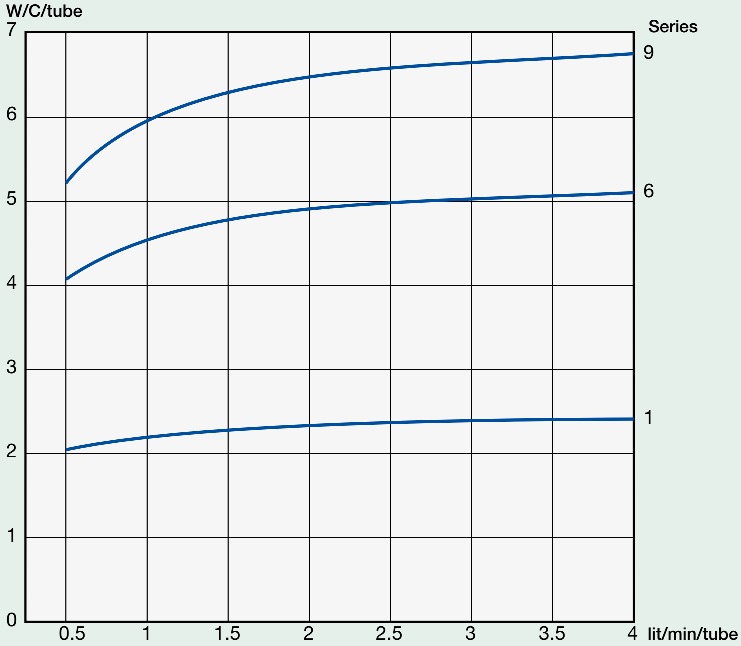
Reliable and Durable Performance

Setrab STD Oil Coolers are used in low to medium-pressure systems or in circulation systems where the oil cooler is vital to achieve reliable and durable performance. For example, in hydraulic systems, engines, transmissions, transformers, and fuel coolers.

Calculation service

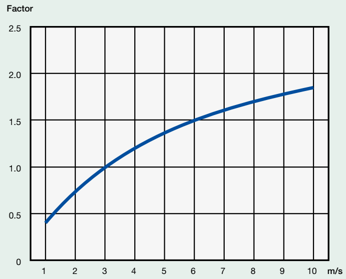
Contact your nearest dealer or distributor if you need help to dimension a cooler for your needs.

Cooling Effect per Tube at Air Velocity 3 m/s

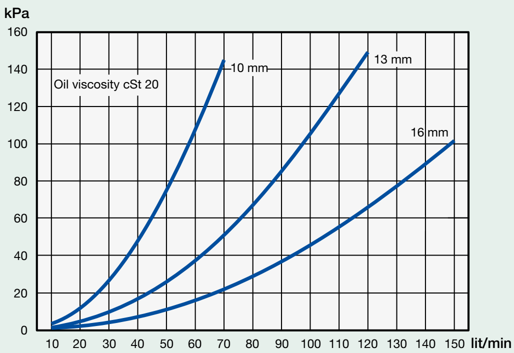


Air Pressure Drop

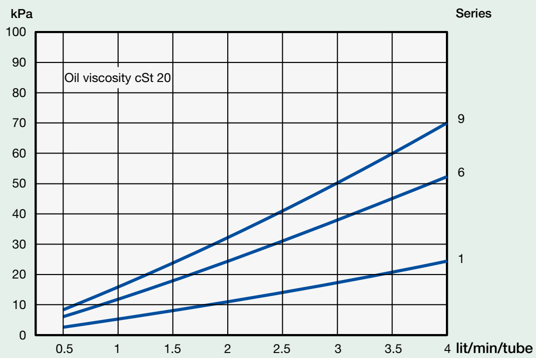
Correction Factor for Cooling Effect at Different Air Flows



Oil Pressure Drop in the Connections with Different Bore Diameters



Oil Pressure Drop in Tubes of Different Lengths



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How to calculate the performance of a STD ProLine oil cooler

The graphs are simplified representations of computer software calculations. The resolution of the graphs may result in bias either up or down depending on cooler and parameter. The graphs should however give a good indication of what to expect from the cooler.

Case

I want to calculate the performance of a STD613 with an AN10 connection.

The input data is

Oil inlet temperature:	110 °C
Oil flow:	32 lit/min
Ambient air temperature:	25 °C
Air flow:	8 m/s

1. **Determine the number of oil tubes on your selected oil cooler:**

   F. ex. STD113, STD613 and STD913 have 13 oil tubes, STD119, STD619 and STD919 have 19 oil tubes, and so on.

2. Calculate the oil flow per tube and minute, (32 lit/min) / (13 oil tubes) = 2.46 lit/min/tube.

3. From the graph "Cooling effect per tube at air velocity 3 m/s" find the value for W/°C/tube for a series 6 oil cooler at 2.46 lit/min/tube. The value is roughly 5 W/ °C/tube. This means the heat rejection is 5 W for every °C of temperature difference between oil inlet and ambient temperature and tube. In this case the temperature difference is 85 °C, since inlet oil temperature is 110 °C and ambient is 25 °C (110 °C - 25 °C = 85 °C). We have 13 tubes so the heat rejection is 13 tubes x 85 °C x 5W = 5 525 W (5.5 kW) at 3 m/s.

4. The air velocity is 8 m/s so we need to adjust the calculation slightly. From the graph "Correction factor for cooling at different air flows" find the factor for 8 m/s. In this case roughly 1.7. The heat rejection at 8 m/s is 1.7 times higher than for 3m/s. Multiply 5 525 W with 1.7 = 9 392 W (9.4 kW). In other words, the heat rejection for this cooler is 9.4 kW at the conditions in the above case.

Air side pressure drop

1. **Air side pressure drop**

   In the graph for "Air side pressure drop" find the value for 8 m/s, roughly 950 Pa. Please note that most installations cannot translate more than 15-20 % of vehicle speed into air velocity through the matrix of the oil cooler if mounted in the ram air.

   If a fan is used the pressure curve of the fan determines the amount of air passing through the matrix of the oil cooler. Please refer to the fan data sheet for more information.

2. **Oil side pressure drop**

   Oil side pressure drop is a combination of pressure drop created when the oil passes through the connection, and the pressure drop created when the oil passes through each oil tube.

   Add the values from graphs "oil pressure drop in the connections with different bore diameters" and "oil pressure drop in tubes with different lengths".

   Oil pressure drop connections, roughly 10 kPa.

   Oil pressure drop tubes, roughly 30 kPa.

   The oil side pressure drop is roughly 10 kPa + 30 kPa = 40 kPa (0.4 bar).

Please note that too high an oil pressure drop can create pressure spikes and activation of pressure relief valves. For reliable and durable operation keep oil side pressure drop low when dimensioning the cooler and connecting hoses.