuum furnace brazing.

The special configuration of the channels in the element increases turbulence in the fluid and therefore the heat transfer capacity. In addition, special turbulators on the ribs of the cooling elements further increase the overall heat transfer coefficient. The resulting product is lightweight, robust and compact.

Oil-air coolers are used in machine and plant engineering, construction machinery and special vehicles as well as in any location where water is not available as a coolant or piping would prove too costly.

2. Safety instructions

Oil-air coolers may be installed only by suitably qualified personnel who are familiar with the safety requirements and the risks. The relevant safety regulations for the place of installation and the generally applicable rules of the technology must be observed. The maximum loads (volumetric flows, pressures, forces, temperatures) given in the product documentation must not be exceeded.

The operator (the employer) of the system must ensure that:

- The safety instructions and operating manuals are available and complied with
- The product is used for the intended applications stated in the operating manual and installation instructions and on the identification plate
- The currently applicable accident prevention and installation regulations are observed
- The permissible operating data and conditions of use are complied with
- Safety devices are used and the prescribed maintenance works are carried out

3. Technical information

3.1 General

- Material: Long-life aluminium
- Working pressure: 20 bar
- Test pressure: 35 bar
- Max. operating temperature: 120 °C
- Compatible fluids: Mineral oils (HL, HLP), water-oil emulsions, other fluids on request

3.2 Design

Various factors must be taken into account when designing oil-air coolers.

The most important parameters are the nominal cooling capacity (P_V), the oil inlet temperature (T_E) and the ambient temperature (T_A).

The required cooling capacity (PK) is calculated using this formula:

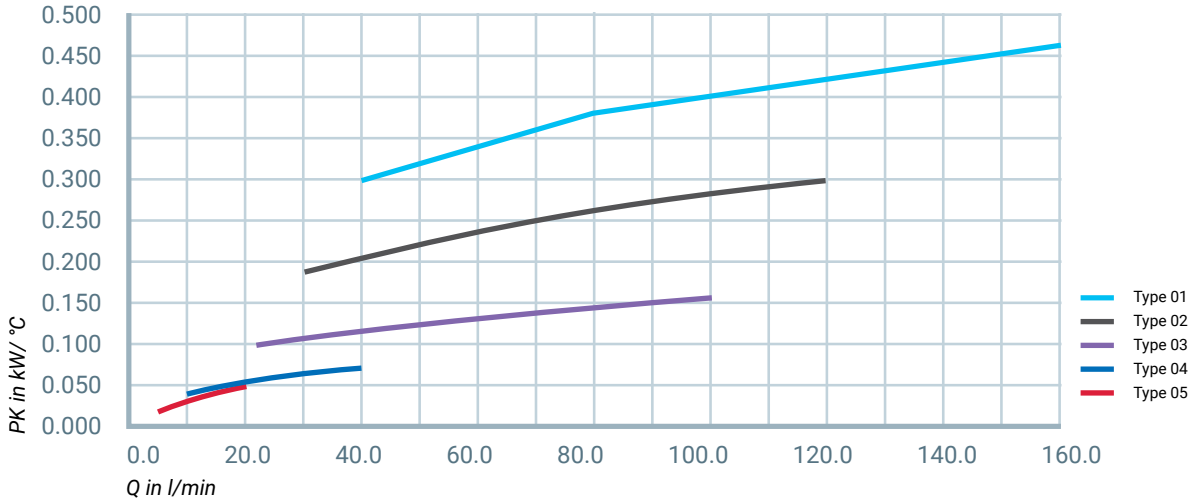
Required cooling capacity

$$P_K = \frac{P_V}{(T_E - T_A)}$$

P_K = Cooling capacity [kW/°C]
P_V = Nominal cooling capacity [kW]
T_E = Oil inlet temperature [°C]
T_A = Ambient temperature [°C]

The choice of product is then made based on the relevant cooling capacity chart curve shown for each model and the volumetric flow rate of the oil (Q).

Example of a cooling capacity chart:

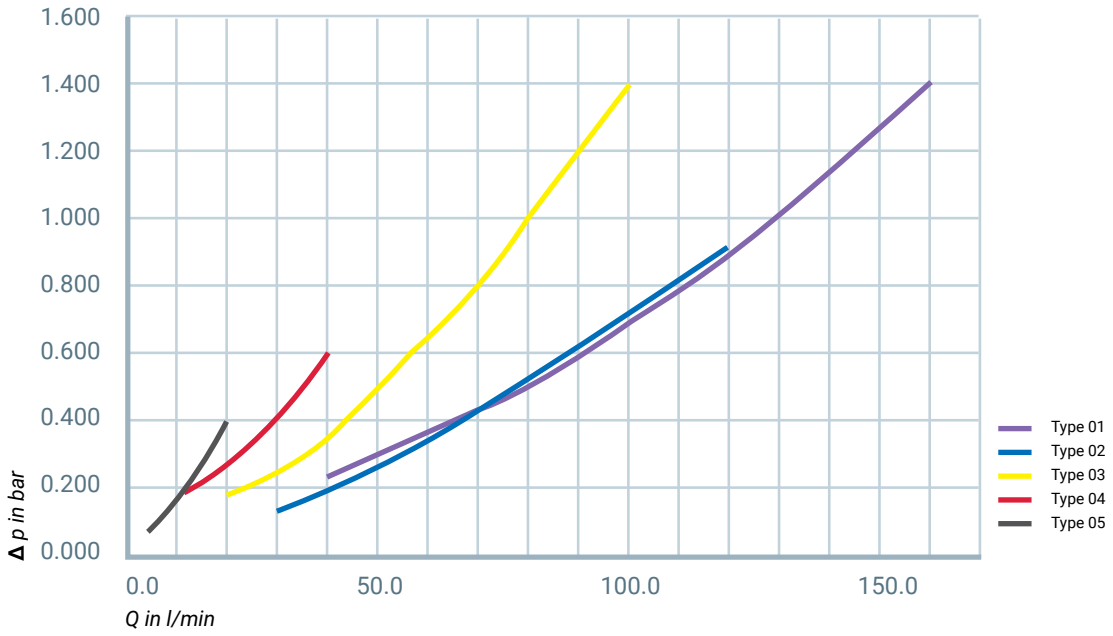


The cooling capacity curves are based on the inlet temperature of the oil at the cooler and the actual air temperature. For example: for an oil temperature of 60 °C and an air temperature of 20 °C, the temperature difference is 40 °C. To calculate the total cooling capacity ***in kW****, multiply* ***the temperature difference*** *by the cooling capacity* ***PK*** *in kW/°C.*

When using differential cylinders, it must be noted that the volumetric flow rate Q returning during retraction is higher (as a rule by a factor of 1.3… 1.6) due to the transmission ratio.

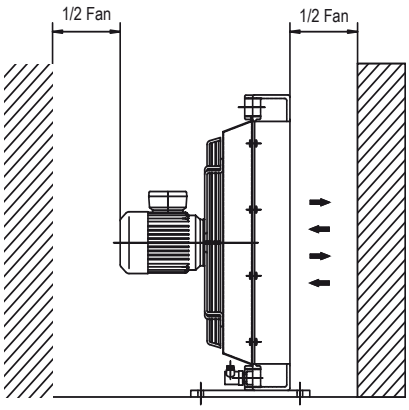
Another parameter is the pressure loss (Δp), which occurs through the use of the cooler and depends on the volumetric flow. This parameter is made available and is different for each model.

Example of a pressure loss chart:



3.3 Installation instructions / assembly

The cooler should be positioned horizontally such that there is no obstruction to the free passage of inlet and outlet air. The specified minimum distance to walls should be observed to ensure a natural flow of cooling air.



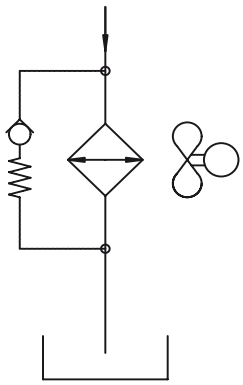
Adequate ventilation must be ensured. Care should be taken to avoid adverse effects on the surroundings caused by hot air or noise from the cooler when choosing where to locate it.

It must also be noted when choosing its location that the fan wheel generates a static charge due to the friction of the air. Therefore the cooler should not be set up near sensitive devices such as electronic equipment.

The cooler is normally installed in the return line of the oil circuit. It must be protected against shock loads and mechanical vibrations and not subjected to imposed strains or vibrations. This is normally achieved by connecting the cooler to the equipment using hose lines. Do not expose the heat exchanger to pressure shocks, pulsations or sudden changes in flow rate. This can lead to irreversible damage of the cooling element.

The installation of a bypass valve in the form of a non-return valve is recommended. This protects the heat exchanger against overpressure, which can occur when starting the equipment with cold, highly viscous hydraulic oil. The opening pressure of the non-return valve should be ca. 5 … 8 bar, depending on the pressure loss of the cooling element.

If a return line filter is installed downstream of the cooler, this increases the overpressure in the heat exchanger by the amount of the back pressure in the non-return valve.



The electrical connection of the cooler may be carried out only by trained specialist personnel.

The mains voltage given on the identification plate must be observed, as must the requirement for an adequate strain relief device on the connecting cable. Electrical protection of the cooler must be in accordance with the applicable standards. When connecting the cooler, the direction of rotation of the motor must be observed (see directional arrow on the housing).

4. MAINTENANCE

Careful maintenance has a crucial influence on operational safety and the service life of hydraulic systems. Oils and filters must be regularly checked and replaced in accordance with the instructions of the manufacturer. Systems must be regularly checked for leaks.

Repairs to the devices may be carried out only by trained specialist personnel.

Alteration, maintenance or installation work must be in accordance with the instructions in the operating manual and installation instructions. Original replacement parts should always be used.

The relevant safety and operating regulations of the country of use must be observed when performing maintenance work of any kind.

The cooling element must be regularly inspected for accumulated dirt or debris and cleaned if necessary to ensure a natural process of air change and to avoid reducing thermal efficiency.

The cooler must be disconnected from the hydraulic equipment before cleaning the oil side of the cooler. Accumulated dirt and debris can be removed by flushing with a flushing oil compatible with aluminium.

The cooler must be flushed again with hydraulic oil before it is put back into use. Cleaning of the air side can be done with jets of compressed air or water directed parallel to the laminations so as not to damage them. Grease or greasy dirt and debris can be removed using jets of steam or hot water. The electric motor must be disconnected from the power supply and suitably protected during cleaning.

5. DISPOSAL INFORMATION

Hydraulic oil, hydraulic hose lines, hydraulic components and electronic components or devices may not be thoughtlessly placed in the ordinary refuse; they must be collected and disposed of in accordance with the applicable waste disposal regulations. The national requirements of the respective country and, if appropriate, the information given in the safety data sheets must be observed.