

Diagnosing Engine Oil Filters With Collapsed Center Tubes

When a collapsed center tube or element is discovered, the natural tendency is to assume something is wrong with the filter (Fig. 1). This is not the case, but is a symptom of problems with internal engine components.

Most engines incorporate within the oiling system a by-pass valve across the inlet and outlet of the full flow oil filter. The valve is designed to open and by-pass oil around the filter and/or element when the restriction reaches its opening pressure (Fig. 2). The by-pass flow circuit insures oil flow to the engine when there is a significant restriction across the filter due to plugging or cold start conditions. Typically, engine manufacturers design by-pass valves to open at a pressure differential of approximately 10 to 30 psid (pounds per square inch differential) with some as low as 4 psid (28 kPad) (kiloPascal differential), with some opening as high as 75 psid (500 kPad). Some engine manufacturers have the by-pass valve located in the filter mounting base on the engine, while others locate the valve in the filter. Either way, the same purpose is served.

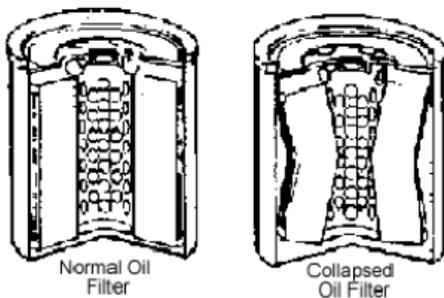


FIGURE 1

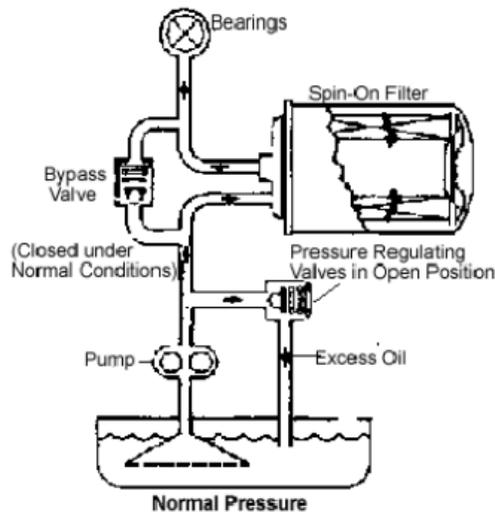


FIGURE 2

Oil filters are designed to withstand, without collapsing, differential pressures significantly greater than those experienced under normal operating conditions.

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Therefore, when a center tube or element has collapsed, it is usually the result of a "sticking" or otherwise malfunctioning by-pass valve.

A collapsed center tube or element can lead to a loss of filtration and oil flow to the engine. There is the possibility that interior parts of the filter or filter media may be physically displaced and could migrate into the oiling system interfering with the oil flow.

The malfunction of the filter by-pass valve, as well as the subsequent collapse of the center tube or element, may not be visually apparent. However, a catastrophic failure of the engine may result due to the seizure of a piston, connecting rod, or main crankshaft bearings among other failure possibilities.

The malfunction of filter by-pass valves and pressure regulating valves has been traced to:

- sticky surfaces caused by cold, highly viscous oil;
- oil contaminated by excessive condensation, coolant, or oxidation;
- improper oil drain and filter change intervals;
- carbon grit that temporarily jams a valve;
- sudden acceleration of the engine with any of the above conditions.

An oil filter with a collapsed center tube or element indicates a malfunction within the system. Inspection of the system and a review of the engine's performance and maintenance history should be conducted.

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