

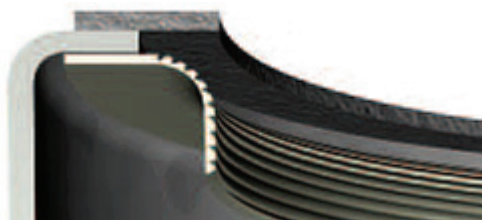
SB035

Teflon™ Crankshaft Oil Seals

Teflon™ is the commonly known DuPont registered trademark for PolyTetraFluoroE thylene (PTFE), which is a synthetic fluoropolymer. It has been used in series engine production in crankshaft radial oil seals since 1989 and is becoming the dynamic oil seal material of choice. It has a typical operating temperature range of -20°C to +204°C, with a mean operating temperature of +170°C (20°C higher than Viton™). Teflon™ is tough, chemically inert, works on surface speeds up to 45 m/s (10 m/s higher than for Viton™), works with all engine oils, but has a poor memory at low temperatures. Teflon™ seals require a shaft surface finish of $R_z < 9 \mu\text{m}$, compared with Viton™ seals requiring a finish of 2 - 6 μm . Compared to Viton™ seals, Teflon™ seals can survive dry running for up to 10 times longer at 3000 rpm (i.e. up to 30 minutes) and produce up to 30% less friction, resulting in reduced shaft wear. Teflon™ crankshaft oil seals can be either knock-in or unitized design.

Teflon™ oil seals are typically to be fitted clean and dry. This means the shaft sealing surface must be clean, dry and free of burrs, with no residual oil or similar product on the shaft - this includes body oil from fingers. The seal will come with a plastic former fitted into the seal lip opening to maintain the correct shape and keep the sealing surface clean and dry. This former must not be removed until installation and it is imperative that the seal lip is not touched or contaminated in any way. The seal is typically installed by fitting the seal and former assembly over the end of the crankshaft and then sliding the seal forward into place. The former can then be removed from the crankshaft and disposed of.

On initial start-up, the lip or sealing surface of the seal will 'burn-in' and leave a Teflon™ coating on the crankshaft. To bond and seal correctly to the shaft, there must be no contaminants on the seal or shaft. In operation, the seal operates with the Teflon™ seal lip running on a Teflon™ surface. If either of these surfaces is compromised, the seal will leak. The heat generated in the seal and the heat of the engine will also cause the seal to conform to the shaft, ensuring the right tension and providing a long-lasting seal.



Typical Teflon™ crankshaft oil seal design.