

ACL TECH TALK

OIL SEALS - THE BASICS

LETS CLARIFY THE ISSUES

There has been some confusion created regarding the correct installation of dynamic oil seals. Let's clarify the issues of, material selection, lubrication and surface finishes required.

Firstly, what is the function of dynamic oil seal? A dynamic oil seal is a physical barrier designed to retain oil and pressure, but exclude dirt, moisture and contamination.

HOW DOES THE SEAL WORK?

The automotive radial lip seal works by creating a thin layer of oil between the sealing lip and shaft journal. Capillary action causes the oil to seep between the lip and the shaft, which results in the oil lifting the sealing lip clear of the shaft. This thin layer is retained, and prevents leakage of the oil past the sealing lip.

It is important to ensure that the seal is fitted square in the housing and perpendicular to the shaft and that end float and radial shaft run out is not excessive.

OIL SEAL MATERIAL

Material selection for automotive engine applications is based on size, operating temperature, environment, pressure and maximum shaft surface speed. Most dynamic oil seals materials, for automotive engine application, fall into five categories.

PolyTetraFluoroEthylene (PTFE)
Fluoroelastomer (Viton)
Silicone
Poly Acrylate
Nitrile

The ACL range includes examples of all of these. As a matter of interest, NAK is the only Asian oil seal manufacturer granted a full licence, by Dupont, to use Viton®.

LUBRICATION

The sealing lip of the oil seal should never be in contact with the shaft. If this were the case, the seal would wear out in a matter of hours, therefore precaution must be taken that the seal is correctly lubricated prior to fitting. If this lubrication is not present, burning of the seal lip can occur, which could lead ultimately to seal failure.

In our experience, the use of a non-molybdenum (general purpose) based grease on all oil seals as an initial start up lubricant is recommended, as it will lubricate and readily disperse in engine oil. An exception to this is where a PTFE seal is being used.

Rubber grease, dishwashing liquid or petroleum jelly are not recommended, as their melting point is too low, and will starve the seal of lubrication before engine oil reaches the sealing lip.

SURFACE FINISH

When oil seals are fitted, care should be taken to ensure the shaft is not burred. Clean the chamfer on the shaft with a fine stone if any damage is suspected. This is best done while the shaft rotates. A shaft can be resurfaced and 0.25 mm (.010") max can be removed, to eliminate wear grooves. Care should be taken to ensure the surface finish is between 0.2 and 0.8um Ra. Also ensure that the shaft is plunge ground to prevent machine lead.

A practice adopted by some is the polishing with emery cloth or scotchbrite®, of a seal area, prior to fitment of the new seal.

This practice can lead to surface area damage.

Why? Microscopic scratches can tear up the surface where the sealing lip runs, which can severely damage a new sealing lip in seconds, and is the cause of many reported leaks.

Should you have any questions regarding this bulletin, or tips, because you fit more seals than we do, email us at sales@acl.co.nz