

What is Torque One Technology?



Many of the head gaskets we manufacture are single torque head gaskets that we call "Torque One Technology", that is they do not require to be retorqued after a running in period. Primarily we achieve this through two processes, facing material selection and pretorquing, which we will explain a little further on, but first we need to provide you with some insight on basic head gasket construction.

Most head gasket designs available for aftermarket use can be classified into two general categories - Composite and Steel. Typically composite head gaskets have a steel core, usually perforated, with softer facing materials bonded on each side. Until recently steel head gaskets consisted of four to six layers of steel bound together by a variety of mechanical methods, however the trend now is for fewer layers, with three or two layers not uncommon and even a single layer now in use on some applications. Both of these categories can be further broken down as shown:

- Composite
 - Asbestos Fibre (No longer used in any Permaseal gaskets)
 - Non-Asbestos Fibre (commonly aramid fibre)
 - Graphite - also referred to as Carbon Fibre

- Steel
 - Multi Layered without rubberised coating
 - Multi Layered with rubberised coating
 - Single Layer with rubberised coating

Facing Material Selection

Facing materials containing asbestos were predominantly used through to the mid nineties by many gasket manufacturers, but Asbestos is banned from sale or use in many countries and no longer used in any Permaseal gaskets. Both retorqued and non-retorque gaskets use facing materials that contain fibres, rubber and clay fillers. As the engine temperatures rise during operation, the rubber and clay fillers contract, causing a reduction in thickness of the head gasket facing material. This loss of thickness due to temperature is called thermal relaxation. The amount of this thermal relaxation is one of the factors that determines whether a gasket will require to be retorqued. Thermal relaxation can be greatly reduced through careful selection of the compounds used in the facing material. A non retorqued head gasket will typically have a rubber content of about 5% compared to that of a retorqued gasket which has rubber content of about 20%. Graphite facing materials contain no fillers or binders and therefore do not suffer from thermal relaxation.

Pretorquing

In addition to thermal relaxation, many materials also experience a loss of thickness when a load is applied for the first time, from which it does not completely recover. This un-recovered loss of thickness is called initial relaxation. Permaseal Torque One Technology head gaskets go through an additional process of pretorquing where the head gasket is compressed by applying approximately 100 tonnes of pressure. This simulates the first torque down sequence of the head gasket being installed on the engine, and reduces the amount of initial relaxation. Once the head gasket has been pretorqued it may still relax approximately 8% however retorquing is only required where the gasket relaxes 15% or more. By comparison a gasket that has not been pretorqued can relax up to 30% - twice the allowable limit. A further benefit of pretorquing is that the process also seats the cylinder bore ferrules into the facing material.

Coating and Beading

To further improve the ability of our head gaskets to effect a cold seal of engine fluids, we apply a silicone bead around critical oil and coolant passages. This bead applies additional load, reducing the potential for engine fluids to escape from the joint. A silicone coating is also applied to both faces of the head gasket to improve micro sealing of cylinder head and block surfaces.

Other Chemical Sealers

The use of other chemical sealers on our head gaskets is not recommended, and may void the head gaskets warranty, as they can cause the silicone coating to deteriorate, and in some cases may cause the deterioration of the gasket itself. The additional thickness of another sealer on a head gasket can also cause an uneven or incorrect load being applied. The use of an additional sealer may also cause relaxation when temperature is introduced.

Torque to Yield Head Bolts

"Torque to Yield" head bolts should not be retorqued as they can overstretch which can prevent the correct load being applied to the gasket. If the "Torque One Technology" head gasket is fitted correctly, (bolt hole threads cleaned, oil on bolts, new bolts if required, torque wrench calibrated, correct torque specs, etc.) there should be no requirement for the head gasket to be retorqued.

Identification of Torque One Technology

In our catalogues, head gaskets and sets manufactured with Torque One Technology are clearly identified. On our packaged head gaskets and sets look for the Torque One Technology logo on the set label.

