

## Oil Filter and Oil Filter Standpipe Inspection

Proper oil filtration and a clean engine lubrication system is an absolute requirement. DD engines use sputtered main and rod bearings. These bearings are superior in load carrying capacity when compared to standard tri-metal bearings. However, sputtered bearings are less forgiving to debris and lack of lubrication conditions.

### Oil Filter Identification

The current oil filter used in DD engines is a stack design with no glue beads. It uses shorter pleats in conjunction with two additional discs in the middle of the filter. This design was released in early 2013 and has the highest quality of filtration. The original early design used six glue bead rings on the outside diameter of the oil filter. The Detroit-branded filter is the recommended oil filter for a DD engine.

The oil filter used in the MBE 4000 engine is similar in size and fitment to the DD platform oil filter. However, an MBE 4000 oil filter must **not** be used in a DD engine. Damage to the oil filter bypass valve can occur if an incorrect oil filter is used. In addition, the MBE 4000 filter is not designed to handle the oil volume and pressures of a DD engine. The figure below shows the difference between the current DD oil filter and an MBE 4000 oil filter.

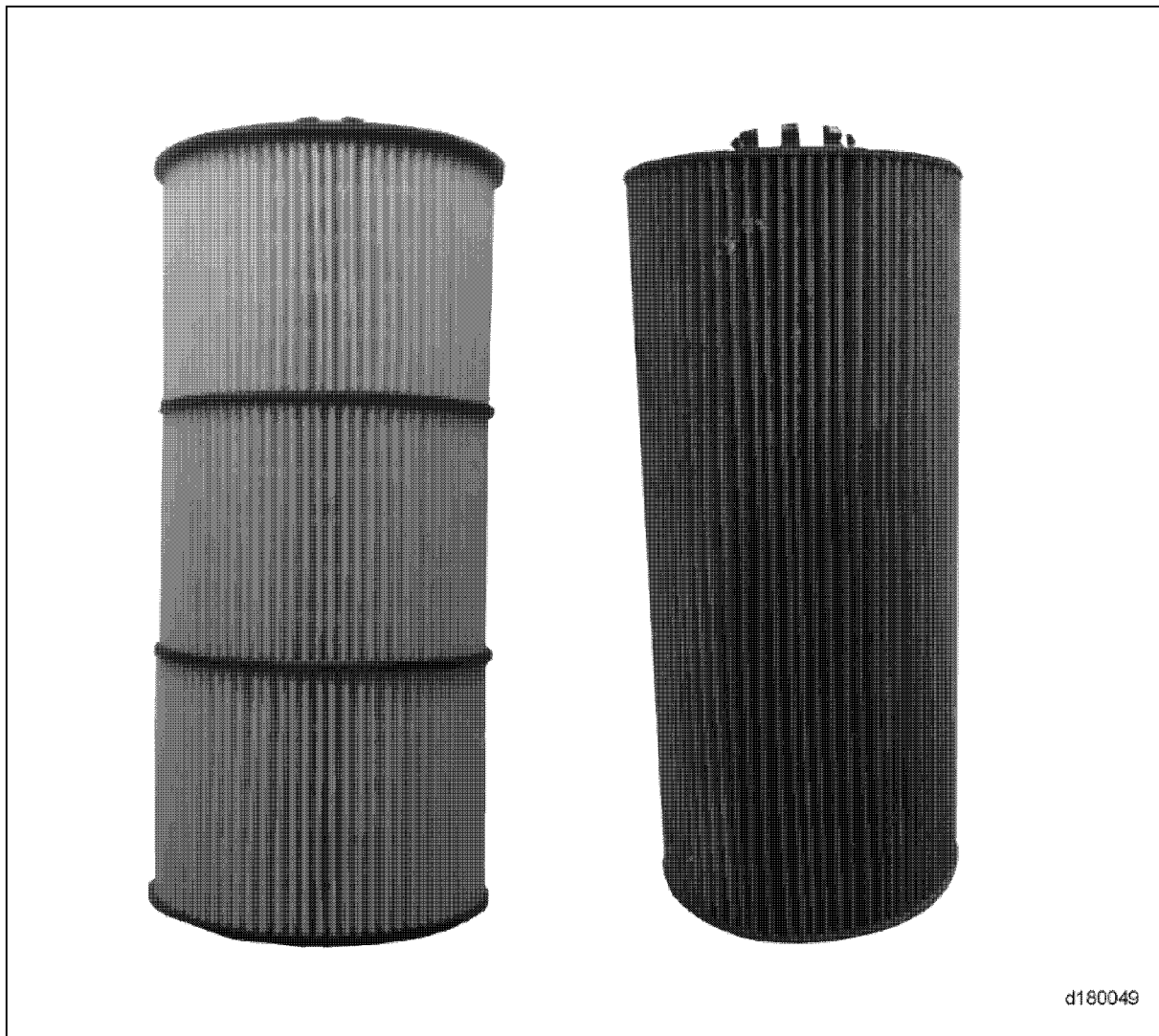


Fig 7.1, Current DD Oil Filter (left-new) and MBE 4000 Oil Filter (right-used)

### Oil Filter Inspection

Inspect the oil filter for signs of debris. If the engine ran for any amount of time with damaged lower end bearings,

there may be bearing material in the pleats of the oil filter and in the oil filter housing. Look for other foreign material such as aluminum shavings, plastic or dirt. If foreign debris is found, investigate further to find the source of the debris.

Coolant contamination of the oil filter will typically result in distorted oil filter pleats or sludge build-up, depending on how long the engine ran with coolant in the oil. See the figures below. The oil filter may be noticeably heavier due to the saturation of coolant. Coolant contamination of the lube system can be detrimental to the lower end bearings, as coolant does not provide the necessary lubricity. The source of the coolant contamination must be determined. Contaminated lubricating oil will be discussed later in this manual.



**Fig 7.2, Oil Filter Contaminated with Coolant**



**Fig 7.3, Oil Filter Severely Contaminated with Coolant**

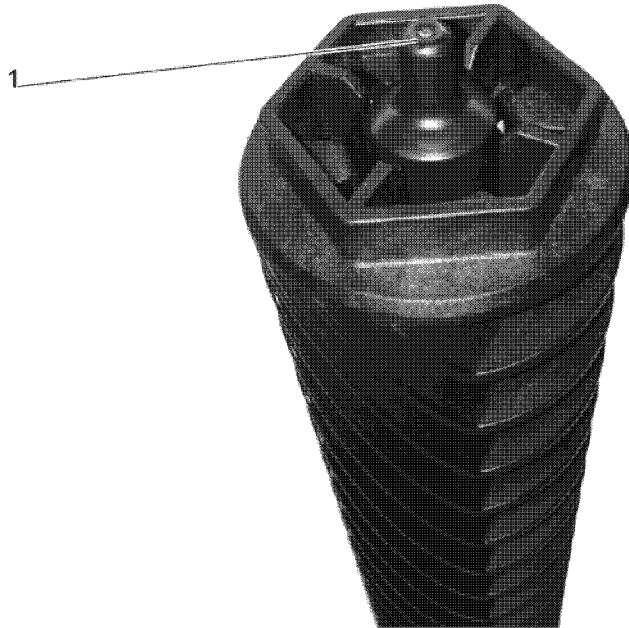
Inspect the oil filter for physical damage or tears to the pleats. A damaged or torn oil filter may allow unfiltered oil into the clean side of the lubrication system. If the bearing failure is caused by debris, a damaged oil filter may be at fault. It is important to note an oil filter does not get damaged on its own. Investigate further to determine how the damage occurred.

It is also important to inspect the oil filter for indications of run time. If the oil filter appears new or very recently replaced, investigate the previous oil change event to determine if it is related to the failure. The lower end bearings should be inspected for lack of lubrication or debris before an oil change event is blamed for the failure.

#### **Oil Filter Standpipe and Bypass Valve**

The oil filter standpipe is made of plastic and contains the oil filter bypass valve (1). See figure below. The bypass circuit is required to prevent oil filter pleat damage at cold engine start. The next figure shows a cutaway of the oil filter standpipe and the operation of the bypass valve.

1. Bypass Valve



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Fig 7.4, Oil Filter Standpipe and Bypass Valve



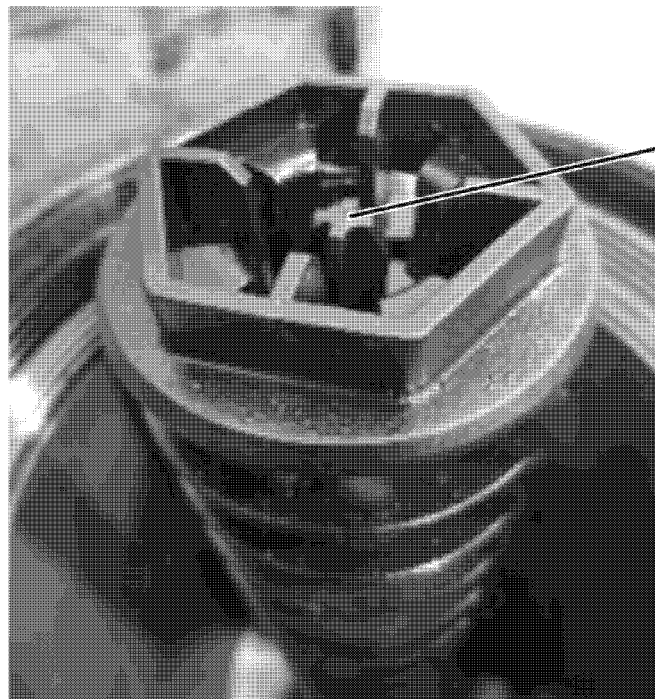
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**Fig 7.5, Oil Filter Bypass Valve Operation (cutaway)**

When the engine is cold, a portion of the engine lubricating oil from the oil sump will bypass the oil filter and be delivered to the various components in the lube oil circuit, including the lower end bearings. Any debris that is small enough to make it through the oil suction manifold strainer, oil pump, oil cooler, and bypass valve can end up in the bearings due to cold oil filter bypass. For this reason, it is important to make clean repairs to the engine so debris is avoided. It is also important to follow the proper sequence for an oil change; oil filter first, then drain the oil pan. This allows any contaminants from the oil filter to drain back to the oil pan and be removed with the dirty engine oil.

The oil filter bypass valve can be damaged during an oil filter change if care is not used when removing and installing the oil filter and cap. See figure below. The bypass valve can also become stuck open from foreign debris or engine parts. See figure below. Operating an engine with a missing, damaged or stuck open oil filter bypass valve could result in a debris-related, lower end bearing failure due to a larger amount of unfiltered oil entering the clean side of the lubricating system.

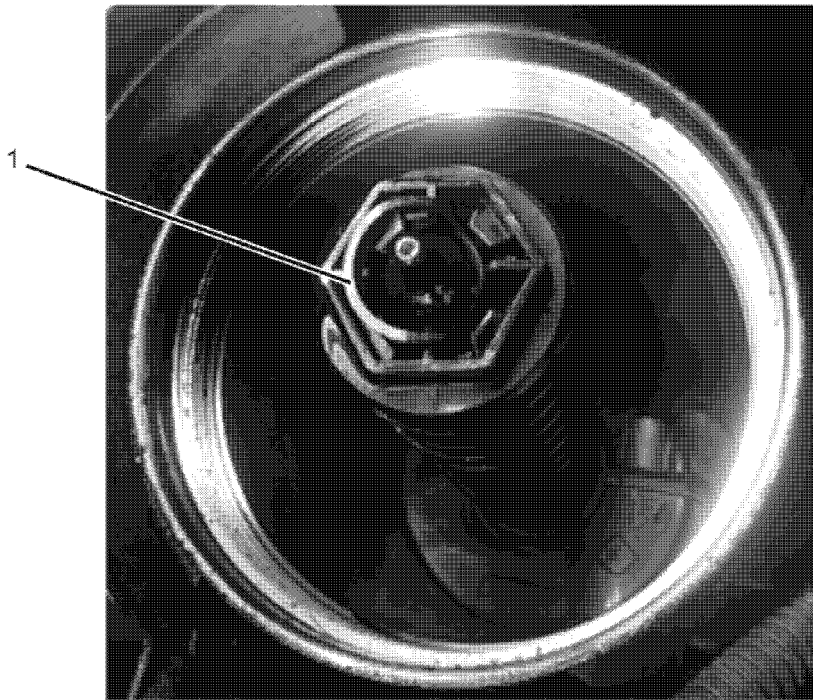
1. Broken Bypass Valve



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**Fig 7.6, Broken and Missing Oil Filter Bypass Valve**

1. Foreign Material / Sealing Ring



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**Fig 7.7, Stuck Open Oil Filter Bypass Valve**