DIESEL SERVICE TIPS

Rain and Snow Can Trash a Turbocharged Diesel Engine

Air filters are designed to protect the engine from contaminants such as bugs, dust, dirt and other debris. Engines do not perform well when the filters are subjected to water and snow, as these conditions promote a hydro-lock of the filter media. When the hydro-lock condition occurs, the filter can be pulled from the air box or shredded and consumed by the turbocharger and engine (see Fig. 1). With the turbine shaft often exceeding 100K RPMs, imagine the damage to the compressor fins in the turbo when consuming fragments of the air filter or other debris. In every case, unfiltered air can flood the engine with harmful contaminants, promoting premature engine and component failure. When subjected to water and snow, a stalling symptom is most certain.

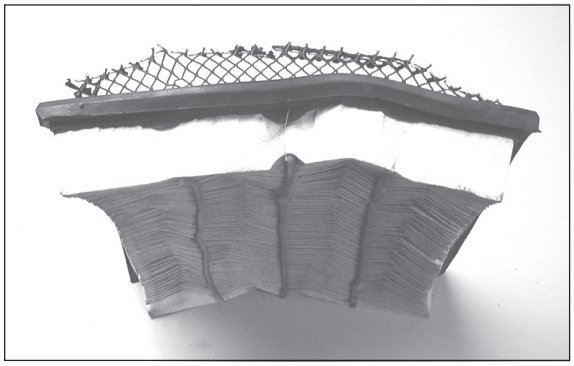

Fig. 1

The technician must take snow or water into consideration when making the diagnosis. A vehicle may encounter a hydro-lock condition with the air filter and the snow may melt or the water evaporate by the time the vehicle is towed in without leaving a trace of evidence for the technician attempting to make the diagnosis.

The means by which the air enters the engine has been a challenge for the vehicle manufacturers, especially with the turbocharged diesel applications. The air must come from a dry source, sheltered from road debris and not subjected to rain, snow or road splash. Keeping the system sealed is imperative, as the filter housing is often damaged from heat or negligence when making a filter installation. Broken hold-down clamps are often not replaced, which affect the integrity of the filter seal.

GM DURAMAX FILTER RESTRICTION

GM reports concerns of restricted air filter elements on 2017-2019 applications equipped with the 6.6L L5P turbocharged engines.

Customer complaints include a Service Engine Soon light along with drivability concerns such as surge, transmission slipping/jerking, vibration or shudder, loss of power, or heavy exhaust smoke under load. A driver information center message…*Clean Exhaust Filter* or *Diesel Particulate Filter is Full* may be displayed.

When running the diagnostics, the technician may identify the following trouble codes:

P0101 Mass Air Flow Sensor Performance

P0106 Manifold Absolute Pressure Sensor Performance

P0171 Fuel System Lean

P0172 Fuel System Rich

P0299 Engine Underboost

P0401 Exhaust Gas Recirculation Flow Insufficient

P0402 Exhaust Gas Recirculation Flow Excessive

P140B Exhaust Gas Recirculation Slow Response-Increasing Flow

P140C Exhaust Gas Recirculation Slow Response-Decreasing Flow

P2459 Diesel Particulate Filter Regeneration Frequency

P2463 Diesel Particulate Filter Soot Accumulation

These symptoms are an indication that the air filter element has been restricted with snow, ice, water, or debris. Water entry into the air cleaner assembly under any condition may saturate the filter media, resulting in a restriction that can damage or distort the air filter. The air filter may come apart resulting in a blockage in the induction system and affecting the Mass Air Flow readings. While it was not mentioned in the TSB, major damage to the turbo and engine can result from the fragments of the filter media being ingested.

CHECKING THE AIRWAY

The Duramax equipped with the 6.6 L5P engine features a functioning hood scoop (Induction System) added to the heavy-duty trucks. The hood scoop is one of the features that differentiate the L5P equipped engine. This design induction system provides cool dense air to the engine in a greater volume than the standard air intake system. Sixty percent of the air is drawn from the hood scoop arrangement and forty percent from a dry location in the inner fender. One of the first concerns is water entry through the hood scoop. The design of the intake system prevents moisture from entering the air filter housing. When air enters the scoop, it passes through an expansion chamber that contains a 180-degree turn in-route to the air filter housing. The 180-degree turn creates a velocity change, forcing any moisture against the outside housing wall where it is expelled through a water drain valve.

AIRBOX AND FILTER SEAL

The airbox housing that contains the filter is fitted with a flexible seal that must make contact with the hood when closed to seal the airway (see Fig. 2).

The housing is held into position by rubber grommets and it is imperative that the housing is in proper alignment with the inner fender. The position of the housing may be impaired due to someone changing a headlight or performing a lamp upgrade and failing to properly re-position the housing, as it must be removed to service the lamps. This can compromise the integrity of the flexible seal or damage the housing, promoting leakage. If leakage occurs, snow can collect on the filter media, melt due to the warm under hood temperatures, and refreeze on the filter media blocking the airflow with a layer of ice.

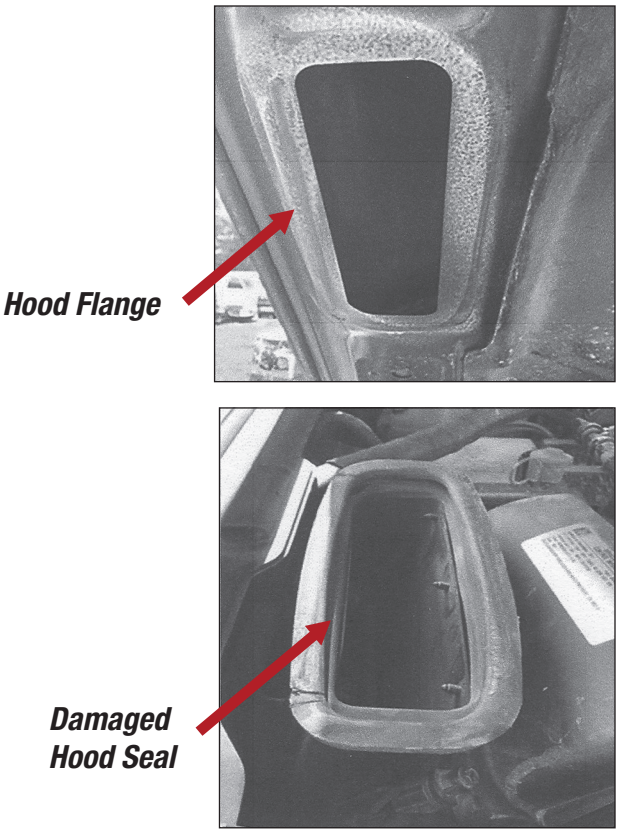

Fig. 2

In addition, water may enter the housing and collect on the filter media, creating a hydro-lock condition, blocking the air flow.

The hood should remain in the closed position during wet weather conditions, as water can enter the open port of the filter housing. Be aware of any vehicle modifications that may affect the housing to hood seal. GM recommends the use of a front grille cover during snow conditions or temperatures at below zero. At these extreme temperatures ice can form on the Temperature Manifold Absolute Pressure Sensor, resulting in drivability issues along with a *Reduced Power* message displayed. When this occurs, P0106 code may be stored in the history file.

Summary: Inspecting the air filter, related housing and plumbing should be a part of the vehicle inspection process. A contaminated or improperly sealed air filter can affect engine performance, its longevity and contribute to damage to costly electronic sensors.

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