PERFORMANCE REQUIREMENTS
Air Cooled Heat Exchanger

Company: _____ Date:_____

Address: _____ State: _____

Phone: _____ Fax: _____

Contact: _____ Ref:_____

The following information is required to select an air to oil cooler.

1. Heat load: _____ kW _____ or hp
2. Oil flow rate: _____ L/min
3. Oil type: _____ (eg ISO68)
4. Maximum desired oil temperature: _____ °C
5. Maximum allowable oil pressure drop: _____ Bar _____ or PSI
6. Cooling ambient air temperature: °C
7. Motor data: 12V - 24V - 240V - 415V - Hyd - no motor.
8. Maximum envelope: _____ H _____ W _____ D
9. Air face velocity (mobile cores only types): _____ m/s.
10. Maximum pressure cooler will be subject to: _____ Bar.

Advise if there are any cylinders or other pressure spike producing components in the cooler circuit.

If unsure of the values required the following information will help. Each number below corresponds to the number above

1. Heat load: the heat load may be determined by:

A. Hydraulic oil cooling: Assume 30% of the input power will be rejected to heat. If the input power is unknown, this formula may be used: $kW = \frac{\text{(system press. Bar) x (L/min flow)}}{} \times 0.00167$

B. Hydrostatic oil cooling: Assume 25% of the input power will be rejected to heat.

C. Heat load test: the heat load can be determined by actually measuring the degree temperature rise from a cold start-up. This temperature rise is the exact amount of heat going into the oil. To run a heat load test, disconnect any heat exchanger in the test loop. Record the increase in oil temperature every 5 minutes. Review the data received, and determine the greatest temperature rise in any 5 minute period.

$$\text{Heat load} = \frac{\text{system volume x oil heat capacity x } (\Delta T \text{ oil temperature rise})}{\text{5 minutes x 60 sec./min}}$$

For example -
Initial oil temp ..... 40°C
Final oil temp ..... 50°C
Time for temp rise ..... 5 minutes
System oil volume ..... 240 litres
Oil heat capacity ..... 1.72 kJ/L°C

$$\text{Heat Load} = \frac{240 \times 1.72 \times (50-40)}{5 \times 60} = 13.8 \text{ kW}$$

2. Oil flow rate: This is simply the flow rate of the oil circulating through the cooler.

3. Oil type: Advise oil grade or viscosity vs temperature details

4. Oil temperature: Oil coolers are typically sized using the maximum desired oil temperatures. Typical temp. ranges are:

Hydraulic oil ..... 43 - 54°C
Bearing lube oil ..... 49 - 71°C
Hydrostatic drive oil .....54 - 82°C
Lube oil circuits .....43 - 54°C

5 Oil pressure drop: Most systems can tolerate a pressure drop through the heat exchanger of 1.5 to 2 Bar. Excessive pressure drop should be avoided. Care should be taken to limit pressure drop to 0.3-0.5 Bar for case drain applications where high back pressure will blow out pump shaft seals.

6. Cooling air temperature: This is the temperature of the air entering the cooler, also referred to as the ambient air temperature. A normal maximum air temperature is usually between 32°C to 38°C. Care should be taken not to install in confined space as ambient temperature will increase and cause overheating.

7. Motor data: Most models are available with a wide variety of motors. List as desired. Be sure to indicate any special requirements.

8. Envelope size: This may be any height, width and depth depending on the application. Allowances should be given so as not to obstruct fan air flow.

9. Air face velocity/cooling air flow: Typically oil coolers are sized for 5.5m/s (20 kph) air velocity. When an air volume flow is given in m^3/s, it may be converted by:

$$\text{AFV m/s} = \frac{m^3/s}{\text{face area of core in } m^2}$$

COMPUTER SELECTION PROGRAM

We provide complete performance graphs for most models of our air cooled heat exchangers. However, for accurate sizing we recommend the use of our computer model selection program which covers almost all of our standard models of air cooled and water cooled exchangers. The program operates on most PC computers under Windows.