

FILTERING FORD'S TURBO DIESEL

Keeping the Air Filter Intact and Sealed Can Be a Challenge!

Ford's Power Stroke Turbo Diesel has a healthy appetite for air, and with the assist of the turbo-charger it has the lung capacity to ingest more than just air. With a filter restriction, the turbo may pull the air filter from the air box, consume parts of the filter, or cause damage to the filter housing. Ford has had its share of challenges with the turbo-charged engine and its ability to properly clean the incoming air while keeping the filter intact in its mounted position. And the mounted position has changed, too. Some of the earlier designs pulled fresh air from beneath the fender well. This proved to be a major problem for vehicles used in severe service. For example, a truck used on a construction site could inhale an inordinate amount of dust, resulting in a total air filter restriction within a few hours of service. Water entry into the housing was also a problem, leading to deterioration of the filter media. When this occurred, the filter would sometimes pull apart and get sucked into the turbo. To correct this, the filter inlet was repositioned to the engine side of the wheel well.

FILTRATION AND AIR INDUCTION MODIFICATIONS

While selecting an air filter for the application from a catalog, you may observe a physical difference in the part number listed and the actual filter located in the air cleaner housing. This should not be a surprise. Numerous design changes have been implemented in an effort to obtain a filter or housing that could withstand the elements. Let's consider some of the factory modifications from Ford:

Revised Cover and Retainers ... Ford advises that 1994–97 Heavy Duty trucks equipped with diesel turbo-charged engines, operated in severe dust conditions, such as that of construction sites, may encounter premature air filter restrictions. When this condition occurs, the engine will produce enough vacuum to distort the walls of the air filter, disrupting the sealing surface of the filter. This results in the filter being bypassed, allowing foreign material to enter the engine. Looking at the construction and rigidity of this style air filter, it would seem impossible that distortion could occur. It can, and if the operator continues to drive the vehicle, premature engine failure is inevitable. Inspect the air cleaner housing for damage or distortion. A revised

cover is available from Ford that incorporates stiffening ribs to reduce the possibility of the air filter distorting or collapsing.

To determine if the air cleaner is fitted with the revised cover, examine the part numbers located on the cover's decal. If part number prefixes F5TA or F6TA appear, replace the cover with the revised unit (F6TZ-9661-AB). On vehicles having an F7TA prefix on the air cleaner cover, replace only the retaining nuts (F7TZ-9B680-AA). In all cases, the revised retaining nuts should be replaced.

Service Procedure:

1. Remove the air cleaner duct from the radiator support and the air cleaner cover.
2. Loosen the retainer nuts on top of the air cleaner.
3. With the air cleaner cover removed, inspect for dust bypassing the air cleaner element. This will be evident by dust accumulation inside the air cleaner hose on the clean side of the air filter. Also, look for dust trails across the filter's sealing surface.
4. If there is evidence of dust bypassing the filter or filter distortion, replace the air cleaner cover with the revised cover from Ford (F6TZ-9661-AB).
5. Clean all sealing surfaces and ducts, prior to installing the new air filter.
6. New revised retainers (F7TZ-9B680-AA) from Ford are recommended.
7. Tighten the new retainers 18–27 inch pounds.

Revised Air Box ... 1999–2001 Super Duty F Series trucks and 2000–2001 Excursion vehicles may encounter a loss of power under load conditions, at cruise speed, or become sluggish on acceleration. The symptoms may be due to the air filter element becoming restricted and collapsing, or the filter being pulled from its mounted position, due to a defective air box and lid.

If normal procedures and diagnostics fail to identify the problem, replace the air cleaner assembly with a revised air lid and air box (1C3Z-9600-AA) and a 3-inch thick panel filter.

FILTER STYLE CHANGES

Several filter styles have been introduced and more modifications may be in the plans of the Ford engineers. Initially, the filter design was oval and double reinforced with wire. The second generation was a flat panel filter with a wire grate on the clean side of the filter. Some filters were reinforced with glue strips to make them more rigid and less susceptible to pleat collapse. A heavy-duty version was available, which was the standard design filter fitted with a foam pad for additional filtration. And now the thickness of the filter media has been increased to three inches for additional filtration and support, along with a redesigned air box. Be prepared for what you may encounter when you open the lid of the air box. If the filter inside is thicker than the filter that was reflected by the catalog, then someone may have installed the updated air box. The air box upgrade retrofitted applications back to 1999, so chances are you will encounter the 3-inch thick filter in some of the older applications that originally contained the thinner style, or foam padded filter. In those cases, the new style 3-inch filter reflected in the 2002 application data should be installed.

Regardless of the filter design, if the filter becomes restricted there is potential for air box deformation or filter deterioration, leading to turbo or engine damage. Proper maintenance intervals are imperative for these applications, especially when used in severe service.

SEVERE SERVICE

The vehicle manufacturers define recommended maintenance service intervals and they should be adhered to. The conflict often comes in properly identifying what should be considered as a severe service vehicle. Many are unaware that their vehicle fits the severe service category.

If a vehicle fits one of the following categories, Ford advises it should be considered a severe service vehicle:

1. Short trips, driven five miles or less.
2. Driven 10 miles or less with the outside temperature remaining below 32 degrees F.
3. Towing heavy loads, such as a loaded trailer.
4. Being driven in dusty, sandy or salty areas.
5. Extended idling or slow speed operation. This would include heavy stop-and-go traffic.
6. Extended driving during excessive temperatures such as 90 degrees F or higher.
7. Police, taxi or other commercial applications.
8. Driven continuously at excessive speeds.

Vehicles that are classified as severe service require maintenance at 3,000 mile intervals. A general maintenance schedule can be misleading, as it does not take into consideration vehicles that may operate in extreme conditions, such as a vehicle used on a construction or road building project. We have seen total filter restrictions in less than 3,000 miles in these situations, along with major engine and turbo damage. When the filter becomes restricted several conditions may occur. These may include: the engine losing power, the air filter collapsing or coming apart and getting pulled into the turbo, or the filter's sealing surface can lose its sealing ability, allowing contaminants to enter the engine, resulting in major engine damage. With the turbine shaft spinning at speeds up to 130,000 rpm, the fins on the compressor wheel will be destroyed when subjected to foreign material, such as particles of an air filter or other debris. It is difficult for the engine to consume the metal parts without encountering major damage.

RESTRICTION INDICATOR

The turbo-diesel air induction system is fitted with a restriction indicator positioned on the clean air side of the air filter element. Its purpose is to determine the need for a filter replacement. When the yellow band in the restriction indicator reaches the CHANGE FILTER mark, the air filter element should be replaced. Once the system has been serviced, the restriction indicator should be reset. Depressing the reset button located on the end of the indicator performs this function.

Periodically, the air restriction indicator should be examined, as a visual inspection of the filter may not be conclusive. While examining the filter, make certain that you pay special attention to the sealing surface of the filter. Look for evidence of leakage, such as a streak of dust on the clean air side of the air cleaner element. Check the air cleaner housing for damage or distortion. Pay special attention to the integrity of the new filter and never install a filter with a cut element or damaged seal.

Ford had a better idea in 2002, as they fitted the F250/350 and Excursion vehicles with an Electronic Air Filter Minder sensor. The electronic sensor is mounted in the air box and wired to the instrument cluster. When a restriction in the air inlet system reaches a determined level, the switch closes, illuminating a filter restriction indicator lamp in the dash. This should get the attention of the driver, saving some needless and expensive repairs. It will definitely save Ford much aggravation and expense in warranty repairs. The operator will pay attention to an illuminated light, while neglecting to look at a mechanical restriction gauge.

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