



Tech Tip

OIL FILTERS 181

OIL FILTER BY-PASS VALVES Some Are Hidden in Plain Sight

It is imperative that the lube tech fully understands the importance and function of the oil filter by-pass valve. The by-pass valve provides protection for the engine by ensuring adequate lubrication in the event of a filter restriction or during periods of high oil pressure or pressure surges, such as that encountered during cold weather starts/snap throttle. For those applications that incorporate an accessible by-pass valve, special care must be taken to prevent damage to the valve when changing the oil filter.

The by-pass valve may be concealed in the filter canister on a spin-on oil filter and out of sight. In the case of cartridge design filters, it may be right in front of you and you may fail to recognize it as a by-pass valve. Some lube techs are allowing vehicles to be driven away with broken by-pass valves and missing springs following an oil and filter change. They have seen the loose components, heard the springs when they would dislodge during a filter installation, but failed to explore the source of the noise and identify the components as a part of the by-pass valve assembly. When this occurs, the engine is running on unfiltered oil. Examples of some common failures will be illustrated later in this article.

KEEPING THE SYSTEM LUBRICATED

Most engines are fitted with a by-pass valve that allows oil to by-pass the oil filter under the following conditions:

- 1) **Contaminated Filter...** The filter by-pass valve is set to open at a predetermined filter restriction/differential pressure. The differential pressure is the difference in fluid pressure between the filter's inlet and the outlet side of the filter. Should the filter become heavily contaminated to the point of fluid restriction/plugged, the by-pass valve will open allowing lubricant to continue flowing

to the internal engine components. Unfiltered lubricant is not the preference, but it is better than no lubricant. Each vehicle manufacturer's by-pass valve has a pre-set by-pass setting.

- 2) **Cold Engine Operation...** During cold engine operation and especially cold weather conditions, it is not uncommon for the by-pass valve to open, allowing sufficient lubrication to the engine components. Once the engine lubricant warms and the pressure differential across the filter drops below the by-pass setting of the valve, the valve closes, allowing filtered oil to flow through the system, lubricating the bearings and vital engine components.

COLLAPSED FILTER/CENTER TUBE

Occasionally we will see a filter with the element or center tube collapsed. The filter almost always gets blamed. When this condition is present, it is usually the result of a filter restriction (heavily contaminated filter) and a sticking or defective by-pass valve.

In some cases the collapsed filter may be the result of a sticking oil pressure regulating valve in the oil pump/engine, resulting in excessive oil pressure. When this condition occurs, the filter may collapse if the by-pass valve is unable to relieve the differential pressure. Spin-on filters can bulge or split due to the excessive pressure, all of which can result in a catastrophic engine failure.

CHRYSLER'S 3.6L PENTASTAR ENGINE

Based on the year model vehicle, the by-pass valve may be positioned in one of two locations.

- 1) 2011–2013 vehicles equipped with the 3.6L Pentastar engine will incorporate a by-pass valve such as that illustrated in Fig. 1. The by-pass valve is a part of the oil filter/cooler housing. A small valve in the top of the oil filter completes the by-pass valve assembly, once the filter is installed.

If the by-pass valve is damaged, the complete oil filter housing must be replaced, as individual components are not available for service.



FIG. 1

- 2) 2014–2016 vehicles equipped with the 3.6L Pentastar engine feature a different by-pass valve, oil filter and oil filter housing. Instead of the by-pass valve being positioned in the oil filter housing as previously illustrated, it is now positioned in the oil filter cap (See Fig. 2).

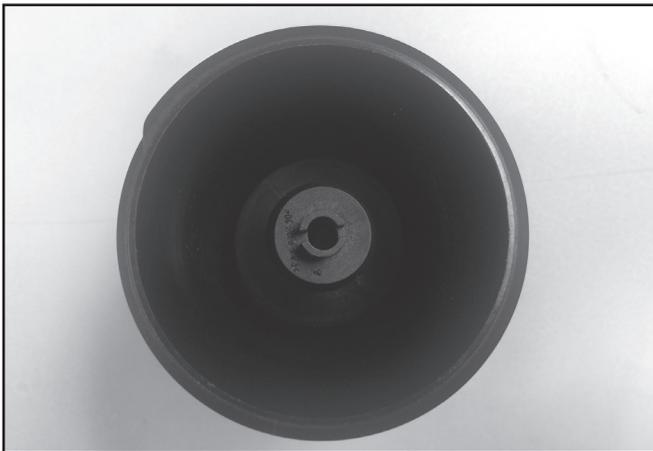


FIG. 2

When removing the filter on one of these applications, we recommend pulling the filter straight from the oil filter cap. **DO NOT** rock the filter back and forth to release it from the cap and by-pass valve assembly. Doing so can result in the by-pass valve latches releasing and the valve coming apart as illustrated in Fig. 3.

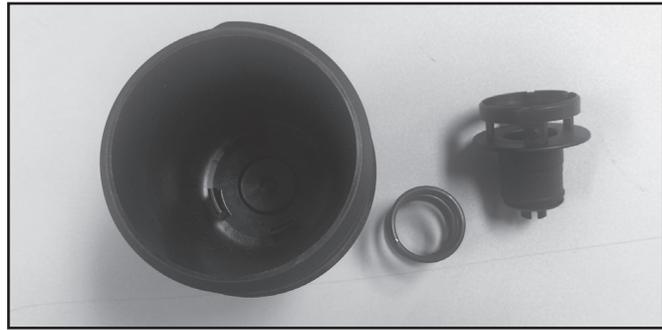


FIG. 3

If the valve does come apart and the latches are not broken, with some patience and the proper alignment, the components can be re-assembled. Most prefer to just replace the cap and valve assembly. Installing a filter with a damaged by-pass valve will result in filter by-pass, allowing unfiltered lubricant to flow through the engine.

With either by-pass valve arrangement, the presence of loose or damaged components will require replacement. Do not allow the vehicle to leave with a damaged or non-functional by-pass valve, as engine damage can result.

EXTENDED OIL CHANGES

Most vehicle manufacturers are promoting extended service intervals. It is a fact...vehicles can be driven longer between oil changes due to synthetic or synthetic blend lubricants. New engine designs, fuel metering and emission control devices result in engines operating more efficiently and cleaner. Combined, these achievements can result in longer service intervals.

Considering these extended maintenance service intervals, are you installing an oil filter that can go the extra mileage? Many focus entirely on the lubricant with little consideration of how long the filter will last and be efficient. Extended oil changes are a major concern, as a restricted oil filter results in an open by-pass valve, which allows unfiltered oil to lubricate the engine components, causing major engine damage. You may never know whether the lubricant is being filtered or not, but the engine components will. Extended life oil filters are available for those vehicles driven under extended service intervals.

LARRY HAMMER, Technical Services
Mighty Distributing System of America



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