

Technical bulletin

PRODUCT:	Turbocharger
OEM:	BorgWarner, BMTS, Continental, Garrett, IHI, Mitsubishi
FITS:	Various
JOB:	How to troubleshoot a turbo failure due to overheating

*More than 95% of turbo failures are caused by external issues – one of these being overheating. Although less common, **knowing both the tell-tale signs** when diagnosing, and **how to fix it**, can save technicians valuable time and money, whilst also ensuring a best practice vehicle service.*

What is overheating?

Extreme heat can destroy many things. And the same goes for turbochargers. Whilst they are designed to withstand exceptionally high temperatures, prolonged exposure to 1,000°C plus and/or cooling issues, will eventually take its toll on the turbine side of the turbo. This can contribute to a whole host of problems, which, if left unchecked, can cause severe damage to other components, and even complete turbo failure.



What causes overheating?

- » poor quality oil, or the incorrect grade, will not provide sufficient lubrication or protection against heat and friction
- » low, degraded and/or incorrect grade of coolant or antifreeze levels will similarly hinder heat transfer and component protection
- » damage to, or blockages in the coolant system
- » non-dealer remapping, engine modifications or fitting a standard turbo to a remapped engine can push the engine and turbo beyond its operating limits
- » repeated hot engine shutdowns causing residual oil in the turbo's bearing housing to carbonise - over time, this can cause accelerated wear to internal components

- » damaged or blocked exhaust system components, such as the DPF, leading to excessive exhaust gas back pressure and heat
- » obstructed oil drain line or damaged crankcase, restricting the flow of oil out of the turbo, preventing it from cooling
- » restrictions to the air flow such as a blocked filter, a faulty MAF or MAP sensor or damaged air intake pipe, resulting in insufficient air to cool the engine
- » coked oil feed and return lines restricting the supply to and flow out of the turbo
- » faulty or leaking injectors causing the engine to overcompensate for changes to the air fuel ratio

What are the signs of overheating?

- » check engine light illuminated
- » a smoky exhaust
- » loss of power and performance
- » abnormally loud whirring noises
- » lack of boost, or drop in pressure, if the vehicle is fitted with a boost gauge
- » discolouration that extends from the turbine wheel base and along the shaft from the head
- » staining to the turbine shaft journal surfaces caused by heat soak (hot shutdowns)
- » discolouration of internal components such as the thrust washer and flinger
- » deposits of carbonised oil on the turbine shaft condensed on the piston ring, piston ring groove and oil flinger groove
- » glazing to the turbine end of the turbine shaft
- » carbon deposits in the oil feed and return lines
- » excessive wear to and corrosion of turbocharger bearings
- » deformation of the turbine and compressor wheels and housing
- » damage to turbine blades including stress cracks, wear to the tips and/or partial loss of blades
- » blue discolouration to the shaft at the turbine end of the turbo

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How to prevent turbo failure due to overheating:

- » perform regular oil and oil filter changes and keep the vehicle topped up with the correct grade of oil, as per manufacturer guidelines
- » check the coolant levels and top up if necessary with the right grade for the driving conditions – remember to only remove the filler cap on a cold engine to avoid the risk of scalding
- » inspect the coolant system for signs of wear to hosing, damage to radiator etc – clean and/or replace as necessary
- » check the entire air induction system for restrictions including the air filter, MAF sensor, MAP sensor and pipework – fit new air filters and replace other components as needed
- » fit new oil feed and return pipes when replacing or refitting a turbo
- » inspect the exhaust system for any leaks and blockages to the DPF, catalytic converter etc – clean and replace, where relevant
- » following a long or hard drive, allow the engine to run at idle for 1-2 minutes before switching off the engine to ensure the turbo is sufficiently cool
- » avoid non-approved chipping or over-fuelling – any engine modifications should be performed by a specialist
- » ensure you only ever fit the right turbo for the application

How to resolve turbo failure caused by overheating:

- » conduct an oil system flush following VM guidelines
- » fill with the correct grade and quantity of oil
- » fit new OE-quality oil and air filters
- » complete in-driving exhaust self-cleaning cycles, if available
- » check the coolant system and replace components, as necessary
- » top up coolant with the correct grade and quantity
- » check the air induction system and replace components, where needed

Whilst this may add additional expense to your customer's bill, it is far more cost and time-effective than having to fit another turbo, and potentially an engine, when they return with the same issue soon after. So, remember to **always diagnose and fix what caused the original unit to fail**, before fitting a new turbo.

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