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TECHNICAL REPORT

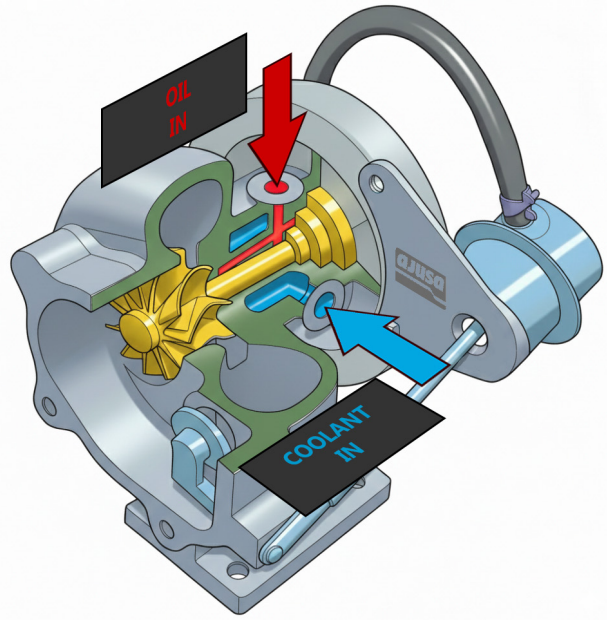
Ajusa coolant pipes for turbocharger

01 introduction

The purpose of this document is to explain the need for **external turbo coolant**, how liquid coolant pipes work, and to present a new line of pipes designed to meet the demands of modern engines.

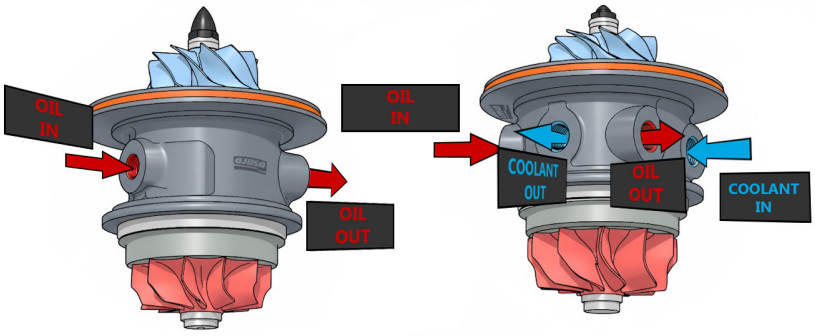
During operation, the turbocharger is exposed to extreme temperatures due to the flow of exhaust gases through the turbine. In modern engines, these temperatures can reach very high values, which places significant **thermal stress on the internal components** of the turbo.

Poor coolant can cause problems such as overheating of the housing, early wear of the bearings, or degradation of the lubricating oil. For this reason, when the coolant generated by the lubricating oil itself is not sufficient, **fluid coolant of the turbo** appears to be an effective solution for controlling the temperature and extending the service life of the turbocharger, even when there is an accumulation of residual heat.



Turbo main housing section

The turbocharger liquid coolant system is part of the overall engine circuit. The coolant, driven by the water pump, passes through the turbo core to absorb heat and then returns to the radiator, where it is cooled down.



Turbocharger body comparison. Lubricating oil coolant (left) and external coolant (right).

02 turbo coolant pipes

Turbo coolant pipes **carry coolant between the engine and the turbocharger**, in both the forward and return directions. They must be able to resist high temperatures, pressure and vibrations, as well as being made of durable materials.

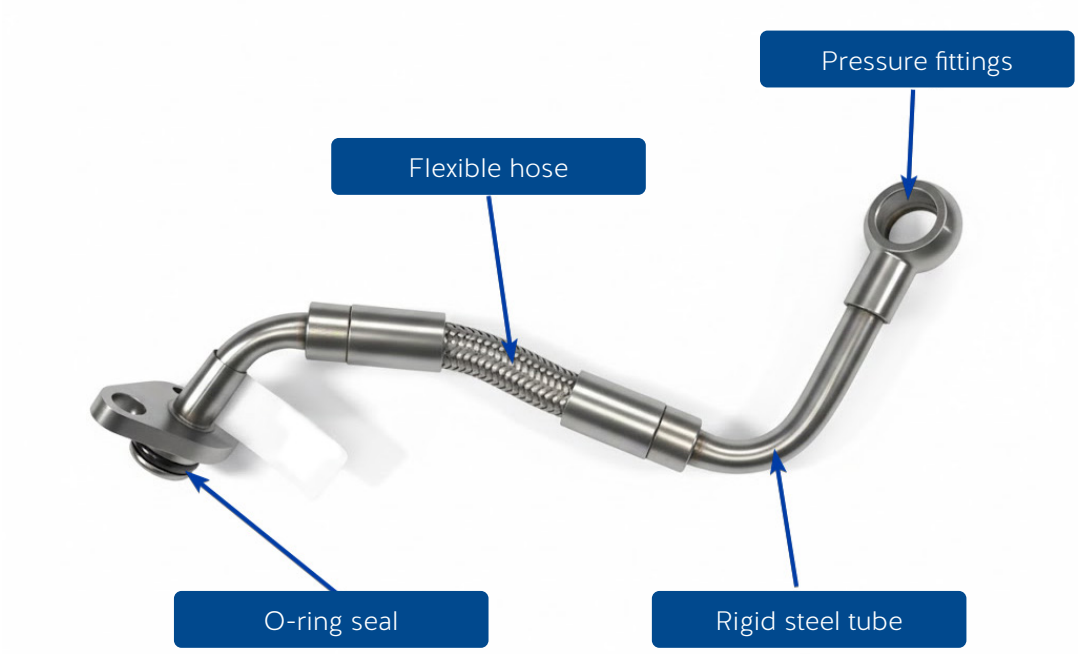
Depending on their application, they can be made of **carbon steel, stainless steel or combinations** of metal and flexible sections, selected to offer high mechanical and thermal resistance.

The pipes incorporate shaped or machined endings that allow for a precise and tight connection using specific seals, clamps or fittings, preventing coolant leaks even under severe working conditions.

In certain configurations, the coolant pipes integrated into an auxiliary circuit with an electric pump allow the coolant to **continue circulating after the engine** has been switched off. This system is essential for evacuating the residual heat accumulated in the turbocharger body.

This effect, known as **heat soak**, occurs when heat from the turbine is transferred to the central body in the absence of coolant flow. Forced circulation limits thermal peak and helps to bring about a controlled drop in temperature.

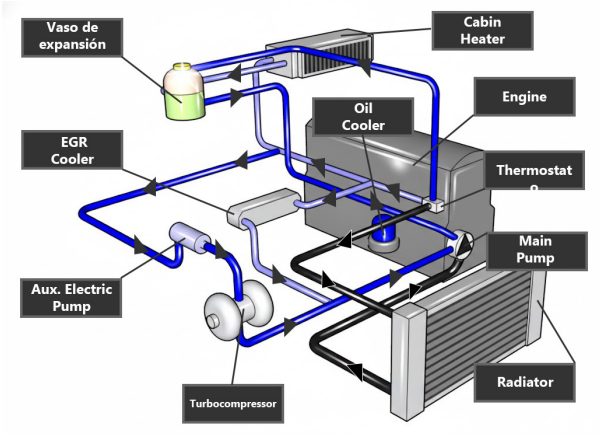
This solution is particularly relevant in vehicles used in severe conditions and those equipped with Start&Stop systems, as it reduces thermal degradation of the oil, the formation of carbon deposits and premature wear of the turbocharger.



03 symptoms and faults in turbo coolant pipes

In today's vehicles, coolant systems have evolved to improve **thermal efficiency** and control a growing number of components, including turbochargers and anti-pollution systems.

The increased complexity of the circuit increases the risk of failures that are difficult to diagnose and costly to repair. Poor thermal management can cause serious damage, especially in liquid-cooled turbos.



SYMPTOM	PROBABLE CAUSE	TECHNICAL CONSEQUENCE
Leakage of coolant in the turbo area may cause vapours	Crack in pipe, faulty seal or damaged fitting	Decreased coolant capacity of the entire engine cooling system
Smell of coolant / crystallised residues	Fractures in materials, joints between flexible pipes, or deterioration due to excessive temperatures	Decreased coolant capacity, damage to electronic components due to water or chemical degradation
Degraded oil or loss of turbo blowing efficiency	Insufficient turbo cooling	Damage to the turbo shaft and bearings. This can affect other systems such as lubrication or intake
Excess pressure in the coolant system	Air inlets to the coolant system	It can cause slow coolant circulation in the rest of the engine, affecting the coolant of other components with serious consequences. It causes coolant degradation
Anomalies in the operation of the Start&Stop system	The turbocharger is unable to cool efficiently.	The temperature parameters of the components may be outside the values at which the Start&Stop system can be activated

04 correct use of turbocharger cooling pipes

The turbocharger coolant pipes must only **be used in compatibility applications**, ensuring correct routing that allows for thermal expansion without generating stress.

It is essential to use suitable materials and gaskets, to observe the specified tightening torque and to maintain the circuit with approved coolant. It is not recommended to reuse damaged or aged pipes.

After any intervention, the leaks should be checked and the system should be completely drained to ensure safe operation of the turbocharger.

05 Ajusa turbo coolant pipe line

This range of turbo water/oil pipes covers more than 40 vehicle models from over 10 major brands, including Ford, VAG, Mercedes, Fiat/Alfa/Jeep, Nissan, and Smart.

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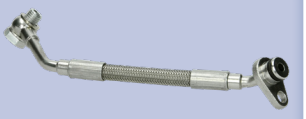

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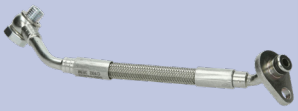

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