



TECHNICAL GUIDE

Cab Suspension (Shock Absorber, Air Bellow, Leveling Valve): Faults & Repair

How to diagnose truck cab suspension faults, replace the shock absorber, air bellow and leveling valve safely, and keep the cab level and comfortable.

When the steering wheel keeps shaking all day, the cab tilts to one side on a bend and takes too long to settle, or the cab sits visibly sunk at the front when you climb in each morning, the problem isn't the seat cushion — it's the cab suspension. The system that protects the driver's back and neck and keeps the bodywork from cracking usually goes unmentioned until it fails, and when it does, it takes away both comfort and safety at once. The shock absorber that damps road vibration, the bellow that holds the cab aloft, and the leveling valve that fixes ride height all work as a team — when one wears out, the load shifts onto the others and the failure chain speeds up. This guide explains, from a foreman's and service technician's perspective, what the cab suspension does, how it fails, the correct diagnostic sequence, safe removal and installation discipline, and the maintenance habits that extend its service life.

This document was prepared by the VADEN technical team based on heavy commercial vehicle cab suspension service practice and OE manufacturer documentation. The values given here are general reference ranges; for exact data such as tightening torque, cab reference height, and working air pressure, the current OE service manual matching the vehicle's engine/chassis code is authoritative. Last updated: September 2026. Component sizing is based on the relevant international standard family (ISO/EN/DIN/SAE) and the manufacturer OE specification.

What Is Cab Suspension? Function and Working Principle

Cab suspension is the damping system that mechanically isolates a heavy commercial vehicle's driver cab from the chassis, absorbing road shock, engine vibration, and body oscillation before it reaches the driver; it consists of the cab shock absorber, air bellow (air spring) or steel spring, leveling valve, connection bushings/mounts, and a stabilizer. In air-suspended cabs, the leveling valve keeps cab height constant regardless of load or road condition.

Cab suspension solves two different problems at once. The first is **isolation**: preventing high-frequency vibration from the chassis, axles, and engine from reaching the cab floor. The second is **damping**: stopping the large-amplitude oscillation created when entering and leaving a pothole within a few cycles. These are handled by different components — isolation comes from flexibility (bellow or spring), damping comes from the shock absorber. A cab that "keeps bouncing after a bump" is a shock absorber issue; one that "slams hard on every bump" is a bellow/bushing issue. Confusing the two leads to replacing the wrong part.

The working principle rests on mounting the cab to the chassis through four flexible connections (in some architectures, two front pivots plus two rear points). The cab is mounted so it can rotate about a forward pivot axis (the front cab tilt hinge); at the rear, the suspension elements hold the cab suspended in the air. When a road input arrives, the cab moves up and down at the rear points; the bellow flexes to soften this motion, and the shock absorber converts the motion's energy into heat to damp it. The stabilizer (anti-roll bar) limits the cab from leaning to one side in a bend, sharing the load between the two sides.

In air-suspended cabs, the system's brain is the **leveling valve**. As cab weight, fuel level, or road grade changes, the amount of air in the bellows must change so the cab stays at the same reference height. The leveling valve continuously measures the cab's actual height through an arm and linkage connected to the chassis; if the cab drops it feeds air, if it rises it vents excess air

to atmosphere. This continuous correction is the mechanism that keeps the cab level and at consistent height.

Cab suspension architectures

Cab suspension architecture in heavy commercial vehicles varies by vehicle class and comfort level. Two layouts are most common. The first is **front pivot + rear suspension**: the cab is mounted at the front through two rubber/silent-block pivots and suspended at the rear by two shock absorbers and two bellows (or steel springs). The second is **full (four-point) suspension**: flexible elements are present at all four corners, front and rear, offering the highest comfort and preferred on long-haul tractors. In the basic light-duty segment, the cab sits on fixed rubber mounts at all four corners with no separate shock absorber/bellow. The correct spare part selection depends on this architecture; even within the same brand, different cab types use different suspension hardware.

Air suspension or steel spring?

The flexible element of a cab suspension comes in two types. In **air-suspended** systems, flexibility is provided by the bellow, height is automatically adjusted by the leveling valve, and comfort does not degrade with load — the standard for long-haul and premium cabs. In **steel-spring (coil/parabolic) suspended** systems, flexibility comes from the spring and damping from the shock absorber; there is no leveling valve, and height depends on the spring's characteristics. Air suspension's biggest advantage is constant height and adjustability; its biggest weakness is vulnerability to air leaks and leveling-valve faults. The presence of a bellow and a leveling valve tells you which type the vehicle has.

OE components on the air suspension side

The bellow, leveling valve, and air control components of cab air suspension in heavy commercial vehicles are largely built around Wabco and Knorr-Bremse OE supplier system families. In the field, cab suspension service is most commonly seen on the **Mercedes-Benz Actros**, **Volvo FH** and **FM**, Scania R and S series, DAF **XF** and **CF**, MAN **TGX** and **TGS**, and Renault T. These names are given only as **application examples**; each vehicle's cab type, comfort package, and model year require different bellow geometry, different shock absorber length, and a different leveling valve arm. The correct part is determined by the vehicle's **chassis/cab code and OE number**, not by brand name.

Components and supporting elements

- **Cab shock absorber**: the hydraulic/gas-pressurized element that damps cab oscillation by converting its energy into heat.
- **Air bellow / air spring**: the reinforced rubber bellow that holds the cab in the air, flexing to soften road shock.
- **Leveling valve (VADEN category 1059)**: the automatic height-control valve that measures cab height and feeds/vents air to the bellow.
- **Connection bushings and rubber mounts**: the vibration-isolating elements at the shock absorber and pivot ends; the most frequently renewed wear items.

- **Stabilizer (anti-roll bar) and link rods:** the rod system that limits cab lean in a bend, connecting the two sides.
- **Front tilt hinge and pins:** the pivot axis that allows the cab to tilt forward, on front-pivot + rear-suspension architectures.
- **Air lines and fittings:** the plastic/nylon air lines and quick-connect fittings between the leveling valve and the bellow.
- **Repair kit (VADEN category 1057):** a set containing bushings, mounts, washers, and sealing elements that renews the suspension mounting points.

Component	Function	Characteristic fault	Service note
Cab shock absorber	Damps oscillation (converts energy to heat)	Oil leak, loss of damping, noise	Renewed as a pair, not singly
Air bellow / spring	Holds the cab suspended, softens shock	Air leak, rubber cracking, collapse	Most common cause of a cab sunk in the morning
Leveling valve (1059)	Keeps cab height constant	Sticking, continuous feed/vent	Arm adjustment is critical; set to reference height
Bushing / rubber mount	Isolates vibration, carries the pivot	Hardening, breakup, play (clunking noise)	Renewed as a set with the repair kit (1057)
Stabilizer / linkage	Limits lateral lean	Play at the rod end, noise from the link	Directly affects cornering behavior

Cab suspension is a safety system: a worn shock absorber and a broken-down bushing degrade not just comfort but the cab's crash and rollover behavior as well. Do not select the part by "vehicle model" alone — verify it against cab type, comfort package, model year, and, where possible, the OE number on the old part. A shock absorber of the wrong length or a bellow of a different geometry may "seem to fit" on installation but will still spoil cab height and suspension stroke.

How is a cab suspension fault recognized?

Cab suspension faults fall into three categories: loss of damping (shock absorber), height/attitude fault (bellow and leveling valve), and play/noise (bushing, mount, stabilizer). The first is read from vehicle behavior while moving, the second from the cab's attitude while parked, and the third from noises. The table below matches field symptoms with likely causes and verification methods.

Symptom	Likely Cause	Check / Verification
Cab keeps bouncing after a bump, settles slowly	Shock absorber damping exhausted, gas/oil loss	Push-and-release test on the cab corner; check shock absorber body for oil trace
Cab is sunk to one side or at the front on getting in each morning	Leak in the air bellow or air escaping from the leveling valve	Fill the system and leave overnight; soap-bubble leak test on the bellow and fittings

Symptom	Likely Cause	Check / Verification
Cab height is unequal side to side or front to back	Leveling valve maladjusted, arm/linkage broken, one bellow collapsed	Measure height from reference points; check leveling valve arm position
Cab keeps rising/falling, air is being consumed for no reason	Leveling valve stuck, or arm linkage out of adjustment	Listen at the valve outlet line; check airflow with the arm in neutral
Hard jolt and a metallic "clunk" on every bump	Hardened/broken-down bushing, snapped mount, empty bellow	Lift the cab and inspect bushing/mount by eye and by hand for play
Cab leans excessively in a bend, slow to settle	Play in the stabilizer linkage, weak shock absorber	Move stabilizer rod ends by hand; shock absorber test
Oil trace from around the shock absorber, body oily	Shock absorber seal blown, internal pressure lost	Wipe dry and recheck after a short drive
Cab dives excessively forward/backward under braking or takeoff	Shock absorber worn out or front pivot mount broken down	Hard-braking test; evaluate front pivot and rear shock absorber together

Shock absorber, bellow, or leveling valve?

The distinction comes from behavior. If the cab **keeps bouncing** while the vehicle is moving, the shock absorber is at fault — it can no longer damp the energy. If the cab **sits sunk or tilted** while parked and settles further overnight, the fault is on the air-holding side — the bellow or the leveling valve. If height **cannot be corrected or keeps changing**, the leveling valve is the prime suspect. If there's noise and play, suspect bushings and mounts. Replacing parts without separating these four categories is the most expensive diagnostic mistake.

Finding the air leak on-site

The fastest method for an air-leak fault is to fill the system to full pressure and apply soap solution to the bellow, fittings, and leveling valve connections; the leak point reveals itself by bubbling. On a cab that sinks overnight, the leak may be slow; in that case fill the system and observe over several hours, noting which corner sinks the most. To separate whether the leak is in the bellow or on the leveling valve's exhaust side, temporarily block the valve's inlet line and see whether the bellow holds air.

Is the leveling valve working correctly?

The leveling valve test is performed by moving the arm. With the engine running and air pressure available, lifting the leveling valve arm by hand should feed air to the bellow (cab rises), pushing it down should vent air (cab lowers), and releasing it to neutral should stop the flow. If the valve keeps feeding or venting air while the arm is in neutral, the valve is internally faulty or the arm/linkage adjustment has shifted. Do not force the arm during testing — the linkage's plastic parts are fragile.

How is cab suspension replaced? Step by step

Cab suspension work holds a cab in the air with a person potentially working underneath; the most critical safety step is therefore securing the cab independently and safely. Before removing a suspension element (shock absorber/bellow), the cab must be additionally supported and locked with a mechanical stand, safety bar, or crane **WITHOUT** relying on the hydraulic tilt system or air pressure. When air is released the cab can drop suddenly. Personal protective equipment is mandatory: impact-resistant glasses, gloves, steel-toe boots. Never work under an unsupported cab.

- 1 Secure the vehicle:** Park on flat, firm ground, apply the parking brake, chock the wheels, and stop the engine. If the cab is to be tilted, first secure any loose items inside the cab and check the bonnet/panel latches.
- 2 Support and SECURE the cab:** Carry the load off the element being replaced by supporting the cab independently with a mechanical stand, safety arm, or crane. This step cannot be skipped; if the suspension element is removed while only the hydraulic/air system is holding the cab, there is a life-threatening risk.
- 3 Release air pressure:** On air-suspended cabs, release the system's air per the manufacturer's procedure. Do not disconnect the bellow or leveling valve line while still under pressure — hose and fittings can fly off when a pressurized line is opened.
- 4 Mark and disconnect the air lines and leveling valve:** If replacing the leveling valve, mark the position of the arm linkage and the location of the air lines (inlet/bellow/exhaust). Clean the fittings before removal and cap the open ends — dirt entering the air system will damage the valve.
- 5 Remove the old shock absorber / bellow:** Loosen the shock absorber's upper and lower mounting bolts and the bellow's top plate and lower seat bolts. Apply penetrating fluid to rusted fasteners; do not force them and crack the cab mounting lug. Inspect the bushings and mounts of the removed part as well.
- 6 Inspect mounting surfaces and bushings:** Clean and inspect the shock absorber/bellow seats, bushing housings, and pivot pins. Renew hardened, cracked, or loose bushings together with the repair kit (1057); fitting a new shock absorber to old, broken-down bushings is wasted money.
- 7 Fit the new part:** Compare the new shock absorber/bellow with the old one for length, connection type, and geometry before fitting. Make sure the bellow seats correctly on its upper and lower faces with no cable/hose pinching. Start bolts by hand, without cross-threading.
- 8 Adjust the leveling valve arm (cab reference height):** If the leveling valve was replaced, bring the cab to the manufacturer's specified reference height and adjust the valve arm to neutral (no flow) at that position. Reference height is an OE value; adjusting the arm by eye leaves the cab permanently too low or too high.

- 9 Torque:** Tighten all mounting bolts to the manufacturer's specified value with a torque wrench. Shock absorber upper/lower bolts, bellow plate bolts, and leveling valve body bolts have narrow tolerances; under-torquing causes play and noise, over-torquing crushes the bushing.
- 10 Fill with air and leak-test:** Fill the system to full pressure and apply soap solution to the bellow and all fittings to check for leaks. Measure that cab height is equal side to side and front to back. Fine-tune the leveling valve arm adjustment if needed.
- 11 Road test and final check:** On a short road test, evaluate damping over bumps, lean behavior in bends, and any noise. On return, recheck all bolt torques and cab height — some play only appears after the first load cycle.

Common Mistakes to Avoid

Working under a cab relying only on the hydraulic tilt system or the air bellow is the most fatal mistake in cab suspension service. Hydraulic locks can release, hoses can burst, air pressure can drop. The moment a suspension element is removed, the cab must be secured with independent mechanical support. This is not a comfort rule — it is a life-safety rule.

Replacing the shock absorber or bellow on only one side leaves the cab unbalanced. When the two sides are of different ages, damping and height differ between them; the cab behaves asymmetrically in bends, and the new part ends up carrying extra load from the worn side. Shock absorbers and bellows are always renewed in pairs, per axle.

- **Skipping the bushings:** Fitting a new shock absorber to old, broken-down bushings and mounts does not fix noise or play; bushings must be renewed together with the repair kit (1057).
- **Adjusting the leveling valve arm by eye:** Cab reference height is an OE value; a wrongly adjusted arm leaves the cab permanently too low or too high and spoils bellow and shock absorber stroke.
- **Letting dirt into the air system:** If fittings are not cleaned before removal, dirt enters the leveling valve's sensitive surfaces and causes it to stick. Open ends must always be capped.
- **Disconnecting a line without releasing pressure:** Fittings and hoses can fly off when a pressurized bellow or air line is opened; always release system pressure before disconnecting.
- **Forcing a rusted bolt:** Using brute force instead of penetrating fluid and the correct wrench can break the cab mounting lug or strip the bolt thread — an expensive repair.
- **Forcing a part of the wrong length/geometry:** A shock absorber or bellow for a different cab type may appear to seat during installation but still spoils cab height and stroke.
- **Using "feel" instead of a torque wrench:** Suspension bolts work under vibration; under-torquing loosens and causes noise, over-torquing crushes the bushing.
- **Skipping the leak test:** If a soap-bubble check isn't done after installation, a slow leak only reveals itself the next morning with a sunken cab.
- **Neglecting the stabilizer linkage:** If worn stabilizer rod ends go unnoticed while renewing the shock absorber, the lean problem in bends will continue.

Technical Values and Checkpoints

The values below are general reference ranges commonly encountered in heavy commercial vehicle cab suspensions. Cab type, comfort package, and model year change these ranges; always check the vehicle manufacturer's current service manual for exact data.

Cab suspension technical values (general reference)

Parameter	Typical range (general reference)	Note
Cab suspension working air pressure	On the order of the vehicle's air system pressure, typically 6–10 bar supply	Actual bellow pressure is set by the leveling valve according to load
Cab reference (neutral) height	Application-specific, determined by OE	Leveling valve arm is adjusted to neutral at this height
Side-to-side / front-to-back height difference	As low as possible (a few millimeters)	Beyond this, check for bellow collapse or valve maladjustment
Shock absorber damping test (press-release)	Should settle within 1–2 oscillations	Continuous bouncing means the shock absorber is worn out
Overnight height loss (air system)	Should be negligible	Noticeable sinking = bellow/valve leak
Bushing / mount play	No play detectable by hand	Clunking and play = time for a repair kit (1057)

Connection torques and checkpoints

The most useful concrete data when fitting a part are connection torques; however, torque values on cab suspension vary noticeably with cab type and bolt size. The values below are general reference bands seen in heavy commercial applications and are not binding for any specific vehicle. The exact value comes from the OE service manual matching the vehicle's chassis/cab code.

Cab suspension connection torques (general reference)

Connection point	Typical torque band (general reference)	Application note
Cab shock absorber upper/lower mounting bolt	Varies with bolt size, check OE	Equal torque both sides; torque wrench mandatory
Air bellow top plate / lower seat bolt	General reference band, confirm with OE	Over-tightening stresses the bellow plate
Leveling valve body and arm connection	Low torque, OE value is authoritative	Arm adjustment is fixed at neutral before torquing
Stabilizer / link rod end	Application-specific	If there's play, renew the rod end, not just the bolt
Front tilt hinge / mount bolt	High torque class, take from OE	Safety-critical; check again after tightening

The torque values above are only a guiding range. Different bolt sizes on the same vehicle are tightened to different torques, and some manufacturers define separate values for initial assembly versus reassembly. Since cab safety depends directly on these connections, what governs in practice is the current service manual specific to the vehicle manufacturer's chassis/cab code, and a calibrated torque wrench must always be used.

- Is the shock absorber body dry — was an oil-trace check done after a short drive?
- Is cab height equal side to side and front to back; does it hold the reference height?
- Is there any crack, wear, or rub mark on the bellow surface?
- Does the leveling valve arm stop flow in neutral; is there play in the linkage?
- Do the bushings and mounts show hardening, breakup, or play?
- Are air lines and fittings leak-free, does a soap-bubble test come back clean?
- Are stabilizer rod ends free of play; is lean behavior in bends normal?

Maintenance and Service Life

Cab suspension has no fixed "replacement interval"; its lifespan is determined by road conditions, load/duty pattern, and regular visual inspection. On a vehicle running heavy duty on poor roads, the shock absorbers and bushings wear out within a few years; on good roads with regular maintenance, cab suspension becomes one of the vehicle's longer-lasting systems. The critical point is catching the fault before it produces sinking or noise, because a worn shock absorber first erodes comfort, then silently shortens the life of the cab body and its weld points.

- **Periodic visual inspection:** At every service, check the shock absorber body for oil trace, the bellow for cracks, bushings for breakup, and air lines for wear.
- **Height check:** On air-suspended cabs, reference height and side-to-side balance should be measured periodically; deviation points to leveling valve adjustment or bellow collapse.
- **Leak monitoring:** Finding the cab sunk in the morning is the first sign of a slow leak; it should not be ignored — fill the system and trace the leak.
- **Renewing bushings on time:** Hardened bushings and mounts stress the cab directly; bulk renewal with the repair kit (1057) is the most economical approach.
- **Replacing shock absorbers in pairs:** If one side is worn, the other is the same age; renewing per axle in pairs preserves balance.
- **Air system cleanliness:** Damp/dirty air wears out the leveling valve and bellow; air dryer and filter maintenance indirectly protects cab suspension too.
- **Post-intervention monitoring:** After any work on the suspension, recheck torque and height at the first loading.

For fleet operators, the most efficient approach is to treat cab suspension as a set rather than a single part. Evaluating the bellow, bushings, and, if needed, the leveling valve during the same service as a shock absorber job is far more economical than bringing the vehicle back down a few months later. VADEN's cab suspension range is built exactly on this logic: leveling valves (category 1059) and repair kits (category 1057) can be matched to the vehicle's chassis/cab code, so a vehicle having its valve renewed can have the bushings and sealing elements dealt

with in the same visit. A ten-minute height and leak check before sending the vehicle back out is the cheapest insurance for both comfort and safety.

This document is for information only; in practice the vehicle manufacturer's current service manual and safety instructions apply. Values are general references for common heavy-duty systems; use the relevant OE service document for model-specific figures. © VADEN Otomotiv San. Tic. A.Ş. · vadenoriginal.com