



Dust-Out Diagnosis For Cummins Diesel Engines

The AERA Technical Department offers the following information regarding Dust-Out Diagnosis for Cummins Diesel Engines. This information applies to Cummins engines used in Dodge pickup trucks from 2003-2012.

This bulletin involves proper inspection procedures to determine engine failure due to dust-out condition. These engines may exhibit particular symptoms that may have been caused by improper air filtration and/or lack of proper maintenance. Some of these symptoms are listed below (not limited to):

- Knocking
- Low power / poor performance
- Lower end bearing failure
- Smoking
- Oil on turbo (dust damage to seal/bearing)
- Hard or so start
- Oil consumption
- Broken connecting rod
- Blow-by (rings not sealing)

To diagnose a dust-out condition, Chrysler offers the following steps:

1. Major mechanical damage can be caused by fuel, fuel injectors, "Up-rate kits or "programmers". Inspect vehicle for any device that adds more power, (fuel) which may damage the engine mechanically. Check for any aftermarket power enhancer "box or "downloader".
2. Inspect for aftermarket "cold air performance air filter housing, duct work and/or air filter type (wrong style air filter which may be used in a stock air filter box).
3. Vehicles with extremely large amounts of visible dirt accumulation are candidates for dust out damage if not properly maintained or use of improper filters. Engines with excessive cylinder and/or ring wear will consume excess oil. Look for oil spilled near filler on valve cover (Figure 1) which may indicate oil has been (or is) added often.
4. Inspect all air handling ducts and components. If dirt is found in the air handling components, further diagnostics may not be necessary. Damaged engines with dirt detected on the "clean side" of air filter may not qualify for warranty coverage. Even if components are clean, inadequate or overloaded air filters may have been cleaned or replaced (Figure 2). In these type cases, you must investigate further. Remove Charge Air Cooler hoses from turbo to intercooler and intercooler to intake. Inspect for signs of dirt or dirt abrasion. Dirt passing through the tubes will wear the outer coating of rubber and make the "cords" show on the inside of the tubes. (Figure 3).
5. If the tubes appear to have been cleaned or replaced, you can reach into the intercooler and check for dirt. (Figure 4). Inspect the turbo inlet impeller blades and aluminum housing for sand blasting and/or dust/dirt accumulation. (Figure 5).

6. An unexplained connecting rod failure may be the result of an engine that has been run very low or completely out of oil. This may be due to a dust out condition caused by worn rings leading to excessive oil consumption. If a rod has failed, inspect all lower end bearings. Scored and damaged lower end bearings may be the result of lack of oil and may not qualify for warranty coverage. All possible causes for oil starvation, oil quality or lack of maintenance must be investigated. **NOTE:** Oil may have been added to the engine after failure to disguise this condition
7. Inspect the grid heater and air intake manifold system. When dirt is introduced into the intake, it tends to collect in the far ends on the inside of the intake manifold. This can be hard to see, but the dirt will "build up" in the corners. Look for evidence using a mirror and flashlight or bore-scope inside the intake towards the ends. Inspect the grid heater for dust/dirt accumulation (Figure 6).
8. Perform a compression test. Low compression is generally due to ring/piston/valve issues. High compression may be due to oil infiltration filling the combustion area causing a hydraulic effect.
9. Inspect cylinder bore(s) for cross-hatching and for excessive piston ring ridge. The absence of well-defined cylinder bore cross-hatching MAY be one of the first signs of cylinder dust or dirt damage. Inspection of cylinder bore(s) for "polished out cross-hatching and excessive piston ring ridge may be accomplished using a bore scope (if available), or cylinder head removal may be necessary.
 - Dirt carried in through the air handling system is typically funneled and concentrated to the end (1 & 6) cylinders.
 - Vertical scratches (broken rings) will usually follow.
 - When inspecting the cylinder bore(s) 1 & 6, compare these to the other cylinders. Cylinder honing operation performed in the Cummins engine manufacturing process is very aggressive. Engines that have dirt introduced will "polish out" this hone witness mark first and then start cutting or wearing down the cylinder walls which will create a ring ridge in the cylinder at the top of the bore, (remove carbon build up prior to checking for ridge).
 - Generally, a properly maintained engine will have well defined hone marks visible beyond 100,000 miles.
 - The absence of well-defined cross-hatching and/or ring damage ALONG WITH dirt found anywhere in the "clean-side" of the air intake system, is evidence of a dust-out condition.

NOTE: Be aware of stains or marks in cylinder wall(s). Marks may follow the ring gap but have no depth or damage to the cylinder bore wall. These marks have a look similar to a "scored" cylinder, yet have no physical damage to the surface and will not cause any harm. These marks can be checked by physically inspecting (scratching with fingernail for example) the surface to detect if cylinder wall is damaged (grooved).

Figures 1-7 Related to Dust-Out Diagnosis For Cummins Diesel Engines



Figure 1: Dusty Truck

1. Dirt Accumulation
2. Oil Spilled on Valve Cover
3. Look for a 5.9L style air filter installed on a 6.7L engine. They are not interchangeable. This 5.9L filter has collapsed.

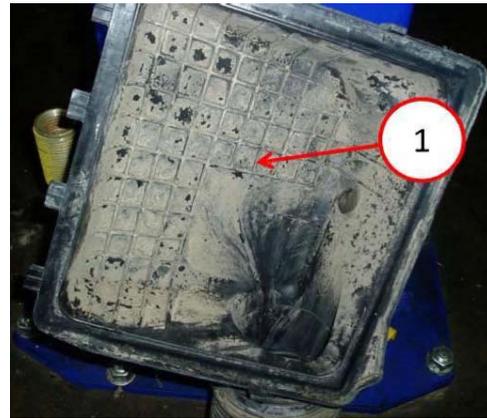


Figure 2: Air Filter Cover

1. Clean side of air filter – look for scratches here caused by an air filter collapsing.

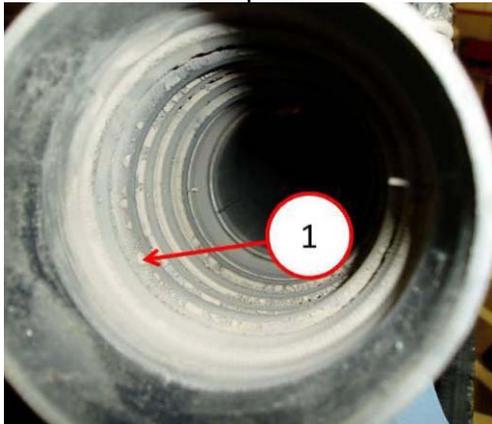


Figure 3: Chard Air Cooler Hose

1. Cords showing due to abrasion.

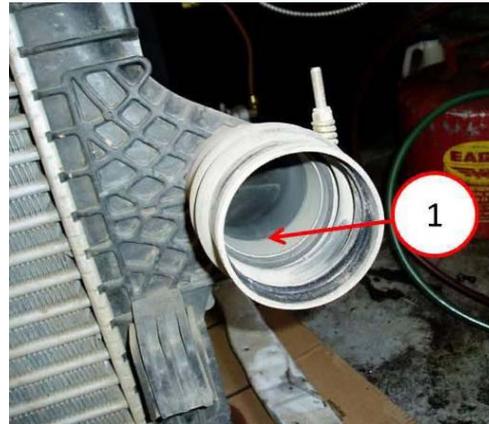


Figure 4: Charge Air Cooler Inlet

1. Dirt/Dust in charge air cooler inlet

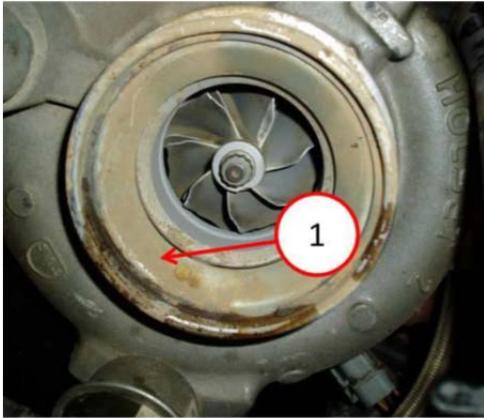


Figure 5: Turbo Inlet

1. Dust/Dirt in turbo inlet

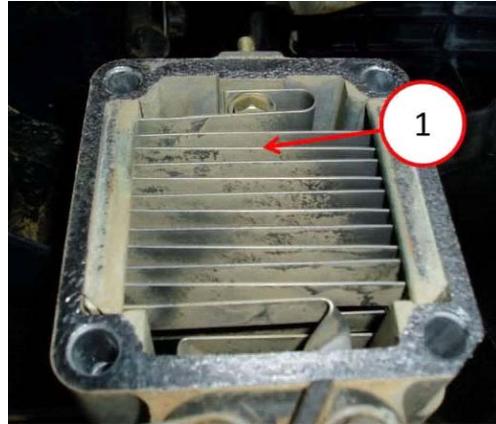


Figure 6: Heater Grid

1. Dirt/Dust on grid heater

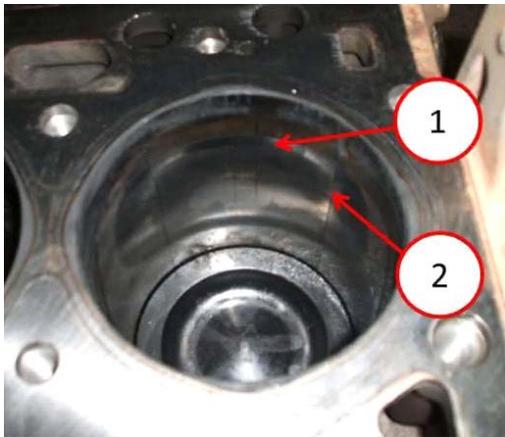


Figure 7: Cylinder Wall

1. Polished Wall
2. Grooved Wall

It should also be noted that the Dodge Truck Company is continuously updating offerings for Heavy Duty Filtration with MOPAR Retrofit or Add On parts availability. Caution must be used as there is not one component that fits/adapts to all engine installations. Dodge has a long list of dos and don'ts for these modifications which include fuel filters. As an example: The maintenance intervals for the fuel filter(s) is 15,000 miles, 400 engine hours or 12 Months, (whichever occurs first) or more often as needed. It is recommended to visit your Dodge MOPAR dealer and view/review the current options available for a specific vehicle.

The AERA Technical Committee

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