Description:
This service information bulletin provides bushing inspection criteria as outlined by Tenneco Automotive. These guidelines will assist customers in identifying a bushing that is worn out or requires replacement versus a bushing that displays visual imperfections but is still fully functional.

A rubber bushing is designed to isolate road noise, vibration and harshness while at the same time control radial, torsional, conical and axial movement at the attachment points. A worn or damaged bushing will not function properly and should be replaced to maintain optimal performance.

Customers should inspect bushings every 6 months or 50,000 miles (whichever service interval occurs first). Coaches operating in severe service should inspect more often than the above service interval. Upon inspection, if a bushing exhibits any of the characteristics that Tenneco has identified as a failed bushing, all the bushings for that rod and the same rod on the opposite side of the vehicle should be replaced.

**SIGNS OF A FAILED BUSHING REQUIRING REPLACEMENT**
The conditions listed below outline bushing failure and require replacement:

1. A visual gap between either the inner or the outer metal and the rubber component while the vehicle is at rest (Figure 1).

![Figure 1. Requires replacement.](image)

2. If there are large open splits in the rubber or if pieces of rubber are missing or dislodged from the bushing (Figure 2).

![Figure 2. Requires replacement.](image)
3. If there is significant axial misalignment between the inner metal and the torque rod eye or visual contact marks on the metal components (Figure 3).

**NOTE**

*With an acceptable torque rod, the rod eye should be centered to the inner metal within 3/16 inch.*

*If the rod eye is offset 1/4 inch or more to one side, the bushing is likely “walking out” and should be replaced.*

![Figure 3. Requires replacement.](image)

4. If there is excessive play or movement in the bushings or physical play in the radial direction when a force is applied by hand or with a short pry bar, the bushing is probably worn and should be replaced.

**NOTE**

*Most torque rod bushings have a radial rate between 100,000 and 400,000 pounds / inch. This means that a good torque rod bushing will require a force of at least 520 pounds to move the rod eye radially with respect to the inner metal as little as 1/16 inch.*
SIGNS OF A FUNCTIONAL BUSHING WITH NONPERFORMANCE VISUAL IMPERFECTIONS

There are 4 common conditions listed below that occur occasionally but do not affect bushing performance and are not a need for replacement.

1. Ozone or oxygen cracking on the exposed rubber at the ends of a bushing (Figure 4).

   ![Figure 4. Acceptable.]

   **NOTE**

   This is typically represented by small cracks or splits on the exposed rubber extending beyond the compressed rubber sandwiched between the inner and outer metals. The cracks are caused by ozone generally present in the atmosphere. Testing has shown that ozone cracking does not effect bushing life because these cracks will not propagate into the compressed rubber. This condition can be found in varying degrees on nearly all rubber bushings as they age, whether used or unused.

2. De-lamination of excess adhesive on post bonded bushings (Figure 5).

   ![Figure 5. Acceptable.]

   **NOTE**

   Some bushings are assembled using adhesive to chemically bond the elastomer to the metal components for increased axial retention. During assembly, some of the adhesive can be squeezed out from between the mating surfaces and cures as a thin layer or bead on the side of the bushing. Over time, this nonfunctional adhesive can de-laminate, crack and peel. Since the adhesive is black, the same color as the elastomer, it can be mistaken as rubber failure. The excess adhesive can be removed and identified by flexing it. If it is hard and brittle, it is not rubber and the bushing does not need to be replaced.
3. Break in wear of cartridge bushings with curled outer tubes (Figure 6).

NOTE

A bushing with a curled outer tube will sometimes generate fine black "crumbs" of rubber similar to that of the shreds of a pencil eraser. The outer tube of a cartridge bushing is sometimes formed to curl around the edge of the elastomer to encapsulate the rubber for increased confinement. This additional confinement increases the bushing's radial load capacity while maintaining a relatively low torsional rate, providing significantly increased durability. As the bushing flexes and articulates, the metal can rub against the rubber causing light abrasion wear. This is normal and will not affect bushing performance in any way. No action is required for this condition.

Figure 6. Acceptable.

4. Slight misalignment of the inner and outer metal components (Figure 7).

NOTE

A normal elastomeric bushing is under very high compression, which is required to obtain maximum durability and performance. This high compression can cause spring back due to drag as a result of internal stress when the components are inserted into one another. A normal bushing will have its inner and outer metal aligned within 3/16th of an inch. This should not be mistaken for bushing "walkout". If the misalignment is less than 3/16th of an inch and there are no signs of contact marks on the rod eyes with the mating brackets or connecting points, there is no need for replacement.

Figure 7. Acceptable.
**BUSHING MAINTENANCE**

**DO:**
- Torque up new bushings at curb height.
- Remove rust and scale.
- Use a calibrated torque wrench and tighten to the OEM torque spec.
- Press outer metal to install.
- Press new bushing to original specified position.
- Note original bar pin angle, and set new bushing to same angle.

**DON'T:**
- Lubricate with petroleum products.
- Over-torque bolts.
- Heat during installation.
- Cut or damage rubber.
- Distort curled outer metals.
- Damage metal edges.

*Procedure complete.*