Light Vehicle Seal Damage Analysis and Troubleshooting

TIMKEN

When attempting to diagnose seal damage and seal-related issues, ask these questions and then review the troubleshooting guide on this poster. These questions and the troubleshooting guide can help you identify types of seal damage, potential causes and courses of action.

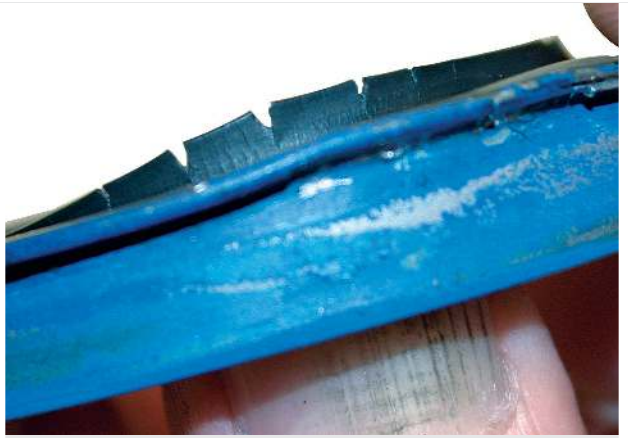
QUESTIONS TO ASK

- How long has the problem occurred?
- Is the seal leaking from the outer or inner diameter?
- What is the surface finish of the shaft?
- Has the manufacturing process of the shaft changed?
- Has the shaft been reworked or machined?
- When and/or in what conditions does the problem occur?
- In what automotive application is the seal used?
- In what environment is the seal used?
- What was used to install the seal?
- How fast does the shaft turn?
- To what temperature was the seal exposed?
- What type of lubricant is being used and has it changed?

HARDENED SEALING LIP SURFACE

Potential Causes/Courses of Action:

- Check the operating temperature. Excessive temperatures can cause the seal lip to harden.
- Check for inadequate lubrication or incompatibility with the sealed fluid.



BRITTLE OR CRACKED SEALING LIP

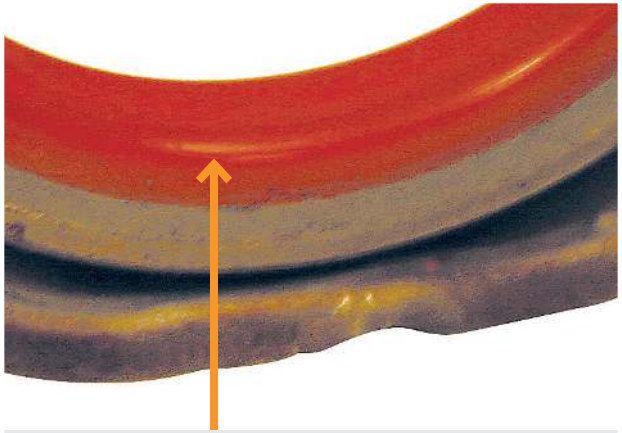
Potential Causes/Courses of Action:

- Check the operating temperature of the lubricant.
- Make sure the seal is the proper fit. An overly tight fit can cause overheating and rapid wear.
- Check the adequacy of the lubricant for the type of seal used.

SEALING LIP SHOWS EXCESSIVE WEAR

Potential Causes/Courses of Action:

- Make sure the shaft finish is not too rough at the point of lip contact.
- Make sure the seal was properly prelubricated before installation. Check the adequacy of the lubricant for the type of seal used.
- Make sure the seal is the proper fit. An overly tight fit can cause overheating and rapid wear.
- Make sure that shaft runout and misalignment do not exceed recommended limits.
- Make sure the seal sits close to the bearings. Check for excessive looseness in the bearing or splines.



SEALING LIP WORN ON ONE SIDE (DIRECTIONAL HELIX MARKS WORN OFF)

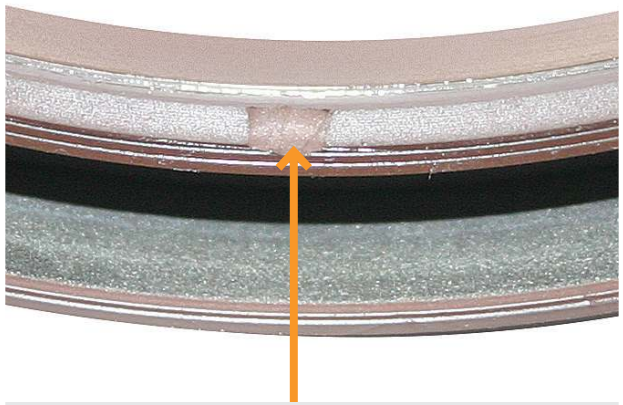
Potential Causes/Courses of Action:

- Make sure there is no misalignment of the shaft to the bore. This can generate rapid wear at a single point on the sealing lip.

TORN SEAL LIP

Potential Causes/Courses of Action:

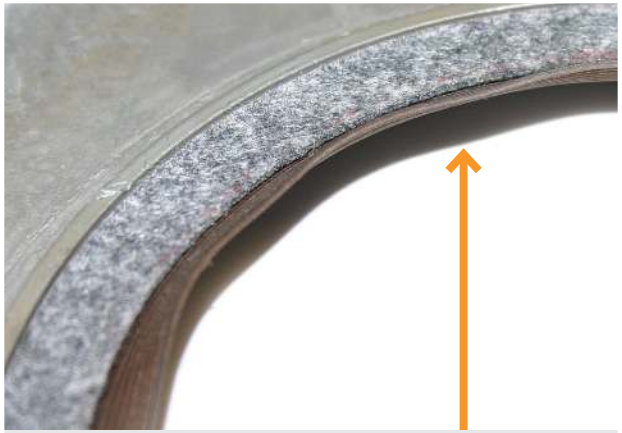
- Damage may have been caused by improper assembly of related parts or the use of improper installation tools.
- Confirm that the seal was guarded by a seal protector when installed over splines, keyways or snap ring grooves.
- Make sure that proper installation tools and methods were used.
- Damage can result from debris contacting the seal lip during operating conditions, which may be too severe for the type of seal being used.



NICKED OR SCRATCHED SEALING LIP

Potential Causes/Courses of Action:

- Damage may have been caused by improper storage and handling or use of improper assembly tools.
- Make sure the shaft was properly cleaned before installation.
- Make sure that proper installation tools and methods were used.
- Confirm that the seal was guarded by a seal protector when installed over splines, keyways or snap ring grooves.



"BLOWN-OUT" SEALING LIP (OR REVERSED DIRECTION OF LIP CONTACT)

Potential Causes/Courses of Action:

- Look for excessive pressure buildup or plugged vents. Vents may become clogged if they are not covered during painting.
- Check the lubricant level. Heating of the lubricant causes expansion resulting in pressure that can blow out the seal.

SOFTENED SEALING LIP SURFACE

Potential Causes/Courses of Action:

- Check compatibility of the fluid and the sealing element. Cross contamination of incompatible fluids can cause a rubber seal to swell and disintegrate.

DISTORTED SEAL CASE

Potential Causes/Courses of Action:

- Make sure the seal O.D. is not too large for the housing bore. The bore diameter should not vary from the recommended size of the seal that is used.
- Make sure the bore is not excessively out-of-round.
- Make sure that proper installation tools and methods were used.

DAMAGED SEAL GARTER SPRING

Potential Causes/Courses of Action:

- Make sure that proper installation tools and methods were used.
- Look for excessive spreading of the sealing lip during installation. It can damage the spring.

SEALING LIP CONTACT ON SHAFT IS TOO LIGHT

Potential Causes/Courses of Action:

- Make sure the seal is the proper fit. If the mounting cones and sleeves have an O.D. of more than 1/32" greater than the shaft, the sealing lip may be overstretched.
- Make sure there is no excessive wear at the point of contact.
- Make sure the shaft is not too soft by reviewing the minimum hardness specifications for existing operation conditions.
- Make sure that proper installation tools and methods were used.

SEAL COCKED IN THE HOUSING

Potential Causes/Courses of Action:

- Make sure that proper installation tools and methods were used.
- Make sure that the seal O.D. is not too large for the bore.
- Check the bore for burrs, scales or chips that may prevent proper sealing.

EXCESSIVE SHAFT WEAR (OFTEN CAUSED BY ABRASIVE DIRT OR GRIT)

Potential Causes/Courses of Action:

- Check exterior dust conditions, which may be too severe for the type of seal being used.
- Ensure that sufficient lubrication is used and that there are no coarse contaminants in the grease.
- Verify shaft hardness limits. The shaft may be too soft.
- Make sure the seal is the proper size.

SCRATCHED OR GOUGED SHAFT

Potential Causes/Courses of Action:

- Properly clean the shaft before installing the seal. Shafts must be thoroughly cleaned and free from paint, shellac or cement. Debris where the lip contacts the shaft can prevent proper sealing.

SPIRAL MACHINE GROOVES ON SHAFT

Potential Causes/Courses of Action:

- Take note of spiral grooves on the shaft, as they may result in lubricant leakage.

LEAKAGE AROUND SEAL O.D.

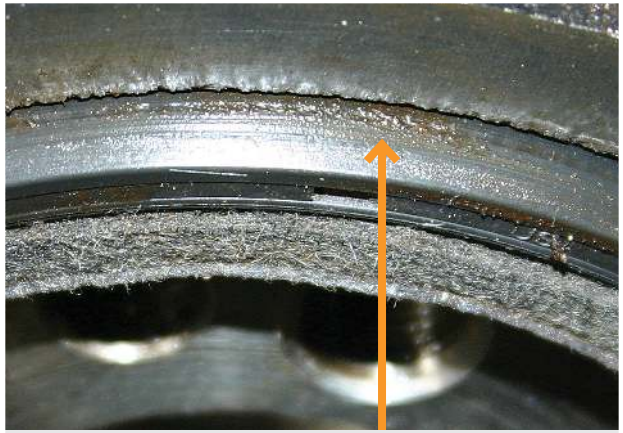
Potential Causes/Courses of Action:

- Check bore surface finish and size. If the bore is only slightly out-of-round (0.001”), use special cement on the O.D. seal surface to offset this condition.
- Check the seal for signs of damage to the O.D. Look for dings, large and deep scrapes or a skewed O.D. These may indicate improper handling.
- Check the bore for scrapes, pits and other physical damage.

EXCESSIVE PRELUBRICATION

Potential Causes/Courses of Action:

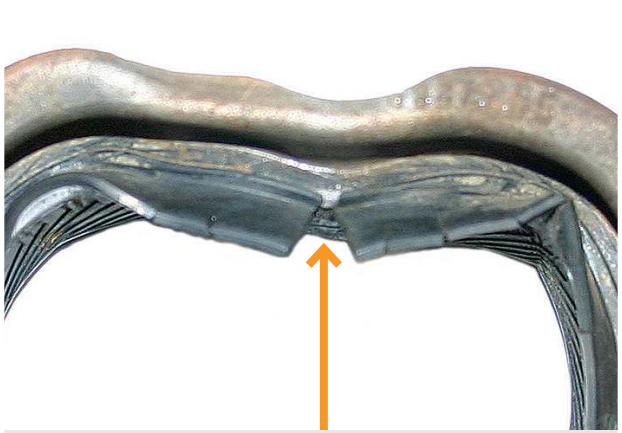
- Excessive prelubrication is not leakage. When too much prelubricant is used, the excess melts and runs out. Verify this possibility before removing a seal that appears to be leaking.



SEAL FALLING OUT OF THE BORE

Potential Causes/Courses of Action:

- Check the sizes of the bore and the seal. The bore may be too big or the seal may be too small.



DRY RUNNING

Potential Causes/Courses of Action:

- Check the location of the bearing and any flanges that may keep lubrication away from the seal.

⚠WARNING ***Failure to observe the following warning could create a risk of serious injury.***

Proper maintenance and handling procedures are critical. Always follow installation instructions and maintain proper lubrication.

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