PEDDERS TECHSTOP

Issue 18/2017

HYDRAULIC SUSPENSION BUSHES

SHOCK ABSORBER, SUSPENSION, BRAKES, TOWBARS
AND WHEEL ALIGNMENT SPECIALISTS

Hydraulic Suspension Bushes

Over the years of steering and suspension development, one of the areas that has had major advancement is the suspension mounting bush.

In the design of compliance type bushes, there is a conflict between high frequency noise isolation and high damping at low frequency. With fluid-filled bushes: it is possible to achieve both at the same time low dynamic stiffness for good Noise Vibration Harshness (NVH) performance. The fluid-filled bushes have replaced the standard rubber variants used in the previous vehicles. The advantages in terms of comfort and road noise isolation are substantial. The system creates a lower spring rate, reducing road noise while also offering high damping characteristics to absorb shock and vibrations on bumps.

What are the Advantages of Hydraulic Suspension Bushes?

While designs differ slightly, all hydraulic bushes rely on the same principle and comprise an inner and an outer sleeve separated by a void filled with hydraulic damping fluid. The bush is firm due to the incompressibility of the fluid, yet the NVH properties of the fluid dramatically reduces road noise being transmitted.

The fluid, being glycol based, is injected inside the bushes as a buffer material. It creates a large damping force and optimizes the dynamic spring constant.

This concept reduces unpleasant vibrations felt when driving on rough road surfaces or going over road surfaces of different levels.

What are the disadvantages of Hydraulic Suspension Bushes?

Whilst these new generation bushes are highly effective when in a serviceable condition, they don't appear to have a long service life, as the fluid tends to escape. When this situation occurs, the bushes compliance tends to increase thus allowing increased movement. This may cause unstable steering and braking, with the car pulling because of an ever changing wheel base.

How can a Hydraulic Suspension Bush be identified?

Usually the construction will give you a clue if it is a Hydraulic Bush, as the outer casing will be rolled over and crimped. This is done to create a seal to stop the fluid from escaping. (see Diagram A over page.)

How do you know they require replacement?

When checking the suspension, if a fluid type of bush has failed, there is a big chance you may not notice any witness marks, like residue of the fluid. We are all aware that mineral based oils are the enemy of rubber so the fluid used is of a glycol base and as such is water soluble, and will wash off when the vehicle travels through water (wet roads when it rains). When the fluid does exit the bush, it leaves behind a cavity completely devoid of fluid and this will allow for increased movement of the component. The checking procedure is no different for fluid filled bushes to that of non-fluid filled bushes, if there is excessive travel in the components, then its time to change the bush.

Is there a need to replace the Hydraulic Suspension Bushes with O.E.?

The quick answer is no, but prior to fitting new bushes to the suspension, please make careful consideration regarding the type of material the bush is constructed from. Have a look at the function of the suspension arms and assess whether or not, by fitting an aftermarket bush, it will restrict movement and place extra load on other components as well as creating any NVH. Rubber constructed bushes may be the ideal replacement, whether hydraulic or not.

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Holden Commodore Radius Arm Bush

Whilst the bush is in a serviceable condition, the amount of movement is kept to a minimum, but as soon as the fluid escapes (the yellow in Diagram A) it leaves behind a void.

As this chamber no longer has fluid in it, this will allow for increased travel of the radius arm and the lower control arm, which will in turn affect the wheel base.

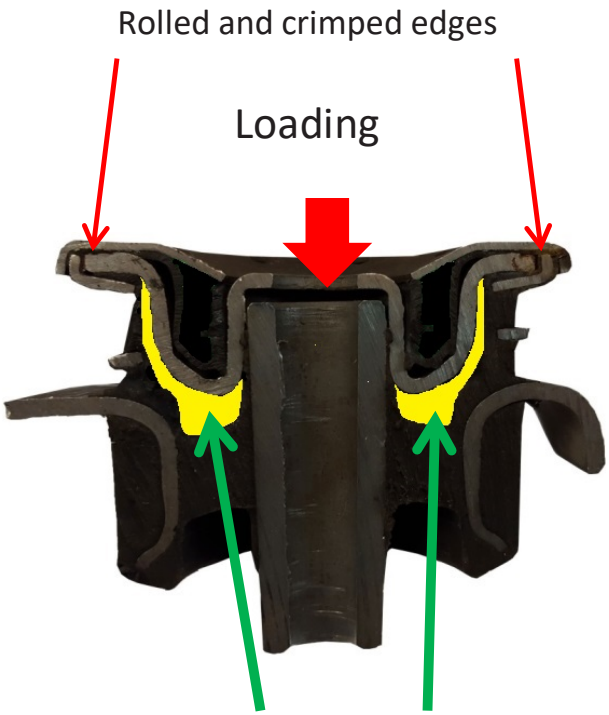

Diagram A

Ford Falcon Lower Front Arm Bush

As the bush compresses and releases under normal road operations, the fluid is allowed to transfer from one side to the other through a series of galleries (refer to Diagram B). The reason for this is to keep a constant even tension around the full circumference of the bush. If the fluid escapes the empty cavities allow for increased compression and greater movement of the arm.

Diagram B