PWO

MAIN FEATURES

Plate Water Oil coolers are the modern variant of the traditional shell and tube coolers.
Unlike other plate coolers on the market mostly produced for water, steam or chemical applications, the internal structure of the OLAER Fawcett Christie PWO is designed to provide the highest efficiency while offering the lowest pressure drop required for the oil in hydraulics and lubrication applications.

WORKING PRINCIPLE

PWO Plate Water Oil coolers are manufactured by layering stainless steel plates between foils of copper. The special embossed pattern of each plate is reversed on every other plate, creating a lattice of contact points between adjacent ridges. The brazing process in a vacuum furnace melts down the copper, producing a compact and pressure resistant cooler package.

Oil and water circulate with a very high level of turbulence between the plates and in an opposite direction. Perfectly tuned flow rates will provide an outlet oil temperature similar to the water temperature. This concept is progressively replacing the shell and tubes models, as it greatly reduces the water consumption in a much smaller package.

HYDRAULICS CONNECTIONS

This range being dedicated to hydraulics applications, OLAER has chosen to use BSP parallel male thread on the oil side. The connectors are internally chamfered and are ideally suited for hose swivel attachments. The water side is fitted a male BSP taper thread suited for hydraulic hose fittings or general purpose connectors available in most hardware stores or plumbing supplies.

LIMITED MAINTENANCE

Even at low flow rate, the high level of turbulence generated in the fluid circulating between the plates prevents the clogging effects from foreign bodies, scale generation and growth of algae. The stainless steel grade 316 provides good corrosion resistance as well as a smooth surface minimizing the risk of particle adhesion.

SPECIAL

OLAER can also deliver special models for specific applications. A wide range of gasketed models is available for different types of materials such as Titanium for applications using sea or brackish water.

Applications

Compressors
Die casting machines
Fixed industrial power units
Fluid couplings Steel works
Injection molding machines
Paper Industry
Steel works

PWO Cooler Model Code

PWO K | 25 | - | 50

Cooler Series
PWO K

Cooler Size
5, 10, 16, 25, 45

Number of Plates
10, 20, 30, 40, 50, 60, 70, 80, 100
See cooler size for availability. Other configurations available on request.

Example : PWO K45-40

"Constant improvement in the range may result in modifications without notice"

INSTALLATION

AND SERVICE INSTRUCTIONS

INSTALLATION INSTRUCTIONS FOR PWO COOLERS

OLAER Fawcett Christie PWO coolers are designed for a dynamic working pressure of 14 bar. In static conditions, they can be suited up to 25 bar.

Inlets and outlets are clearly identified on the OLAER sticker affixed to the front of the unit. In doubt, oil connections are usually larger than water connections, and fitted with a parallel thread. Water connections use taper threads. The maximum tightening torque on the connectors is 200Nm.

The nominal cooling efficiency is achieved by cross flowing through the plates, the oil inlet and water inlet being located on a diagonal. (i.e. C1 oil in, C3 oil out, C4 water in, C2 water out).

The cooler may be mounted in any position. However, requirements for draining the circuits must be taken into consideration.

The PWO coolers must not be installed into a rigid frame. Use the OLAER purpose made brackets (or "armaflex" equivalent) to provide a "soft, elastic installation". All piping should be done in such a way as to minimize the machine vibrations to the cooler. When installed on the circuit return line, the cooler must be connected using flexible hoses. Failure to comply with mounting instructions may void the OLAER warranty.

FACTORS EFFECTING FOULING

Temperature, turbulence, velocity, flow distribution, surface finish and water quality all effect fouling in a cooler.

PRIMARY CAUSES OF FOULING

Laminar flow is formed when the velocity in the flow channel is uneven with low velocity next to the heat transfer surface. When the fluid passes through a tube the highest velocity will be at the centre of the tube, The fluid velocity is reduced the closer it gets to the tube wall, creating a stagnant film of low flow velocity next to the tube wall. The tube wall has no turbulence to keep particles in the fluid in motion. In laminar flow particles collect on the tube wall causing fouling of the heat transfer surface. Conventional cooler types are very sensitive to low velocities and easily get into the laminar area.

The opposite of laminar flow is turbulent flow. Operating with turbulent flow is the best way to avoid fouling in coolers.
PWOs impart a high degree of turbulence to the fluid. This turbulence keeps particles moving in the fluid and actually performs a scouring action to keep the heat transfer surface clean. This is accomplished by the unique design of PWOs. As the fluid passes through the channel it is constantly changing direction, disturbing the boundary layer and insuring turbulent flow even at extremely low velocities. In OLAER PWO coolers water flow rate will always be turbulent.

CLEANING

Measuring of inlet and outlet temperatures of the cooler indicates if fouling has occurred.
Fouling of the heat transfer surface decreases the heat transfer, resulting in temperature differences lower than specified. Another way to determine fouling is by measuring pressure drop over the cooler. Since fouling restricts the passages and thus increasing the velocity, this will be shown as increased pressure drop. When using these methods make sure that the water flow rate is as specified as changes in flow rate, of course, also effect temperature and pressure drop.

METHODS OF CLEANING

If cleaning of the cooler is required, back-flush with water will remove most soft deposit. If fouling appears in shape of hard deposit, circulate a weak acid through the cooler in reverse direction to the normal water flow. Use 5% phosphoric acid or, for frequent cleaning, 5% oxalic acid or similar weak acid. Afterwards rinse with a large quantity of water to flush all acid from the cooler before starting up the system again. Never wait until the cooler is completely clogged before cleaning.

FILTERS OR STRAINERS

When there are particles in the fluid that could clog the cooler, filters or strainers should be used. Particles up to 1mm diameter will not cause any problems.
When the water is chemically treated, please contact OLAER .
Sea water cannot be used in PWOs. For sea water applications PWOs with titanium plates or Shell&Tubes coolers are recommended. Ammonia cannot be used in PWOs.

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