

THEME: TURBO AND TURBOCHARGED SYSTEM

ENGINE CRANKCASE VENTILATION

BACKGROUND

Turbo failures are often provoked by improper working conditions, caused by other components or system failures. The engine crankcase ventilation is one of the systems that has tremendous importance on the turbo vitality. By failures, the engine burns oil and the excessive pressures inside the crankcase hinder proper oil flow out of the turbo and return into the engine oil sump.

PROBLEM

Commonly, there are two issues relating to the crankcase ventilation system: excessive pressure in the crankcase and improper oil separation. Both impact the lifespan of the turbo.

The first problem is the excessive pressure that may occur in the crankcase. Besides being dangerous for the engine itself, it affects the oil returning from the turbo. As the oil flow leaving the turbo relies only on gravity to return to the oil sump, the excessive crankcase pressure will be a hindrance for this flow. This can lead to an excessive amount of oil accumulating inside the turbo, ultimately leading to turbo shaft leaks and oil penetrating the compressor and exhaust side.

The second issue is improper oil separation from the blow-by gasses that may occur if the clogged or malfunctioning crankcase ventilation assembly is unable to filter the oil from the breather air. This leads to oil getting to the engine intake, causing contaminating combustion. Turbos suffering from excessive soot built up on the turbine side are often the outcome of crankcase ventilation and oil separation failures. Sometimes, oil present in the compressor side or intercooler may relate to the failure, too.

RECOMMENDED SOLUTION

Diagnose whether the crankcase pressure is at a proper level. A dedicated pressure measure is one of the most efficient and recommended procedures to conclude if the crankcase ventilation operates properly. An engine compression test can also give you a hint of whether you are dealing with a crankcase problem.

Thoroughly inspect the entire crankcase ventilation system. The system design may vary depending on application, it may include PCV valve, oil separation device/filters, duct and hoses. The system must be tight and clean. By leaks, valve/separator malfunctions or stubborn soiling impossible for cleaning, replace the system components or the entire system.

COMMON FAILURES PROVOKED BY MALFUNCTION OF THE CRANKCASE VENTILATION

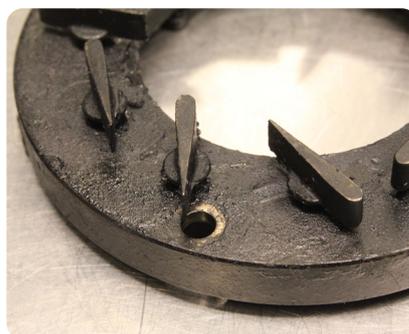
1. Turbo shaft seals leak oil, turbo contaminated by oil
2. Oil present in the charge side of the system
3. Excessive oil consumption, engine smoking blue or grey, rev increase on idling
4. Oil present in the exhaust side of the system, vanes of the variable mechanism sticking
5. Clogs and malfunctions of the exhaust treating devices i.e. catalytic converter, DPF filter

CRANKCASE PRESSURE MEASURE TIPS

To conduct pressure measure of the crankcase ventilation, you can use a simple liquid gauge. You can buy it in a dedicated turbo diagnose set or you can make your own.

- Remember to take the crankcase pressure measure when the engine is in operational temperature. Inspect the pressure values in the entire range of engine revs - from idling up to higher level of RPMs.
- In a healthy engine, marginally excessive pressure when idling is normal. Getting the engine on higher revs will normally indicate a negative pressure i.e. vacuum. In all revs range the **negative pressure should not exceed -5 mbar / -0,07 psi** and the **positive pressure 5 mbar / 0,07 psi** respectively.
- Any excessive pressures outside the -5 or +5 range indicate some crankcase ventilation issues. It should either be replaced or cleaned.
- If the negative pressure is deeper than -5 mbar, the engine has some problems breathing. Inspect the air intake filter and the air channeling ducts if free from clogs. If not fixed, the restrictions may cause the crankcase ventilation to clog completely and provoke some severe turbo and engine failures.

To make your own liquid gauge for the pressure check, follow this video:
<https://bit.ly/2RRMf7x>



The turbo's variable vane mechanism is suffering from an excessive soiling caused by contaminated exhaust gases. An outcome of impaired blow-by gases separation and oil burning by the engine.



Impaired oil separator of the crankcase ventilation system.

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