



TECHNICAL GUIDE

Fifth Wheel & King Pin: Faults, Replacement & Maintenance Guide

A hard clunk when a tractor unit takes up trailer load usually traces to fifth wheel jaw or king pin wear: sizing, diagnosis, replacement and lubrication.

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If you hear a hard "clunk" the moment a tractor unit starts pulling a trailer, feel a front-to-rear surge in corners and under braking-acceleration, or notice that the king pin just will not lock when coupling, the first thing to inspect is the single connection point between the tractor and the semi-trailer: the fifth wheel. This coupling, which locks the truck-tractor and the semi-trailer together, both carries the full trailer weight and allows the vehicle to rotate and articulate freely in corners and over uneven ground. Known in German technical documentation as the *Sattelkupplung*, it is called the "fifth wheel" in the field, while the matching part on the trailer side is the *king pin*. Because it is one of the safety components with the most severe consequences if it separates on the road, correct diagnosis, knowledge of the wear limits, and proper maintenance of the fifth wheel are vital. This guide compiles the working principle of the fifth wheel and king pin arrangement, its common faults, the correct replacement steps, and field inspection points for heavy commercial vehicle technicians.

Editor's note (E-E-A-T): This technical guide was prepared by the VADEN technical team based on field experience with heavy commercial vehicle tractor-trailer coupling systems and OE manufacturer documentation practice. The values given here are typical reference ranges; for the exact wear limit, torque, and installation values specific to the vehicle and fifth wheel type, always refer to the current OE service manual of the relevant vehicle and coupling manufacturer. *Last updated: September 2026.*

What Is a Fifth Wheel (King Pin)? Function and Working Principle

The fifth wheel is an articulated coupling plate attached to the tractor's chassis that grips the semi-trailer's king pin with its locking jaw to carry the trailer load, while at the same time allowing the tractor and trailer to rotate relative to each other in the horizontal plane.

The working principle is based on a "catch and lock" logic. When the tractor reverses under the trailer, the vertical king pin beneath the trailer enters through the fifth wheel's V-shaped throat. When the pin reaches the jaw (locking tongue) of the lock mechanism, it pushes the jaw; the spring-loaded mechanism locks behind the pin, and a safety catch engages to prevent the jaw from opening on its own. At this point the king pin is secured horizontally within the fifth wheel but can rotate freely about the vertical axis. To uncouple, the driver lifts the safety catch and pulls the release handle; the jaw opens and, when the tractor is driven forward, the pin exits the throat.

The plate is mounted to the tractor chassis via two mounting brackets and a rocker (pivot bearing). This rocker allows the trailer to pitch fore-and-aft relative to the tractor over dips and undulations; the king pin provides rotation (yaw) about the vertical axis. In this way the trailer and tractor form a flexible yet secure whole that both carries load and can move in a limited way about three axes. Because the contact between the top surface of the plate and the trailer skid plate operates under heavy friction, it constantly requires an oil/grease film; without this lubrication, wear accelerates and steering kickback and squeaking occur.

- **Plate (top plate):** Usually spheroidal (nodular) cast iron or steel; the main body with the throat opening that carries the trailer skid plate.

- **Lock mechanism (jaw):** Spring-loaded single- or double-jaw locking group that grips the king pin.
- **Release handle and safety catch:** The uncoupling lever and the secondary safety that prevents the jaw from opening unintentionally.
- **Mounting brackets and rocker (rocker/bushing):** The pivot bearings and bushings that attach the plate to the chassis and allow fore-and-aft pitch.
- **Mounting plate / intermediate plate:** The connection between the plate and the chassis and the height/slide arrangement (fixed or sliding type).
- **King pin:** The hardened steel pin on the trailer side that locks into the plate (typically 2" or 3.5").
- **Wear parts / shim set:** The wedge, bushings, and wear plates that adjust jaw clearance.

King Pin Sizes: The Difference Between 2" and 3.5"

In heavy commercial vehicles there are two common king pin standards: 2 inches (50.8 mm) and 3.5 inches (89 mm). The 2" pin is the most common in general road haulage; the 3.5" pin is used on heavy-load, low-bed, and special transport trailers. The fifth wheel and the king pin must always be in the same size class — a 3.5" pin will not lock, or will lock unsafely, in a 2" plate and vice versa. In replacement and matching, the pin diameter is the first value to verify.

Fixed, Sliding, and Height-Adjustable Types

The fifth wheel mounting arrangement varies by vehicle. In the fixed type, the plate is fixed to the chassis in a specific position. The sliding type allows the plate to be slid fore-and-aft and locked to adjust axle load distribution and overall length; it is especially important for axle load and manoeuvrability. Depending on weight and trailer height, there are low-/high-profile plates with different coupling heights. Incorrect height or an incorrect slide lock upsets the axle load balance and driving safety.

Greased and Low-Maintenance Plates

On classic fifth wheels the top surface of the plate is lubricated regularly with grease. To reduce the maintenance burden, some models use lubrication plates (low-friction / maintenance-free pads); in these types, low-friction polymer plates form the contact surface instead of grease. In both types the lock mechanism must be lubricated separately; a plate with lubrication pads does not mean "no maintenance at all," it only reduces the top-surface grease.

Typical Application and Matching

Application / Segment	Typical King Pin	Notable Fifth Wheel Feature
Road tractor (standard rig)	2" (50.8 mm)	Fixed or sliding, greased plate
Distribution / urban tractor	2"	Low-profile, low-maintenance plate
Heavy-load / low-bed transport	3.5" (89 mm)	High-capacity, reinforced jaw
Long-haul / load-sensitive vehicle	2"	Sliding plate, remotely locked
Off-road / construction-site tractor	2" or 3.5"	Wide-articulation rocker, durable coating

Part number verification: Although fifth wheels look similar externally, the king pin diameter (2"/3.5"), coupling height, mounting hole pattern, sliding/fixed type, load capacity (D-value / horizontal drawbar and vertical imposed load), and rocker type vary by model. The wrong plate type or an incompatible king pin can lead to unsafe locking, excessive clearance, and, in the worst case, separation of the trailer. Before installation, always verify the match against the vehicle's and trailer's OE part number, king pin size, capacity value, and mounting arrangement; do not rely on visual similarity.

Fault Symptoms and Diagnosis

Fifth wheel faults usually begin as "it doesn't lock fully when coupling" or "there is a clunk/play on the road." On this component every symptom must be treated as a safety warning, because the consequences can extend all the way to separation of the trailer. The table below summarizes the most common field symptoms along with their possible causes and verification methods.

Symptom	Possible Cause	Check / Verification
"Clunk-clunk" knock and fore-and-aft surge under braking-acceleration and in corners	Excessive clearance between the jaw and king pin, worn wedge/bushing	Measure the clearance with a low-speed fore-and-aft (rock) test while coupled; check the jaw clearance
Lock does not fully close, safety catch does not seat	Dirt/rust in the jaw mechanism, weak spring, pin not fully engaged	Visually verify the position of the release handle and catch and that the jaw fully wraps the pin
Pin goes high/low during coupling, "high hitch"	Wrong trailer height, worn plate throat/ramp	Compare the trailer plate to the plate height; observe that the pin enters the throat correctly
Steering kickback, squeaking, heavy turning	Plate top surface dry/ungreased, lubrication pad worn	Check the grease film and wear marks on the contact surface
Wear or ovality on the king pin neck/root radius	Long-term operation with play, overload, lack of lubrication	Measure the pin diameter and root wear with a king pin gauge
Movement between plate and chassis/mounting plate, crack marks	Loose mounting bolts, weld/bracket crack, fatigue	Inspect bolt torque and bracket/weld seams for cracks
Sliding plate slides / does not lock on the road	Slide lock worn or not fully locked	Verify that the slide lock pins are fully seated and check the lock indicator

Play Test and Lock Check

The most critical field diagnosis is the play test. With the tractor coupled to the trailer, the parking brake applied, and safety precautions taken, the clearance between the king pin and the jaw is observed and, where possible, measured by moving the vehicle gently fore-and-aft at low speed (or with a suitable pry bar). A distinct "clunk" knock and visible fore-and-aft movement indicate that the jaw-wedge assembly is worn and requires adjustment or replacement. In addition, at every coupling it must be visually verified that the jaw fully wraps the pin after the lock closes, the safety catch is seated, and the release handle is in the locked position.

King Pin Wear and Gauge Measurement

Although the king pin is hardened steel, over time it wears, becomes oval, or bends, especially at the neck (upper cylinder) and the root radius. Manufacturers offer a special *king pin gauge* for this job; when the gauge grips the pin, it shows whether the wear has exceeded the limit. A worn or cracked king pin causes unsafe locking and play even in a sound fifth wheel; for this reason the plate and pin must always be evaluated together. If the king pin is worn, it must be replaced/re-welded on the trailer side, and this operation should be carried out by a competent workshop.

Mounting, Bracket, and Rocker Inspection

The connection of the fifth wheel to the chassis is at least as critical as the lock. The torque of the mounting bolts, the weld/rivet seams of the mounting plate, the mounting brackets, and the rocker bushings must be inspected regularly for cracks, looseness, and excessive play. A crack that starts on the chassis or bracket can, as it propagates, lead to the plate breaking away. Excessive play in the rocker bushings is felt as swaying and knocking while driving.

Further reading

For a plain-language technical overview of this subject, see the reference article on [Wikipedia](#). Always confirm specific figures and procedures against the vehicle manufacturer service data.

Replacement / Installation Steps

Personal protective equipment (PPE) and safety: The fifth wheel is a heavy and safety-critical component; its falling or uncontrolled movement of the trailer causes serious injury. Before starting work, secure the tractor and, if present, the trailer on level ground, chock the wheels, apply the parking brake, and stop the engine. Use suitable lifting/support equipment when removing the plate; do not put hands or feet under the lock and heavy parts. Use equipment with sufficient lifting capacity, protective gloves, and goggles. This operation must be carried out in accordance with the coupling manufacturer's installation instructions and the vehicle manufacturer's chassis connection specification.

- 1 Secure the vehicle:** Park on level ground, apply the parking brake, chock the wheels, switch off the engine. If the trailer is coupled, uncouple it safely, set it on its landing legs, and move it away.
- 2 Record the existing arrangement:** Before replacement, photograph and note the plate position, slide lock setting, height and mounting hole pattern, and, if necessary, the release handle direction.
- 3 Disconnect oil lines / automatic lubrication if present:** If an automatic grease feed or sensor (lock status sensor) is present, mark its connections and remove them safely.
- 4 Support the plate:** Before removal, support the fifth wheel with a suitable lifter/stand; ensure the weight does not drop uncontrolled.

- 5 Remove the rocker and bracket connections:** Loosen the rocker pins/bolts that attach the plate to the mounting bracket; inspect the condition of the bushings and pins.
- 6 Remove the mounting bolts:** Loosen the bolts that attach the plate/mounting plate to the chassis and lift the plate off. Check the mounting plate and the chassis connection point.
- 7 Prepare the mounting surface and bracket:** Clean away dirt, rust, and old grease residue; if there is any crack, deformation, or dent on the mounting plate, bracket, or chassis, replace/repair it.
- 8 Verify the new plate and correct type:** Before installation, confirm that the king pin diameter (2"/3.5"), coupling height, capacity value, sliding/fixed type, and hole pattern are suitable for the vehicle.
- 9 Position the new fifth wheel:** Place the plate onto the bracket/mounting plate at the correct position and height; fit the rocker pins and bushings.
- 10 Torque the bolts:** Tighten the mounting and bracket bolts with the quality bolts specified by the manufacturer, to the specified torque, incrementally and crosswise; comply with the requirement for self-locking/secured nuts.
- 11 Lubricate and perform a function test:** Lubricate the plate top surface (if not fitted with a lubrication pad) and the lock mechanism with suitable grease. Move the release handle to the open position and, by coupling and uncoupling with a test king pin or trailer, verify that the jaw fully locks, the safety catch seats, and the play is within tolerance; then perform a road test and re-check the torque.

Points to Watch (Common Mistakes)

The most critical mistake — setting off without verifying incomplete locking with a road test:

Setting off before the king pin fully seats in the jaw and the safety catch engages can lead to separation of the trailer. After every coupling the lock must be visually verified, and a low-speed pull (tug test) must confirm that the connection holds. This is the most fundamental step in preventing fatal accidents.

Incompatible king pin / capacity: Using a 3.5" pin in a 2" plate (or vice versa), an under-capacity plate, or the wrong coupling height leads to unsafe locking and overstressing. The plate, king pin, and trailer must always be matched in size and capacity.

- Fitting a plate of a different diameter/capacity/mounting arrangement by relying on visual similarity — an unsafe connection.
- Neglecting to lubricate the plate top surface and lock mechanism — rapid wear, steering kickback, squeaking.
- Neglecting the jaw clearance (wedge adjustment) — constant knocking, accelerated wear.
- Fitting the mounting bolts at the wrong torque or with low-quality bolts — loosening, fatigue cracks.

- Assuming a worn king pin is sound and focusing only on the plate — play and unsafe locking continue.
- Not verifying that the sliding plate lock is fully seated — the plate sliding on the road, axle load shifting.
- Overlooking a chassis/bracket crack — progressive fatigue and risk of breakage.
- Assuming a lubrication-pad plate "needs no maintenance" and never lubricating the lock — lock seizure.

Technical Values and Inspection Points

The values below are **typical / general reference** ranges for heavy commercial vehicle fifth wheel applications. They vary by plate type, capacity, and vehicle; for exact values, the OE service manual of the coupling and vehicle manufacturer is authoritative.

The fifth wheel falls under ECE R55, which governs mechanical coupling components of vehicle combinations, while the semi-trailer kingpin interface dimensions are standardised by ISO 337. The binding reference is the vehicle's current OE service manual.

Parameter	Typical Reference Range	Note
King pin diameter (neck)	2" = 50.8 mm / 3.5" = 89 mm	Must be the same class as the plate; measured with a gauge
Permissible jaw-pin clearance	Typically $\leq \sim 3$ mm (varies by manufacturer)	If the limit is exceeded, adjust the wedge or renew the wear kit
Vertical imposed load (plate capacity)	~ 10 – 36 tonne class by type	Selected to suit the total vehicle and trailer load
Operating temperature range	~ -40 °C to $+80$ °C	Grease and elastomer limits
Lubrication grease type	High-pressure (EP) lithium-based grease	In the lubrication-pad type, excluding the top surface, the lock is still greased
Lock function	Full jaw engagement + safety catch must seat	Visual + tug test verification at every coupling

The connection torques vary by plate type, mounting plate, and bolt size; the values below are only a general reference and the OE specification is authoritative.

Connection	Typical Torque Range	Note
Mounting plate / chassis bolt (M16, 8.8/10.9)	~ 200 – 300 Nm (by class)	Crosswise and incremental; quality bolt essential
Bracket connection bolt (M20)	~ 350 – 500 Nm (by class)	OE value is authoritative; secured nut
Rocker pin/bolt connection	Per manufacturer specification	Clearance and free movement must be preserved
Slide lock connection	Per manufacturer specification	Lock must seat fully; torque check on first uses

Field tip: Most fifth wheel complaints come from two sources: insufficient lubrication and neglected jaw clearance. With regular EP grease, keeping the lock mechanism clean, and wedge adjustment, both knocking and wear are largely prevented. Delaying lubrication rapidly consumes both the plate and the king pin together.

- Are the king pin diameter and root wear within the gauge tolerance?
- Is the jaw–pin clearance (rock test) below the manufacturer's limit?
- When the lock closes, does the jaw fully wrap the pin and does the safety catch seat?
- Are the plate top surface and lock mechanism sufficiently lubricated?
- Are the mounting bolts at torque, and are the bracket and weld seams crack-free?
- On the sliding type, is the slide lock fully seated and its indicator locked?

Maintenance and Service Life

The fifth wheel is a long-lived component when regularly lubricated, when the lock mechanism is kept clean, and when the mounting connections remain sound. Its real enemies are lack of lubrication, dirt/rust, overload, and neglected play. Maintenance of this component is not merely a matter of comfort but directly of road safety, because it is the only mechanical link between the tractor and the trailer. In periodic maintenance, the plate, king pin, lock mechanism, and mounting connections must be evaluated as a whole.

- Lubricate the plate top surface and lock mechanism with suitable EP grease at the interval specified by the manufacturer (in the lubrication-pad type the lock is still greased).
- Clean the lock jaw, handle, and safety catch of dirt/rust; verify that they operate freely and fully.
- Measure the jaw–pin clearance (rock test) periodically; adjust the wedge or renew the wear kit as it approaches the limit.
- Check the king pin with a gauge; renew a worn/cracked pin without delay.
- Periodically check the torque of the mounting and bracket bolts; inspect the bracket and weld seams for cracks.
- Keep the sliding plate rails and lock clean, lubricated, and fully operational.
- Rather than forcing a lock mechanism or wear kit that is showing symptoms, prefer to renew it with a suitable wear set or a complete plate, since it is safety-critical.

A healthy fifth wheel, with correct lubrication and periodic play checks, operates safely throughout the life of the vehicle; however, an arrangement run with an ungreased, worn, or play-affected king pin both wears out rapidly and carries the risk of separation on the road. Timely intervention on connection play and lock symptoms both preserves safe towing performance and prevents larger damage to the king pin, plate, and chassis bracket.

The fifth wheel and king pin arrangement is one of the most safety-critical components, forming the only link between the tractor and the trailer on a heavy commercial vehicle. With correct diagnosis, selection of the right type in the correct size and capacity, meticulous installation, regular lubrication, and above all lock verification at every coupling, both road safety and vehicle efficiency are preserved. The VADEN ORIGINAL Fifth Wheel product group covers heavy

commercial vehicle applications with lock (jaw) mechanism repair kits, rubber kits, wear ring kits, and bearing, assembly and type conversion kits; because these kits are listed by fifth wheel type – Jost JSK 34, JSK 36, JSK 37, JSK 38 and JSK 40 – checking the type plate on your existing fifth wheel together with the OE reference lets you select the correct overhaul kit and restore safe, long-lasting towing performance.

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