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MAINTENANCE MATTERS

Oil Filter Performance Parameters

Oil filters are complex devices that perform a vital function in an extremely hostile environment. They generally perform their jobs quietly and efficiently, and it is only when they fail that we take notice. To better understand their role in the operation of your coach's engine or transmission, let's review some of the key parameters of their performance.

Resistance to Flow:

As fluid flows through a filter, the filter resists the flow. For fluid to pass through the filter, it must overcome this resistance. The result of this resistance is a reduction in the fluid pressure from the upstream side to the downstream side. This pressure differential, or pressure drop, is measured in pounds per square inch differential, or PSID.

There are many factors that affect the pressure drop across a filter, such as:

- Thickness and tortuosity of the media
- Filter area
- Mean pore size of the media
- Fluid viscosity
- Fluid temperature
- Flow rate
- Filter cleanliness

Filtration Performance:

The control of contamination levels in lubricating oil is a key factor in achieving optimal machine performance, reliability and service life. The main function of the filter is the control of contamination levels by the retention of fluid-borne particulate matter. There are two measures of filter effectiveness. One is efficiency and the other is "beta ratio." Beta is accepted by many in the filter and petroleum industry as a standard measure of filtration performance. Consumers are usually more familiar with micron ratings but it should be noted that a micron rating does not properly or fully describe either the efficiency or contaminant-holding capacity of a filter and by itself is an arbitrary number.

Collapse Strength:

The differential pressure, or pressure drop, across a filter increases as it becomes contaminated. If contaminants are allowed to accumulate beyond the design limit of the filter, the pressure can increase to the point where the filter media or structure will fail. In the case of a cylindrical filter, the direction of fluid flow often dictates the high-pressure side will be on the outer surface of the filter and the low-pressure side will be in the "inside" or center tube side, thus exploiting the geometrical properties. Excess pressure will result in the collapse of the filter tube or a breech of the media. When that collapse will occur is a function of the differential pressure across the filter, which is determined by the factors outlined in the above checklist.

In sum, oil filter performance is a complex interaction between the filter media and the hydraulic circuit. Regular maintenance, inspection and replacement are key to optimizing filter performance, service life and, ultimately, operating costs.

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