Tech Tip

AIR FILTERS 155

SOME FILTER FACTS

Solving Air Filter Related Problems

Often the assumption is made that any level service technician or helper can make an air filter installation without difficulty or penalty. Maybe they can…but are they experienced enough to make certain the proper installation has been made and the system is completely sealed? Do they understand the damage that can be incurred due to an improperly sealed system or a damaged air box? Can they recognize a filter that has exceeded its life expectancy and will likely cause damage to the engine or turbocharger? Not all lube service technicians know the answers to those questions, and without some training/instruction they are not expected to.

The inexperienced technician or helper may not appreciate how important the air filter and related plumbing may be until a customer returns with some major engine or turbocharger damage. When this occurs, it can create some tense moments, especially when the repair bill reflects thousands of dollars. If the problem is due to the quality of the part and a reputable supplier is involved, it should not be a financial issue for the shop. If the problem is due to negligence, or to damaged or improperly sealed plumbing, the shop or the vehicle owner is responsible for the repairs. With a little training, communication and observations, these conditions are preventable. Let's consider some air filter related issues that include the position of some vehicle manufacturers, and some issues that we have identified through our own exploration and troubleshooting efforts.

CUMMINS DIESEL ENGINE DUST-OUT

Chrysler calls it "Dust-Out" and Ford calls it "Dusting". The end result is the same…and that would be a damaged engine and turbocharger due to debris being pulled through or around the filter media. The turbocharged diesel engine can overcome a dirty/restricted air filter by pulling the debris through the filter media or collapsing an air box, allowing the filter to be bypassed.

Chrysler takes a firm position on engine warranty claims on the Cummins diesel engines, especially when it involves dirty air entering the engine, negligence, or add-on power improving accessories. Engines exposed to these conditions will not be covered by the vehicle manufacturer's warranty. Symptoms that may have been the result of improper air filtration may include the following:

1) Engine knocking
2) Bearing failure
3) Poor performance/engine down on power
4) Oil consumption
5) Engine smoking
6) Crankcase blow-by
7) Oil on turbo (dust damage to seal and bearing)
8) Hard start/no start

Chrysler advises their dealers to inspect any alleged defective engine for the following symptoms, prior to applying for an engine warranty claim:

1) Perform a compression test. Low compression is usually due to ring, piston or valve issues. High compression may be the result of oil infiltration.
2) Mechanical damage can be caused by fuel, fuel injectors or up-rate kits or programmers that boost engine power. Inspect the vehicle for evidence of these power-up devices. Damage resulting from these devices does not qualify for warranty.
3) Inspect all air ducts and components. The presence of dirt in the air ducts on the clean air side of the air filter will not qualify for warranty coverage.
4) Check for an aftermarket "cold air" performance air filter housing, duct work and filters. Once again, dirt detected on the clean air side of the air filter will not qualify the engine for warranty repairs.

Don't try to out-fox the vehicle manufacturer. Cleaning up the air filter housing and plumbing prior to taking the vehicle in for warranty service will not improve the outcome. Chrysler will inspect the cylinders for cross-hatching and excessive piston ring ridge. Chrysler states that the absence of cylinder bore cross-hatching may be the first sign of damage incurred due to dust/dirt entry. The evaluation may be performed with the aid of a bore scope or cylinder head removal. Dirt carried through the air system on the Cummins diesel engine is typically concentrated to the end cylinders (1 and 6). A properly well maintained engine will have defined hone marks visible beyond 100K miles. Engines that have been damaged due to dirt ingestion will polish out the hone witness marks and then start wearing down the cylinder walls, creating a ring ridge at the top of the cylinder bore. The absence of the honing marks, along

with dirt in the clean air side of the air intake system, is evidence of a dust-out condition, per Chrysler.

For liability reasons, make certain your technicians inspect the intake air plumbing for evidence of dirt and debris on the clean air side of the filter, prior to installing a replacement air filter. This applies to any vehicle manufacturer and especially diesel applications. If dirt is present, it would be advisable to notify the vehicle owner and write a description of your observation on the repair ticket. It would be wise for you to keep a copy of the repair ticket, just in case engine problems arise and someone tries to blame you or the parts you installed for the damage.

SUPER DUTY FORD DOWN ON POWER

The turbo-diesel engine must have a lot of clean air. A restricted airway can result in a lot of performance challenges for the technician, especially when the symptoms are intermittent. If an intermittent air filter restriction sounds strange, read on to determine some conditions that can promote the symptoms.

Ford acknowledges that some 2008–2010 F-Super Duty vehicles may encounter poor acceleration or an engine that is down on power, accompanied by a "Check Air Filter" message illumination. When the mentioned symptoms are present, the first step should involve a thorough air filter inspection. It should involve more than inspecting the filter for debris, especially if the vehicle is being operated in snow conditions, or during heavy rains or floods. Ice, snow or water can restrict air flow through the filter and elude the technician, especially if the vehicle has been placed in a warm shop where the evidence quickly melts away. Obviously, once the snow/ice melts the performance returns, unless the filter is saturated with water. Replace any filter that reflects evidence of being contaminated with water. If the symptoms occur during snow conditions, Ford recommends installing a snow deflector gasket (part #9C3Z-9C664-A), which should be secured to the top of the air filter and allowed to rest on the edge of the air box. In addition, a winter grill cover (part #8C3Z-19A414-A) must be used to minimize snow intrusion. The gasket can remain in place year round, but the grill cover must be removed if the temperature exceeds 50° F or if the vehicle is being used as a tow truck, to prevent engine damage. Further, if the air filter minder does not contain engineering number 8C3Z-9N622A, it should be replaced with that part number.

Ford is not the only vehicle manufacturer to encounter snow, water or ice ingestion into the air cleaner of their diesel applications. We have seen Ford, GM and Chrysler vehicles that have encountered major engine and turbo damage due to water entry. When this occurs, the airflow is restricted, causing the engine to stall or the air filter to be sucked into the air box and sometimes consumed by the engine and turbocharger. When that occurs, a lot of expensive parts are destroyed.

CORVETTE AIR TURBULENCE

After having his 2008 Corvette serviced, which included replacing the air filter, the customer returned the following morning with an illuminated Check Engine light and trouble code PO171 (Fuel Trim Lean Bank 1) stored in memory. The technician was certain that it was a coincidence and had nothing to do with his service. The customer was convinced otherwise, as the Check Engine light came on following the air filter replacement.

Turbulent air flow to the air cleaner and intake was the culprit. This has been a problem on the 2007–2009 Corvettes. The upper radiator air baffle positioned directly beneath the air filter may dislodge, forming a gap between the air baffle and bumper beam. When this occurs, air flow to the intake/air cleaner is disturbed, resulting in a lean condition. The Check Engine light will illuminate and DTC PO171 (Fuel Trim Lean Bank 1) or PO174 (Fuel Trim Lean Bank 2) will be stored in diagnostic memory. This would be the last place that an experienced technician would look when diagnosing the mentioned trouble codes. In addition to the space between the air baffle and the bumper beam, some non-functional holes in the bumper beam will further disrupt the air flow. GM recommends sealing the holes in the bumper beam with an adhesive patch such as a sound deadener patch. Revised retainer clips P/N 05973400 are available to secure the air baffle to the bumper beam.

Ground Clearance… In our troubleshooting efforts we have identified a second condition that promotes the same air baffle separation, and it explains why some of these vehicles return with the same symptoms, following the installation of the revised retainer clips.

Inspect the lower radiator support, which consists of a framework of aluminum square tubing with what appears to have skis/runners on the bottom of the assembly. The ground clearance on the Corvette is so close that the lower radiator support often drags, especially if there is a dip when entering a driveway, or if the radiator support makes contact with a parking curb. Damage to the support will dislodge the air baffle retainers. Most of the radiator supports I have examined have reflected ground contact.

While servicing air filters may seem elementary, the inspection and replacement should be taken seriously, as a failure can cause a catastrophic engine or turbocharger failure. Some basic knowledge and attention to detail may prevent your shop from being liable for some costly engine repairs. Check for factory service bulletins that may address filter related issues. Make certain your technicians understand the liability exposure the shop can incur due to a damaged filter, air box or related plumbing.

LARRY HAMMER
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