

TURBO INSPECTION GUIDELINES

Very often fully functioning turbochargers are replaced, because the problem shows up at the turbo, although the turbocharger is in good condition.

Before 'blaming' the turbocharger, carefully read following information and try to identify the 'cause' of the problem.

As a general rule, if both the Radial- and Axial clearances are within tolerances and there is no 'visual' damage to both compressor- or turbine wheel, it is most of the time very unlikely, that the turbocharger is faulty.

ENGINE SMOKING Smoking may be due to air intake restriction, often caused by a dirty/partially blocked air filter or a collapsed intake hose. These problems affect the air/fuel ratio and give black smoke. Also if the engine cannot breathe as designed, it will pull air from other sources. Excessive closed crankcase ventilation will give smoke.

LOW ENGINE POWER / BOOST PRESSURE Air inlet restriction prevents the engine from breathing as designed, this increases the engine operating temperature. As an air leak in the compressor outlet, or a partially or blocked intercooler would restrict the engine breathing.

NOISY / WHISTLING TURBOCHARGER Often the noise comes from air/gas leakage, due to pre-turbine exhaust gas or an air/boost leak. Check all joints, if noise continues check turbocharger clearances and wheels for housing contact.

SEIZED WHEELS / SLUGGISH TURBO If the turbocharger rotor has seized or is hard to rotate, this is often due to lubricating oil degradation which can cause a high build up of carbon in the bearing housing interior, restricting rotation. Insufficient or an intermittent drop in oil pressure can cause the rotor to seize, as can introducing dirt into the lubricating oil.

WORN / EXCESSIVE CLEARANCE A turbocharger has specific axial and radial rotor clearances. These are sometimes mis-diagnosed as 'worn bearings'. If the clearances are out of specifications, the cause could be attributed to a lubricating oil problem, insufficient oil, dirt ingress, oil contamination with engine coolant or fuel.

OIL LEAKAGES Oil leakages at the turbo, provided bearing clearances are normal, are in most cases a result of an engine problem. Check crankcase pressure, carter ventilation, air filter.

CABO TURBO Technologies, Queekhoven 1, 3813 LS AMERSFOORT

TROUBLESHOOTING PROCEDURES

Recommendations and remarks regarding life and service of turbochargers

Identify the cause of the problem first! Is it a turbo problem and must the turbo be replaced? Or is it an engine problem, showing up at the turbocharger? If your engine is not operating properly, you should not automatically assume, that the turbocharger is causing the problem. In many cases a turbocharger is replaced, although the fault **is engine related and not caused by malfunctioning of the turbo.**

Very often fully functioning turbochargers are replaced, because the problem shows up at the turbo, although the turbocharger is in good condition.

Therefore always carefully check all points from the Holset Turbocharger Diagnostic Chart to identify the problem, before removing the turbo from the engine.

Only after all these points have been checked, one should check the turbocharger for faults. Since the turbocharger components are manufactured on high-precision machines to close tolerances and the wheels rotate up to 140,000 rpm in commercial diesel engines, turbochargers should be inspected by qualified specialists only.

Turbocharger service and lifetime

The turbocharger is designed such, that it will usually last as long as the engine. It does not require any special maintenance and inspection is limited to a few periodic checks. To ensure that the turbocharger's lifetime lines up with that of the engine, the following engine manufacturer's service instructions must be strictly observed and followed up:

- > Oil change intervals
- > Oil filter system maintenance and replacement
- > Oil pressure control
- > Air filter system maintenance and replacement

What are the main factors causing turbocharger failure?

90 % of all turbocharger failures are due to the following causes:

- * Penetration of foreign parts into the turbine or the compressor of the turbocharger
- * Dirt/contamination in the lubrication oil of the engine, also lubricating the turbo bearings
- * Insufficient/inadequate oil supply (oil pressure/filter system/engine start up-shut down)
- * High exhaust gas temperatures (incorrect fuel injection system)

These failures can be avoided by regular maintenance. When servicing the air filter system for example, care should be taken that no tramp material gets into the turbocharger.

