group

ADR SYSTEM

moving innovation

maintenance manual

ORIGINAL KADR

Quality stops the clock

adrspareparts system

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1. SAFETY NOTICE

The authors and publisher are not liable for any physical damage or personal injury resulting from errors or omissions in this manual.

This manual does not replace the manual provided by the vehicle manufacturer.

Maintenance must be carried out by suitably qualified personnel using appropriate tools.

This manual describes everyday maintenance operations and does not cover major repairs.

We recommend that maintenance should be carried out by a specialised workshop.

Carrying out repairs and maintenance work may be dangerous. This safety notice describes only some of the potential hazards and is intended to make users aware of the risks and encourage them to take care.

Personal protection :
Wear appropriate personal protection equipment: goggles, mask, gloves, helmet, safety shoes, overalls, etc.
Work in the presence of another person.

Unstable vehicles :
Never work underneath or near a vehicle that has been raised using only a jack.
When working underneath or near a vehicle that has been jacked up, always make sure that the jack is used in conjunction with stands or other effective supports and that the jack and stands used can bear the weight.
Check that the vehicle is perfectly stable and that the forces applied to the vehicle while carrying out maintenance will not cause it to shift. Also check that the ground is firm.

Hot parts :
Some parts, such as brake drums, for example, may become extremely hot in use.

Pressurised hydraulic or pneumatic systems :
NB: Before carrying out maintenance on hydraulic or pneumatic systems, which may be pressurised, take all necessary precautions to avoid accidental pressure release.

Risk of fire, risks from fumes, toxic gases and irritant substances :
All fuel is highly flammable and petroleum vapour is explosive.
For cleaning and degreasing parts, use only appropriate, recognised cleaning fluids and follow the instructions on the packaging.
Avoid contact with the skin and avoid inhaling vapour, fumes or toxic gases.
Do not smoke, use a naked flame or create sparks, etc if there is a risk of explosion or fire owing to the presence of flammable vapours, fuel, oil, paint, solvents, dust, straw, etc.
A fire extinguisher appropriate for the type of risk should always be to hand.

Asbestos :
The brake linings of our axles no longer contain asbestos. We used asbestos-free linings well before EU regulations prohibited its use.
If there is any doubt about the presence of asbestos (for example, when carrying out maintenance on old axles), the brakes and linings should be handled as if they contained asbestos, as asbestos dust is a major health hazard.

1. SAFETY NOTICE

Environment :
We have carefully studied the harmful effects of our products on the environment.
Respect the environment and do not dump oil, grease and used chemical products. They should be disposed of in accordance with the regulations at a waste collection point, waste disposal centre or recycling centre.

2. AXLES

2.1 General

The specifications of our axles and suspensions can be found in the general COLAERT ESSIEUX catalogue.
The catalogue provides the following information.

Axles
- The axle cross-section.
- The axle type.
- The axle loads and maximum admissible offset at speeds of 25, 40 and 60 km/h with zero offset wheels, with single, tandem or tridem axles.
- The number and size of studs and the bolt circle.
- The centre hole diameter.
- The brake dimensions (drum internal diameter and lining width).
- The braking characteristics certified by CEMAGREF and TUV.

The general catalogue also gives the admissible load on the axle assembly for different load offsets.
Exceeding these values may cause excessive bending of the axle and possibly permanent damage.

Stabiliser jacks bearing on the axles, weight transfer devices or lifting axles do not increase the maximum load on the axles or suspensions.

Suspension
- The maximum load for the suspension.
- The wheel-base.
- The type of spring, the number of leaves and the number of fixed leaves.
- The height of the axle assembly unladen and laden, for different axle cross-sections.

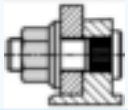
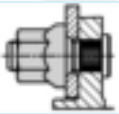
2. AXLES

2.2 Axle, maintenance and adjustment

2.2.1 Assembly and fixing of the wheels

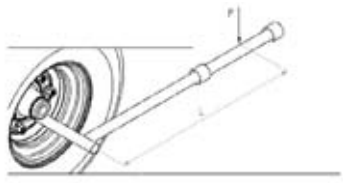
Above all to check that the type of wheel used is compatible with the nut of the wheel stud, for all the cases of fixing of the wheel with centering on the wheel stud, i.e. all those of table below except the nuts of the type M, to check that the holes of the rim have a conical part in order to receive the spherical part as of nuts DIN, the spherical washer of the plain nuts or the conical part of the nuts with “Bec “.

In the case of twim tyres, in order to ensure a good centering, it is necessary to insert a spherical washer between the flask of the hub and the rim except assembly nuts M .

NUT TYP	Spanner	Wheel stud	Tightening torque	Leverage (*L)	Force (*F)
	mm	mm	Nm	mm	Kg
DIN 	17	M12x1,5	90 $^{+10}_{+0}$	300	30
	19	M14x1,5	130 $^{+10}_{+0}$	300	40
	24	M18x1,5	270 $^{+20}_{+0}$	450	60
Plain nut + washer 	24	M18x1,5	270 $^{+20}_{+0}$	450	60
	27	M20x1,5	350 $^{+30}_{+0}$	600	60
	30	M22x1,5	450 $^{+60}_{+0}$	800	60
"Twin" 	24	M18x1,5	270 $^{+20}_{+0}$	450	60
	27	M20x1,5	350 $^{+30}_{+0}$	600	60
	30	M22x1,5	450 $^{+60}_{+0}$	800	60
"M" 	-	-	-	-	-
	27	M20x1,5	415 $^{+35}_{+0}$	800	55
	32	M22x1,5	575 $^{+75}_{+0}$	1000	60
"Bec" 	28	M18x1,5	270 $^{+20}_{+0}$	450	60
	30	M20x1,5	350 $^{+30}_{+0}$	600	60
	32	M22x1,5	450 $^{+60}_{+0}$	800	60

Tightening of the nuts of wheel

On lately assembled wheels, the nuts can, at the beginning, to loosen itself in consequence of a compressing. It is thus necessary to check the tightening of the nuts after the first course in load. One will proceed in the same way later on after each disassembling of wheels. To tighten the nuts, to use the adapted special spanner. If one uses the machines bolt ones for the nuts of wheel, to regulate the tightening torque well, if not the threading and the metal of the stud and nuts of wheel undergo an overload.



(*) The 2 last columns of the table are useful as reference for those which do not have a torque spanner or of pneumatic screw driver (see the figure at side).

It is allowed to use an impact spanner for disassembling, but it is absolutely necessary to avoid the tightening of the nuts with this type of spanner, because the exerted couple is unverifiable.

2.2.2 Tightening and retightening wheel nuts (Summary) :

Never use impact wrenches to tighten the wheel nuts as the impact torque may be excessive.

Wheel nuts should be tightened diagonally using a torque wrench.

If power tools are used (for example, pneumatic torque wrench) they must be carefully set to the required torque for tightening.

Otherwise, the studs and wheel nuts may be overtightened which may damage or break them.

Retighten the wheel nuts after:
- The first time of use.
- The first laden journey.
- The first 1,000 km.
- Every 6 months or 25,000 km.

Repeat every time the wheels are changed or removed.

2.2.3 Checking the hubcaps

Missing or damaged hubcaps must be replaced immediately to avoid dirt penetrating into the hub which might result in damage to the bearings.

Check that the hub caps are in place and in perfect condition.

For press fit hubcaps, check visually that they are fully home.

For hubcaps attached using screws, fit a new gasket if necessary when the hubcap is removed and retighten the screws regularly (every 6 months).

2.2.4 Checking the wheel bearing play

- After the first 1,000 km.
- Before intensive use, every 6 months or 25,000 km.

Wheel bearings are subject to wear: their lifetime depends on the operating conditions, the load, the speed, the adjustment and lubrication, etc.

To check the wheel bearings:
- Lift the wheel off the ground.
- Turn in both directions slowly to check for any rough points or friction.
- Turn it at high speed to check for unusual noises, such as grating or knocking.

If the bearing is damaged or worn, the bearing and seals should all be replaced (see paragraph 2.2.7 Replacing the wheel bearings).

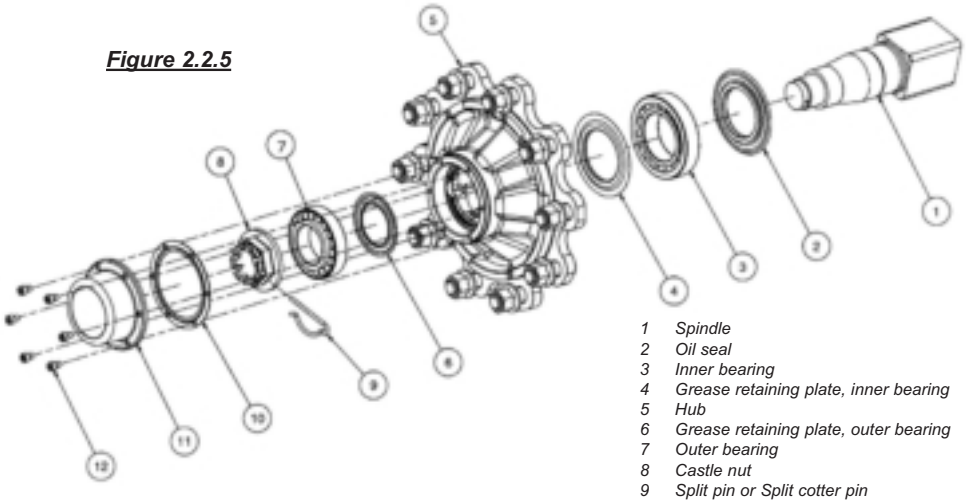
To check the wheel bearing play, raise the axle until the wheel is no longer resting on the ground ***(ensure that the vehicle cannot move)***.
Release the brake, grip the wheel at the top and the bottom and check the play by trying to tilt it. The play can also be detected by using a lever between the wheel and the ground.
If you can feel any play, adjust the wheel bearing (see paragraph 2.2.5 Adjusting the wheel bearings).

Make sure that the play does not come from the suspension or a steering axle kingpin.

2.2.5 Adjusting the wheel bearings

Lift the axle until the wheel is no longer resting on the ground.
Large wheels should be removed so that the play is easier to feel and to make it easier to adjust the bearings.

Figure 2.2.5



1 Spindle
2 Oil seal
3 Inner bearing
4 Grease retaining plate, inner bearing
5 Hub
6 Grease retaining plate, outer bearing
7 Outer bearing
8 Castle nut
9 Split pin or Split cotter pin
10 Hubcap gasket
11 Hubcap
12 Hubcap screw

- Remove the hubcap.
- Remove the cotter pin or hair-pin clip from the spindle.
- Tighten the castle nut (right-hand thread) to take up the internal play (the conical roller bearings should then be firmly held between the hub seatings, the pressure ring, spindle and castle nut).
The rotation of the hub or wheel feels to be slightly stiff.
- Slacken the castle nut until there is no longer any friction between the castle nut and the outer bearing and the hole for the pin is aligned with a notch in the castle nut.
- Tap the hub gently using a mallet to shake down the assembly.
- Check that the hub rotates more freely.

- Always err on the side of too free rather than too tight.
- When the hub has been adjusted, fit a new split cotter pin or re-fit the hair-pin clip.
- Refit the hubcap.
- Refit the wheel following the instructions in paragraphs 2.2.1 (Fitting wheels) and 2.2.2 (Tightening and retightening wheel nuts).

When the wheel has been refitted, turn it slightly. It should come to rest with a slow rocking movement due to the imbalance.

2.2.6 Lubricating the wheel bearings

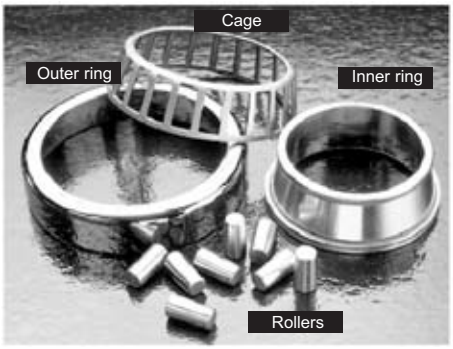
In normal operating conditions, lubricate the bearings every 2 years or every 50,000 km and when the brake shoes are replaced.
In harsh conditions the bearings should be lubricated more frequently.

Use a general purpose EP grease formulated for lubricating plain, ball and roller bearings, subject to heavy loads and impacts typical of HGV, agricultural vehicle hubs, etc.

All parts (hub, spindle, bearings, seals, castle nuts, hubcap, cotter pin) should be degreased and perfectly clean before reassembly.

The work should be carried out in a clean environment with appropriate tools as the slightest bit of dirt can damage the bearings or even the spindle.

When carrying out maintenance on the bearings, check the brake linings, drum and return springs, clean the brakes, clean and lubricate the brake cam shaft.



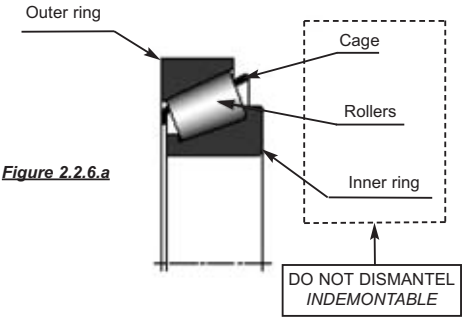


Figure 2.2.6.a

Disassembly : (See figures **2.2.5** and **2.2.6.a**)

- Slacken the wheel nuts.
- Lift the axle until the wheel is off the ground.
- Remove the wheel.
- Release the brakes (make sure that the vehicle cannot move).
- Remove the hubcap.
- Remove the split pin or pin from the spindle.
- Remove the castle nut.

- Remove the drum/hub assembly. using a hub puller if necessary: the outer ring, the grease retaining plates inside the hub (depending on the model), the small bearing cone and cage come with the hub. Check these parts.
  The bearing cups and grease retaining plates can be left inside the hub for cleaning.
- Remove the large bearing cage and cone from the spindle using a bearing puller if necessary.
- Check the oil seal between the spindle and the large bearing (or the wheel bearing seal depending on the model), and replace these parts if necessary. A puller may be required to remove the wheel bearing seal. Note the orientation of the oil seal for reassembly.
- Check the contact surfaces on the spindle for the bearing and seal and the threaded end of the spindle and remove any bumps or asperities.
- Check the hub surfaces in the same way.
- Check the bearing face of the castle nut.

Clean and degrease all parts with a suitable cleaning fluid.

Reassembly :

- Grease the spindle lightly.
- Refit the oil seal or wheel bearing seal (ensure that the seal is the right way round), a punch makes it easier to fit the wheel bearing seal and avoids damaging the seal.
- Apply a generous coating of grease to the large bearing cage and rollers, making sure that the grease penetrates all round the rollers and under the cage.
- Fit at bottom the interior ring (cone) of the large bearing on the rocket, it is important to take care not to damage the cage of the bearing, to go up the cone unit, rollers and cage (figure **2.2.6.a**) on fized to use if necessary tools as shown in the figure **2.2.6.b**, the effort to push must apply only to the cone, in no case on the cage or the rollers what involves a deterioration of the bearing.
- Apply a 15 mm (small axles) or 20 mm (large axles) layer of grease all around and right across the large and small bearing cups that are still in the hub.
- If the hub does not have grease retaining plates, put a large amount of grease in the centre of the hub to act as a reservoir.
- Slide the hub/drum assembly over the spindle and the brake shoes keeping the hub perfectly straight and aligned until it is in contact with the oil seal at the back of the spindle.
- Apply a generous layer of grease to the small bearing cage and rollers and fit the assembly to the spindle.
- Fit the castle nut and adjust it as described above (See paragraph 2.2.5 Adjusting the wheel bearings).
- Lock the castle nut with a hair-pin clip or new split cotter pin as appropriate.
- For hubs without grease retaining plates, fill the hubcap with grease.
- Refit the hubcap.

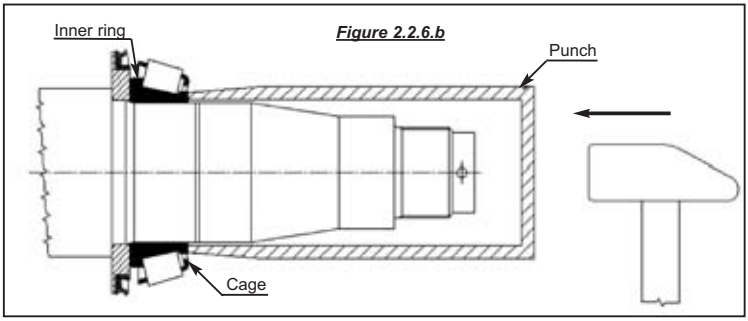


Figure 2.2.6.b

2.2.7 Replacing the wheel bearing

New grease retaining plates should be fitted to hubs with grease retaining plates (See figure 2.2.5), as the plates will be damaged while removing the bearing cups.

Unpack the bearings at the last moment and never mix them up.

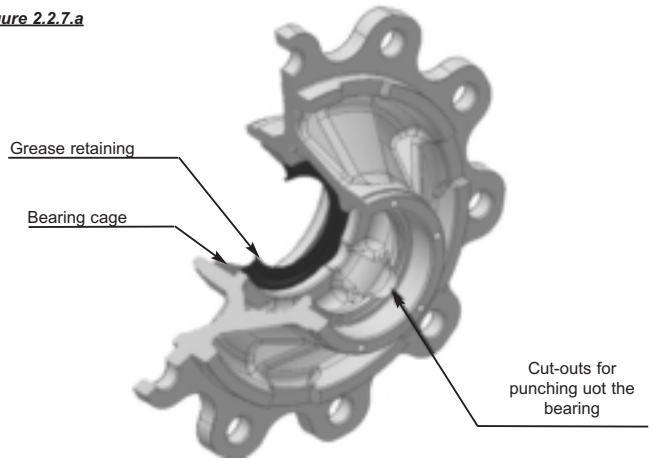
To replace the wheel bearings, follow the instructions for removing the hub (see paragraph 2.2.6 Lubricating the wheel bearings) and remove the bearing cups from the hub as follows.

Removing the bearing cups from the hub

Note the orientation of the bearing cups and grease retaining plates for reassembly.

- The bearing cups are an interference fit and must be punched out using a hammer and a mild steel punch (See figure **2.2.7.a**).
- If the hub has grease retaining plates, these will be punched out at the same time as the bearing cups and will, therefore, be damaged.

Figure 2.2.7.a



Fitting new bearing cups into the hub :

Make sure that the bearing cups and grease retaining plates are the right way round.

NB: Never fit the bearing cup with the bearing cone and rollers in place

- If the hub has grease retaining plates, first put the grease retaining plate in its seating (the right way round) and ensure that it remains well centred and in place while the bearing cup is being fitted. Re-check when the operation is complete.
- Fit the bearing cups and punch into place using a mild steel punch as shown in figure 2.2.7.b.

Take care that the bearing cups are straight and that they are firmly against the seating in the hub.

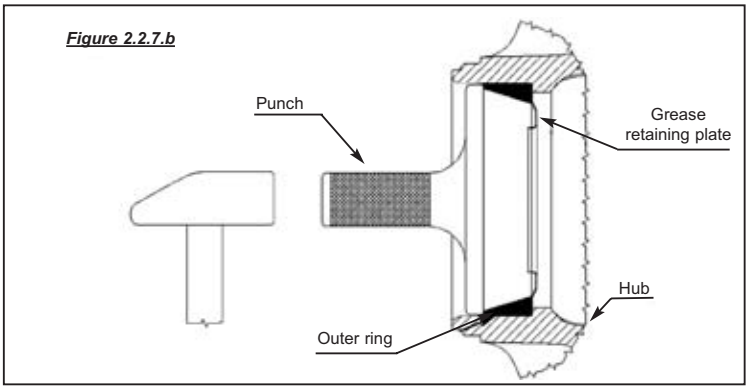


Figure 2.2.7.b

2.3 Brake maintenance and adjustment

2.3.1 Initial checks

The brakes should be tested before using for the first time and after the first laden journey:

- Check the actuator and return spring mountings, check the actuator stroke and return travel and check that the road and parking brakes operate and release correctly.
- Tighten the screws and nuts (covers, fulcrum, etc), check the cotter pins, pins, circlips, etc.
- Check for hydraulic fluid and air leaks.

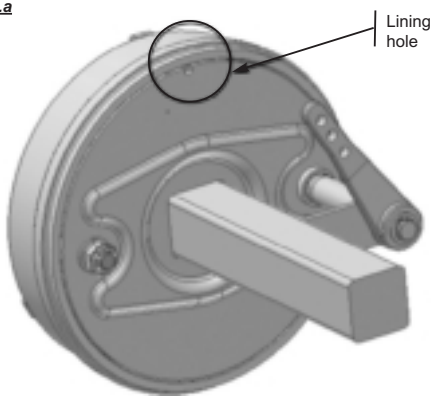
2.3.2 Checking brake clearance and wear

Check and test the brakes before intensive use and every 3 months:
- Check the brake wear and the clearance between the brake linings and the drum visually (See figure **2.3.2.a**). It is probable that the linings are worn when the actuator travel has increased significantly.
- Check the thickness of the brake linings (See table paragraph 2.3.5 Replacing the brake shoes for the minimum thickness).

The brake shoes should be replaced as soon as the minimum lining thickness is reached.

- Check that the brakes are clean and clean them if necessary.
- Lubricate brake cam shaft bearings with grease nipples lightly to avoid grease deposits on the brake linings and drums.
- Carry out the initial checks described above (See paragraph 2.3.1 Initial checks).

Figure 2.3.2.a



2.3.3 Adjusting brakes with fixed levers

Take up the slack when the actuator stroke reaches about two thirds of the maximum travel (See figure **2.3.3.a**).

To take up the slack, turn the lever by one or more splines, ensuring that the brakes are not touching when released (to prevent overheating the brakes).

Never change the linkage position for the actuator on the lever without authorisation from the vehicle manufacturer as the vehicle will have been tested with the actuator at this position (the brake operating levers have several holes, always use the original hole).

For braking systems with a yoke, the yoke must remain parallel with the axle especially when the brakes are fully applied (See figure 2.3.3.b). This means that the stroke of the levers on the brakes at each side must be identical. Otherwise, the brake slack must be adjusted.

Figure 2.3.3.a

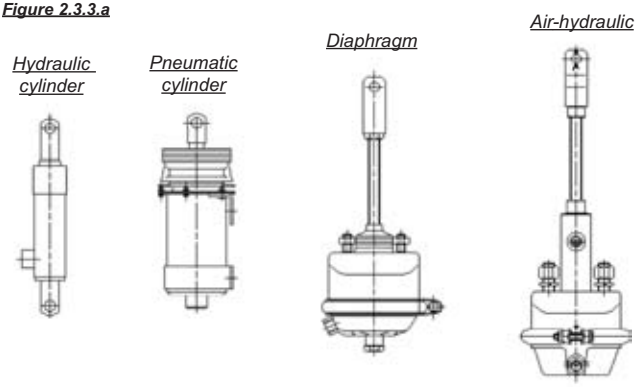
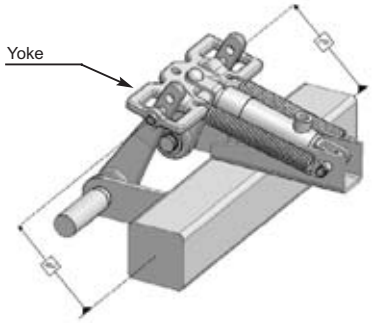


Figure 2.3.3.b



2.3.4 Adjusting brakes with adjustable levers

Take up the slack when the actuator stroke reaches about two thirds of the maximum stroke (See also paragraph 2.3.3 Adjusting brakes with fixed levers).

To take up the slack, turn the adjustment screw on the lever to adjust the relative position of the cam and the lever (See figure **2.3.4**).

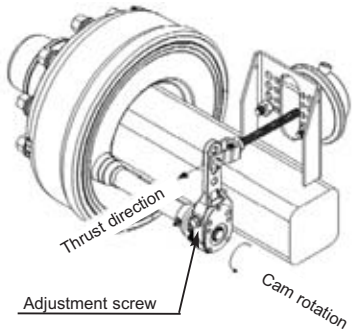
NB. The actuator brakes by pushing the lever to turn it in a particular direction. The screw must be adjusted so that the cam moves in this direction to take up the slack. The direction in which the screw must be turned depends on the configuration.

Ensure that the brakes are not touching when released (to prevent overheating the brakes).

Never change the linkage position for the actuator on the lever without authorisation from the vehicle manufacturer as the vehicle will have been tested with the actuator at this position (the brake operating levers have several holes, always use the original hole)

For braking systems with a tandem yoke, the yoke must remain parallel with the axle especially when the brakes are fully applied (See figure **2.3.3.b**). This means that the stroke of the levers on the brakes at each side must be identical. Otherwise, the brake slack must be adjusted.

Figure 2.3.4



2.3.5 Replacing the brake shoes

The brake shoes should be replaced as soon as the minimum lining thickness is reached.
When replacing the brake shoes, repack the wheel bearings with grease (See paragraph 2.2.6 Lubricating the wheel bearings).

MINIMUM LINING THICKNESS		
BRAKE TYPE	**DIMENSIONS (Drum internal diameter and lining width)**	**Minimum lining THICKNESS**
256E	250 x 60	2
305E	300 x 60	2
309E	300 x 90	2
310E	300 x 100	5
314E	300 x 135	5
316	300 x 160	5
356E	350 x 60	2
359E	350 x 90	2
408E	400 x 80	2
406E	406 x 120	5
412S	406 x 120	5
414S	406 x 140	5

See paragraphs 2.2.5 Adjusting the wheel bearings and 2.2.6 Lubricating the wheel bearings for hub disassembly and reassembly and wheel bearing lubrication and adjustment.

When replacing the brake linings, check all the brake components.
- Condition of the drums.
- Condition of the cam shafts and levers, in particular check the play in the splines.
- Wear on the bushings.
- Condition of the bellows (depending on the model).
- Condition of the shoe return springs.
- Condition the fulcrums and their mountings (depending on the model).
- Check the rotation of the brake shoe rollers (if fitted) and lightly lubricate before reassembly.

Always replace any worn or damaged parts.

When reassembling, apply a thin coat of grease to all contact surfaces (cams, fulcrums, bushings, etc) being careful to avoid getting any grease on the drums and shoe linings.

For brakes with an adjustable fulcrum, centre the brake shoes before clamping the fulcrum:
When the hub/brake assembly has been reassembled, slacken the fulcrum nut slightly, operate the brake lever in the correct direction (direction of the actuator thrust) by pulling on the lever by hand. (it is easier if a pipe is placed over the lever as shown in figure 2.3.5) to press the shoes against the drum.
Clamp the fulcrum while pressing on the lever.
If the nut is locked using a split cotter pin, always use a new cotter pin.

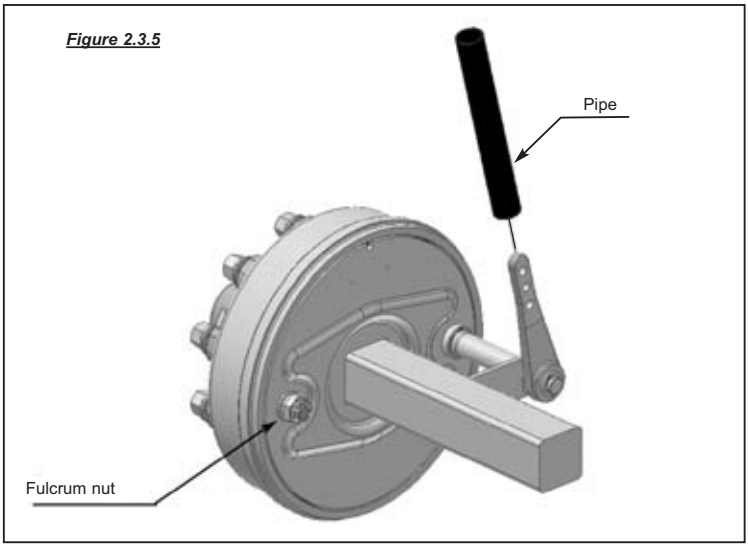


Figure 2.3.5

3. STEERING AXLES

3.1 General

Steering axles have a suspended traverse with two spindles that can swivel about a kingpin. This can considerably reduce tyre wear, improve the manoeuvrability of trucks and trailers and significantly reduce parasitic forces on the chassis and wheels.
They are particularly useful for large vehicles with several axles.
The wheel alignment is finely controlled by a tie rod which is adjusted by turning the tie rod that has a left-hand thread at one end and a right-hand thread at the other or by turning a flexible eccentric bushing, depending on the model.
There is a damper to reduce oscillations and stabilise the mechanism.
The two locking rams are used to straighten the wheels just ***BEFORE*** reversing. They can also be used on steep cambers or on particularly rough surfaces (bumps, potholes, etc).

3.2 Steering axle maintenance and adjustment

3.2.1 Normal maintenance

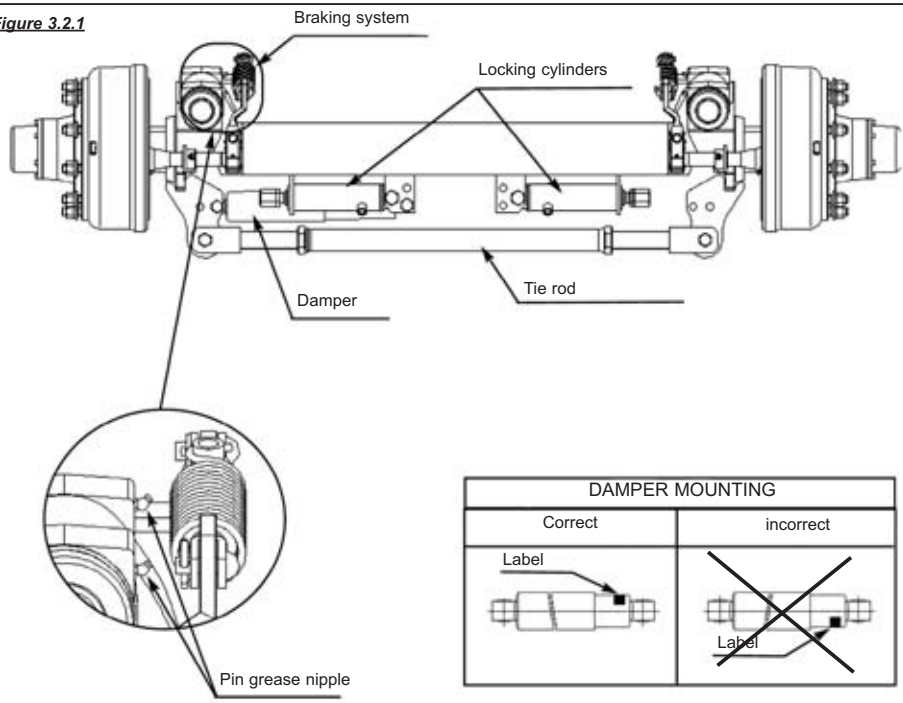
Steering axles should be maintained as for standard axles (See paragraphs 2.2 Axle maintenance and adjustment and 2.3 Brake maintenance and adjustment) as well as carrying out the maintenance and adjustments required for steer axles described below.

Before intensive use and every 3 months:
(See figure **3.2.1**)
- Lubricate the kingpins.
- Tighten the screws and nuts and all parts mounted on the axle (chambers, cylinders and mountings, locking cylinders, damper, tie rod, etc).
- Tighten the blind nut and lock nut on the locking cylinders (see paragraph 3.2.3 Locking cylinder maintenance and adjustment).
- Tighten the lock nuts at the end of the tie rod (See paragraph 3.2.2.1 Steer axle with adjustable length tie rod) or the clamping screw for the flexible bushing (See paragraph 3.2.2.2 Steer axle with eccentric flexible bushings) depending on the model.
- Check the flexible bushings on the tie rod and damper and change them if necessary.
- Check that the tie rod has not been accidentally bent as this adversely affects the steer axle, in particular the wheel alignment.
- Check the full-lock angle limit screws on the axle, if appropriate.
- If the steer axle oscillates, check the damper. Oil traces do not indicate that the damper is unserviceable but a major oil loss will result in its failing. Uncouple it at one end and push it in and out by hand for the whole travel. If there is little resistance, replace the damper. Also replace the damper if it is badly dented.
- Ensure that the damper is mounted the right way round. A new damper should have the ***label at the top*** as shown in figure **3.2.1**
- Look for and correct any leaks of air or hydraulic fluid from the chambers, cylinders and damper.

NB: Before carrying out any work on hydraulic or pneumatic systems, take all necessary precautions to ensure that the hydraulic fluid or air is not under pressure.

For steering axles with conical kingpins: check and adjust the clearance (See paragraph 3.2.4 Adjusting the clearance, steer axles with conical pins only).

Figure 3.2.1


Braking system
Locking cylinders
Damper
Tie rod
Pin grease nipple
DAMPER MOUNTING
Correct
incorrect
Label
Label

3.2.2 Checking and adjusting the wheel alignment

3.2.2.1 Steering axle with adjustable length tie rod (see figure 3.2.2.1)

Before adjusting the wheel alignment, check that the flexible bushings at the ends of the tie rod are in good condition and replace them if necessary.

Align the wheels with the vehicle on a smooth, level surface.

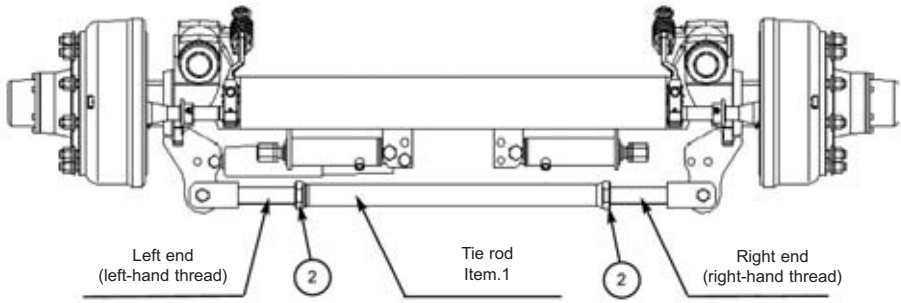
The wheel alignment must be adjusted with the locking cylinder pistons retracted.
- Measure the distance between the rim at the front of the wheels and at the back of the wheels: the distance should be the same.
- Move the vehicle forward to turn the wheels through 180° and repeat the check to allow for bent wheels.

If the wheel alignment is not perfect, adjust it as follows.

With the locking cylinder pistons still retracted

- Slacken the 2 lock nuts Item 2 on the end of the tie rod Item 1.
- Turn the tie rod to pull or push the wheels until the distances are the same. The wheels may be set to have a slight toe in (distance at the front less than the distance behind) of no more than about 4 mm but never adjust with toe out.
- Lock the lock nuts Item 2 when the tie rod has been adjusted and then adjust the locking cylinders (See paragraph 3.2.3 Locking cylinder maintenance and adjustment).

Figure 3.2.2.1

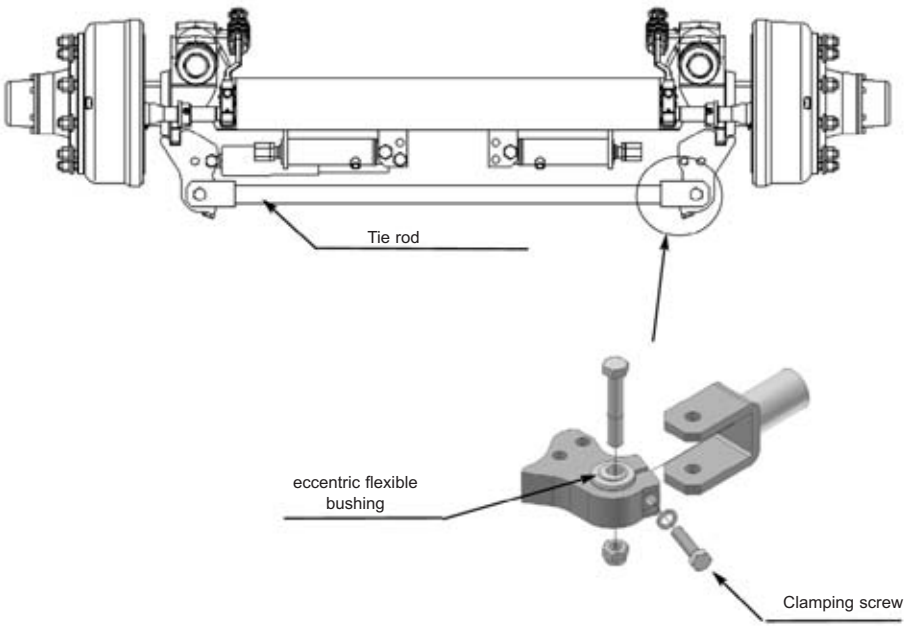


3.2.2.2 Steering axles with eccentric flexible bushings (see figure 3.2.2.2)

In this case the length of the tie rod is fixed and the wheel alignment is adjusted using the flexible bushings at the ends of the tie rod. The mounting hole in the flexible bushing is eccentric. The wheels are aligned by slackening the screw clamping the flexible bushing and then turning the flexible bushing in its housing. Follow the instructions in paragraph 3.2.2.1 (Steer axle with adjustable length tie rod).

Retighten the clamping screw after adjustment.

Figure 3.2.2.2



3.2.3 Locking ram maintenance and servicing

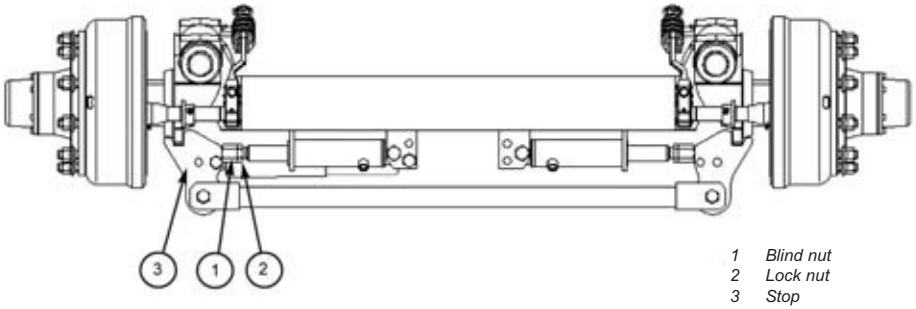
The locking rams straighten the wheels and hold them straight.

Tighten the lock nut Item 2 against the blind nut Item 1 regularly (figure 3.2.3).

Adjust the locking rams after aligning the wheel (See paragraph 3.2.2 Checking and adjusting the wheel alignment).

Procédure : (See figure 3.2.3)

Figure 3.2.3



1 Blind nut
2 Lock nut
3 Stop

- Move the lock nuts Item 2 and the blind nuts Item 1 as close as possible to the body of the ram.
- Without operating the locking rams, align the steer axle and the vehicle on a smooth, level surface.
- Pressurise the rams and maintain the pressure.
- Screw the blind nuts Item 1 to contact the stops Item 3 without forcing
- Screw the lock nuts Item 2 to contact the blind nuts Item 1
- Tighten the lock nuts Item 2 firmly
- Check that the wheels are still aligned.

The only maintenance required for the locking rams is to keep them perfectly clean, in particular the surface of the ram rod.
If the seals are leaking, they can be replaced (contact the vehicle manufacturer).

NB: Before carrying out any work on hydraulic or pneumatic systems, take all necessary precautions to ensure that the hydraulic fluid or air is not under pressure.

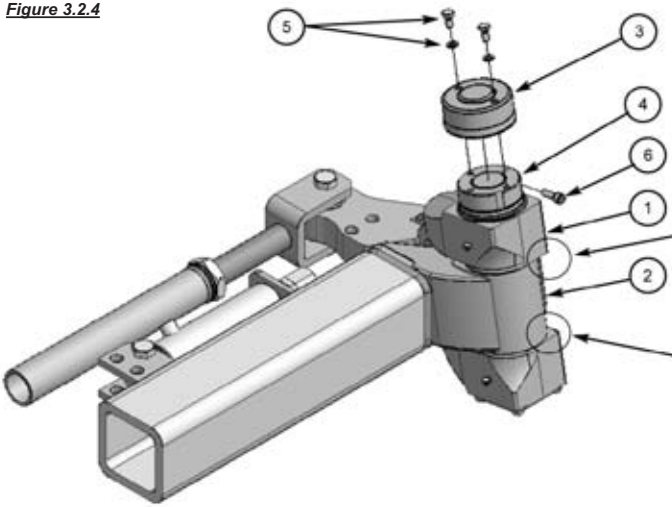
3.2.4 Adjusting the clearance, steering axles with conical pins only

Before intensive use and every year:
- For steer axles with conical kingpins (this type of axle has pressed steel caps *Item 3* over the adjustment nuts *Item 4*).
- Check and, if necessary, adjust the clearance. It should be between 0.5mm and 2mm (***see figure 3.2.4***). The clearance should be adjusted before it falls below 0.5mm.

(See figure 3.2.4)

- Remove the 2 screws and washers *Item 5* and the cap *Item 3*
- Slacken the clamping screw *Item 6* on the adjustment nut *Item 4*
- Adjust the clearance using the adjustment nut *Item 4*
- Tighten the screw I*tem 6* and refit the cap *Item 3*

Figure 3.2.4



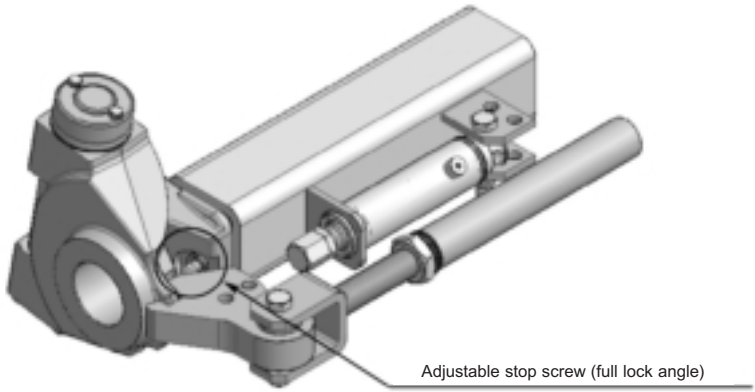
1 *Steering arm*
2 *Pin*
3 *Cap*
4 *Adjustment nut*
5 *Screw and washer*
6 *Clamping screw*

3.2.5 Adjusting the full-lock angle (depending on the model)

Adjust the full-lock stop screws to limit the axle full-lock angle when fitting wide tyres.

Check the full-lock angle regularly by turning fully to the right and to the left and checking that the tyres do not touch the trailer or suspension as this might wear or damage the tyres.
Adjust the full-lock stop screws, if appropriate.
Tighten the lock nuts.

Figure 3.2.5



3.3 Driven steering axles

The vehicle manufacturer is responsible for designing and fitting the hydraulic system for hydraulic steered axles.

To align a steered axle, bleed the hydraulic circuit or carry out any other maintenance on the hydraulic system, see the vehicle manufacturer's manual.

The vehicle manufacturer is responsible for checking and adjusting the steered axle geometry.

NB: Before carrying out any work on hydraulic or pneumatic systems, take all necessary precautions to ensure that the hydraulic fluid or air is not under pressure.

4. BOGIE SUSPENSIONS

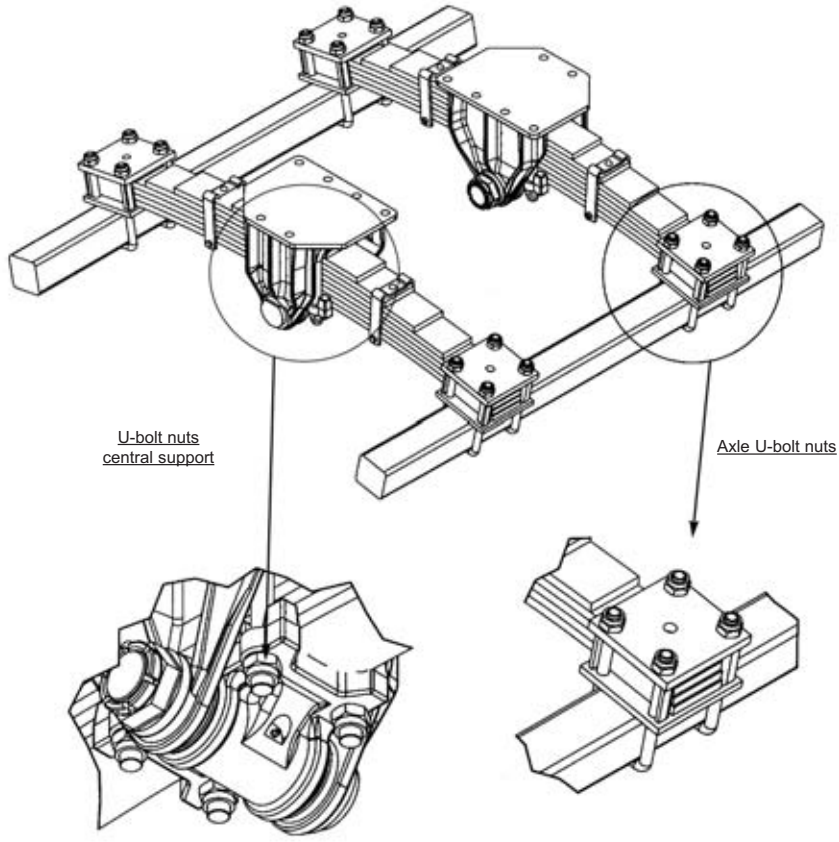
4.1 Bogie with U-bolt clamps of central support *(figure 4.1.a)*

After the first laden journey, before intensive use or every 6 months:

- Tighten all the U-bolt nuts (centre and axle U-bolts) to the recommended torque. Tighten the nuts diagonally (see chap.8 page 31).
- If the suspension is bolted to the chassis, tighten the bolts.
- Lubricate the central trunnion.

Under harsh or intensive operating conditions, maintenance should be carried out more frequently.

Figure 4.1.a



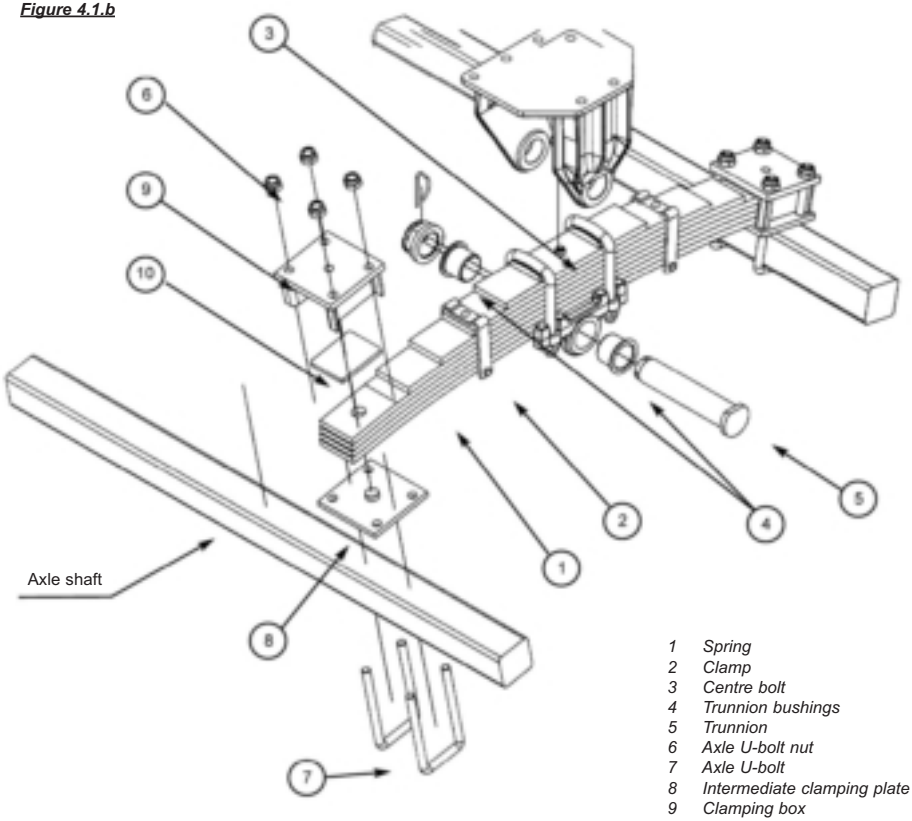
4. BOGIE SUSPENSIONS

Every year

- Check the play between the bushings and the trunnions and, if there is excessive play, replace the worn parts.
- Check the general condition of the springs: clean them thoroughly and brush the sides of the springs to check for cracks.
- If there is any play between the spring and the axle, check the whole of the clamping system (**See figure 4.1.b**): the rubber pad, the clamping box and plate and the alignment pin.

Reassemble, tightening the U-bolt nuts diagonally to the recommended torque(see chap.8 page 31) .

Figure 4.1.b



1 Spring
2 Clamp
3 Centre bolt
4 Trunnion bushings
5 Trunnion
6 Axle U-bolt nut
7 Axle U-bolt
8 Intermediate clamping plate
9 Clamping box
10 Rubber pad

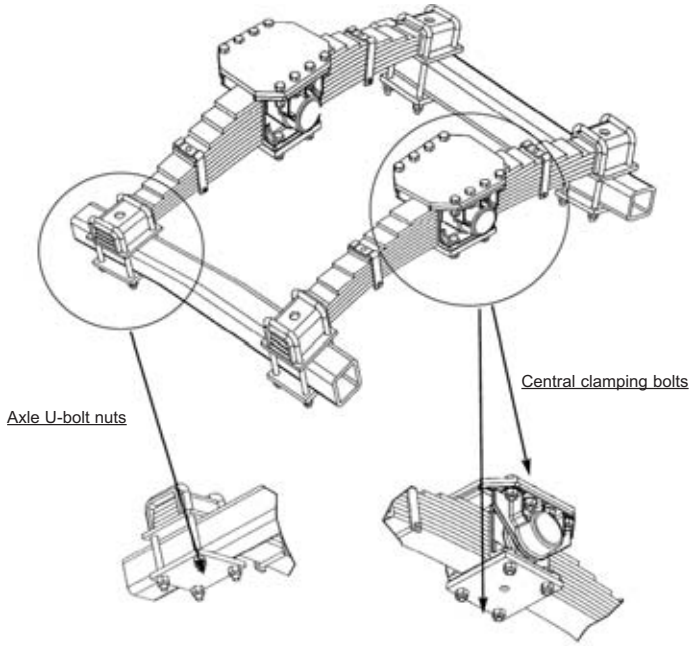
4.2 Bogie with central support box *(figure 4.2)*

After the first laden journey, before intensive use or every 6 months:

- Tighten all the centre clamping bolts and axle U-bolts to the recommended torque.
Tighten the nuts diagonally (see chap.8 page 31).
Lubricate the central bearings

Under harsh or intensive operating conditions, maintenance should be carried out more frequently.

Figure 4.2



Every year:

- Check the play in the centre bearings and, if there is excessive play, replace the worn parts.
- Check the general condition of the springs: clean them thoroughly and brush the sides of the springs to check for cracks.
- If there is any play between the spring and the axle, check the whole of the clamping system (**See figure 4.1.b**): the rubber pad, the clamping box and plate and the alignment pin.

Reassemble, tightening the U-bolt nuts diagonally to the recommended torque (see chap.8 page 31).

5. BASIC TANDEM SUSPENSION AND BASIC HALF-TANDEM SUSPENSION

After the first laden journey, before intensive use or every 6 months (***See Figure 5.1***):

- Tighten all the centre clamping bolts and axle U-bolts to the recommended torque. Tighten the nuts diagonally (See chap.8 page 31).
- Retighten all the nuts and screws on the suspension (spring shackles, rocker, equaliser bearings, spring bolts, springs)

- Lubricate the rocker bearings and the spring bolts.

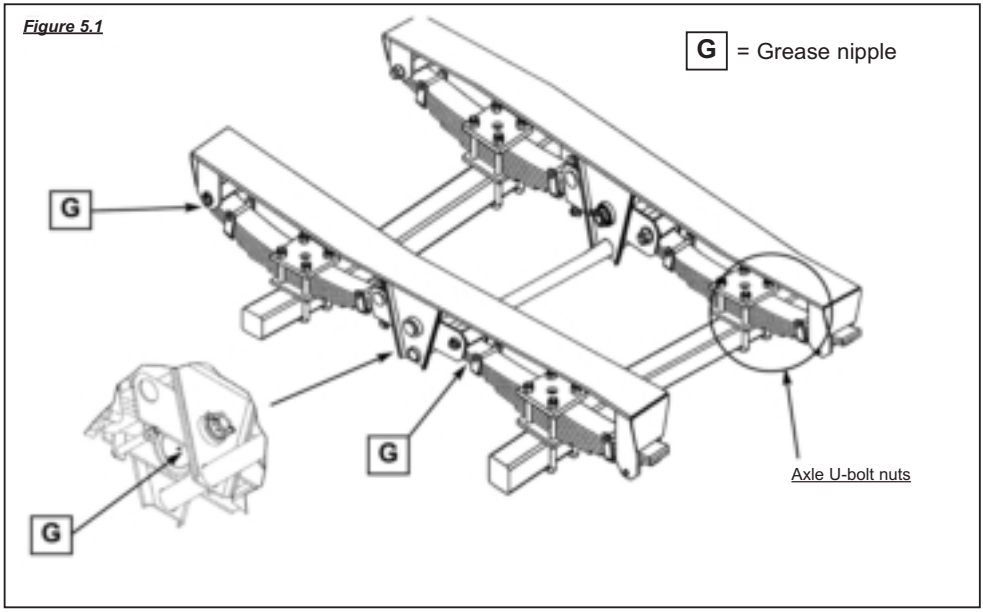
Under harsh or intensive operating conditions, maintenance should be carried out more frequently.

Every year (***See Figure 5.2***) :

- Check the play between the bushings Item 2 and the rocker shafts Item 1 and, if there is excessive play, replace the worn parts.
- Check the rocker Item 3 and the spring shackles Item 4 for wear (spring bearing surface) and replace these parts if they are very worn.
- Check the general condition of the springs Item 5, clean them thoroughly and brush the sides of the springs to check for cracks.
- If there is any play between the springs and the axles, check the whole of the clamping system: clamping plates Item 8, spring alignment Item 9, brides Item 10.

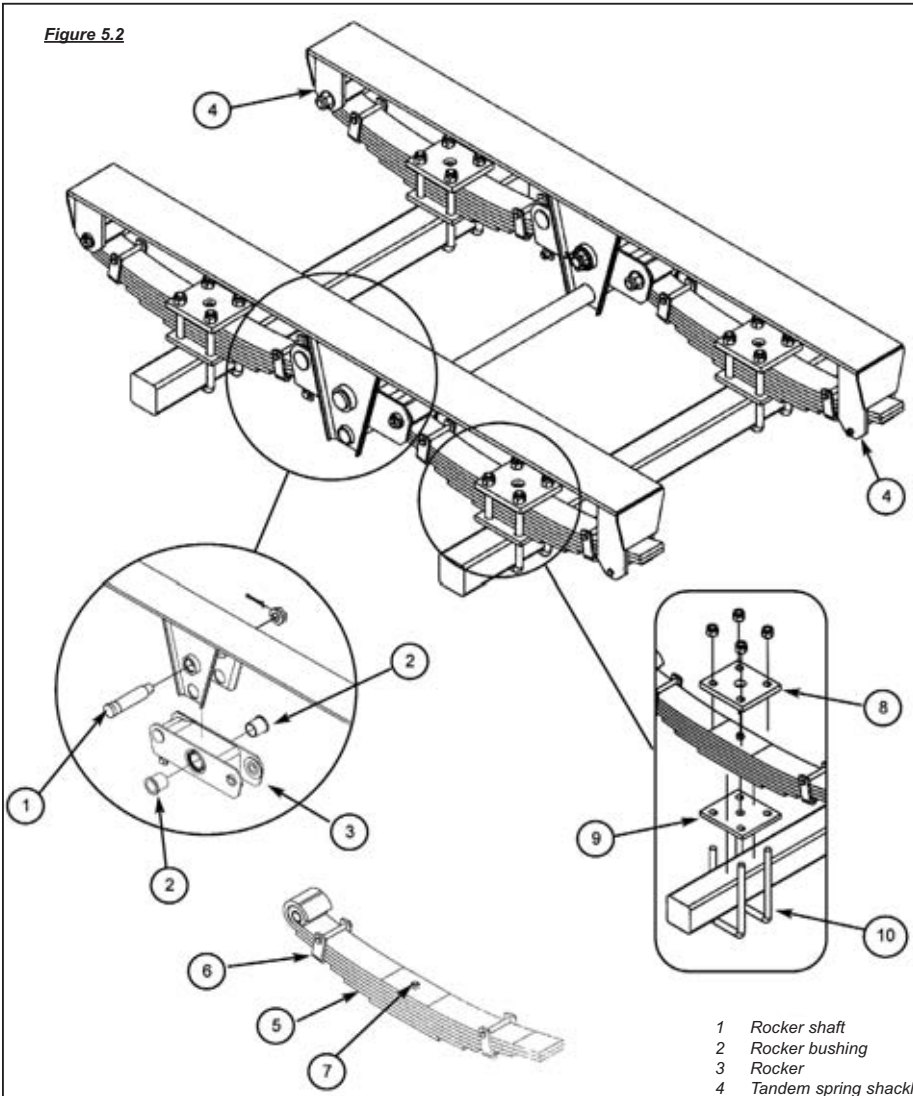
Maintenance of half-tandem suspensions without rocker bars is the same as for simple tandem suspensions with rocker.

Figure 5.1



5. BASIC TANDEM SUSPENSION AND BASIC HALF-TANDEM SUSPENSION

Figure 5.2



1 *Rocker shaft*
2 *Rocker bushing*
3 *Rocker*
4 *Tandem spring shackles*
5 *Springs*
6 *Clamps*
7 *Centre bolts*
8 *Clamping plates*
9 *Centre bolt alignment plates*
10 *U-bolts*

6. ROD HALF-TANDEM SUSPENSION, TANDEM AND TRIDEM

After the first laden journey, before intensive use or every 6 months ***(See figure 6.a)***:

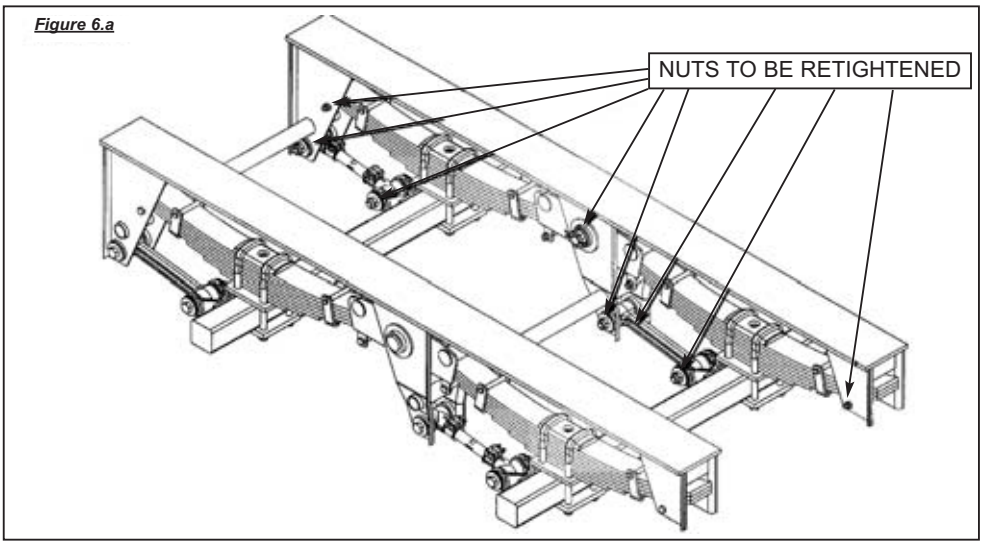
- Tighten all the axle U-bolt nuts to the recommended torque.
Tighten the nuts diagonally (See chap.8 page 31).
- Retighten all the nuts and screws on the suspension (spring shackles, rocker, fixed and adjustable trailing arms, springs).
- Retighten the adjustable trailing arms ***(See figure 6.b)***: if the bolts were loose, the length of the trailing arms may be incorrect. Check that the axles are correctly aligned after tightening (central section with left and right-hand threads).
- Retighten the fixed and adjustable trailing arm flexible bushing mountings:
NB: The clamping washers Item 1 should not touch the bracket Item 2. If they do, the conical rubber bushings should be replaced Item 3 ***(See figure 6.c)***.
- Check the condition of the clamping bolts.
- Lubricate the rocker shafts.

Under harsh or intensive operating conditions, maintenance should be carried out more frequently.

Every year (See figure 6.d)

- Check the play between the bushings Item 1 and the rocker shaft *Item 2*, and, if there is excessive play, replace the worn parts.
- Check the rocker *Item 3* and the spring shackles *Item 4* for wear (spring bearing surface) and replace these parts if they are very worn.
- Check the general condition of the springs *Item 5*, clean them thoroughly and brush the sides of the springs to check for cracks
- If there is any play between the springs *Item 5* and the axles, check the whole of the clamping system: clamping plates *Item 8*, spring bolt alignment plate *Item 9*, U-bolts *Item 10*.

Figure 6.a



6. ROD HALH-TANDEM SUSPENSION, TANDEM AND TRIDEM

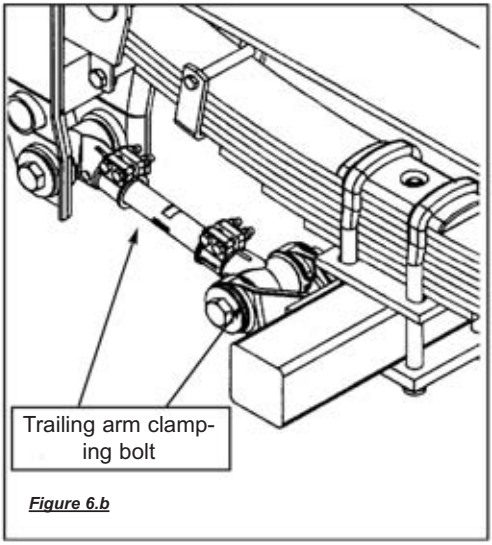


Figure 6.b

Figure 6.c

1 *Clamping washer*
2 *Bracket*
3 *Conical rubber bushing*

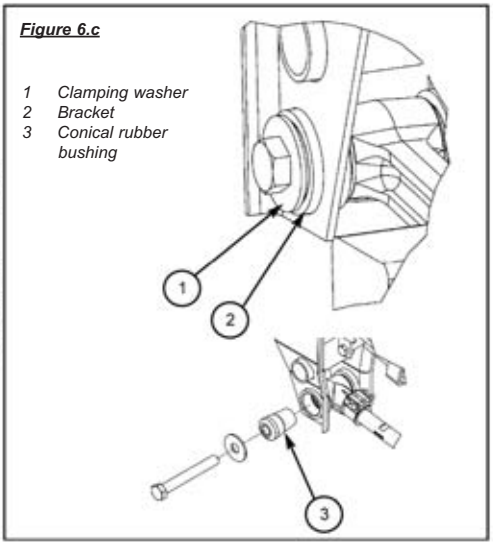
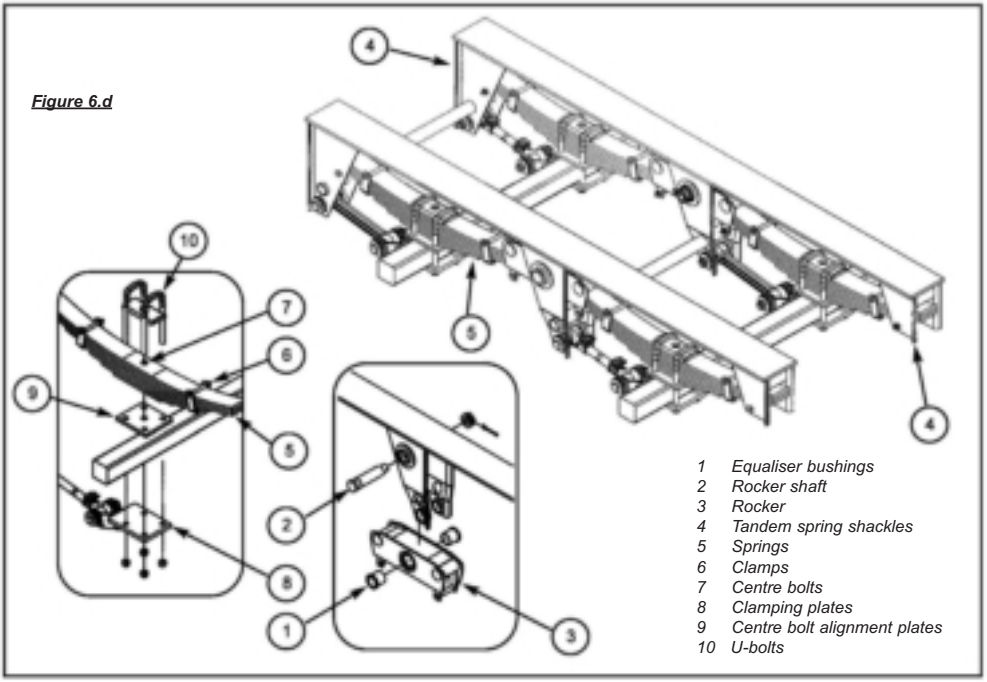


Figure 6.d



1 *Equaliser bushings*
2 *Rocker shaft*
3 *Rocker*
4 *Tandem spring shackles*
5 *Springs*
6 *Clamps*
7 *Centre bolts*
8 *Clamping plates*
9 *Centre bolt alignment plates*
10 *U-bolts*

7. AIR SUSPENSION

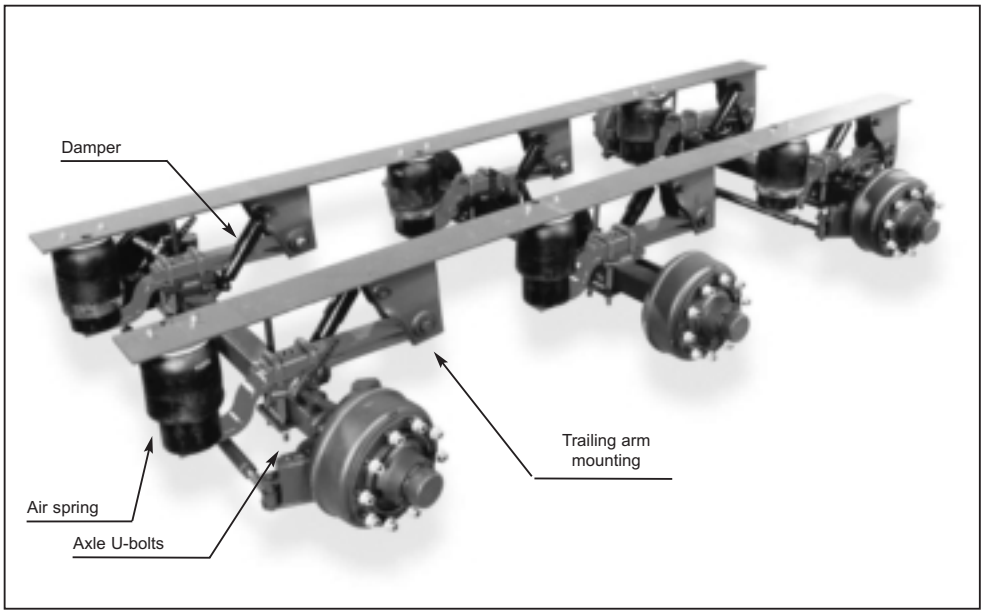
After the first laden journey, before intensive use, every 6 months or 25,000km:

- Retighten all the axle U-bolt nuts.
Tighten the nuts diagonally (See chap.8 page 31).
- Retighten all the nuts and screws on the suspension, checking in particular that the spring flexible mounting are firmly clamped.
- Check that the outside of the air spring is not damaged or worn (rubbing) and that there are no holes, cracks, crazing or foreign bodies. Remove, if necessary, and replace the faulty parts.
- Check for air leaks and plug them
- Check for any leakage from the dampers: poor road holding and wheels lifting on bad road surfaces are usually caused by faulty dampers.
- Check the damper flexible mountings by moving the damper by hand
- Check the trailing arm flexible mountings and replace if necessary. If they are worn, the play can be seen by moving the vehicle backwards and forwards, with the wheels locked using the parking brake or chocks.

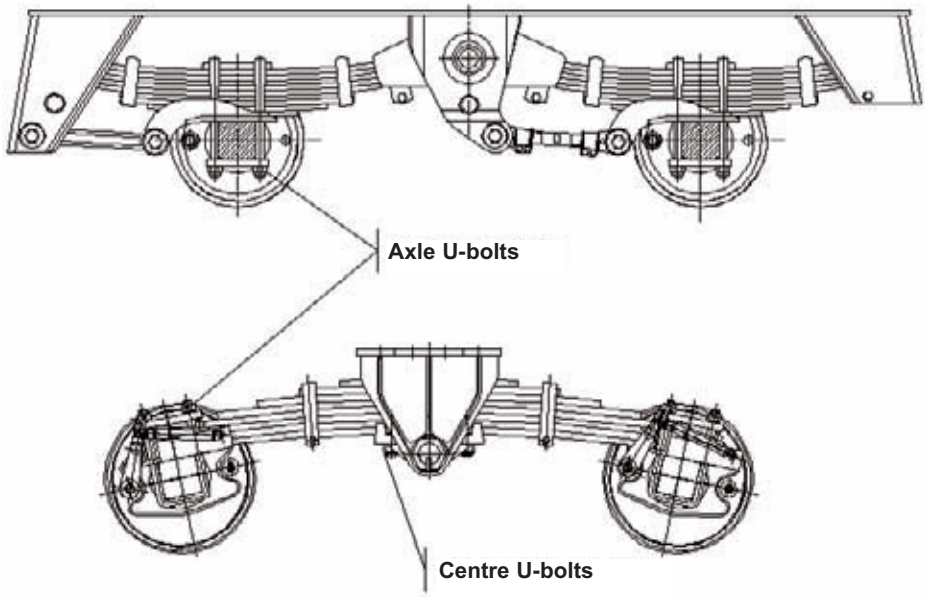
Under harsh or intensive operating conditions, maintenance should be carried out more frequently.

See the vehicle manufacturer's manual for the settings and maintenance of the air system.

NB: Before carrying out any work on hydraulic or pneumatic systems, take all necessary precautions to ensure that the hydraulic fluid or air is not under pressure.



8. U-BOLT TIGHTENING TORQUE



U-bolt	Torque
mm	mKg
Ø18	23
Ø22	45
Ø24	50
Ø27	60

9. SPRING DRAWBAR

After the first laden journey, before intensive use or every 6 months ***(See figure 8)***

- Retighten all the mounting U-bolt nuts to the recommended torque *Item 2*.
- Lubricate the attachment shaft *Item 3*.

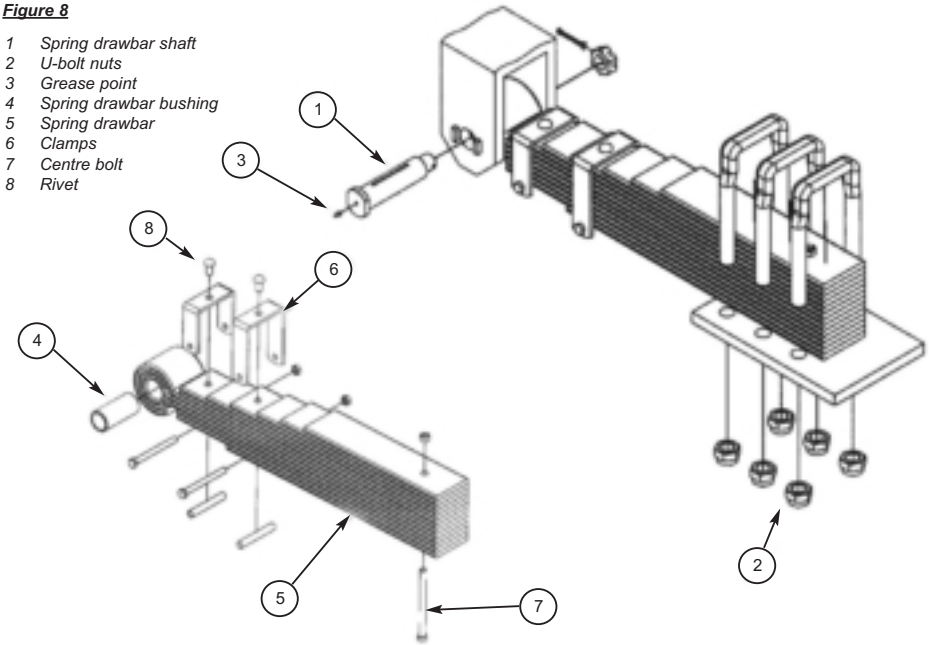
Under harsh or intensive operating conditions, maintenance should be carried out more frequently.

Every year:

- Check the play between the bushing *Item 4* and the spring drawbar shaft *Item 1*, and, if there is excessive play, replace the worn parts.
- Check the general condition of the spring *Item 5*, clean it thoroughly and brush the sides of the springs to check for cracks. Check the condition of the clamps *Item 6*.

Figure 8

1 Spring drawbar shaft
2 U-bolt nuts
3 Grease point
4 Spring drawbar bushing
5 Spring drawbar
6 Clamps
7 Centre bolt
8 Rivet

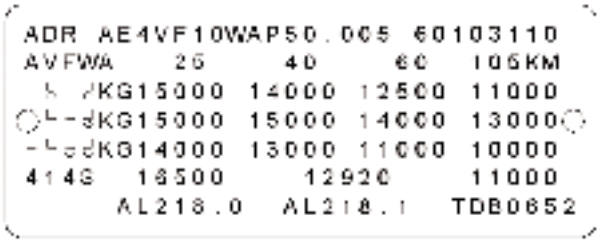


10. SPARE PARTS

COLAERT ESSIEUX axles, bogie, tandem and tridem suspensions all have an ID plate.
These plates are fixed to the axle shaft, the brake cover, the centre mounting bracket or the equaliser mounting bracket for tandems and tridems.

When ordering COLAERT ESSIEUX spares, please give the vehicle manufacturer all the information marked on these plates, as shown in the example below.

AXLE AND BRAKE ID PLATE (Riveted on the axle shaft)



11. MINIMUM PROGRAM OF MAINTENANCE

This maintenance plan is intended for normal operating conditions. More frequent maintenance may de required for harsh operating conditions (construction sites, mountains, intensive use, etc).

See the following paragraphs for detailed maintenance instructions.

	on commissioning	after the firt laden journey	after the first 1,000 km	every 3 months	every 6 months or 25,000 km	before intensive service	every 2 years or 50,000 km
2.2 Axle maintenance and adjustment							
2.2.2 Tightening and retightening wheel nuts	X	X	X		X		
2.2.3 Checking the hubcaps	X				X		
2.2.4 Checking the wheel bearing play			X		X	X	
2.2.6 Lubricating the wheel bearings							X
2.3 Brake maintenance and adjustment							
2.3.1 Initial checks	X	X		X		X	
2.3.2 Checking brake clearance and wear				X		X	
2.3.3 Adjusting brakes with fixed levers				X		X	
2.3.4 Adjusting brakes with adjustable levers				X		X	
3. Steering axles							
3.2.1 Normal maintenance				X		X	
3.2.2 Checking and adjusting the wheel alignment					X		
3.2.3 Locking cylinder maintenance and adjustment					X		
3.2.4 Adjusting the clearance, steering axles with tapered pins only						X	
3.2.5 Adjusting the steering angle						X	
4. Bogies suspension		X			X	X	
5. Basic tandem suspension and basic half-tandem suspension		X			X	X	
6. Rod half-tandem suspension, tandem and tridem		X			X	X	
7. Pneumatic suspension		X			X	X	
8. Springs drawbar		X			X	X	

NOTES

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maintenance manual

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