HT PUMPS

ANALYSIS OF THE HT PUMP SERIES

Several aspects were taken into consideration while we were working on the development of the new HT versions of HAWK pumps:

- *Inlet water taken from a tank at negative pressure up to 35°C.*
- *Inlet water supplied by an auxiliary pump above 35°C.*
- *Changes in the inlet water temperature from cold to hot.*
- *Interrupted pump operation to verify running dry for short and long periods.*
- *Various types of detergent.*

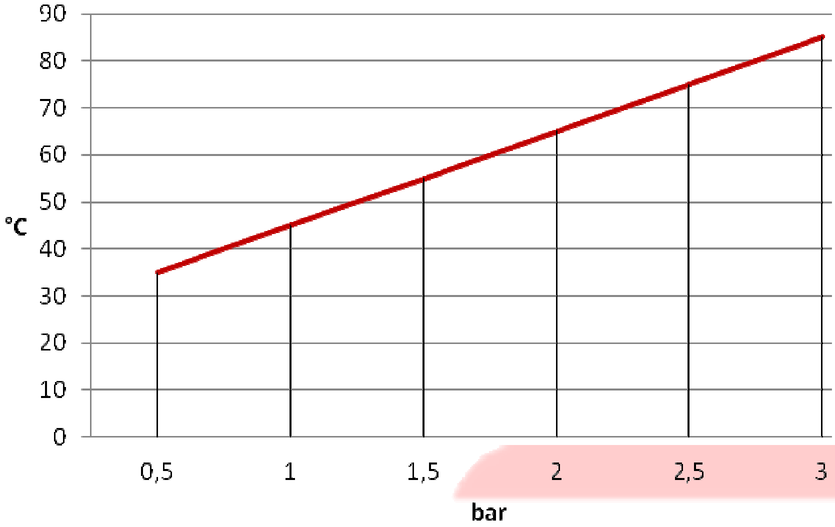
ENHANCEMENTS and OBSERVATIONS

The standard series was enhanced with several improvements, including:

- We changed the standard ***high and low pressure seals*** with seals made out of a material that is more resistant to wear and temperature (graphite filled PTFE). These seals are suitable for working with liquid temperatures ranging from 0°C to 85°C without being damaged. They tolerate longer dry running times compared to standard seals. The brass rings supporting the seals have also been modified to achieve less play and better sliding.
- The surface finish of the ***brass manifold housing with a chemical nickel coating*** protects against corrosion by chemicals and limits the effects of cavitation. Protection is both external and internal, offering better protection against corrosion.
- ***Negative supply pressures and abrupt changes in temperature encourage cavitation, which can be very dangerous***. Cavitation is the rapid conversion of liquid into steam, followed by the sudden formation of steam bubbles in the liquid. This formation of bubbles generates microscopic but intense explosions of the liquid. When cavitation occurs near metal components, it causes these components to wear. If it occurs near seals, they deteriorate rapidly especially on the outer lip.
- ***Piston pumps need an inlet flow rate at least twice the nominal flow rate of the pump with a supply pressure between 0.5 and 3 bar***. Note: a piston does not move with linear motion, but accelerates continually after each dead centre and decelerates before each dead centre. This alternating motion causes the amount of water taken up from the inlet to follow this motion too, increasing and reducing the instant flow rate. Since the maximum velocity of a crank mechanism is circa 1.7 times the average velocity of the piston, the instant flow rate at peak velocity is circa 1.7 times the nominal flow rate, thus the supply of inlet water must guarantee this requisite. A bad pump supply will result if this condition is not guaranteed and cavitation is extremely likely. Altering the flow rate needed by the pump also causes variations in the supply pressure. If the suction pressure is too low, it could fall below 0 when the pump requires maximum flow rate. Vice versa, if it is too high, it could keep the suction valves open for longer, resulting in part of the pumped water returning to the suction line and consequently reducing the volume efficiency of the pump. In the first case, the formation of cavitation is likely, whereas the second case is detrimental for the mechanical life of the manifold housing since the pipes were not designed to support these pressure loads.

HT pump versions were designed to work with inlet liquid temperatures up to 85°C. In order to prevent the risk of cavitation damage at these temperatures, the inlet water supply to the pump should be at a pressure of 3 bar, measured directly near the suction mouth. This pressure is needed to guarantee optimum component life (seals and valves), and performance.

The chart below is useful for choosing the correct supply pressure:



Note how a supply pressure of 3 bar extends the life of the pump (seals and valves), even with low liquid temperatures (for example 45°C).

The hydraulic system supplying the pump must be as short as possible, without any bottlenecks or blockages, such as bends or "T" couplings.

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