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TECHNICAL REPORT

Oil return pipe turbocharger

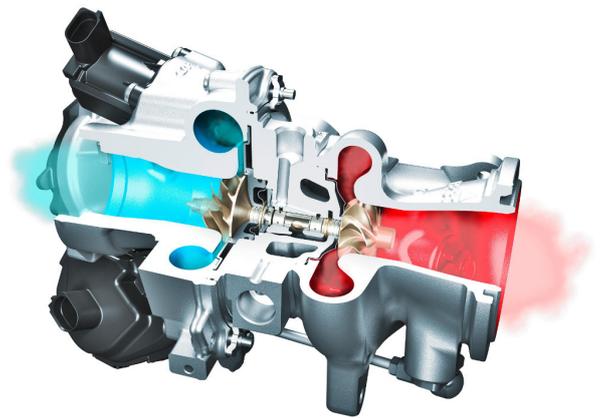


01

INTRODUCTION

To ensure good lubrication of the turbocharger, it is necessary to maintain a **constant and adequate flow of lubricant**. In this way, heat transfer and correct lubrication are produced, maintaining the temperature in the optimum working range, in order to avoid dilations and maintain clearances.

The **oil feed pipe**, and the **return pipe** must be kept in **perfect condition**, maintaining a constant flow of oil inside the turbocharger core is of vital importance to counteract the extreme work that occurs in the main shaft.

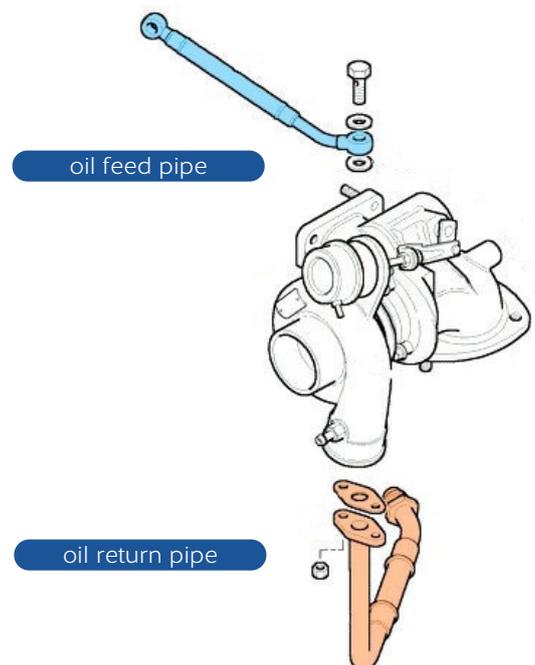


02

HOW OIL RETURN PIPES WORKS

The main task of the return pipe is to **evacuate the lubricant from inside the turbo** and maintain flow through it to the oil pan. The diameter of the return pipe is **larger** (approximately twice) than the oil pipe, in order to **guarantee the outlet flow**.

The lubricant flows through the return pipe. The **relative pressure** inside the return pipe is close to 0, basically by gravity. This is extremely important otherwise back pressures would be created inside the core, which can trigger a **premature breakage of the sealing elements** that prevent the oil from escaping through the shaft area towards one of the two casings, intake or exhaust.



03

WHY IS IT NECESSARY TO REPLACE THE RETURN PIPE?

When performing a major repair on a vehicle's turbocharger, it is essential to ensure that the turbo's **lubrication system is in good condition** to ensure proper lubrication.

As happen with the oil pipe, the return pipe is extremely important as it collects the turbine oil at high temperature from shaft area and is subject to a greater fatigue stress due to its high rigidity. Over time the **flexible elements of the tube tend to deteriorate** as indicated above. For this reason, **Ajusa has a wide variety of return tubes in its catalogue.**

A **return pipe in poor condition** can cause different situations that end in failure. On the one hand, the breakage or cracking of this due to fatigue, the passage of time and the agents that incorporate the oils, especially affecting the flexible parts, would trigger an oil loss with the consequent risk, not only for the turbo but also all mechanics.

On the other hand, **a constriction in the case of tubes that are reassembled** after being removed and show signs of fatigue in their flexible elements, could prevent the correct flow of oil, generating fatal pressures for the turbo.

04

DESIGN AND MATERIALS

The materials used for the manufacture are **stainless steels** with walls less than 1 mm thick, with strict standards that allow their shaping and bending without risk of breakage throughout the process.

Flexible sections are usually combined with rigid sections to adapt to the space inside the engine compartment, and especially to reduce its rigidity since the return pipes have a larger diameter than the oil pipes. They offer greater structural rigidity, making more sensitive to fatigue phenomena at the ends and fixing elements.

The materials used in the flexible section are usually fluorinated elastomers or PTFE reinforced with braided mesh, to provide the necessary resistance for high temperatures which oil returns after its journey through the turbocharger, sometimes the oil exceeds 120°C. In fact, it is common in some of them a

shielding of the structural type or through thermal protectors for this reason. Hydro-forming techniques are also often applied to create flexible bellows-type sections with the same purpose, to reduce rigidity.

On the other hand, the ends are usually sealed with O-rings, mainly in FKM, or with a metal gasket between the flange and the turbocharger or the block.

The return tube can be an independent unit from the oil tube or be incorporated in the same flange, this occurs in those pipes where the oil inlet and outlet is carried out through the same wall in the turbo core.

TYPES OF RETURN PIPES MARKETED



Stainless steel pipe with PTFE flexible and metal mesh



Stainless steel pipe with hydro-formed bellows flexible



Combined oil and return pipe



PTFE pipe with heat protection