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TECHNICAL REPORT

Launch of new Ajusa product:
timing covers



01 introduction

With advances in internal combustion engine technology, the industry is seeking to **optimise engine performance** ever more, combining greater efficiency with a lower environmental impact. Modern timing systems play a key role, and the proper protection of wet chain and belt systems is critical to preventing premature and costly breakdowns.

Ajusa presents its **new range of stamped steel timing covers**, developed to meet the needs of professionals and offer a reliable solution that helps to ensure the quality of repairs and maintenance work on timing systems.

This new range provides the **structural rigidity required** to minimise the risk of deformation, as well as optimum adaptability at the sealing points. This reduces the risks associated with reusing casings that have been deformed or damaged by the use of sealants, ensuring a long-lasting and reliable seal in every repair.

A solution designed to protect both the distribution system and the investment made in repair and maintenance work



AJUSA PART NUMBER TD1002

OEM PART NUMBER

FORD | 160714 · 1372482 · 1738621 · 1 372 482 · 1 738 621 ·
6C1Q6019AB · 6C1Q6019AC · 6C1Q-6019-AC
FIAT | 9660026980 · 9 660 026 980
CITROËN | 0320.Z1 · 0320Z1
AUDI | 1001027NO



AJUSA PART NUMBER TD1001

OEM PART NUMBER

FORD | 1484924 · 1738862 · 7C163019AC · 7C16-3019-AC ·
7C166019AA · 7C16-6019-AA · 7C166019AB · 7C16-6019-AB

02 timing systems

Timing systems have been, since the early days of internal combustion engines, one of the fundamental elements for their proper operation. Their critical role in engine timing means they work with a very tight tolerance margin, since any failure can cause severe breakdowns and, therefore, high repair costs, even leading to irreversible engine damage.

Therefore, proper maintenance, along with periodic inspection and the prevention of potential failures, is essential to guarantee their operation and avoid unnecessary costs during the vehicle's useful life.

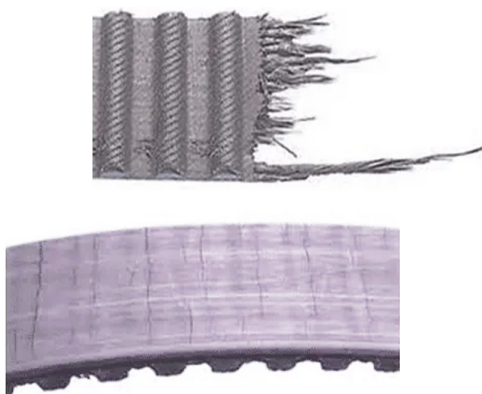
Over the years, timing systems have evolved from old gear trains and side camshafts to more efficient, compact, and quieter solutions.

In modern vehicles, the **timing system usually consists of a chain or belt and a set of toothed pulleys** or gears that transmit movement in a synchronized way.

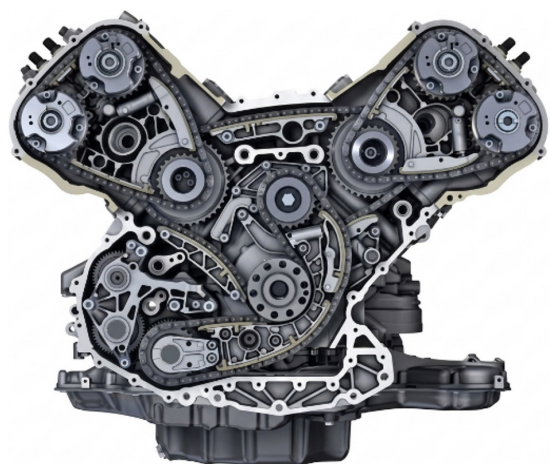
The coordinated operation of all these components makes it possible to maintain precise synchronization between the movement of the pistons and the opening and closing of the valves, according to the different phases of the engine's operating cycle.

To protect this mechanical assembly and ensure its proper operation, the **timing system is housed in a specific chamber**. This must provide adequate protection against external contaminants and, at the same time, ensure the necessary seal to prevent engine oil from leaking outward.

Therefore, **properly sealing the timing cover** is a fundamental aspect to preserve the integrity of the engine. The parts responsible for ensuring this seal must be kept in optimal condition and replaced when necessary, thus helping to prevent leaks, protect the timing components, and ensure the reliability of the assembly.



Breaks and cracks in a dry belt

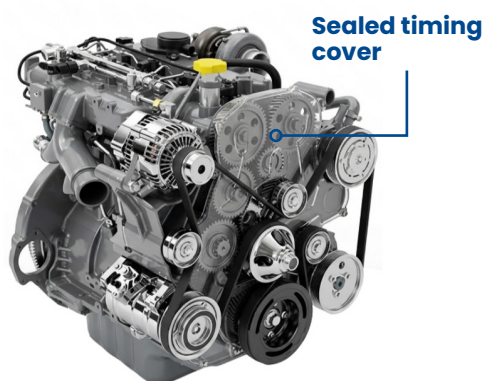


Modern multi-chain timing system

03 type of covers by timing system

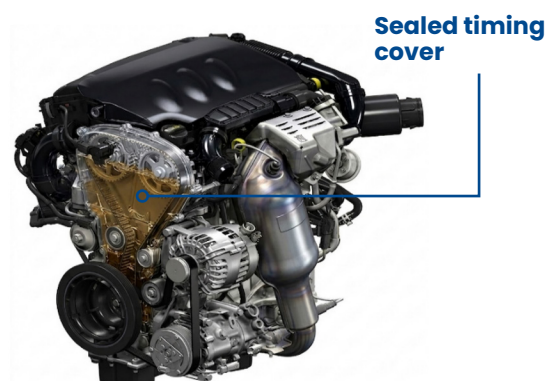
GEAR DRIVE

Gear wheels immersed in oil and enclosed in a housing. No longer in use as they are noisy and inefficient. Common in industrial vehicles due to their high reliability.



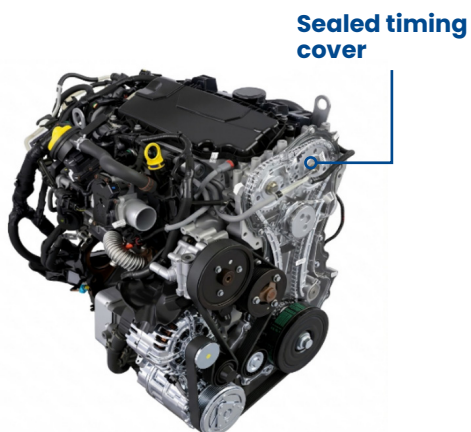
TIMING CHAIN

Tooth wheels and flat chain. Requires a sealed chamber and an hermetic seal as it is immersed in engine oil.



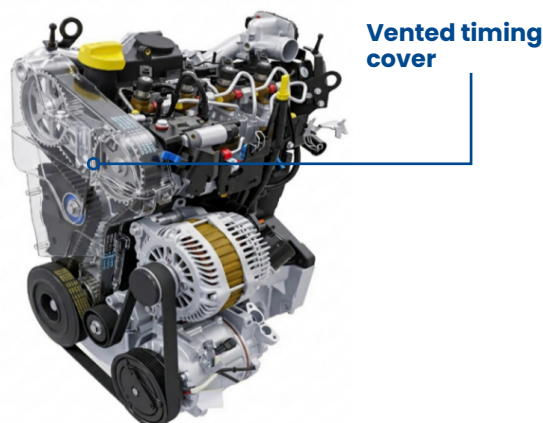
WET BELT

Rubber belt immersed in oil (for overhead camshafts). Requires a sealed chamber and an hermetic cover.



DRY BELT

An exposed rubber belt that operates without fluids. Its casing serves only to protect the system from external elements.



04 materials and manufacturing process

Materials used to manufacture distribution covers vary depending on the intended purpose for which the manufacturer has designed them.

Sometimes metal distribution covers require a surface finish to provide protection against corrosion, such as: electrolytic zinc plating, hot-dip galvanising, phosphating or cataphoretic coating (e-coat).

CASTING COVERS

Although they are used less and less frequently, cast timing covers offer a high level of protection and strength, ensuring a tight seal and allowing for the mounting of heavy auxiliary components.

However, their considerable weight, size and manufacturing cost have limited their use to applications where they are essential

POLYMERIC COVERS

Plastic covers present limitations for sealing areas exposed to oil, due to their lower durability against temperature, and offer little versatility for housing auxiliary components.

Therefore, they are usually used as protection in dry-belt timing systems. However, reinforced polymers are beginning to replace them thanks to their improved performance.

STAMPED STEEL COVERS

They are currently the most common, as they offer a good balance between protection, sealing, and cost.

In addition, they allow for the integration of auxiliary elements such as tensioners and shafts, although they have lower torsional rigidity than cast covers.

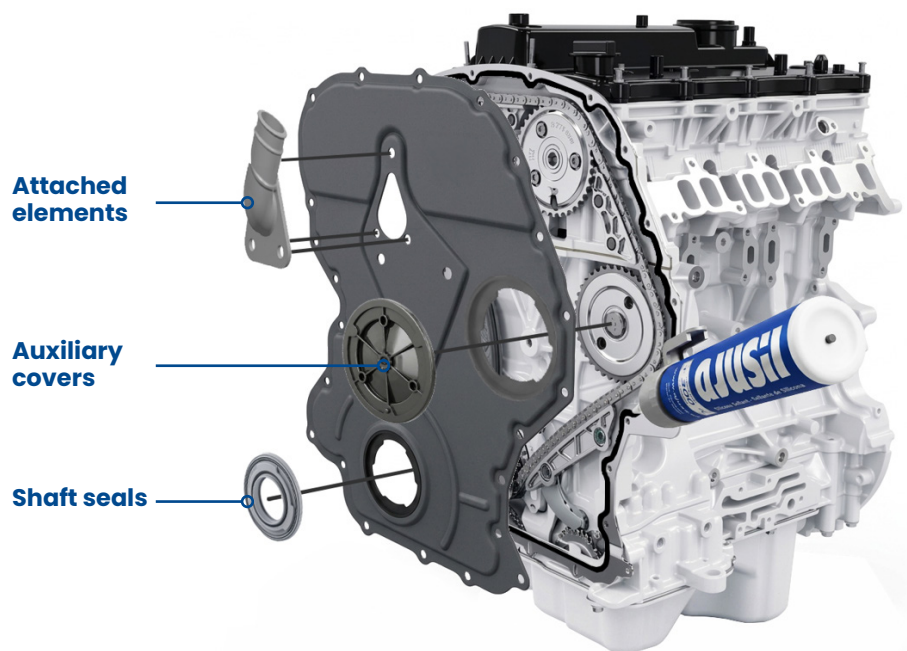


05 sealing elements

To retain oil in submerged timing systems, it is necessary to **ensure the seal between the timing cover and the engine block**. To achieve this, different solutions can be used, such as elastomer gaskets with a steel carrier and sealing ribs, or silicone sealants.

In certain applications, the crankshaft must transmit its rotational movement to the outside of the engine through the front part to drive other auxiliary components, such as accessory belts or injection pumps. When the timing chamber must remain sealed, **it is necessary to seal the point where the shaft passes through the cover**. In these cases, the radial oil seal is responsible for ensuring this tightness. For this reason, timing covers may include specific housings for their proper installation and fixation.

Likewise, some covers may feature inspection ports or holes designed to house sensors. These points must also be properly sealed to prevent oil leaks and ensure the system's tightness. Therefore, during any repair or disassembly operation affecting the timing cover, it is essential to check the condition of these elements and verify that their seal is adequate.



06 failure prevention

It is increasingly common for timing system repair and maintenance procedures to involve replacing the cover once it is removed. The use of silicone sealants makes reuse involve a costly cover cleaning process without ensuring optimal results, since minor deformations or scratches can occur on the contact surfaces. The best guarantee of a proper seal after performing a thorough timing service is the use of new covers that completely eliminate the following possible failures:

Leaks due to gasket or sealant degradation: they cause moderate oil losses that can damage nearby components, alter the electrical system, or cause fires.

Cover deformation: in stamped covers, a lack of flatness on the contact surface generates recurring leaks. Sometimes a deformation that is imperceptible to the naked eye can produce leaks due to misalignment in the integrated oil seals and at critical points of the sealing face.

Defect in bolts or their sealing: bolts and their sealing are common leak points. They must be replaced if their threads or heads are damaged and, when specified by the manufacturer, anaerobic sealants should be used. In addition, applying cover sealant may require sealing specific areas around the bolts.

Corrosion on the contact surface: it causes lubricant loss, abnormal noises, and engine oil contamination.

Failure of integrated oil seals: the deterioration of the oil seals or the deformation of their seat in the cover cause significant oil leaks.



Example of an engine with a clear oil leak from the timing casing.