Asia Pacific Region Only

TECHNICAL BULLETIN

SHOCK ABSORBER INSPECTION

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INTRODUCTION

Shock absorbers dampen suspension movement. Without them, suspensions will overreact to movement and vehicles could literally bounce off the road, particularly around undulating corners. They control movement and make the ride more comfortable for the driver and safer for cargo. Excessive suspension movement also has a detrimental effect on our road surfaces, which is why firmer shocks are often required to meet 'Road Friendly' certification.

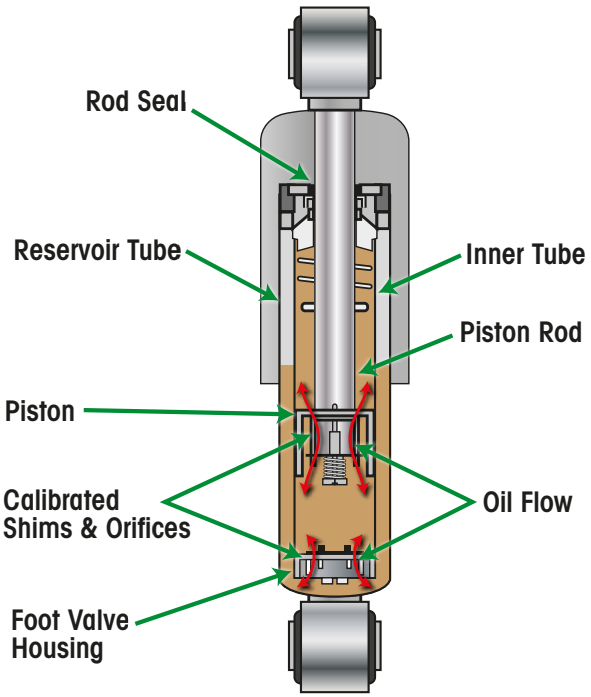

Figure 1: Shock Absorber Components

Shock absorbers work by converting kinetic energy from body movement and wheel vibrations into heat. Movement of oil within a shock absorber is restricted by calibrated shims and valves, which are built into the foot valve and piston. (Refer Figure 1) The resultant heat is absorbed by the oil and released through the shock absorber body, which is cooled by the passing air.

Shock Absorber Force/Velocity Curve

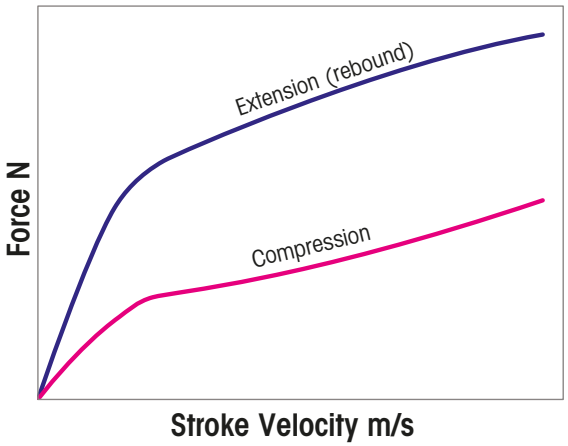

Figure 2: Typical Shock Absorber Force Curve

All current shock absorbers are double acting. Most of the first hydraulic shock absorbers were single acting, meaning there was no restriction on compression and only offered resistance on rebound. However, they are now all double acting. If you look at the chart in Figure 2 of the dynamic shock force versus velocity, you'll see that while the extension and compression curves are different, the shock still dampens in both directions.

Shock absorbers do not determine ride height or carry weight. Their primary function is to dampen suspension movement and aid in controlling vehicular movement.

On air spring systems, shock absorbers also play the secondary role of limiting air spring extension, which prevents the air spring from being over extended and pulled apart. Some severe service application use shock straps, or Auxiliary Rebound Limiter (ARL) straps or chains to limit axle movement during rebound. ARL provide additional bolstering to prevent air springs from overextending in service and support the suspension while a trailer is lifted.

For more details regarding trailer suspension inspection and maintenance, including shock replacement, shock strap or ARL assessment refer to trailer suspension manual 97117-161.

GUIDE TO INSPECTING SHOCK ABSORBERS

Like most other suspension components, a program of regular scheduled inspections and preventative maintenance for shock absorbers, will avoid unscheduled downtime and reduce overall maintenance costs.

OVERVIEW OF SHOCK MISTING & LEAKING

Misting shock absorbers are often misdiagnosed as failures. Shock absorber rod seals rely on a thin film of oil to keep the seal lubricated and in good condition. As the shock absorber extends, some of the hot oil coating the piston rod evaporates before condensing in the cooler outside air onto the shock absorber body.

This forms an oily film on the outside of the shock absorber body. Over time, this film will collect dust and grime, which will often coat the entire body of the shock absorber. Misting is a perfectly normal and necessary function of the shock absorber. The fluid that disperses through the seal area helps to lubricate and prolong the life of the seal.

Mechanics may find it difficult to differentiate between a misting shock absorber and leaking shock absorber that needs replacing. The examples shown below can be helpful in determining shock absorber serviceability.

Truck and trailer shock absorbers have reservoirs that may contain up to a litre of oil. A typical heavy vehicle shock absorber would have to lose more than 10% of its oil volume before damping performance will be affected. Shock absorber upper seals may leak because of extreme wear, contamination, or a defect. A leaking shock absorber will show clear signs of fluid leaking in streams from the upper seal, which may drip from the shock absorber.

If you are unsure about the condition, then raise the chassis to fully extend the shock absorber. The entire shock absorber body may then be inspected without removing it from the suspension.

SHOCK ABSORBER MISTING & LEAKING EXAMPLES

Light Misting

Light oil film on upper shock body

Medium Misting

Medium oil film on upper half of the shock body

Heavy Misting

Heavy oil film extending to the bottom of the shock body

No action required. Do not remove shock absorber.

Leaking

Oil leak path lines visible on the shock body

Action required. Replace shock absorber.

OTHER INSPECTION POINTS

In addition to looking for oil leaks, there are other shock absorber checks that must be carried out regularly.

- Check the mount bolts for tightness and security.
- Check for broken upper or lower mounts.
- Check the mounting bushes for wear or deterioration.
- Check for broken or damaged dust shields.
- Check the shock body to see if it is severely dented.

A loose mounting bolt will usually leave witness marks around the mounting bolt washer from the relative movement between the parts.

Fitting the wrong shock absorber, an incorrect ride height setting, or adverse operating conditions without jounce limiting will often cause a broken mount or even internal shock damage.

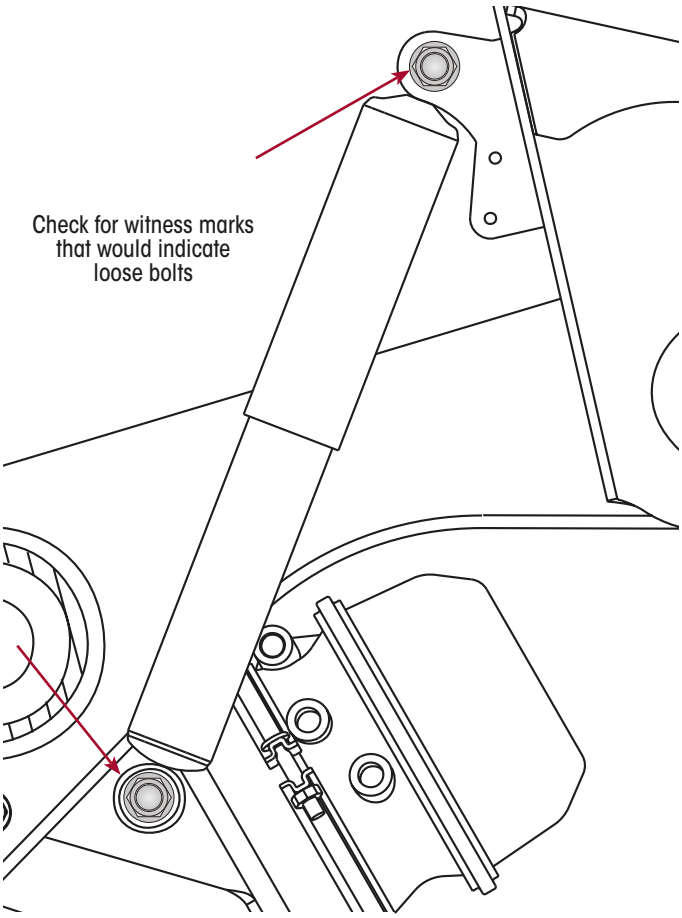

Figure 3: Check for Movement Witness Marks

NOTICE: Wipe any built up oil and dust from the shock absorber body after inspection. This will allow you to complete a clearer assessment of shock absorber condition at the next inspection.

HEAT TESTING

Shock absorbers function at temperatures ranging from ambient to 175 degrees C. A shock absorber's role is to dampen suspension movement by transforming kinetic energy into heat and then dissipating it via the oil. As a result, the shock absorber should be at least slightly warm to touch after normal use, depending on driving conditions.

If ride deterioration is experienced and there is suspicion that a shock absorber has failed internally, which is visually undetectable, perform the following shock absorber heat test:

⚠ **CAUTION**: Shock absorbers can reach temperatures sufficient to burn your skin after being driven over corrugated roads. Therefore, it is usually best to check the shock temperature with an infrared thermometer. However, with a little care the temperature can be checked quite simply with the back of your hand. Do not touch the shock absorber if there appears to be excessive heat with your hand near it.

1. Operate the vehicle at moderate speeds for at least fifteen minutes.
2. Within a few minutes of driving the vehicle, check the temperature of the metal frame near the shock absorbers to establish a reference ambient temperature.
3. Check the temperature of each shock absorber on the body below the dust cover or tube. Temperature checks must be carried out quickly, within a few minutes of driving the vehicle.
4. All shock absorbers should be warmer than the vehicle frame. Any shock absorber that is noticeably cooler than the corresponding one on the other side of the axle may have failed. A differing temperature on any axle warrants removal and further examination of the cooler shock absorber.
5. To inspect for an internal failure, remove and shake the suspected shock absorber. Listen for the sound of metal parts rattling inside. Rattling of metal parts can indicate that the shock absorber has an internal failure and requires replacement. A shock that presents no resistance when stroked will have lost all oil or have some other mechanical issue.

⚠ **CAUTION**: Do not lift the truck or trailer without the shock absorbers in place. If shock absorbers are not in place, overextension of the air springs will occur. Damage may occur to the overextended air springs.

CHECKING SHOCK ABSORBERS BY HAND

Removing shock absorbers to check their movement by hand is not a generally recommended procedure.

Heavy vehicle shock absorbers are difficult to check accurately by hand. Different shock absorbers have differing rates of movement depending on design. It is also not possible to move a heavy vehicle shock absorber by hand with the same force that is exerted on it when fitted to the vehicle. This means that oil flow around the shock piston will be different when checked by hand to that when fitted to the vehicle.

If the shock has been removed from the vehicle, it should be possible to extend and compress the shock to check for resistance to movement. A shock absorber that has leaked sufficient fluid will have little to no resistance or have inconsistent movement as it is compressed and extended.

All Hendrickson shock absorbers are double acting. They will commonly compress a little easier than on rebound. However, the damping rates will depend on the manufacturer and intended suspension application.

Fastener Tightening

Shock bolts must only be tightened and torqued at the specified suspension ride height. Trailer torque procedures and specifications are detailed in Hendrickson Trailer Torque Specification Manual 97117-251. For truck suspensions, refer to the manual for that specific suspension, which are available on the Hendrickson website.

NOTES

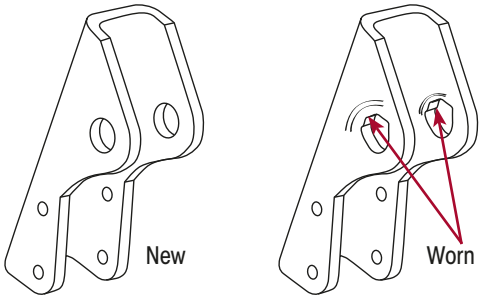

Figure 4: Inspecting Shock Bushes & Mounts

Damage to mounting holes by a loose shock absorber bolt must be replaced or repaired. Otherwise, it may cause the new shock absorber to also come loose. Refer Figure 4.

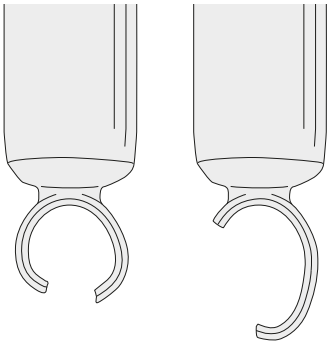

Figure 5: Checking for Damaged Mountings

Incorrect ride height, fitting the wrong shock absorber and deteriorated shocker bushes can cause damage to shock absorber mountings. Refer Figure 5.

Some applications require installation of shock straps or separate Auxiliary Rebound Limiters (ARL). For details regarding maintenance of trailer suspensions, replacing shock absorbers, inspecting shock straps or ARL refer to trailer suspension maintenance manual 97117-161.

Revisions Table

DATE	REV	PAGE	DESCRIPTION
Mar-2024	D	All	Expand descriptions, add shock operation and notes.

Actual product performance may vary depending upon vehicle configuration, operation, service and other factors.
All applications must comply with applicable Hendrickson specifications and must be approved by the respective vehicle manufacturer with the vehicle in its original, as-built configuration.
Contact Hendrickson for additional details regarding specifications, applications, capacities, and operation, service and maintenance instructions.

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