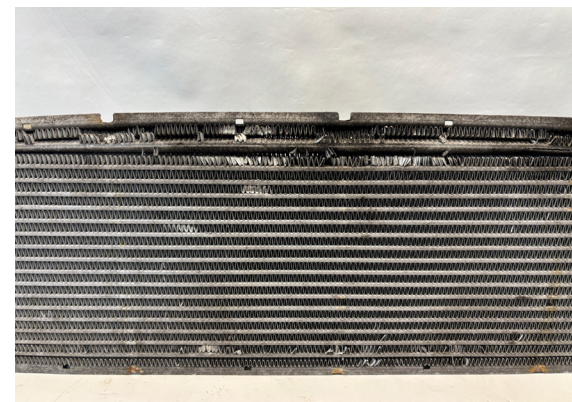


# Turbo Troubleshooting

A guide to successful turbocharger replacement



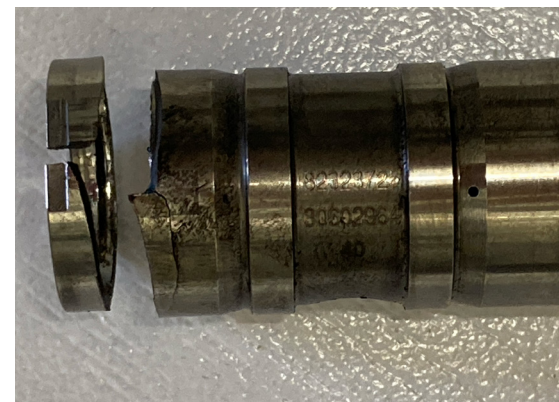
## Problem:

### Oil and water ingress in the intercooler

Oil and water residues cause blockages in the capillaries and restrict air flow. Possible consequences include swelling of the intercooler and leaking. With vehicles that travel short distances, an often overlooked cause of boost pressure control limit errors is water ingress in the intake tract.

## Solution:

When replacing the turbocharger, it is essential to check the intercooler for flow rate, fluid residue and foreign objects - especially after compressor wheel damage - and replace if necessary.



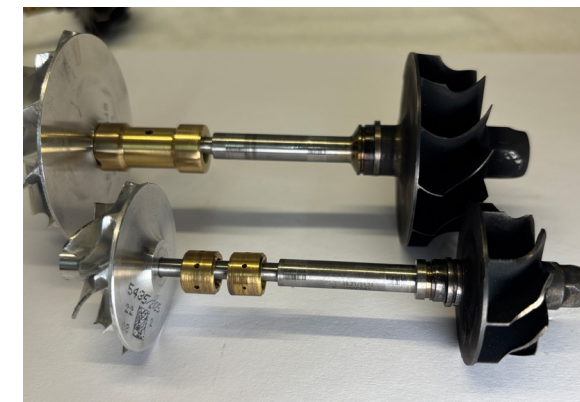
## Problem:

### Insufficient lubrication and oil pressure

Fuel contamination in the oil causes a change in viscosity. This leads to a reduction in lubricity due to the coking of the fuel elements in the bearing. This can also be caused by insufficient oil supply due to narrowing of the oil supply lines, clogged oil strainers or insufficient oil pressure. The consequences are a thermally discoloured shaft and breakage of the anti-rotation devices on the bearing bush, as well as oil coking on the bearing.

## Solution:

When installing the new turbocharger, replace the supply and return lines. Carry out an engine oil and filter replacement and check the oil pressure.



## Problem:

### Oil contamination

Oil carbon particles and metal abrasion lead to scoring and simultaneous material removal from the bearing pairs. The increased bearing play causes the turbine wheels to rub against the housing, resulting in turbocharger failure.

## Solution:

Since the introduction of extended Long-life Servicing, only about 1/3 of the oil flows directly through the oil filter. During the warm-up phase and under acceleration and full load, most of the oil is diverted past the filter to ensure oil pressure at all bearing points. Frequent oil changes with oil sludge flushing prevent this damage.

Compressor inlet

Oil inlet

Turbocharger outlet



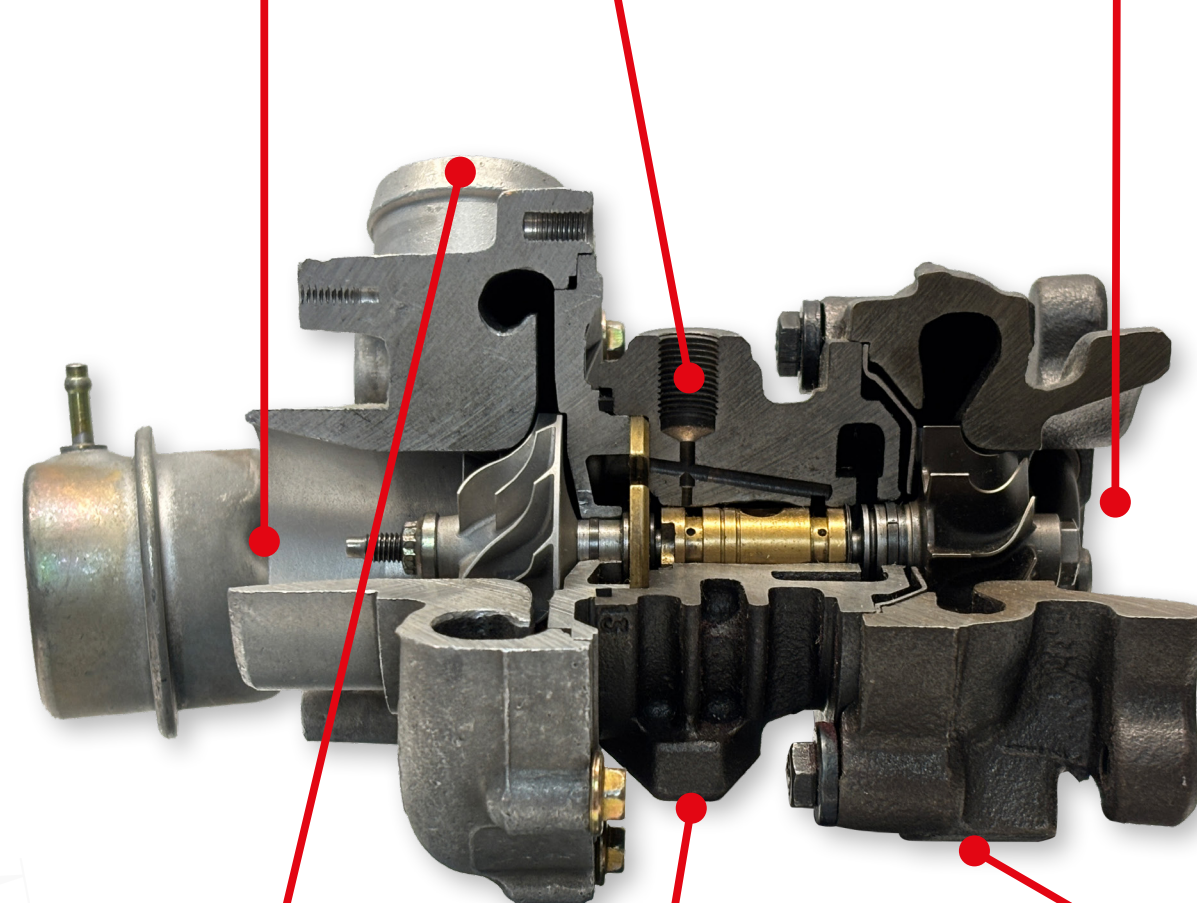
## Problem:

### Oil loss at the compressor inlet of the turbocharger above the crankcase

This is not a turbocharger fault! These oil leaks, which run out of the compressor after the intake hose has been removed - giving the impression that the oil is coming from the turbo - are actually drawn in from the engine ventilation system. Typical signs of this type of damage are oil-covered black compressor blades and oil leaks around the compressor inlet.

## Solution:

Check the engine internal/crankcase pressure using febi Testing Unit for turbocharger 196202.



## Problem:

### Increased exhaust back pressure

Soot, oil carbon particles and fuel and moisture residues in particle filters, oxycats and petrol catalytic converters, as well as defective and water-filled silencers, restrict exhaust gas flow. This creates axial pressure on the turbine shaft, which shifts it towards the compressor and destroys the turbo.

## Solution:

Check the exhaust back pressure manually with febi Testing Unit for turbocharger 196202 while driving under all load conditions. The exhaust back pressure must remain below 0.3 bar.

Compressor outlet

Oil leak

Turbocharger inlet



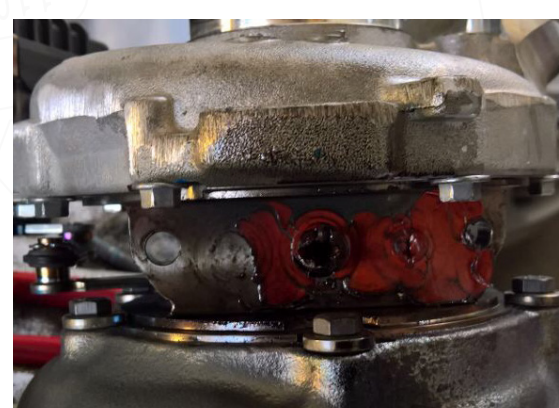
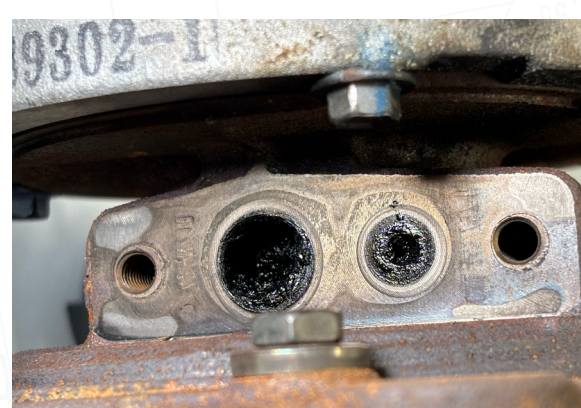
## Problem:

### Damage caused by foreign objects to the compressor wheel

This damage is caused by soft foreign objects, such as parts from the air mass sensor, reduction rings, or pieces of the intake hose - or hard foreign objects like nuts, screws or components from the camshaft area.

## Solution:

Before installing the new turbocharger, check the intake tract for foreign objects or missing parts. If the turbocharger has been damaged in the past and the compressor wheel nut is missing, it is essential to find and remove it.



## Problem:

### Restricted oil return

The accumulation of carbon deposits (coking) leads to overheating. They also lead to oil loss as the shaft's rotation forces the oil that does not drain away through the piston rings into the intake and/or exhaust tract.

## Solution:

Always use new supply and return lines and check the points where these connect to the engine block, ensuring they are clear. Never use liquid sealant for installation. In the picture on the right, liquid sealant has blocked the oil supply and led to the immediate failure of the newly installed turbo.



## Problem:

### Damage caused by foreign objects to the turbine wheel

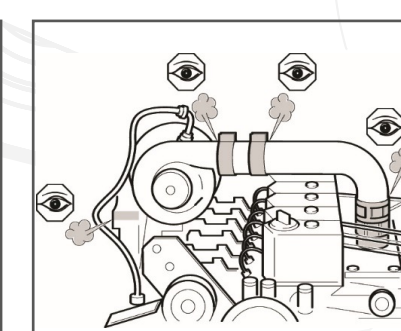
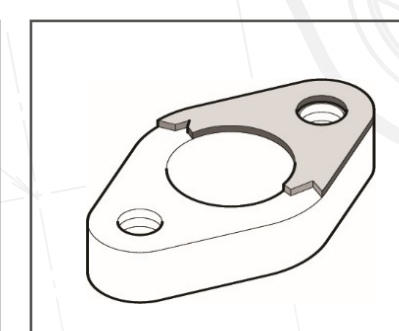
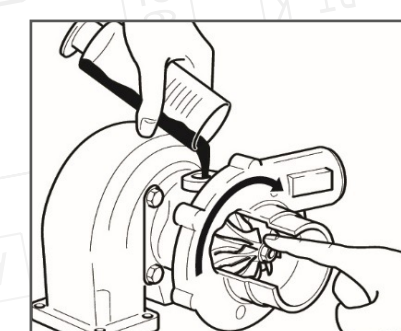
Fragments from the combustion chamber cause damage to the turbine wheel and, if present, to the VTG adjustment. When driving at low revs, the exhaust gases from the individual cylinders oscillate and fatigue the inner wall of these components. The fragments hit the turbine wheel as they circulate with the exhaust gases. In the picture on the right, the tip of a glow plug broke off and destroyed the wheel.

## Solution:

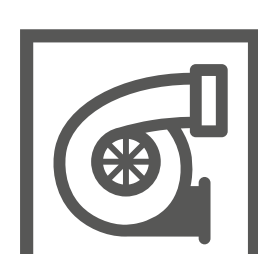
Before installation, be sure to check EGR pipes and throttle valves for internal damage.

## Instructions:

- Before installing a new turbocharger, determine and eliminate the cause of failure of the old turbocharger!
- Before installation, check that the correct turbocharger has been chosen by comparing the turbocharger's model numbers with the engine code and the turbo manufacturer's specifications.
- Check the entire area around the turbocharger, ensuring that the intake, compressor outlet and exhaust tract is functioning properly and is leak-free and clean. Remove all foreign objects and leakage and clean the sealing surfaces!
- Ensure that the engine ventilation and oil supply are functioning properly and that the oil can flow freely from the turbocharger back to the engine. In particular, the oil supply and return lines must be checked to ensure they are unobstructed - however due to their design we recommend that these are always replaced.
- Remove all protective caps and plugs from the new turbocharger!
- Before installing the new turbocharger, use a 10 ml syringe to fill the oil inlet with engine oil and turn the turbine shaft.
- Always use new, precisely fitting sealing elements. Never use liquid sealant or exhaust paste when connecting!
- Sealing surfaces and threads must be free of wear and damage. The tightening torques specified by the vehicle manufacturer must be observed.
- Before initial operation, it is essential to carry out an oil service with oil and air filter replacement in accordance with the manufacturer's specifications.
- For initial start-up, run the engine with the starter motor for three periods of 20 seconds with a 10 second break in between. Prevent the engine from starting by disconnecting the plug from the rail sensor or injector. Then start the engine and check all connections and seals while idling. Only accelerate the engine 30 seconds after starting.



- Installation may only be carried out by trained specialists! Failure to observe these installation instructions may result in damage to, or malfunction of, the turbocharger and will invalidate the warranty.



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