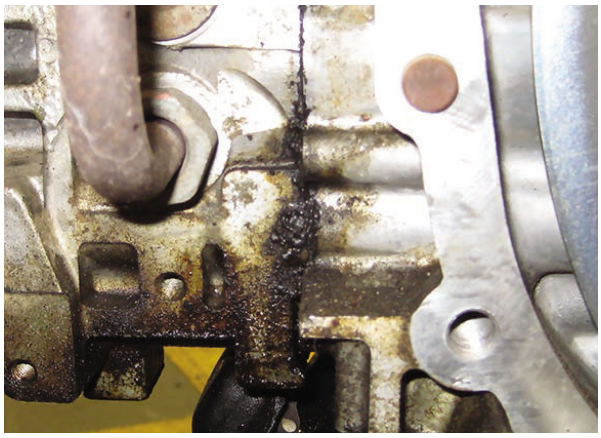
TECBLOG SEALING SUBARU 2.5L ENGINES

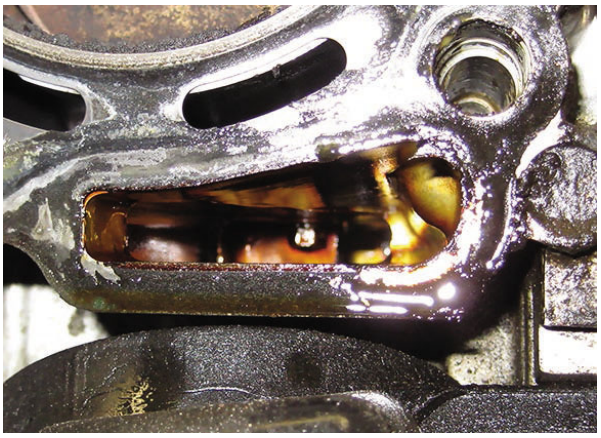
THE EJ-SERIES 2.5L BOXER ENGINE HAS BEEN POWERING MANY OF SUBARU'S VEHICLES SINCE 1996. THERE ARE MANY DIFFERENT VARIATIONS OF THIS MOTOR, AND THEY ALL SHARE THE POTENTIAL FOR DEVELOPING HEAD GASKET LEAKS.

The OE gaskets were composite or early-generation MLS gaskets, and both designs can be prone to leaks. Earlier gaskets tended to leak combustion gasses or coolant internally, often resulting in an oily residue or smell in the coolant overflow bottle, and subsequent coolant loss and overheating. Later gaskets tend to develop external coolant and/or oil leaks, which are initially noticed by the smell of oil or coolant burning, and can be seen at the head gasket joint.

There are many causes of leaking Subaru head gaskets, and most experience a combination of these issues.



External oil leak from failed head gasket



Head gasket damage, resulting in external leak

HEAT CYCLES

Even though the motors are all aluminum and the heads and block expand at the same rate, these lightweight castings flex as they heat and cool, scrubbing away at the OE composite gasket and the coating on the OE MLS gasket.

"BOXER" ENGINE CONFIGURATION

Subaru uses flat, horizontally opposed "boxer" engines exclusively in their vehicles. In a flat engine, the cylinders are parallel to the ground instead of angled up in an inline or "v" configuration. This means that oil remains in contact with the head gaskets instead of draining back to the oil pan when the engine is shut off. Over time, this constant contact with oil can cause an inferior head gasket to deteriorate.

ELECTROLYSIS

Many later-model Subarus experiencing external coolant leaks also have corrosion present on the battery and/or in the ground cable for the battery. While it sounds strange, the extra resistance causes electrolysis in the cooling system, causing the coolant to become corrosive.

ABNORMAL COMBUSTION / HEAD BOLT STRETCH

Head gasket failure can occur on naturally aspirated 2.5L Subaru engines due to detonation or preignition. However, it is more common for owners of turbocharged models to experience this type of failure, due to increased cylinder pressures. This issue is further multiplied because many owners of turbocharged Subarus modify the engine and increase boost pressure to increase the power output. This creates even higher cylinder pressures and temperatures, which increase the likelihood of abnormal combustion. In extreme cases, the combination of increased temperature and pressure can cause the OE head bolts to stretch as well.

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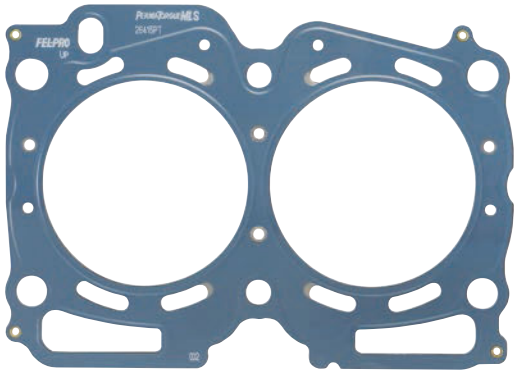
FEL-PRO® PERMATORQUE® MLS HEAD GASKET WITH LASERWELD™ STOPPER LAYER TECHNOLOGY PROVIDES A RELIABLE SEAL UNDER ALL OF THESE CONDITIONS.

This solution starts with the proven PermaTorque® MLS gasket design. Each PermaTorque MLS gasket is designed on an application-specific basis, using multiple layers of full-hard stainless steel with embossed beads and specialized coatings. The sealing beads act as springs to maintain sealing strength through heat cycling and under extreme conditions. The coating negates the possibility for excessive scrubbing as the castings expand and contract. The coating also compensates for surface finishes as rough as 60 Ra, instead of the 30 Ra or less often required by OE MLS head gaskets.



On demanding applications like the Subaru 2.5L engine, Fel-Pro incorporates LaserWeld,™ a laser-welded stopper layer added to further improve sealing. This technology was originally developed for use in stock car racing and has been proven to hold up to the most extreme conditions. The LaserWeld stopper layer precisely controls and limits the compression of the multiple layers within an MLS head gasket to ensure proper sealing stress. This stopper layer withstands cylinder pressures more than twice that of a standard MLS gasket. This further helps to promote extended head gasket life and allows the gasket to perform exceptionally well in engines with performance enhancements.

TORQUE SPECS

As with any engine that uses torque-to-yield head bolts, it is important to install new head bolts when servicing Subaru 2.5L head gaskets to ensure proper bolt loading, even though the OE repair manual doesn't call for new head bolts. Follow the correct torquing sequence and specifications when installing.

Felpro-Only.com is a comprehensive resource providing in-depth technical information featuring a forum where engine professionals can ask questions of Fel-Pro engineers.