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USER MANUAL FOR FORAGE WAGON

MKL



Happy to become an agricultural machinery supplier of Yours!

Willingly, efficiency of Laumetris machinery will vastly increase Your overall results.

Kind regards,

Laumetris

Specification of the manure spreader / Warranty Certificate

Machine type / commercial name:	Forage wagon
EU vehicle whole-type approval number:	e32*167/2013*0 ____ * _ ____
Production date:	_____
Type:	MKL
Version:	_____
Variant:	_____
Vehicle identification number (VIN):	_____
Axle serial number:	_____
Steered axle serial number:	_____
Manufacturer:	„Laumetris“, UAB Technikos street 5, Keleriskiai, Kedainiai district, 57342, Lithuania Tel.: +37034742390 info@laumetris.lt
The Seller:	_____
Address:	_____ _____ _____
Phone, email address:	_____
Delivery address:	_____ _____ _____
Owner or user:	_____
Name, surname / company name:	_____
Address:	_____ _____ _____
Phone, email address:	_____

Manufacturer:
UAB „Laumetris“

signature

Seller:

signature

Buyer:

signature

WARRANTY

Standard factory warranty period for Laumetris machinery is 12 months after delivery. Warranty is only applicable if the Warranty Certificate document is signed correctly and scanned copy returned to Laumetris by post or email address: garantija@laumetris.lt

Seller may provide different warranty periods, in such cases the seller must be addressed regarding the warranty claim.

Only claims, which had been correctly completed and submitted no later than two weeks after the defect occurred, can be processed. Warranty claim document and procedure steps can be found here:

<https://www.laumetris.lt/downloads>

Warranty voids:

- Damage was caused by overloading.
- Arbitrary modifications of machinery.
- Misuse of machinery.

Warranty is not applicable for wearing parts: tires, rims, brakes, bearings, conveyer gears, manure spreaders vertical beaters blades.

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Declaration of conformity



EU DECLARATION OF CONFORMITY FOR THE MACHINERY

According to EU Machinery Directive 2006/42/EC

UAB „Laumetris“, Technikos street 5, Keleriskiai village, Kėdainiai district, 57342, LITHUANIA
hereby declares that the Transporting machinery named below are
manufactured in compliance with Council Directive 2006/42/EC

The above declaration covers the following manure spreaders:

MKL-XX;

Serijos Nr.: MKLXXXXXJXXXXX550 - MKLXXXXXXXXXXXXX999 (X is a variable symbol)

Keleriškiai 2019 02 13

A handwritten signature in blue ink, enclosed in a blue oval.

Jonas Putna
Commercial director
UAB „Laumetris“

Technikos street 5, Keleriskiai village, Kedainiai district, 57342

The undersigned is also authorised to compile technical documentation for the above machines.

1. INTRODUCTION

This document (manual) describes the use and servicing of manure spreaders.

Manure spreaders:

MKL-10; MKL-12; MKL-14; MKL-16; MKL-18; MKL-20;

The user manual contains partial information on the transportation of possible goods as well as specifics of the use and lay-up. For more detailed information as well as for warranty repair, the manufacturer plant shall be addressed.

The manufacturer reserves the right to change the design of the products in improving their quality without any further notice to the buyer. Also, the manufacturer is not obliged to make such changes to already sold products.

MKL manure spreaders are made for safe use provided that the user manual is followed. Therefore, this manual must be read before beginning to use the product.

Read the manual before using the product.

The user manual is the main guidance for the product.

Other important information can be found on the website www.laumetris.lt/downloads

In case needed information cannot be found on this manual nor Laumetris website, request for it directly. UAB "Laumetris" assumes no responsibility for the events that may occur. Only a professional may operate the product and the product must be checked before every use to assure safety of an operator, environment, surroundings and everybody else.

1.1 Identification

When addressing the issues of correspondence, warranty repair, and other issues, please refer to the manure spreader's vehicle identification number.



Fig. 1.1. Statutory plate is located on the right side of the manure spreader.

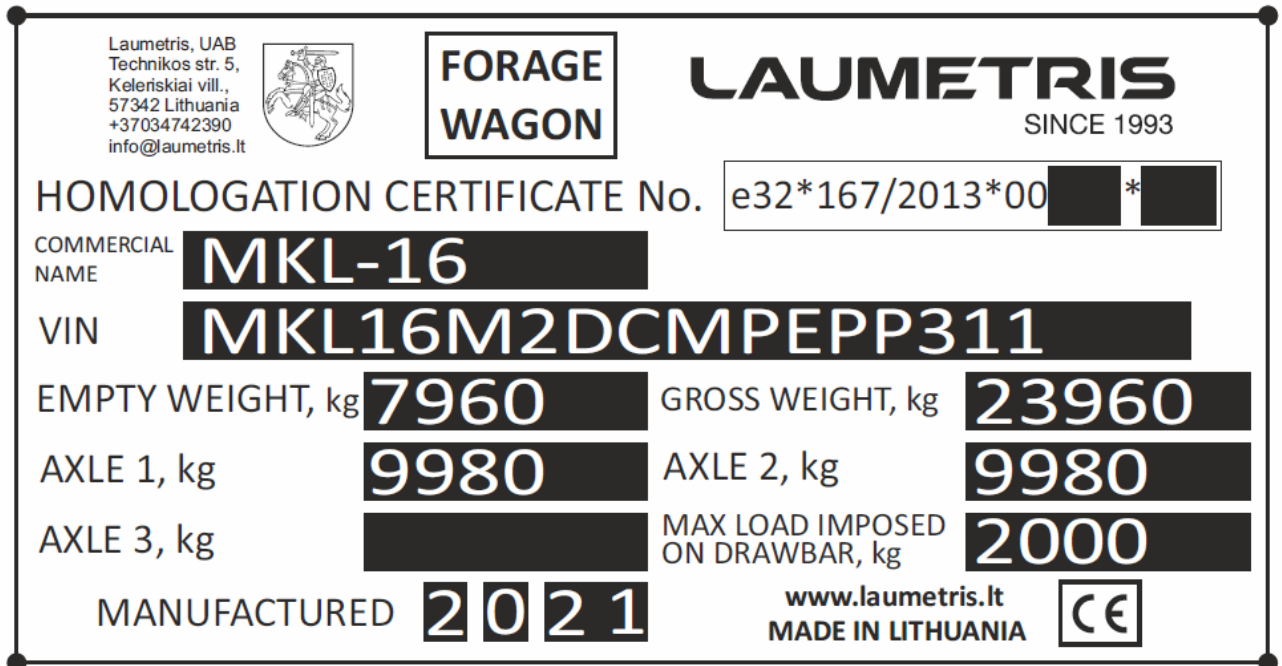


Fig. 1.2. Manure spreaders statutory plate

The manure spreader identification data are indicated on the manufacturer's statutory plate placed on the right frontal side of the frame. The number is written and embossed on the frame above the statutory plate.

THE USER MANUAL IS THE MAIN GUIDANCE FOR THE MANURE SPREADER

Axis statutory plate

Wheel axis brand and type are marked on the axis statutory plate which is on the center of the axis.



Fig. 1.3. Axis statutory plate position.

1.2 Purpose

The manure spreaders are intended to transport manure to the field and spread it.

UAB "Laumetris" produced manure spreaders are made with vertical manure beaters, which cut and spread manure. Vertical manure spreading beaters chop and spread manure in a wide area. This model manure spreaders, spread manure up to 12 meters width.

The manure spreaders may be aggregated with self-propelled tractors fitted with an external hydraulic system, output for warning and stopping light signalling, and hitch for attaching agricultural machinery.

The manure spreader may not be used for the transportation of people.

The manure spreader may not be used for the transportation of fuel, gas cylinders, toxic substances, etc. as well as unsafe goods, which may cause environmental pollution or the transportation whereof requires compliance with additional technical conditions. The manufacturer shall not be liable for it and this risk shall be assumed by the machinery user.

When using the manure spreader, the conditions for use, servicing, and lay-up provided for by the manufacturer shall be followed.

Work with the manure spreader shall be allowed to persons who have familiarized themselves with the design of and servicing manual for the manure spreader, attended a work safety and first medical aid course, and hold a tractor driver's license.

During work, effective work safety requirements and occupational medicine, safe driving, and road traffic rules must be observed.

The manufacturer plant shall not be liable for the consequences of any unauthorized change of the design of the manure spreader.

1.3 Scope of supply

The manure spreader is delivered as a complete assembly.

The scope of supply shall include:

- Manure spreader;
- operating manual;
- warranty certificate with warranty conditions;

At the customer's request, the manure spreader can be equipped with hydraulic brakes.

1.4 Transportation

The manure spreader is prepared for sale completely assembled and does not require additional packing. Packing is required only for the manure spreader documentation and additional fittings. The manure spreader is delivered to the customer on a trailer or attached to a tractor.

1.4.1 Manure spreaders transportation on a trailer

Loading and unloading of the manure spreader from a transportation trailer is done by using a loading ramp and using an agriculture purpose tractor. Follow general health and safety principles during work. The person carrying out the loading / unloading work must have the qualifications required to operate these vehicles. The manure spreader must be coupled to the tractor in accordance with these instructions. The brake system of the manure spreader must be checked before driving the loading ramp.

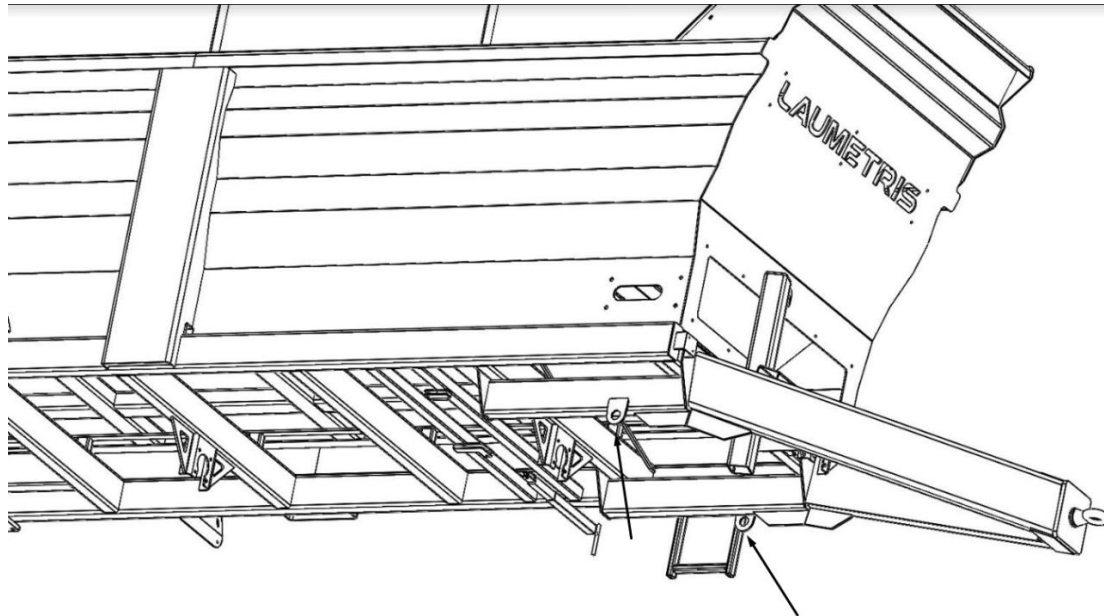


Fig. 1.4. Manure spreader fastening loops at the front and rear.

When the manure spreader is loaded onto the transportation platform, the parking brake must be turned on. Lashing straps or chains must be connected to the transport platform through specified loops and tensioned. Uncouple the tractor after attaching the manure spreader.

! Attention! When the manure spreader is transported on a platform, it must be secured in accordance with safety requirements and directives.

The driver of the vehicle must be particularly careful during transport, as the center of gravity of the vehicle has risen after the manure spreader has been loaded.

Use only certified and technically reliable fasteners. Carefully read user's instructions for proper mounting.

During mounting care must be taken not to damage transportation loops or paint. The weight of the manure spreader is given in tables 3.1, 3.2.

! Attention! Improper securing of the fasteners can cause an accident

1.4.2 Requirements prior to use

Before using the manure spreader, the user must read the operating instructions and follow the instructions provided. During transportation adjust the driving speed to the road conditions, but do not exceed the maximum permitted speed.

! Attention! The user must read the operating instructions before transporting the manure spreader on his own.

2. GENERAL REQUIREMENTS FOR WORK SAFETY

2.1 Symbols and definitions



**ATTENTION!
IMPORTANT!**

This symbol in the instruction means to pay attention to the safety of use, i.e. possible breakdown or danger of injury.

The warning signs must be well readable. If damaged, they must be replaced immediately. Original stickers can be purchased from UAB LAUMETRIS.

Failure to execute this instruction may result in the breakdown of the machine or its separate parts.

'Qualified' - person, is someone who has a good knowledge of work safety requirements when working with machinery, is able to identify potential hazards and knows how to avoid them, and has knowledge of providing first aid to injured people.

The term "use" shall cover installation, commissioning (preparation for use), and servicing (commissioning, start-up, shut-down, etc.).

It is important to draw attention to other essential points, such as transportation, installation, use, and servicing as well as to technical data (in the user manual, production documentation, and directly on the machine) in order to avoid hazards which may cause bodily injuries or damage to implements.

2.2 Obligatory provision of information

The user manual is the main guidance for the operator of the manure spreader. When transferring the machine further to other users, the user manual must also be transferred. The person who has accepted the manure spreader must also familiarise himself with the user manual.

2.3 General requirements for work safety and use

When using and servicing the manure spreader, the general requirements for work safety and use in operating the tractor shall be followed.

Before starting to operate the manure spreader, it is necessary to familiarise oneself with the design of the manure spreader and work safety requirements.

Make sure that all warning and information signs and notices are present on the machine.

Check the reliability of the attachment of the manure spreader to the tractor and connection of the control systems of its parts to the systems of the tractor.

It is prohibited to use the manure spreader by children, unauthorised persons, or intoxicated persons.

2.3.1 General requirements for work safety

1. Attach the manure spreader to the hydraulic-assisted hook installed at the tail of the tractor or to the hitch loop.
2. When attaching and detaching the manure spreader, be attentive because there may be hazard of injury due to the lifting or compressing force that has formed at the hitch. If the manual brake of the manure spreader is not turned on, it is prohibited to stay between the tractor and the manure spreader or behind the manure spreader.
3. When connecting the hydraulic, pneumatic, and electricity systems of the manure spreader to the respective systems of the tractor, the engine must be shut down and the engine ignition key must be pulled out.
4. Before beginning work, check the following:
 - The reliability of the connection of the manure spreader to the tractor. The hitch pin must be secured.
 - The reliability of the connection of the hydraulic system and pneumatic system;
 - The reliability of the connection and technical condition of the light signalling system and brake system;
 - The tyre pressure (refer to Table 2.1);
 - The sufficiency of visibility and absence of people in the vicinity before driving;
 - The possible radius of turning of the tractor with the manure spreader without hindering with the drawbar the other parts of the suspension system of the tractor.
5. The following shall be **PROHIBITED** when working with the manure spreader:
 - To work without having familiarised oneself with the design of the manure spreader and work safety requirements;
 - To start the hydraulic, pneumatic, and electricity systems of the manure spreader without having checked the reliability of the connection of the manure spreader to the tractor;
 - To work under the lifted tail gate without having secured it with hydraulic locks;
 - To work with non-operating brakes of the manure spreader;
 - To work with broken down light signalling;
 - To tow the manure spreader at a speed above 25 km/h;
 - To exceed the maximum permissible total weight of the manure spreader established in Article 17 of the EU Regulation No 167/2013.



Attention! To avoid overloading, refer to the densities of the main materials to be transported set out in Table 6.1.

6. Load the body only when:
 - The manure spreader is connected to the tractor;
 - The manure spreader stands on a solid and even surface;

- No people are present in the place of unloading;
 - There are no high lateral winds;
 - The distance from above-ground electricity transmission lines is safe.
7. Drive carefully because the vertical load transferred by the manure spreader to the tractor may affect manoeuvrability.
 8. Choose the driving speed according to the environmental conditions. Avoid sharp turns when driving uphill or downhill.
 9. Keep distance.
 10. If it is necessary to reverse, make sure that visibility is sufficient (another person can help).
 11. Before entering a turn, assess your inertia.
 12. When standing, the tractor and manure spreader must be with activated hand-brakes.
 13. Fix any problems only after shutting down the tractor engine and pulling out the ignition key.
 14. When disembarking from the tractor, shut down the engine and pull out the ignition key. Activate the hand-brake.
 15. Before disconnecting the manure spreader from the tractor, activate the hand-brake of the manure spreader.
 16. Make sure that the following warning notices are attached:
 - At the front of the manure spreader: “Boarding the moving manure spreader is prohibited”;
 17. When loading or unloading the manure spreader, suspend ropes only at points marked with special signs.

2.3.2 Wheels

1. Constantly check the tyre pressure! Maintain pressure according to the manual (Table 2). When in inflating a tyre, do not stand in front of the tyre. In case of excessive pressure, the tyre may explode and cause injuries!
2. Regularly check the condition of the tyre. Use only original tyres.
3. Regularly check the tightening of the wheels.
4. Perform the tightening of the wheels in a certain sequence.
5. Replace wheels and adjust hub bearings and brakes only after installing protective supports under the sway-beam and the axle and inserting protective wedges under the wheels of the opposite side.
6. Install jacks on a firm base under the balance level or axle only at points marked with special signs.

2.3.3 Hydraulic and pneumatic systems

1. The hydraulic and pneumatic systems are under high pressure. In the hydraulic system, the maximum permissible pressure is 15 MPa; in the pneumatic two-circuit system, the maximum permissible pressure is 0.8 MPa.
2. When connecting the hydraulic and pneumatic systems, the machine manufacturer's recommendations must be observed.
3. When connecting the hydraulic and pneumatic systems to respective tractor systems, it must be ensured that the couplings from the manure spreader and tractor sides are not under pressure.
4. Regularly monitor the hydraulic connections and replace any damaged or worn-out parts. The replacement of the hoses must comply with the manufacturer's requirements. Replace the hydraulic hoses every 5 years even if they were not damaged until that time.
5. No dripping in the hydraulic system is allowed. When fixing any problems, release pressure and shut down the tractor engine.

2.3.4 Periodical servicing

1. When performing any maintenance work at the manure spreader, use appropriate tools and wear protective clothes.
2. Perform any cleaning, servicing or repair works only after shutting down the tractor engine.
3. Regularly check bolt connections and tighten them if necessary.
4. Regularly check pivot connections for their wear and for the reliability of the pinning of the axles.
5. Replace any worn-out parts or assemblies with new ones complying with the manufacturer's requirements set for them.
6. Deliver any parts that are not suitable for use to the appropriate points in accordance with environmental requirements.

7. When performing any welding work when the manure spreader is attached to the tractor manure spreader, disconnect wires from the accumulator battery.
8. The manure spreader must be kept under a roof so that not to cause any hazard to humans and animals.

2.3.5 Driving on public roads.

1. Before every drive always check if lightning systems works properly and signs attached to the machine are visible.
2. Before every drive check quality of brakes and braking system. Test brakes when starting to drive.
3. Every agriculture vehicle must have a slow moving vehicle sign.
4. Follow instruction of road traffic regulations.
5. Never exceed speed limit according to road signs and never exceed higher speed than 40 km/h. Take all risks precautions necessary to evaluate safe drive speed according to road condition, loading quality: placement of load (more load on one side than the other); density of load (potential movements of load); amount of load; be extremely careful when transporting liquids.
6. Never exceed loading capacity according to road regulations in your country, Regulation of (EU) No 167/2013 or any other regulation limiting load capacities as well as technical loading capacity. Usually technical loading capacity is higher than according to road regulations.
7. Do not work with the manure spreader when there is more than 8° surface inclination.
8. Pay attention to brakes when starting to use, brakes might not be working at full potential at the beginning of vehicle usage.
9. If leaving a manure spreader loaded on a downhill slope, apply the parking brake and place the safety wedges under the wheels.

2.4 Signs and notices

The signs and warning notices marking the manure spreader must be highly legible and may not be removed. Any damaged or removed sign must be restored. Original signs and stickers can be purchased from UAB LAUMETRIS.



Information sign

ATTENTION!

Read through the manual and follow the work safety recommendations during operation.

Place: at the front of the body.



Information sign

Marking of the attachment point to lift with flexible slings.

Place: At the side beams of the frame.



Information sign

Before beginning technical maintenance or repair, shut down the engine and pull out the ignition key.

Place: at the front of the body.



Indicating sign

Maximum permissible speed of the manure spreader.

Place: at the rear of the body.



Information sign

Keep a safe distance from electrical lines.

Place: at the front of the body.



Warning sign

Attention!

Do not stand on the chain transporter if the tractors motor is on and the PTO shaft is turning..



Warning sign
Marking of the warning of crushing hazards.
Place: at the rear of the body



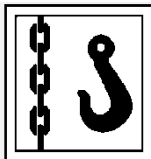
Warning sign
Carriage of people is prohibited.
Place: at the front of the body.



Warning sign
Keep a safe distance from the vehicle.
Place: at the front of the body.



Warning sign
Marking of the warning of crushing hazards.
Do not stand near an opening rear cover.
Place: rear cover.



Information sign
Marking of the place of securing the loading hook.
Place: At the side beams of the frame.



Warning sign
Attention!
Warns about crushing hazards. Do not put hands near a working chain transporter elements.



Information sign
Marking of the place of installing jacks.



Warning sign
Indication of slow moving vehicle.
Place: at the rear of the body.



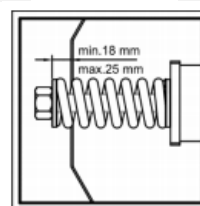
Information sign
Greasing points marking
Place: on the chassis, body, drawbar.



Warning sign
Be careful of thrown out objects. Thrown out objects may harm all parts of the body. Keep a safe distance from the manure spreader, minimum 25 meters.
Place: Manure spreader rear.



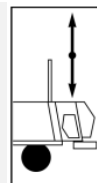
Warning sign
Warns about crushing hazard. Keep a safe distance from spinning manure spreaders.
Place: rear.



Information sign
Check transporter tension.
Place: Manure spreader front.



Warning sign
Wait until all elements of the machine will stop before touching.
Place: manure spreader rear.



Information sign
Raising / Lowering rear cover before beaters (controlled from the tractor).
Place: manure spreader rear.



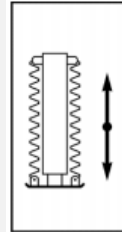
Warning sign
Before climbing into manure spreader body to do maintenance or repairs, turn of the tractor engine and take out the key from ignition, to secure the tractor from unauthorized access.
Place: near ladder.



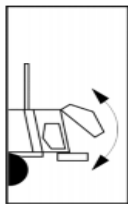
Warning sign.
High pressure oil, risk of penetrating skin and entering body.
Place: at front of the body..



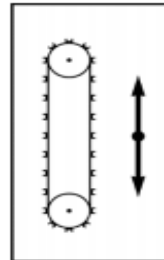
Information sign.
PTO shaft rpm.
Place: front of the body.



Information sign.
Hydraulic support foot lifting (Controlled from the tractor).
Place: front of the body.



Information sign.
Raising/ lowering of the rear cover (controlled from the tractor).
Place: rear of the body.



Information sign.
Changing manure transporter direction to spreading / into the body (controlled from the tractor).
Place: front of the body.

YELLOW	SUPPORT FOOT
GREEN	TAILGATE
RED	MANURE TRANSPORTER
BLUE	HITCH CYLINDERS

Information sign.
Informs about hydraulic lines marking meanings.
Place: front of the body.

Max load on drawbar – 3,0 t	on drawbar
Tyre pressure – 0,4 MPa	at the wheel rims
Maximum pressure of the pneumatic braking system – 0.8 MPa – double circuit	at the front of frame
Maximum pressure of the hydraulic braking system – 15 MPa	at the front of frame
Boarding the moving manure spreader is strictly prohibited	at the front of the body

Table 2.1. Other warning signs.



ATTENTION!

The user of the manure spreader must take care of the legibility of the warning symbols and notices arranged on it and to replace them with new ones if they are damaged.

Tyre	Pressure Bar
650/65R30.5	2.0-4.0
750/65R30.5	2.0-4.0
800/65R32	2.0-4.0
600/55R26.5	2.0-4.0
650/55R26.5	2.0-4.0

Table 2.2. Required tyre pressure.

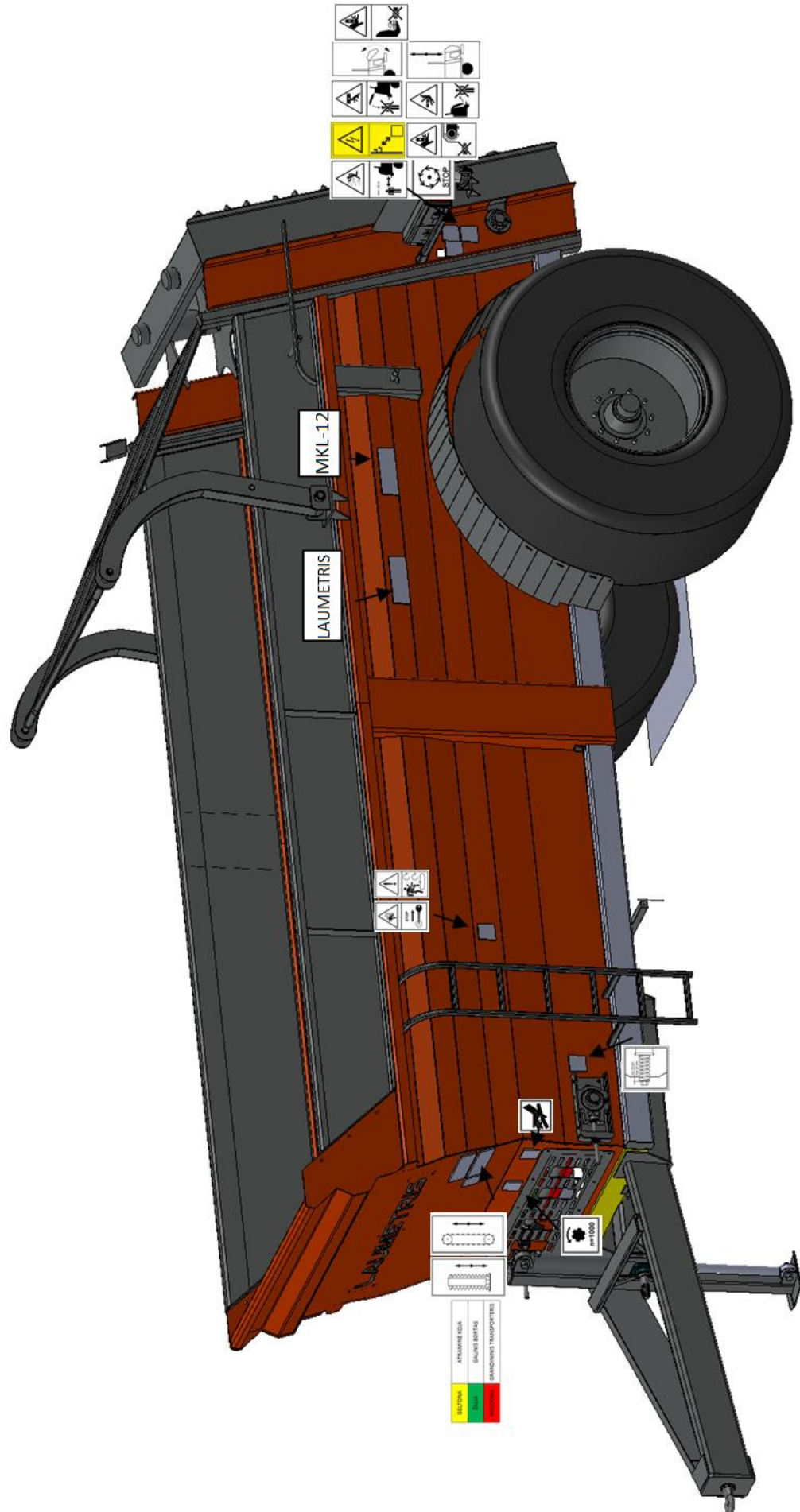


Fig. 2.1. Sticker position schematic.

3. TECHNICAL SPECIFICATIONS

Model	MKL-10	MKL-12	MKL-14
Technical loading capacity, tons*	10	12	14
Volume capacity, m ³	10	12	14
Width, m	3,0	3,0	3,0
Length, m	8,4	8,5	8,5
Height, m	3,4	3,4	3,4
Mass of the manure spreader, kg	6000	6250	6500
Tires size	650/65-R30,5	650/70R32	750/65R32
Maximum transport speed, km/h	25	25	25
Minimum tractor power requirement, HP	120	140	150

Table 3.1. Technical specifications of MKL - 10/12/14. Specifications may differ according different options of a product.

Model	MKL-16	MKL-18	MKL-20
Technical loading capacity, tons*	16	18	20
Volume capacity, m ³	16	18	20
Width, m	3,0	3,0	3,0
Length, m	8,5	9,6	10,9
Height, m	3,4	3,4	3,4
Mass of the manure spreader, kg	8000	8500	9000
Tires size	600/55R26.5	600/55R26.5	710/50R26.5
Maximum transport speed, km/h	25	25	25
Minimum tractor power requirement, HP	170	180	200

Table 3.2 Technical specifications of MKL-16/18/20. Specifications may differ according different options of a product.

*The maximum weight of the load reflects the technical load of the product - it does not indicate the permissible load according to road traffic regulations or other legal requirements.

4. DESIGN AND OPERATING PRINCIPLE

Manure spreaders MKL are metal-structure machines intended for manure transportation to the field and spreading of manure. Manure spreaders are equipped with two vertical manure spreading beaters.

The chassis of the manure spreader has working pneumatic brakes, dependant on the weight of the load being carried. The parking brake is controlled manually using a screw and acts through the friction elements of the working brake of the front axle. The tractor manure spreader are equipped with warning signalling lights and may be used when driving by public roads.

Manure spreaders are manufactured in accordance with EU no. 167/2013 and the requirements of functional safety in the EU 2015/208.

Chain transporter diagram:

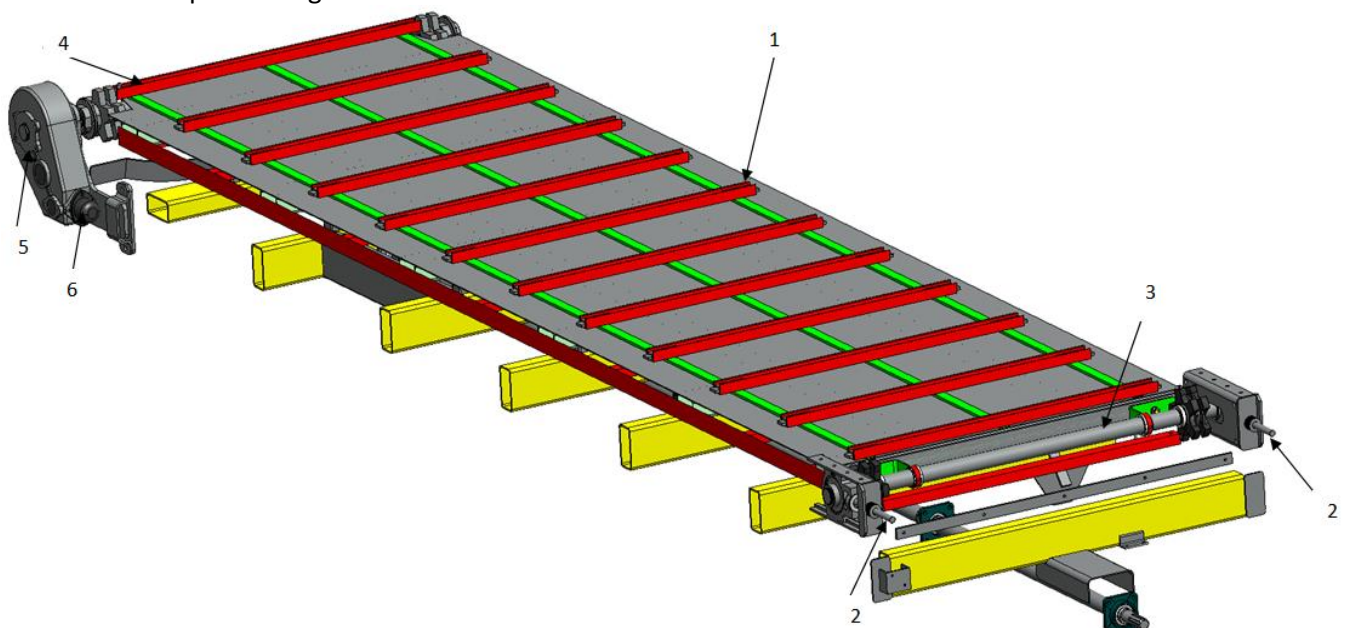


Fig. 4.1. Chain transporter diagram: 1 - chain transporter; 2 - chain transporter tensioning bolts; 3 - chain transporter tensioning axis; 4 - chain transporter driving axis; 5 - reductor; 6 - hydro motor.

Drive transmission diagram when using vertical beaters:

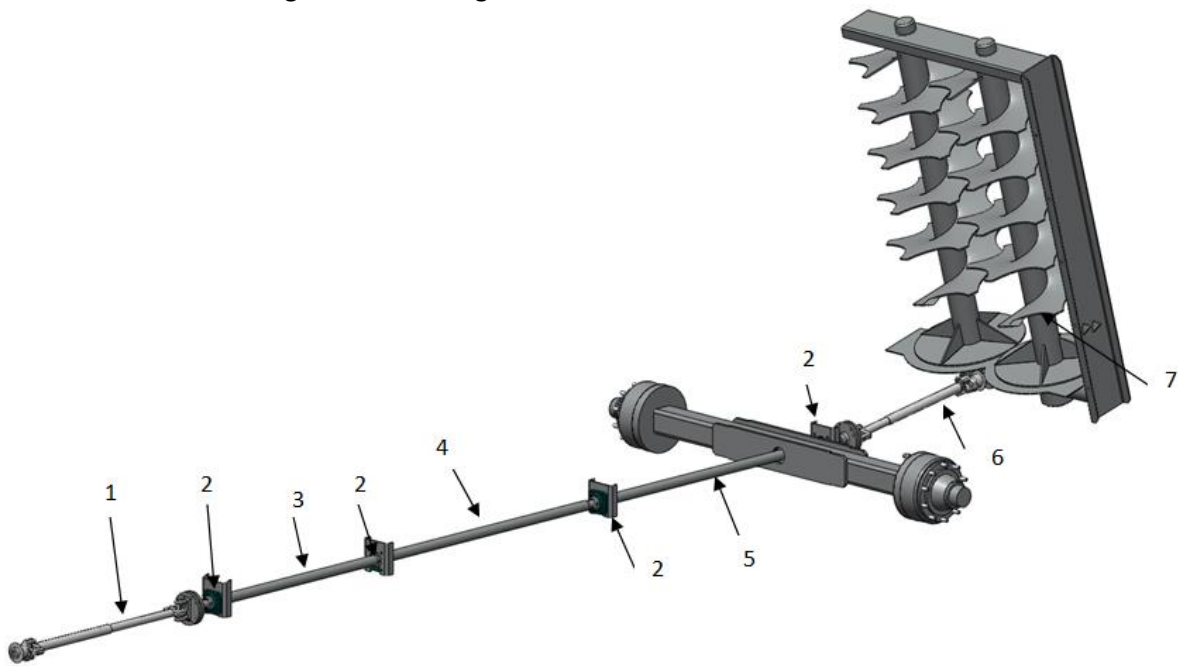


Fig. 4.2. Drive transmission diagram: 1 - PTO shaft with connection to the tractor; 2 -shaft bearing; 3 - transmission shaft; 4 - transmission shaft; 5 - transmission shaft; 6 - PTO shaft; 7 -manure spreader.

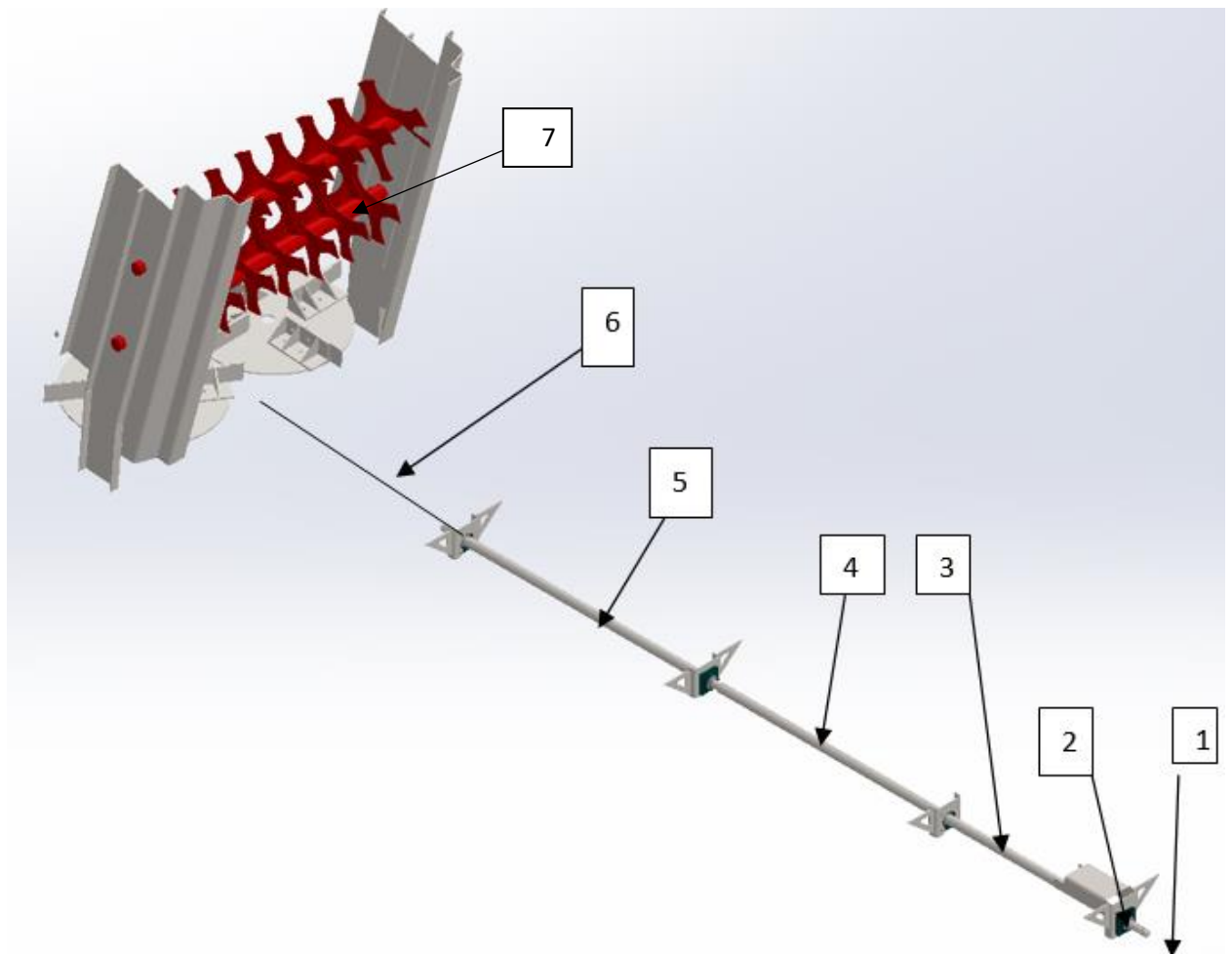


Fig. 4.3 Horizontal beater gear transmission schematic:
1 – PTO shaft with connection to the tractor (see.fig. 4.5.); 2 -Shaft bearing; 3 – transmission shaft; 4 – transmission shaft; 5 – transmission shaft; 6 – PTO shaft (fig. 4.5 and 4.7); 7 – Manure spreader.



Fig. 4.4 Horizontal manure spreader gears; Spreader transmission pto shaft; spreader transmission gear (comes fully assembled from manufacturer – Berma.)



4.5 pav. Bypass clutch; friction clutch.

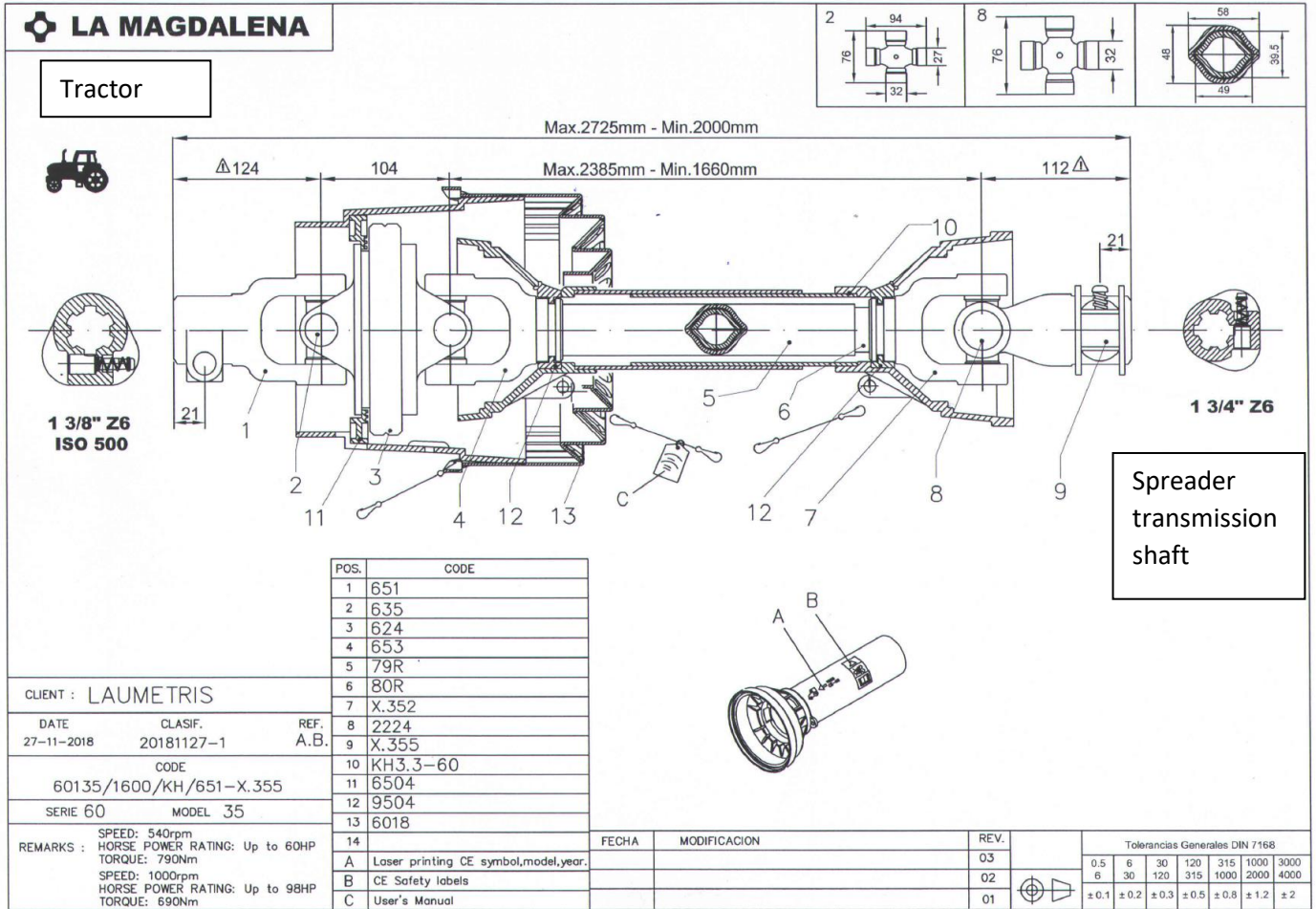


Fig. 4.6 Pto shaft connecting tractor to the manure spreader schematic

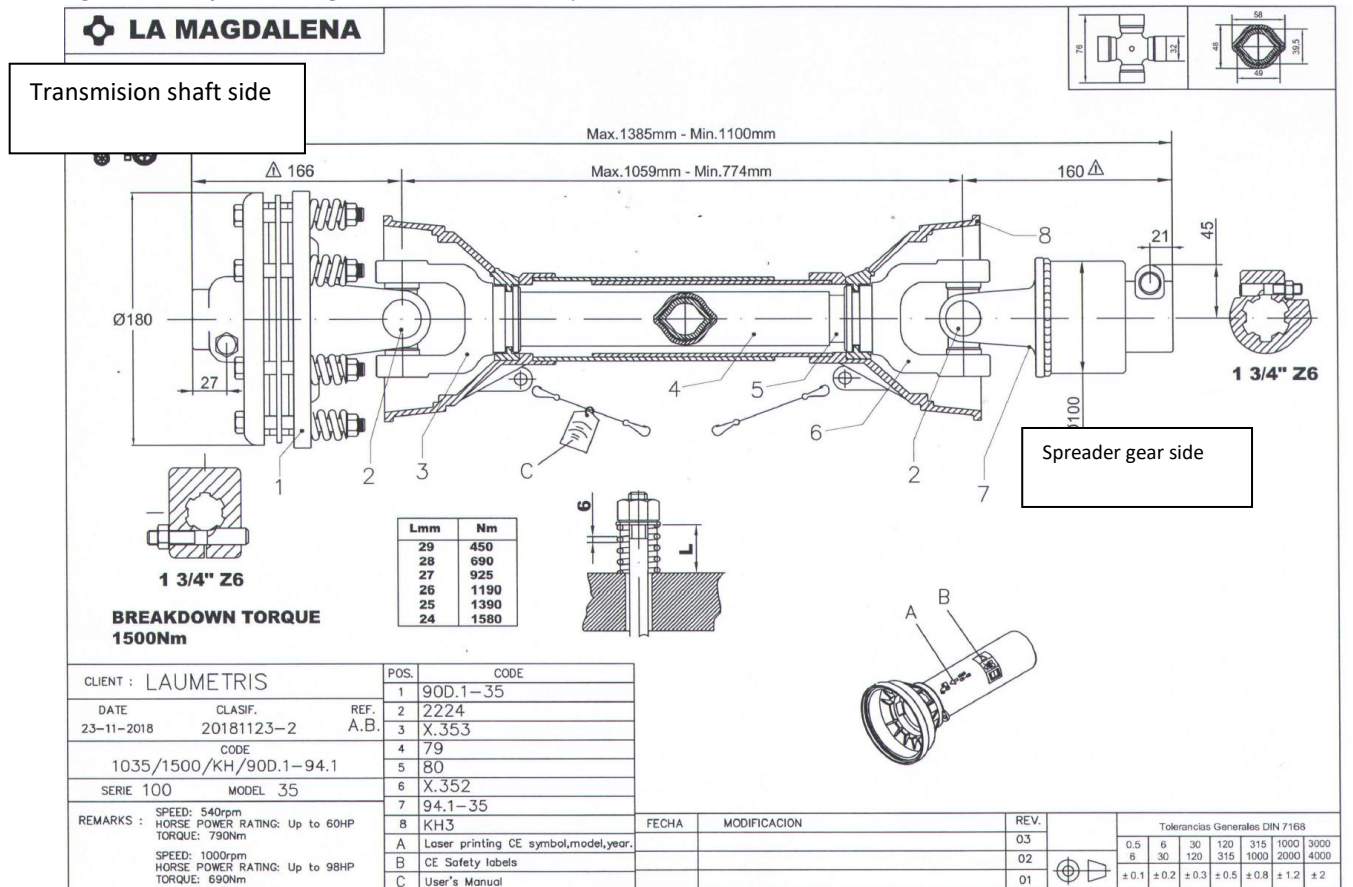


Fig. 4.7 PTO shaft between the last transmission shaft and the spreaders bottom gear. Nr. 1 friction clutch; nr. 7 - bypass clutch.

4.1 Frame

The frame consists of a thick-walled rectangular profile metal pipe welded structure, which has mounting places for the drawbar, chassis, body, and other necessary assemblies.

4.2 Chassis

The single-axle chassis consists of a rigid axle whose hubs have wheel mounting bolts and drum braking mechanisms with extendable cams.

Manure spreaders can be equipped with two or three axle chassis with an automatic steering system. Two axles chassis drives one axle, three axle drives two (first and third). The steering axle hubs can rotate around the vertical joints at the ends of the axle. The angle of rotation of the hubs is regulated by a trapezoidal steering rod system. When moving forward, the force of inertia of the load weight acts on the wheels and turns them towards the trajectory of the tractor wheels. This significantly reduces the extraneous forces acting on the wheels and hubs, reduces tire wear and improves the manoeuvrability of the manure spreader. The vibration of the axle trapezoidal steering rods is reduced by shock absorbers.

Using a manure spreader with a two-axle chassis, when driving forward the steering axle hubs rotation is followed by a hydraulic cylinder inserted in between the hubs, which is switched to floating mode while driving. When reversing the hydraulic cylinder switches to wheel straightening mode, straightens and locks the wheels in the straightened position. The wheels do not steer when driving backwards.



ATTENTION!

If the chassis of the manure spreader has steering axle(s), those must be locked when reversing! Also it must be locked when driving above 25 km/h speed!

4.3 Body

The body is tight, on the back it has two vertical manure spreaders (optionally with spreading discs), manure pushing out chain transporter, lifting back cover.

4.4 Variable-height support foot

The manure spreader can be equipped with a mechanical or hydraulic variable-height support foot. The variable-height support foot is necessary when the manure spreader is not in use (detached from the tractor).

Mechanical variable-height support foot. By turning the handle to one or another side, the length of the device changes, while changing the position of the drawbar towing loop in the vertical direction. When the manure spreader is attached to the tractor, the supporting device is reinstalled into the horizontal position and fixed with a pin.

4.5 Hydraulic tailgate lifting mechanism

The hydraulic tailgate lifting mechanism raises the tailgate. It is lowered by releasing pressure in the system (the force of the weight of the gate squeezes oil from the hydraulic cylinder), or forcedly. Power to the hydraulic tailgate lifting mechanism is supplied from the hydraulic system of the tractor (Fig. 4.3).

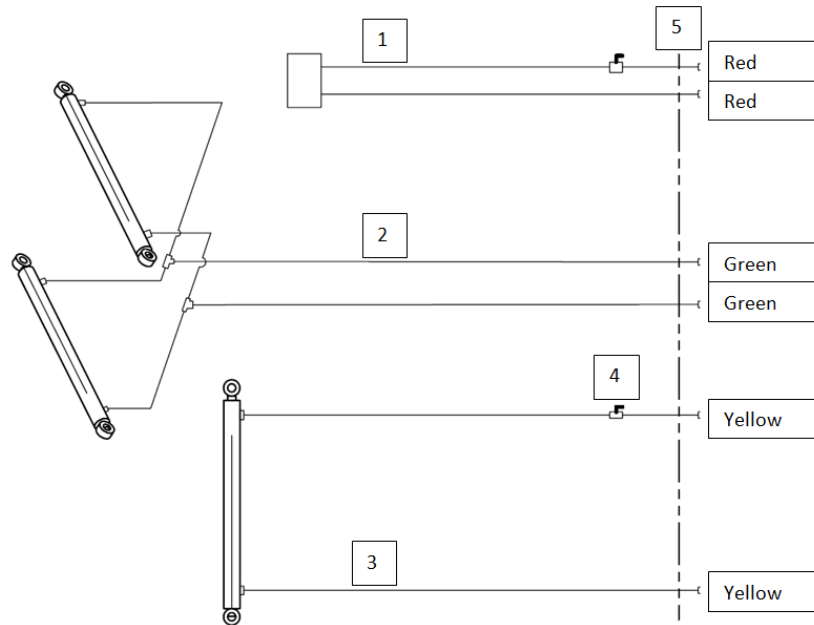


Fig. 4.3. The general hydraulic diagram of the manure spreader. 1 - chain transporter hydro motor; 2 - tailgate hydraulic cylinders; 3 - support foot hydraulic cylinder; 4 - valve; 5 - connection coupling.

4.6 Warning light signalling

The electricity system of the tractor manure spreader is adapted to operation together with the direct 12 V current electricity system of the tractor.

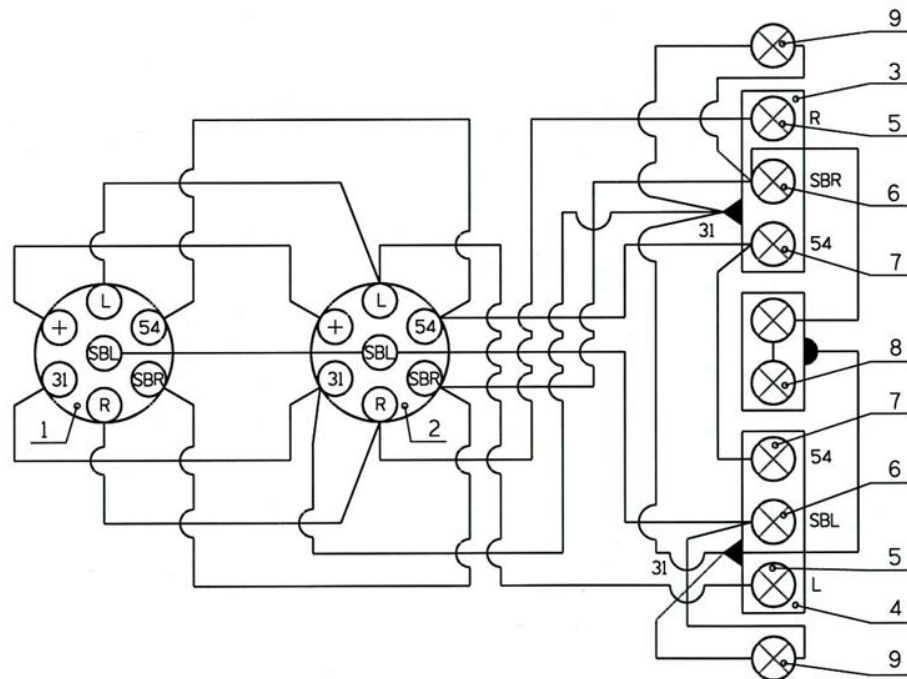


Fig. 4.4. The general electric diagram of the Manure spreader MKL. 1 – electrical switch socket to the tractor; 2 – electrical switch to the manure spreader; 3 – rear right light; 4 – rear left light; 5 – turn signal lamp; 6 – fender lamp; 7 – brake lamp; 8 – licence plate lamp; 9 – position lamp.

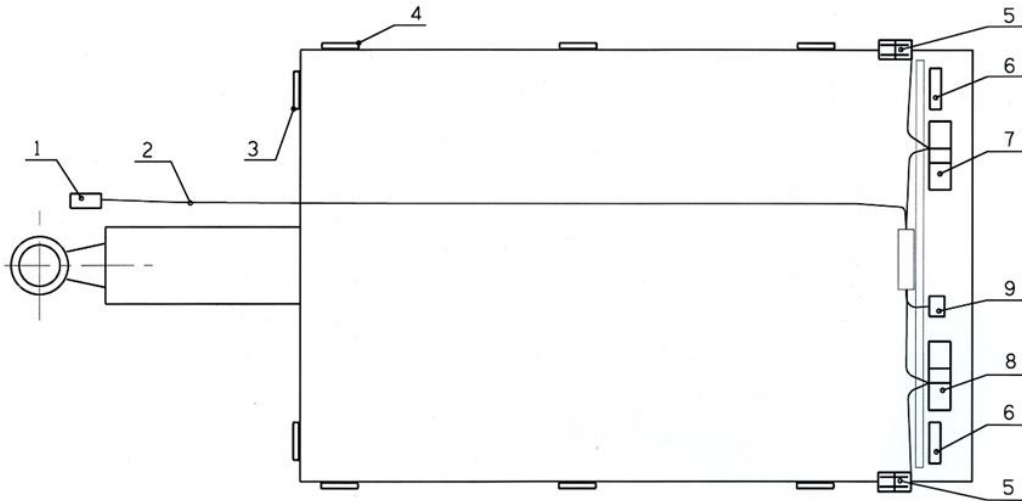


Fig. 4.5. The layout diagram of the lights of the manure spreader. 1 – connecting socket; 2 – wires; 3 – white front reflector; 4 – yellow side reflector; 5 – position lights; 6 – red rear reflector; 7 – rear right light; 8 – rear left light; 9 – licence plate light.

4.7 Brake system

The tractor manure spreader may be equipped with a pneumatic or, at the customer's request, hydraulic Hydraulic single line circuit braking system.

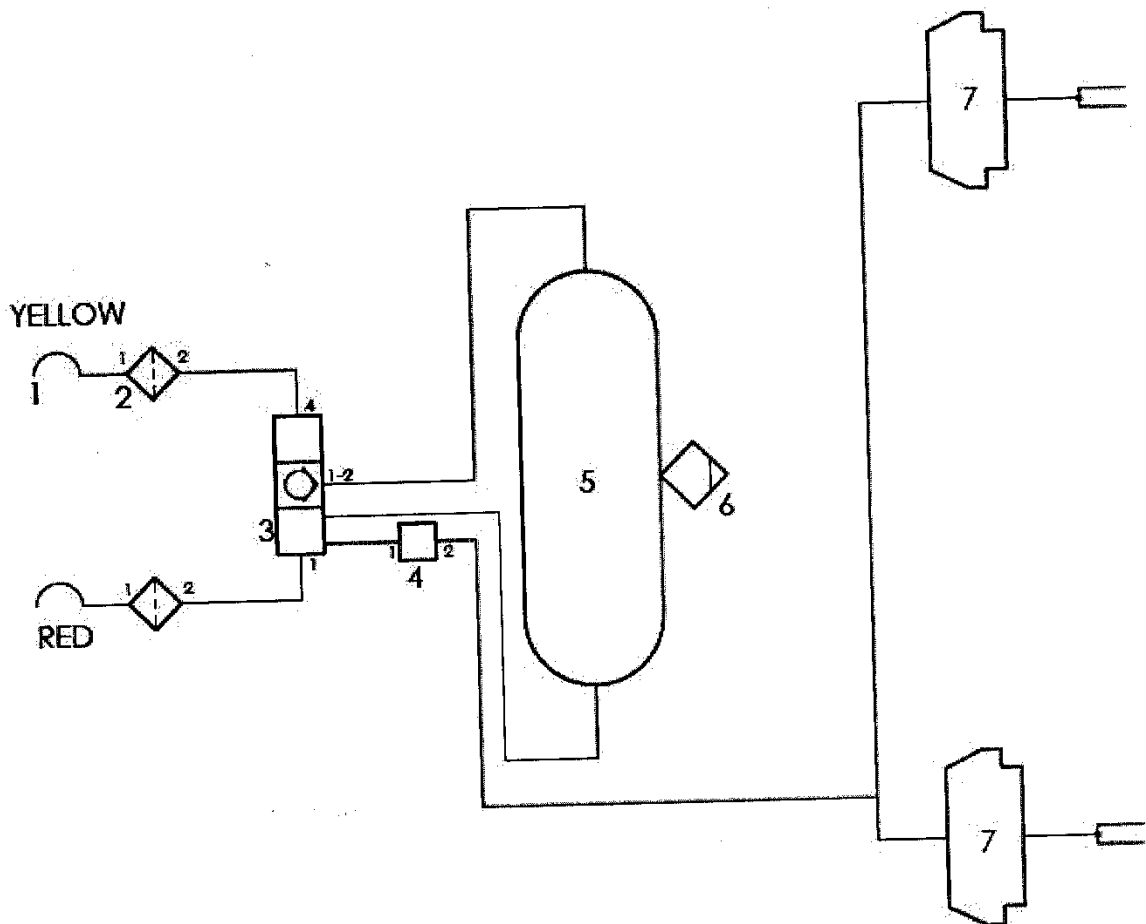


Fig 4.6 Pneumatic one axle breaking schematic. 1 – pneumatic connection head; 2 – air line filter; 3 – break release valve; 4 – pneumatic braking speed increase valve; 5- air receiver; 6 – drainage valve with ring; 6 – brake chamber.

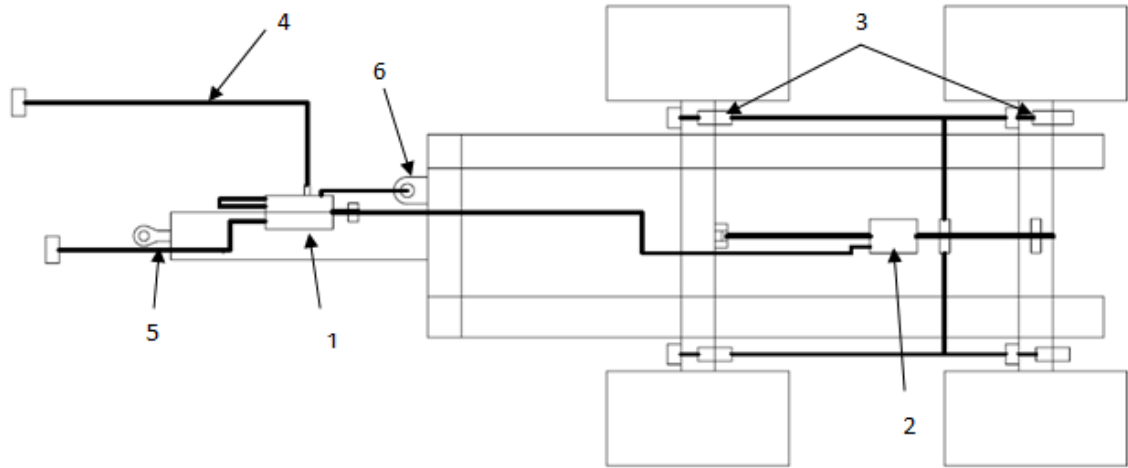


Fig. 4.7. Hydraulic single circuit braking system schematic: 1 - Main valve; 2 - brake force control valve; 3 - brake hydraulic cylinders; 4 - electric control cable; 5 - brake control line; 6 - emergency brake accumulator.

Hydraulic two line circuit braking system.

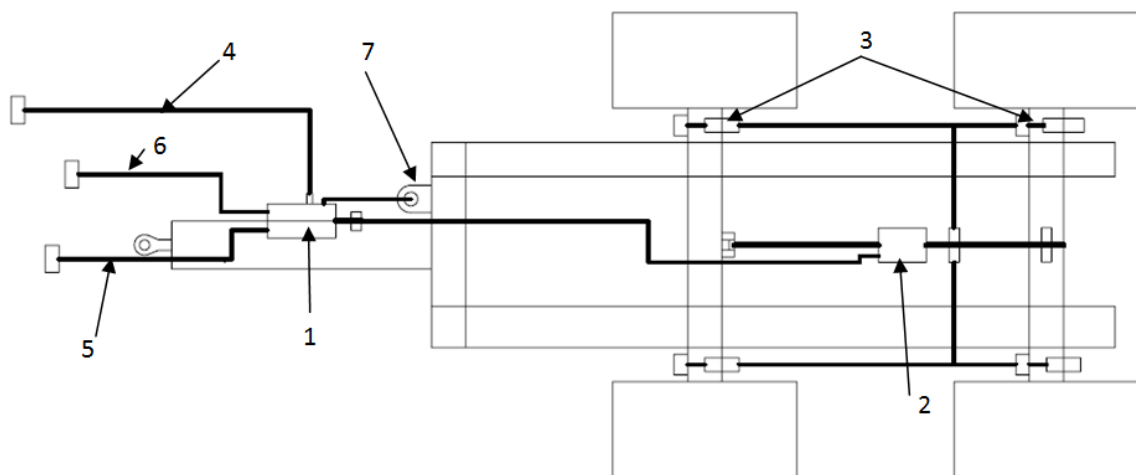


Fig. 4.8. Hydraulic two line circuit braking system schematic: 1 - Main valve; 2 - brake force control valve; 3 - brake hydraulic cylinders; 4 - electric control cable; 5 - brake control line; 6 - additional line to the tractor; 7 - emergency brake accumulator.

The tractor manure spreader is usually equipped with a pneumatic double-circuit brake system, which acts upon all the wheels. This system, which is connected to the brake system of the tractor, acts when pressing the brake pedal of the tractor.

The system has a three-position brake force regulator for each axle, which is controlled automatically, depending on the weight of the load in the body.

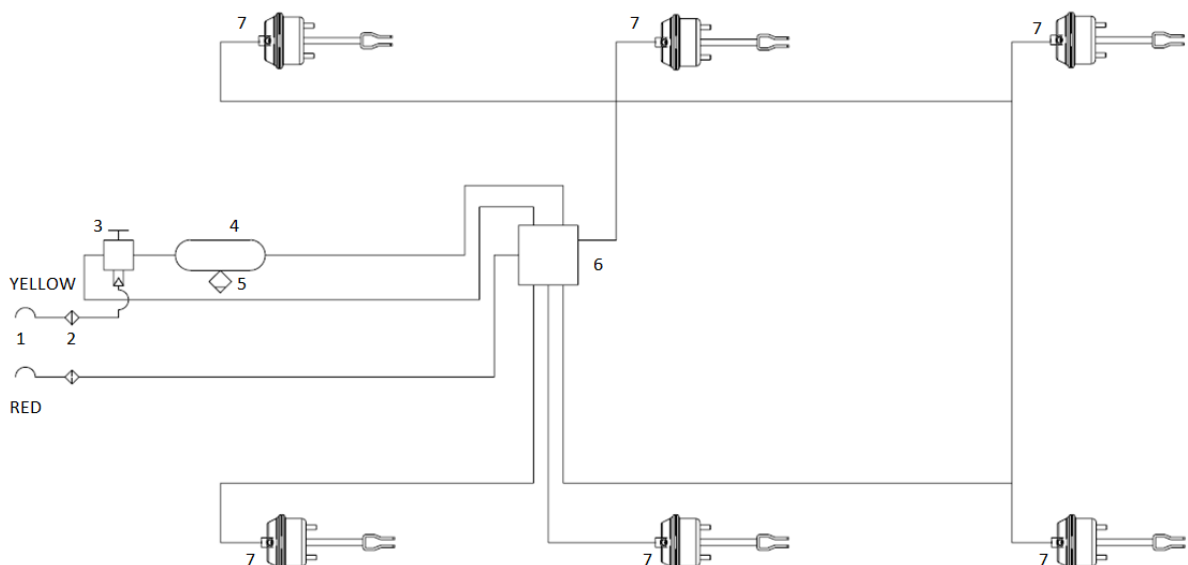


Fig. 4.9. Diagram of the double-circuit pneumatic brake system. 1 - pneumatic coupling head; 2 - air line filter; 3 - brake release valve; 4 - air reservoir; 6 - LSV controller with integrated knuckle joint; 7 - pneumatic brake chamber.

5. Storage

The vehicle must be protected against direct sunlight and rain. If the wheels may be exposed to sunshine, tyre pressure must be reduced. Protection wedges (blocks) must be placed under the wheels.

When preparing for storage, the following must be done:

- wash the manure spreader;
- replace or repair any worn-out parts or assemblies;
- replace any obsolete hose of the hydraulic system with new ones. This shall be done every 5 years;
- paint any scratched or damaged rusted places;
- apply grease to joint axles, wheel bearings, and hydraulic cylinders piston rods;

6. INFORMATION FOR THE USER

6.1 Preparation of the manure spreader for work



IMPORTANT!

Use only a tractor in good working order!

When attaching the manure spreader to a tractor for the first time, the following must be done:

- familiarise yourself with the names and locations of the elements of the manure spreader;
- remove any unnecessary objects from the body;
- check the tyre pressure;
- check bolt connections and pinning of the joint axles.
- Attach the manure spreader to the tractor in accordance with the following procedure:
- lower the hitch loop of the tractor to the height of the drawbar loop of the manure spreader;
- reverse until the hole of the hitch loop of the tractor coincides with the hole of the drawbar loop of the manure spreader;
- insert a pin and fasten;
- raise the hitch loop of the tractor to the required height;
- pull up the hand-brake of the tractor;
- raise the support of the manure spreader to the required height;
- connect the hydraulic and pneumatic systems of the manure spreader with the respective systems of the tractor;
- connect the light signalling cable of the manure spreader to the electricity system of the tractor;
- check the operation of the hydraulic cylinders of the manure spreader and tightness of the system;
- check the operation of the brakes of the manure spreader and tightness of the system;
- check the operation of the light signalling of the manure spreader;
- before driving, make sure that the parking brake of the manure spreader is released.

Repeat these actions every time when attaching the manure spreader.



ATTENTION!

Any unauthorized persons are prohibited to stay between the tractor and the manure spreader when attaching the manure spreader!

6.2 Loading of a manure spreader

The manure spreader may be loaded only when it is attached to the tractor and stands on a horizontal surface.

Before starting the loading operation, make sure that the tailgate and discharge port of the manure spreader are fully closed.

When loading, it is necessary to distribute the load evenly throughout the body. Do not overload in order to prevent spillage.

If the items being transported project beyond the dimensions of the manure spreader, follow the requirements of the traffic rules while marking of the load and ensuring safety on the road.



ATTENTION!

It is prohibited to exceed the maximum permissible total weight of the manure spreader! In order to avoid overloading, refer to the densities of the main materials to be transported set out in Table 6.1.

Material	Density, kg/m ³
Old manure	700-800
Mature manure	800-900
Fresh manure	700-750
Compost	950-1100
Silage	200-600
Peat	350-1000
Wood Chips	600-750
Mulch	300-700

Table 6.1. Densities of the main materials to be transported.

6.3 Spreading manure

Spreading manure in the field is done following these steps:

- Get ready to drive at the beginning of the field;
- Open the rear of the body with the hydraulic cylinders after opening the hydraulic locks. Allow a part of the load to fall out;
- Switch on the manure spreaders;
- Switch on the chain conveyer when you start driving;
- Check that the chain conveyer moves in the direction of the end of the manure spreader;
- To change the manure spreading amount, change the chain transporter speed, by changing the hydraulic motor speed from the tractor.
- When you have finished spreading manure, switch off the chain conveyer and vertical spreaders;
- Close the tailgate and lock it by closing the hydraulic cylinder locks.



Attention!

It is forbidden to stand in the unloading area.

Make sure the chain transporter moving direction is to the rear!

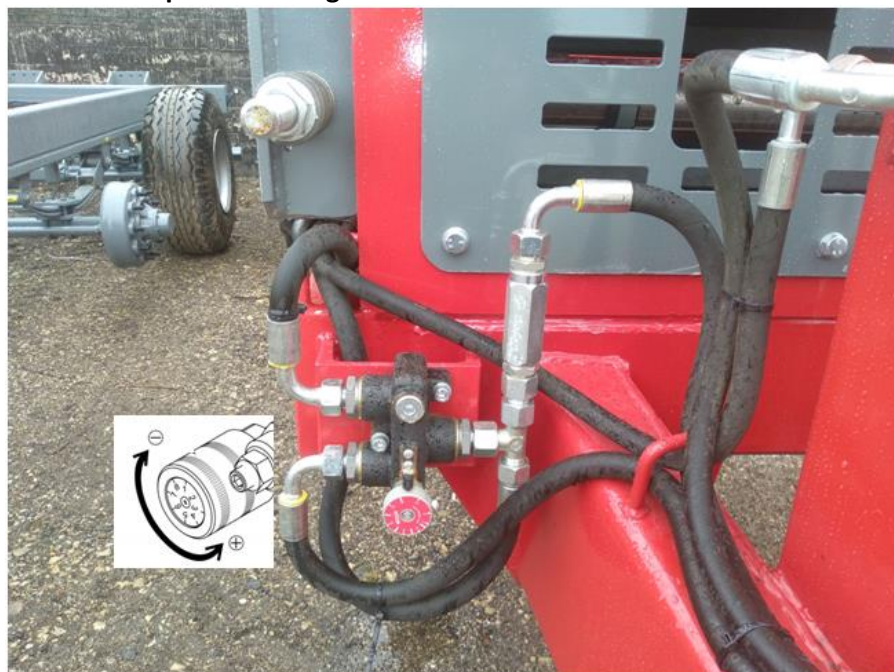


Fig.6.1. Chain transporter speed adjustment (adjusted from the manure spreader).



Fig. 6.2. Chain transporter tensioning bolt.

On both sides of the manure spreader screw the unpressed spring washers on both sides of the manure spreader, then tighten the nut by 40 mm, after that tighten or loosen the nut according to the conveyor tension.

6.4 Detaching the manure spreader off the tractor

Detach the manure spreader from the tractor in accordance with the following procedure:

- activate the hand-brake of the manure spreader;
- if the manure spreader is parked on a slope or uneven site, protective wedges (blocks) must be put under the wheels;
- disconnect the hydraulic and pneumatic systems of the manure spreader from the tractor;
- disconnect the light signalling cable of the manure spreader from the electricity system of the tractor;
- install the support of the manure spreader;
- lower the hitch loop of the tractor until the support of the drawbar of the manure spreader rests upon the ground;
- remove the pin connecting the drawbar towing loop of the manure spreader with the hitch loop of the tractor.



Fig. 6.3. Protection wedges placement method.



ATTENTION!

The manure spreader cannot be detached off the tractor if:

- protection wedges (blocks) are not placed under the wheels.



Fig. 6.4. Brake clamping cable.

To clamp brakes using brake clamping cable, turn the handle clockwise, to loosen - counterclockwise.



ATTENTION!

Before starting to drive, loosen the brake clamping cable!

7. ACTIONS DURING SERVICING

7.1 Chassis

7.1.1 Maintenance of wheels

During the use of the manure spreader, it is necessary to constantly monitor the condition of the hubs, wheel rims, and tyres as well as the tightening of wheels and tyre pressure. The tyres should not be cracked or ruptured.

To tighten the wheels, use a torque wrench. Select the torque from Tables 7.1, 7.2, 7.3, 7.4 and Figures 7.1, 7.2, 7.3, 7.4, 7.5 according to the design of the hub.

Wrench (mm)	Number of columns	Tightening torque (kgm)	Tightening torque (Nm)	Lever (mm)	Applied force (kg)
17	4 – M 12 x 1,5	9 min – 10 max	90 min – 100 max	450	20
19	5 – M 14 x 1,5	13 min – 15 max	130 min – 150 max	450	30
24	6 – M 18 x 1,5	27 min – 29 max	270 min – 290 max	450	60
27	8 – M 20 x 1,5	35 min – 38 max	350 min – 380 max	600	60
30	10 – M 22 x 1,5	45 min – 51 max	450 min – 510 max	800	60
36	10 – M 24 x 1,5	55 min – 61 max	550 min – 610 max	920	60

Table 7.1 Torque instructions for burnished columns.

Wrench (mm)	Number of columns	Tightening torque (kgm)	Tightening torque (Nm)	Lever (mm)	Applied force (kg)
17	4 – M 12 x 1,5	9 min – 10 max	90 min – 100 max	450	20
19	5 – M 14 x 1,5	15 min – 17 max	130 min – 150 max	450	30
24	6 – M 18 x 1,5	30 min – 34 max	300 min – 340 max	500	60
27	8 – M 20 x 1,5	40 min – 44 max	400 min – 440 max	700	60
30	10 – M 22 x 1,5	50 min – 56 max	500 min – 560 max	900	60

Table 7.2. Torque instructions for galvanised columns.

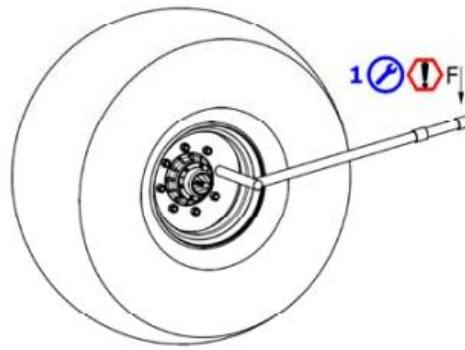


Fig. 7.1. Wheel tightening process.

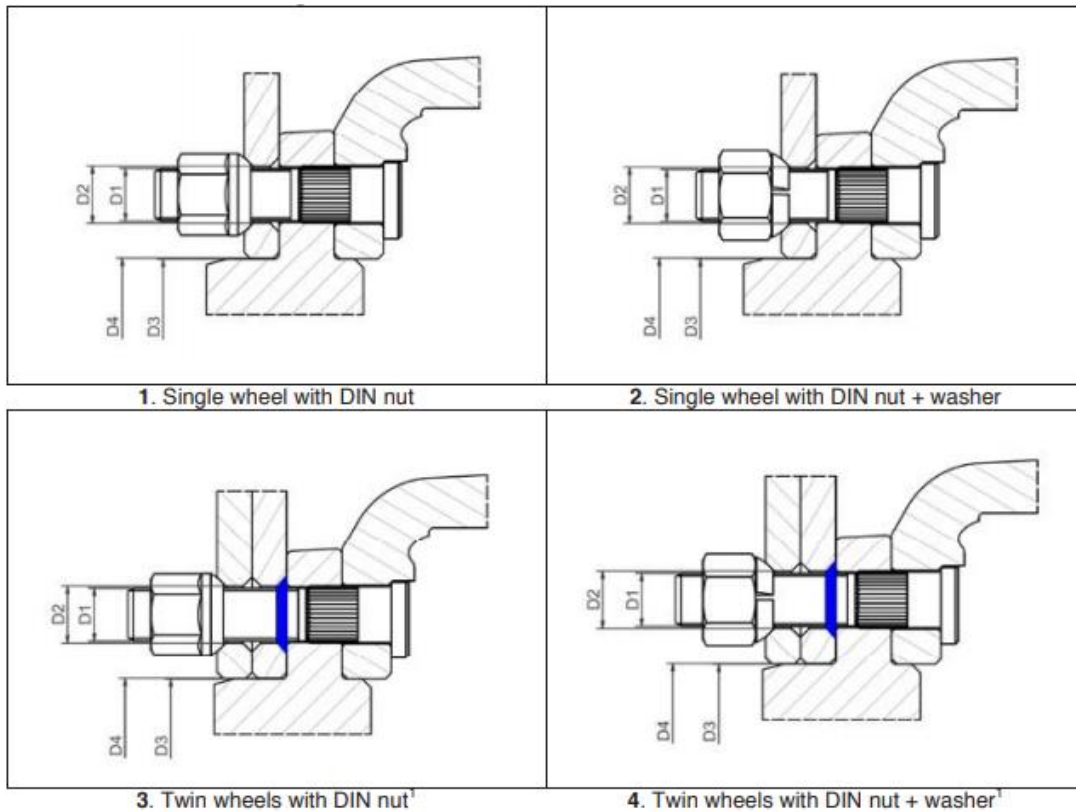
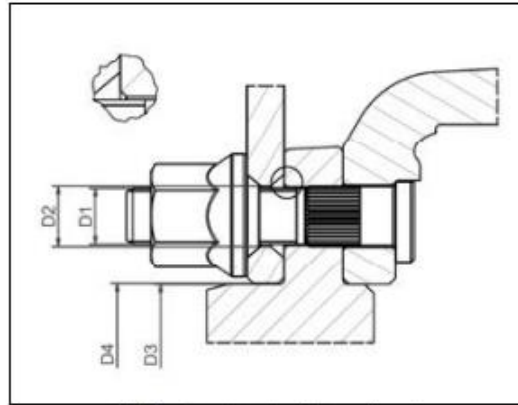


Fig. 7.2. Mount with centering on columns. 1 – when mounting, always remember to insert the conic washer on the column (indicated in blue in the illustration) before the internal wheel, as illustrated.

Fitting	Column	Wrench	Wheel hole	Hub centre	Wheel centre	Illustration
	D1 (mm)					
4 x Ø 95	M 12 x 1,5	17	16	62	63	1
5 x Ø 140	M 14 x 1,5	19	18.5	93	94	1
6 x Ø 205	M 18 x 1,5	24	21.5	160	161	1 – 3
8 x Ø 275	M 18 x 1,5	24	21.5	220	221	1 – 3
8 x Ø 275	M 18 x 1,5	27	21.5	220	221	2 – 3 – 4
8 x Ø 275	M 20 x 1,5	30	27	220	221	3 – 4
10 x Ø 335	M 22 x 1,5	30	27	280	281	3 – 4

Table 7.3. 1 – 2 – 3 – 4 illustrations' tightening information.

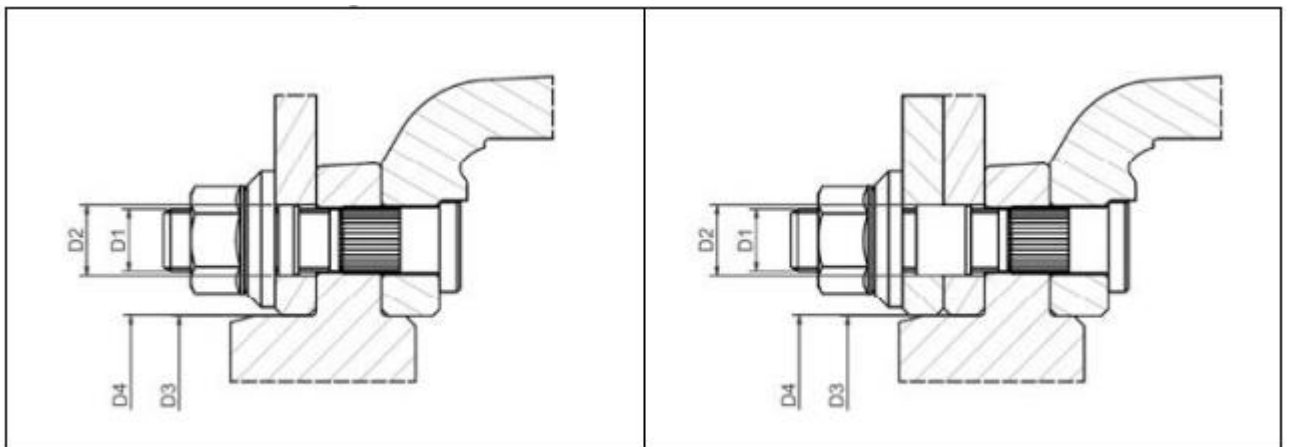


5. Single wheel with conic nut

Fig. 7.3. 5 illustration

Fitting	Column	Wrench	Wheel hole	Hub centre	Wheel centre	Illustration
	D1 (mm)		D2 (mm)	D3 (mm)	D4 (mm)	
8 x Ø 275	M 18 x 1,5	29	21.5	220	221	5
10 x Ø 335	M 22 x 1,5	32	27	280	281	5

Table 7.4. 5 illustration's tightening information.



6. Single wheel with ISO nut

7. Twin wheels with ISO nut

Fig. 7.4. Mount with centric on hub.

Fitting	Column	Wrench	Wheel hole	Hub centre	Wheel centre	Illustration
	D1 (mm)		D2 (mm)	D3 (mm)	D4 (mm)	
8 x Ø 275	M 20 x 1,5	28	27	220.5	221	6 – 7
10 x Ø 225	M 22 x 1,5	32	27	175.5	176	6 – 7
10 x Ø 335	M 22 x 1,5	32	27	280.5	281	6 – 7
10 x Ø 335	M 24 x 1,5	36	27	280.5	281	6 – 7

Table 7.5. 6 – 7 illustrations' tightening information.

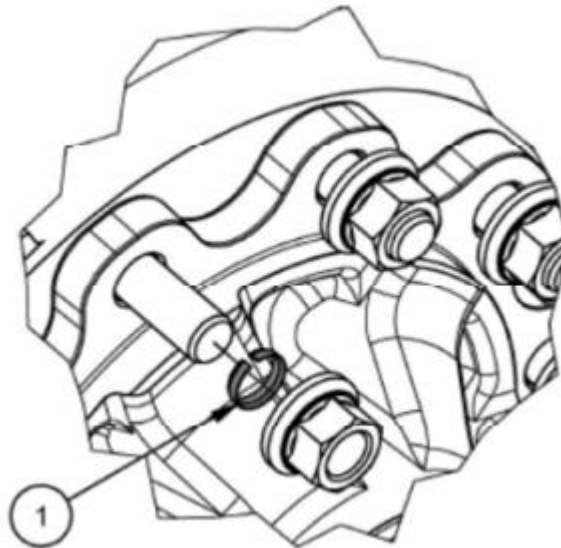


Fig. 7.5. Wheel mounting with centring on hub can be facilitated by the introduction, at least in two columns, of the indicated centring rings, reference 1 in the illustration. This is useful especially when mounting twin wheels since the disc offset could make hub positioning problematic.

7.1.2 Maintenance of axles

Constantly check the tightening of the hub covers. Any lost or damaged cover must be replaced in order to protect the hub against the penetration of dirt. When replacing screw-able covers, the spacer should also be replaced. The cover shall be tightened up regularly (every 3 months).

Under normal working conditions, hub bearings should be lubricated every 500 working hours or after each 8500 km as well as replacing brake blocks. Under severe working conditions, more frequent lubrication is required. When lubricating the bearings, it necessary to check the thickness of the brake blocks, the drum and pull-off springs as well as to clean and lubricate the brake cam.




















Rigid and steering axle lubrication and maintenance table  Lubrication  Maintenance	After the first 10 km of use at full load.	After the first 200 working hours or first 300 km travelled.	Every 500 working hours or every 8500 km travelled. ¹	Every 1500 working hours or every 25000 km travelled. ¹	Every 3000 working hours or every 50000 km travelled. ¹
Lubrication with special ADR Lithogrease 3 grease					
A – grease change in hub bearings					
B – brake cam supports					
C – brake levers					
D – steering rod joints					
E – steering hinges					
Maintenance					
1 – Wheel nut torque check					
2 – brake gasket check					
3 – bearing gap check and any adjustments					
4 – brake lever stroke check and any adjustments					
5 – steering hinge gap check and any adjustments					
6 – shock absorber end screw torque check					
7 – steering control cylinder fastening screw torque check					
8 – steering rod end screw torque check and steering angle adjustment					
9 – brake cylinder support screw torque check					

Table 7.6. Rigid and steering axle lubrication and maintenance table.



ATTENTION!

For each instruction, increase check frequency in the event of heavy duty!

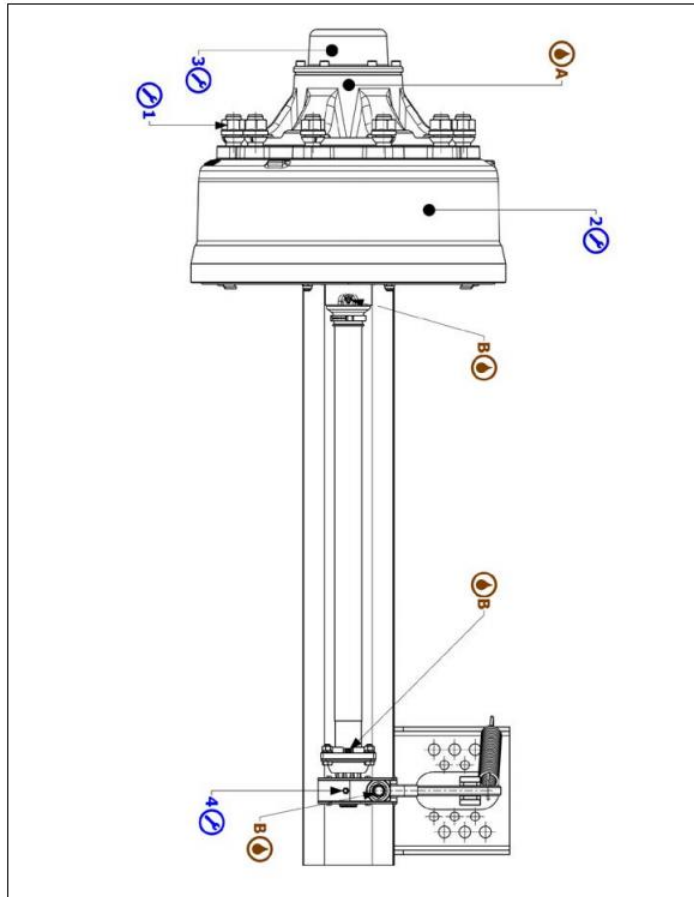


Fig. 7.6. Rigid axle: lubrication and maintenance point map.

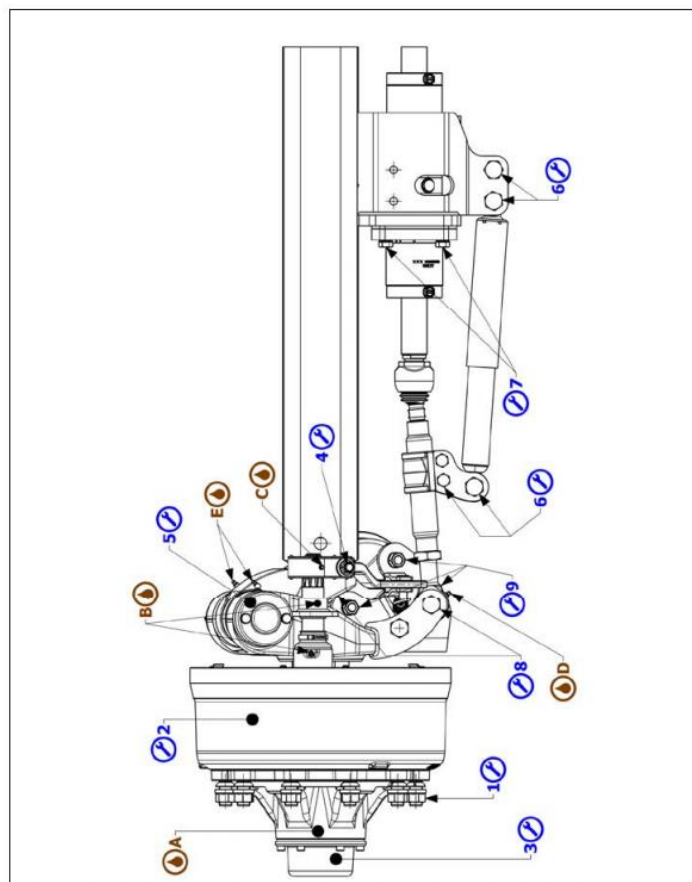


Fig. 7.7. Dual mode steering axle: lubrication and maintenance point map.

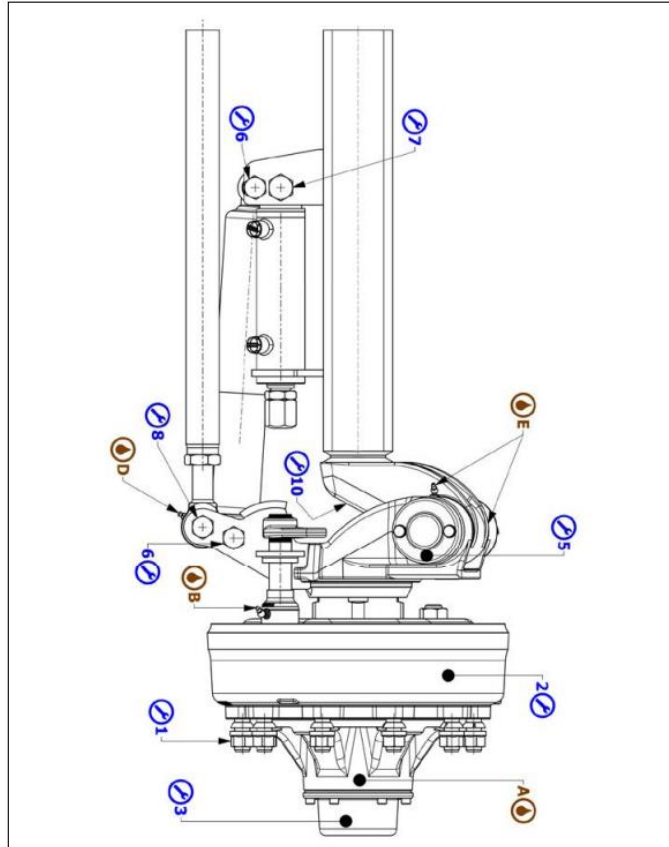


Fig. 7.8. Standard self-steering axle: lubrication and maintenance point map.



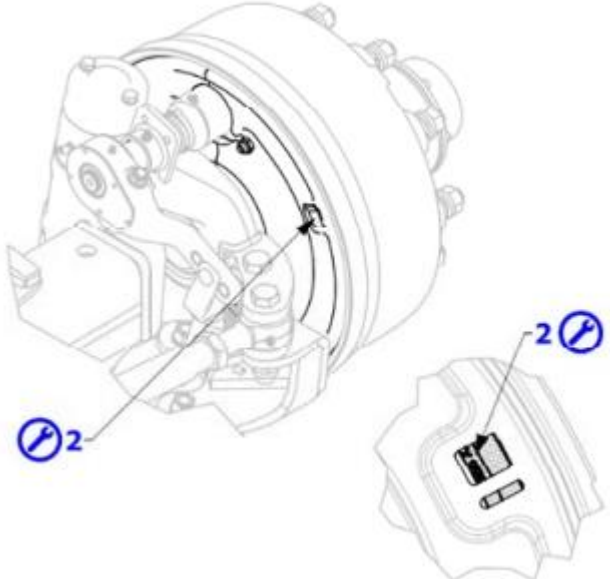
<p> 2. Brake gasket check.</p> <p>Every 500 working hours (or every 8500 km travelled). Check brake friction gasket wear. Open both inspection windows on the back of the brake and check friction material thickness outside the reference line.</p> <p> The reference line should always be well visible and, for vehicle safety, it is best to replace the brake friction gaskets when material thickness outside the line is reduced to 2mm. Always use original friction gaskets of the same type as those to be replaced. Friction gasket features are indicated next to the gasket inside the reference line.</p>	
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Table 7.7. Brake gasket check.


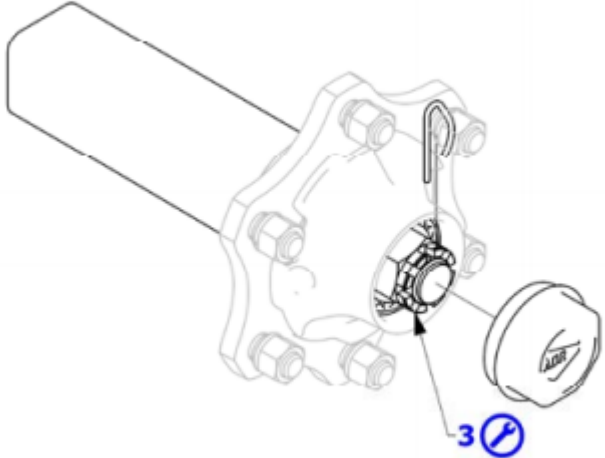
<p> 3. Bearing gap check (version with press-in hub cap)</p> <p>After the first 200 working hours at full load (or after the first 300 km travelled), afterwards every 1500 hours (or every 25000 km travelled).</p> <p>Make sure the wheel bearings do not rock. This check is performed by lifting the axle with a jack until the wheel is off the ground and rotates freely. Insert a lever between the ground and tyre and force the wheel up to find any gaps.</p> <p>Bearing gap adjustment</p> <ul style="list-style-type: none"> - remove the hub cap - remove the elastic stop pin on the rack nut - tighten the rack nut while simultaneously rotating the wheel until the hub is slightly braked - rotate the rack nut until a slot with the hole on the spindle is found and insert the elastic pin. Make sure the hub rotates manually with slight resistance - top up ADR Lithogrease 3 grease on the visible part of the bearing and reassemble the press-in hub cap. 	
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Table 7.8. Bearing gap check of axle version with press in hub cap.


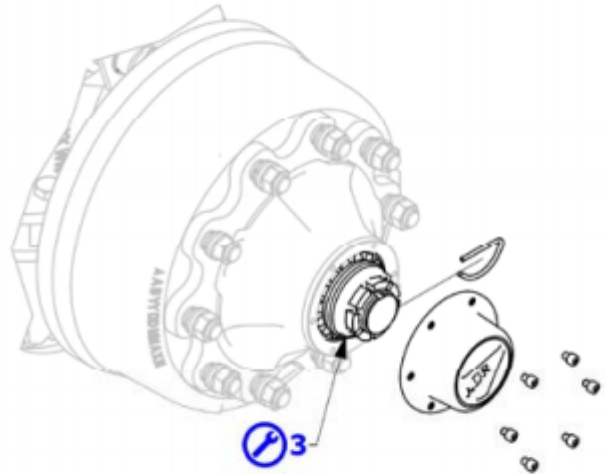
<p> 3. Bearing gap check. (version with flanged hub cap)</p> <p>After the first 200 working hours at full load (or after the first 300 km travelled), afterwards every 1500 hours (or every 25000 km travelled).</p> <p>Make sure the wheel bearings do not rock. This check is performed by lifting the axle with a jack until the wheel is off the ground and rotates freely. Insert a lever between the ground and tyre and force the wheel up to find any gaps.</p> <p>Bearing gap adjustment</p> <ul style="list-style-type: none"> - remove the flanged hub cap removing the 6 screws; - remove the elastic stop pin on the rack nut; - tighten the rack nut while simultaneously rotating the wheel until the hub is slightly braked; - rotate the rack nut until a slot with the hole on the spindle is found and insert the elastic pin. Make sure the hub rotates manually with modest resistance; - top up ADR Lithogrease 3 grease on the visual part of the bearing and reassemble the hub cap being careful that its seal gasket is integral. If damaged, replace the gasket with an ADR original spare part; - reassemble the hub cap and tighten the 6 screws. 	
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Table 7.9. Bearing gap check of axle version with flanged hub cap.

3. Bearing gap check
(Teknoax version with screw-in hub cap).

After the first 200 working hours at full load (or after the first 300 km travelled), afterwards every 1500 hours (or every 25000 km travelled).

Make sure the wheel bearings do not rock. This check is performed by lifting the axle with a jack until the wheel is off the ground and rotates freely. Insert a lever between the ground and tyre and force the wheel up to find any gaps.

Bearing gap adjustment

- remove the 3.6 hub cap and 3.5 gasket.
- remove the 3.4 stop screws and 3.3 rack.
- tighten the 3.2 rack nut while simultaneously rotating the wheel until the hub is slightly braked.
- reposition the 3.3 rack and secure it to the 3.2 rack nut with the 3.4 screws.
- Top up **ADR Lithogrease 3** grease on the visual part of the bearing and reassemble the 3.6 hub cap being careful that its seal gasket is integral. If damaged, replace the gasket with an **ADR original spare part**.

Table 7.10. Bearing gap check of Teknoax axle version with press in hub cap.

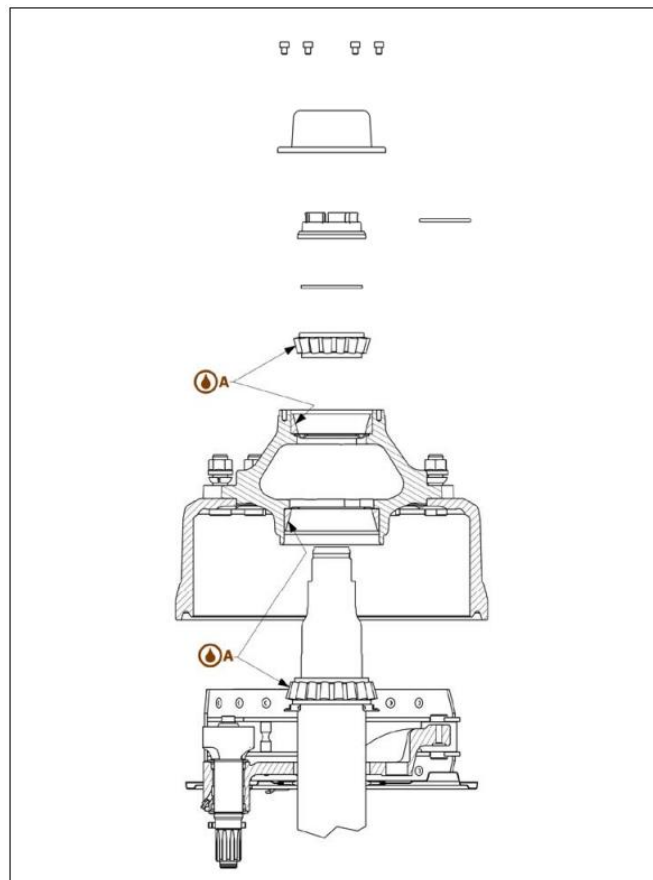


Fig. 7.9. Grease change in hub bearings.


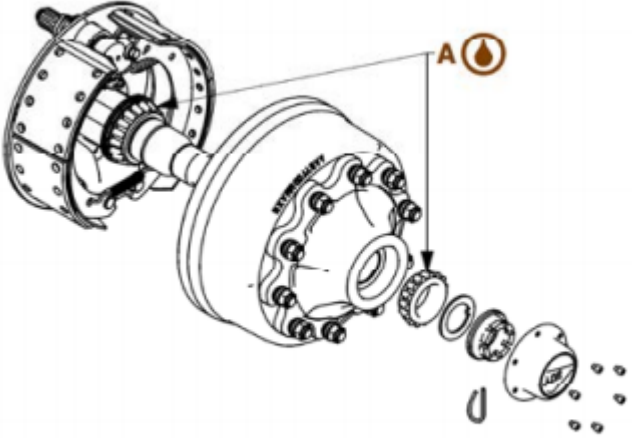
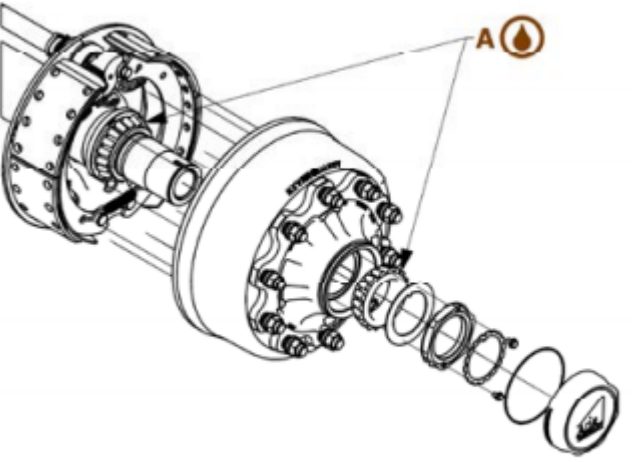
 A. Grease change in hub bearings.	
<p>Every 3000 working hours (or every 50000km travelled). As with the bearing gap check, lift the axle with a jack until the wheel rotates freely, then:</p>	
Flanged hub cap version	Teknoax version
<ol style="list-style-type: none"> 1. remove the hub cap; 2. remove the elastic stop pin on the rack nut; 3. remove the rack nut; 	<ol style="list-style-type: none"> 1. remove the hub cap and gasket; 2. remove the stop screws and rack; 3. remove the threaded rack nut;
<ol style="list-style-type: none"> 4. remove the hub complete with drum and bearings from the spindle; 5. perform this operation on one wheel at a time to avoid exchanges components between one wheel and the next. When simultaneously removing several wheel, mark the bearing cages to avoid incorrectly reassembling them; 6. clean the brake, check general conditions and wear. Replace any worn or damaged parts, eliminate any lubricant residue that could jeopardise good brake operations; 7. remove all used grease residue, clean the bearings and gaskets, replace damaged parts; 8. grease the conic housings and bearing rollers as indicated in the illustration, using ADR Lithogrease 3 grease, the amount necessary for each bearing is about 150g; 9. reassemble all parts as indicated in the illustration with the help of bushings to avoid alignment errors that could damage bearings. 10. before reassembling the rack nut (flanged hub cap version) or threaded nut (Teknoax version), apply a layer of grease on the bearing, reassemble and adjust the nut as indicated in point 3-Bearing gap adjustment. 	
	
	

Table 7.11. Grease change in hub bearings.




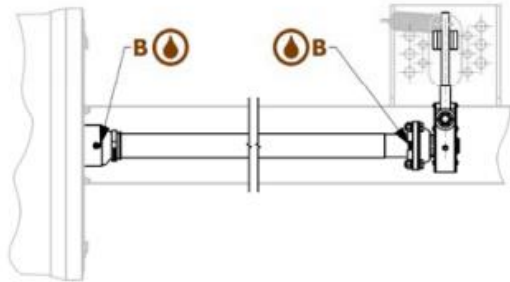
<p> B. Brake cam support lubrication.</p> <p>Every 500 working hours (or every 8500 km travelled) and before starting after a long period of disuse.</p> <p>Lubricate the points indicated in the illustration with ADR Lithogrease 3 grease.</p> <p>Lubricate the supports so that new grease leaks from the housings.</p> <p> Grease and oil penetration in the brake is not admitted.</p> <p>Repeat the operation even after each vehicle wash with high pressure equipment.</p>	 <p>A perspective view of the brake cam support assembly. Two points are marked with a brown oil drop icon and the letter 'B'. One point is at the top of the cam support housing, and the other is at the bottom of the support where it meets the main housing.</p>
	 <p>A side view of the brake cam support assembly. Two points are marked with a brown oil drop icon and the letter 'B'. One point is at the end of the support rod where it connects to the drum, and the other is at the support housing.</p>

Table 7.12. Brake cam support lubrication.


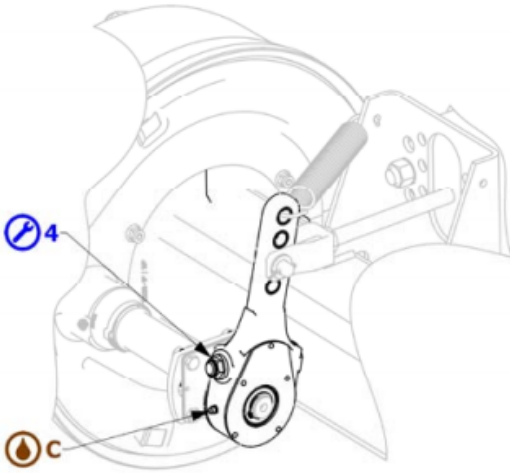


<p> 4. Brake lever stroke check and any adjustments</p> <p>Every 500 working hours (or every 8500km travelled).</p> <p>Make sure the brake cylinder rods do not exceed, with full brake, 40 mm - 45 mm.</p> <p>Stroke must be adjusted using the register screw indicated in the illustration, rotating it with a wrench until it stops at the brake block contact with the drum. The register screw has a jack, thus from the end stroke position, loosen the register screw about 2 clicks and make sure the stroke corresponds to the instruction when adjusted.</p>	 <p>A perspective view of the brake lever assembly. A blue wrench icon with the number '4' points to a register screw on the lever. A brown oil drop icon with the letter 'C' points to a grease point on the lever housing.</p>
<p> C. Lubrication.</p> <p>Every 500 working hours (or every 8500km travelled).</p> <p>Lubricate the registration mechanism with ADR Lithogrease 3 grease through the grease point indicated in the illustration.</p> <p> Repeat the operation even after each vehicle wash with high pressure equipment.</p>	

Table 7.13. Brake lever stroke check and any adjustments.





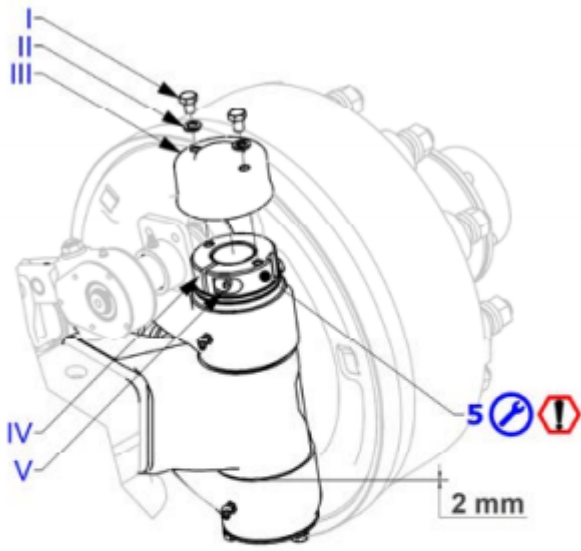

<p> E. Grease steering hinges.</p> <p>Every 500 working hours (or every 8500km travelled). Lubricate with ADR Lithogrease 3 grease using the grease points indicated in the illustration until new grease leaks from the housings.</p> <p> Repeat the operation even after each vehicle wash with high pressure equipment.</p>	
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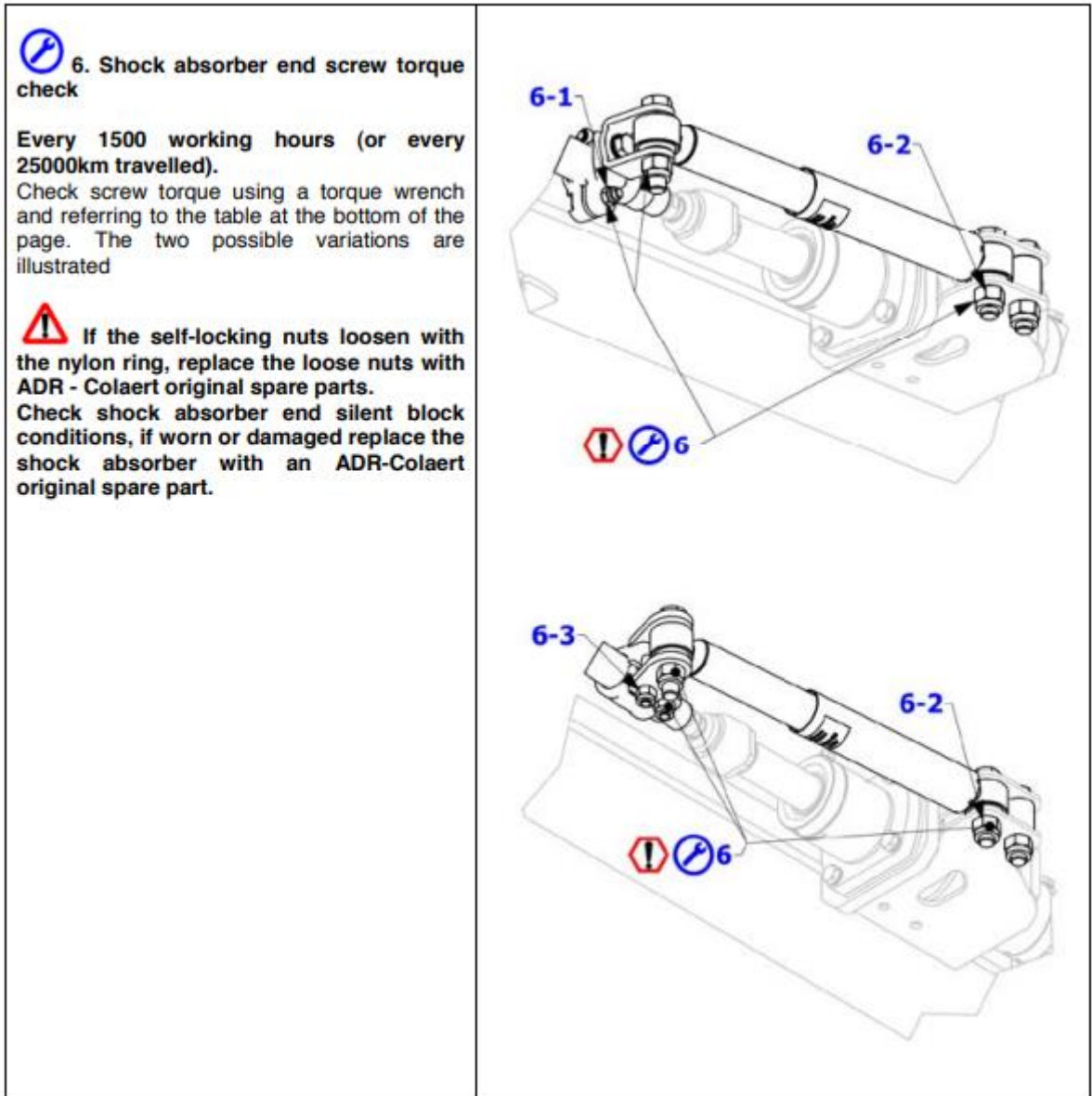
Table 7.14. Grease steering hinges.

<p> 5. steering hinge gap check and any adjustments.</p> <p>After the first 10 km at full load, afterwards every 1500 working hours (or every 25000km travelled). Check that the gap between the steering arm and relevant support is not under 2 mm as indicated in the illustration with the car empty and in drive. If the gap is smaller, adjust the hinge pin as follows:</p> <ul style="list-style-type: none"> - remove the cover III; - loosen the screw V to free regulation nut rotation IV; - rotate the nut clockwise to restore the required gap; - block the nut with the screw V; - reassemble the cover III and secure it with the screws I and elastic washers II; - if the O-ring in the cover III is damaged, replace it with an original ADR - Colaert spare part. 	
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 **Torque instructions for the regulation nut IV and lock screw V**

Part	Axle series	Thread	Tightening torque (Nm)
IV	Light	M42	350 ± 10
	Average	M48	450 ± 10
	Heavy	M55	500 ± 10
	Heavy Duty	M75	600 ± 10
V	All series	M10	78

Table 7.15. Steering hinge gap check and any adjustments.



6. Shock absorber end screw torque check

Every 1500 working hours (or every 25000km travelled).

Check screw torque using a torque wrench and referring to the table at the bottom of the page. The two possible variations are illustrated

⚠ If the self-locking nuts loosen with the nylon ring, replace the loose nuts with ADR - Colaert original spare parts. Check shock absorber end silent block conditions, if worn or damaged replace the shock absorber with an ADR-Colaert original spare part.

Table 7.16. Shock absorber end screw torque check.

id	screw	wrench	Number of parts to be tightened	tightening torque (kgm)	tightening torque (Nm)
6-1	M 12	19	1	7 min / 9 max	70 min / 90 max
6-2	M 20	30	3	40 min / 45 max	400 min / 450 max
6-3	M 14	21	2	12 min / 15 max	120 min / 150 max
7	M 14	21	4	18 min / 20 max	180 min / 200 max

Table 7.17. Part (Table 7.15 and 7.16) torque instructions.

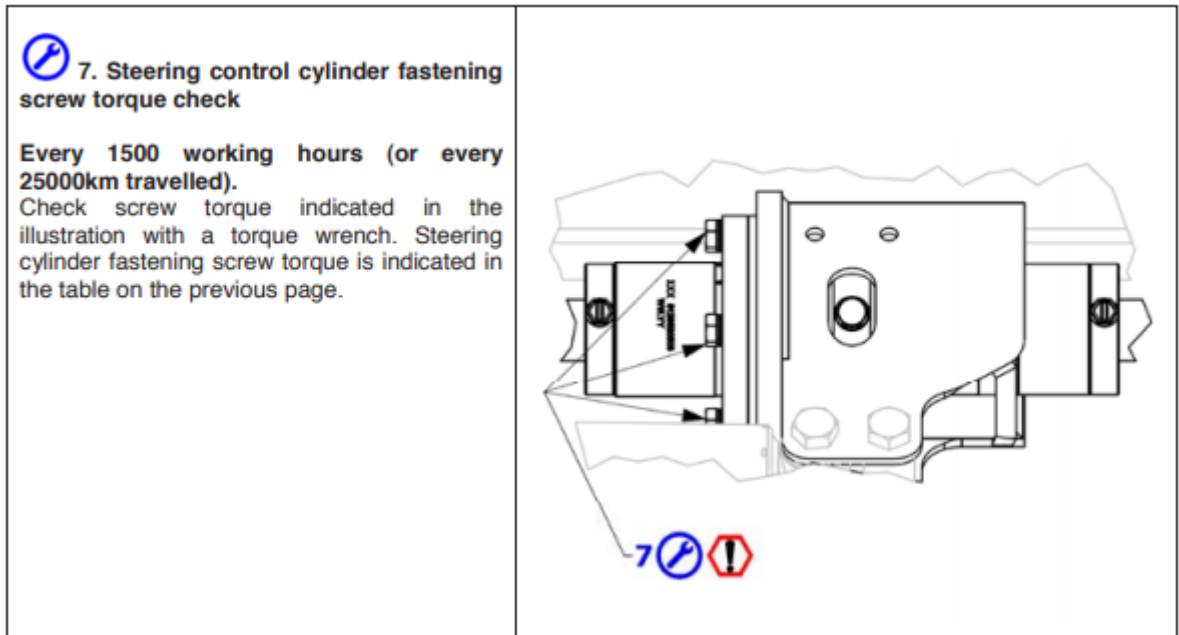


Table 7.18. Steering control cylinder fastening screw torque check.

id	screw	wrench	Number of parts to be tightened	tightening torque (kgm)	tightening torque (Nm)
8-A	M 20	30	4	40 min / 45 max	400 min / 450 max
8-B	M 18	27	2	58 min / 62 max	580 min / 610 max
9-1-A	M 16	24	4	18 min / 22 max	180 min / 220 max
9-1-B	M 20	30	4	40 min / 45 max	400 min / 450 max
9-2-A	M 20	30	4	40 min / 45 max	400 min / 450 max

Table 7.19. Part (Table 7.18) torque instructions.

Steering angle	L±1mm		
	Steering type		
	SM	ST	SW
8°	52	47	42
9°	50	44	39
10°	47	42	37
11°	45	39	34
12°	42	37	32
13°	40	35	29
14°	37	32	26
15°	35	30	24
16°	32	27	21
17°	30	25	-
18°	27	22	-

Table 7.20. Approximate regulation of the steering angle according to quota L.



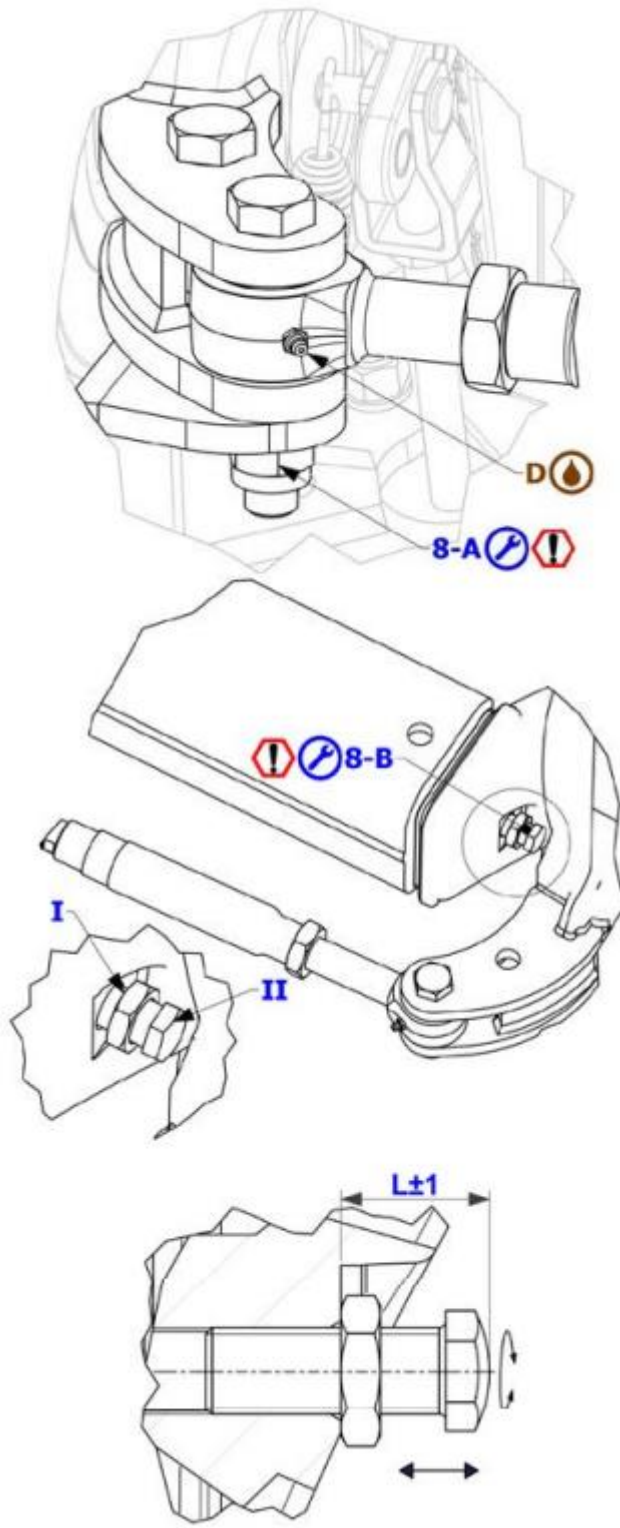



<p> 8-A. Steering rod end screw torque check.</p> <p>Every 1500 working hours (or every 25000km travelled). Check screw torque indicated in the illustration with a torque wrench, following the instructions in the table at the bottom of the page.</p> <p> For self-locking nuts with nylon ring, replace the loose nuts with ADR original spare parts.</p>	
<p> 8-B. Steering angle adjustment.</p> <p>If required by operating conditions, proceed as follows to change the steering angle.</p> <p>The steering angle is adjusted using parts I and II shown in detail in the illustration. Proceed as follows:</p> <ul style="list-style-type: none"> - loosen the counter nut I until the screw head is reached; - adjust the admissible steering angle using the screw II. For admissible steering angle adjustment values, refer to the table at the bottom of the page; - tighten the counter nut I using a torque wrench following the instructions in the table; - repeat the operation on the opposite side of the steering axle. <p> To avoid damaging the steering control cylinder, the maximum steering angle adjustment should never exceed the maximum admitted and indicated in ADR - Colaert technical specifications.</p>	
<p> D. Grease steering joints.</p> <p>Every 500 working hours (or every 8500 km travelled) or after every wash with pressure jets. Lubricate with ADR Lithogrease 3 grease using the grease points indicated in the illustration until new grease leaks from the housings.</p>	

Table 7.21. Steering rod end screw torque check (Table 7.19); steering angle adjustment (according to Table 7.20); grease steering joints.



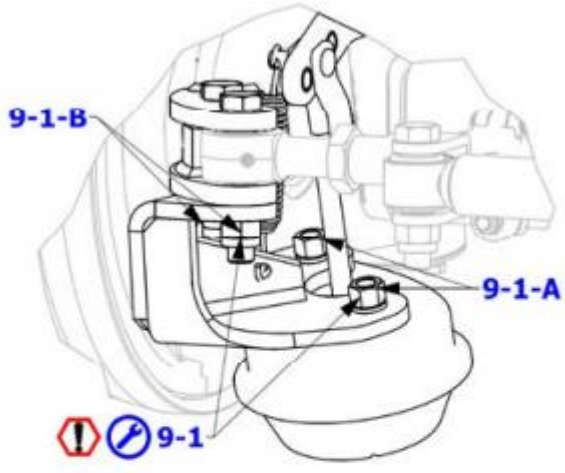
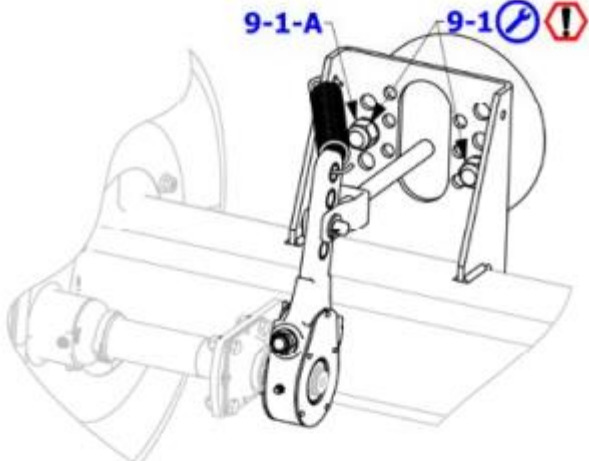
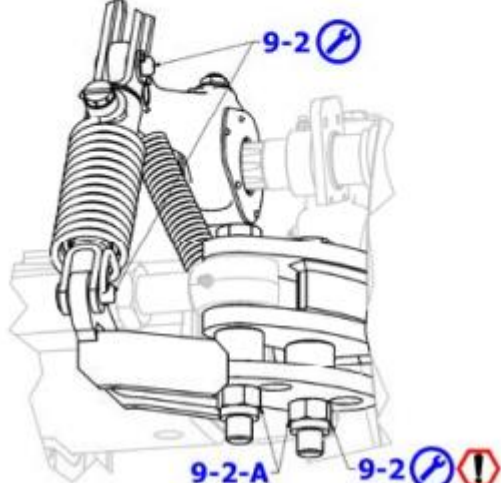
<p> 9. Brake cylinder fastening screw torque check.</p> <p>Ref. 9-1 pneumatic brake system.</p> <p>Ref. 9-2 oil hydraulic brake system.</p> <p>Every 1500 working hours (or every 25000km travelled). Check screw torque indicated in the illustration with a torque wrench, following the instructions in the table on the previous page.</p> <p> If the self-locking nuts loosen with the nylon ring, replace the loose nuts with ADR - Colaert original spare parts.</p>	
	
	

Table 7.22. Brake cylinder fastening screw torque check.

7.1.3 Maintenance of tandem and tridem suspension
















Tandem and Tridem mechanical suspension lubrication and maintenance table  Lubrication  Maintenance	After the first 10 km of use at full load.	After the first 500 working hours or first 8500 km travelled.	Every 500 working hours or every 8500 km travelled. ¹	Every 1500 working hours or every 25000 km travelled. ¹
Lubrication with adhesive grease, water repellent and E.P. additive				
A – moderately grease the ends of the leaf springs and relevant sliding housings in the suspension frame (fixed supports and rocker arm)				
Maintenance				
0 – visual inspection of the integrity of all components.				
1 – axle anchoring to leaf spring: check correct housing. Check torque with torque wrench				
2 – threaded pin torque check on rocker arm support.				
3 – threaded pin torque check on axle reaction rods.				
4 – end terminal screw torque check on axle reaction rods.				
5 – non-slip screw torque check on leaf springs				

Table 7.23. Tandem and tridem mechanical suspension lubrication and maintenance table.

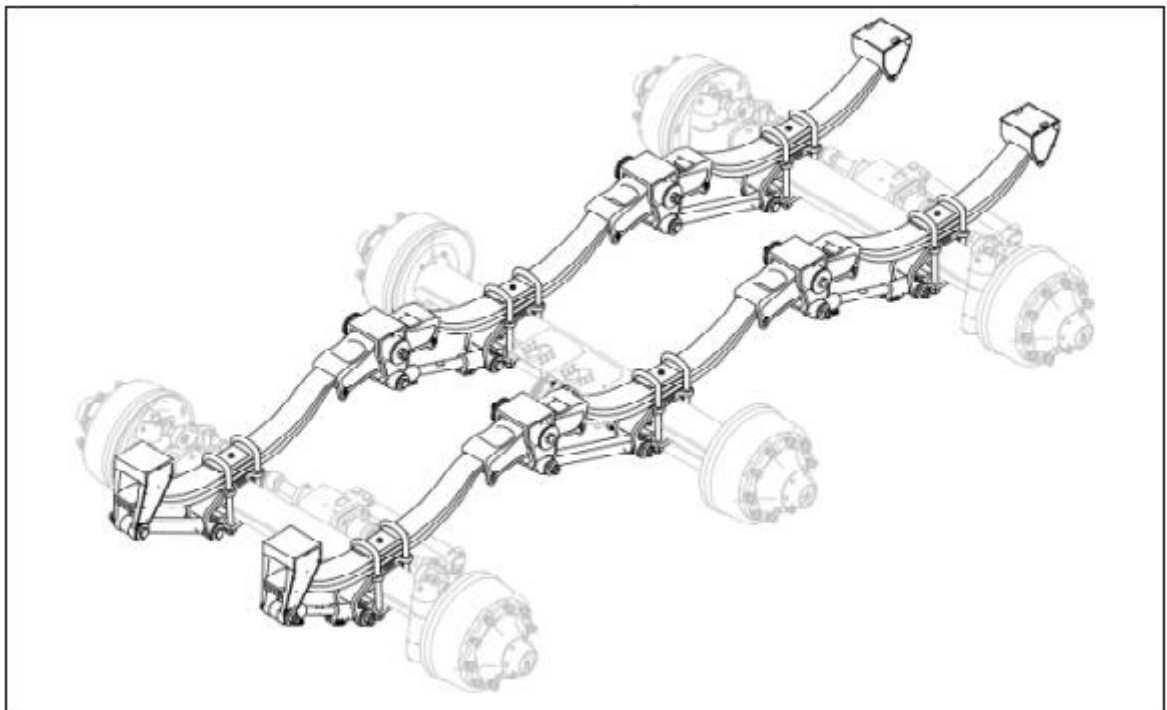


Fig. 7.10. Tandem and tridem series layout.

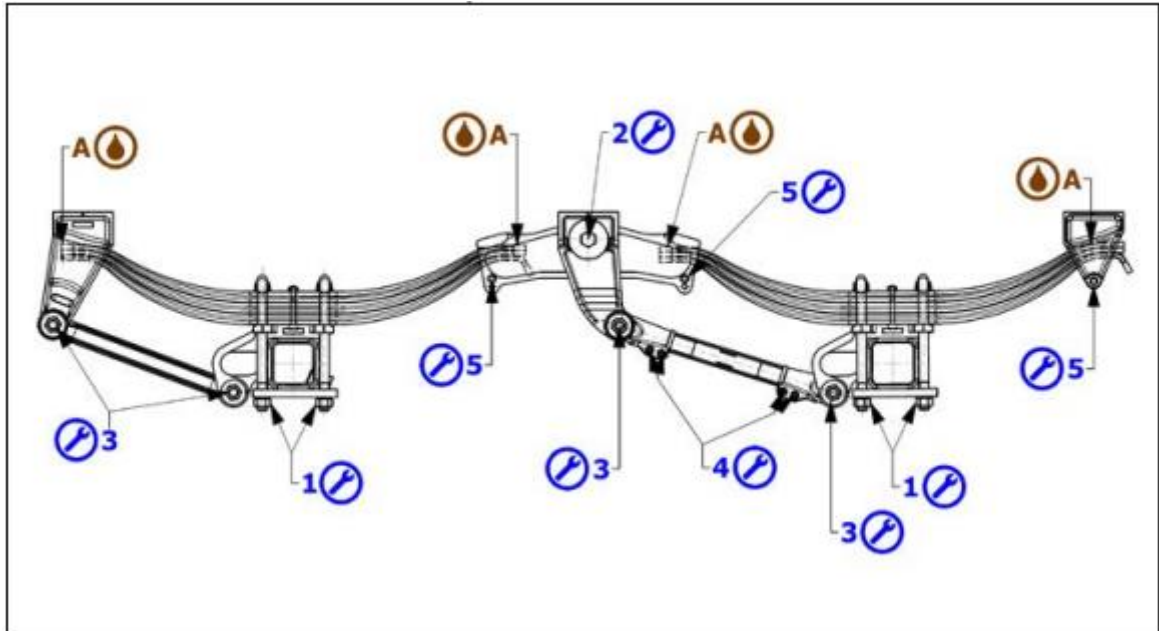


Fig. 7.11. Lubrication and maintenance map.


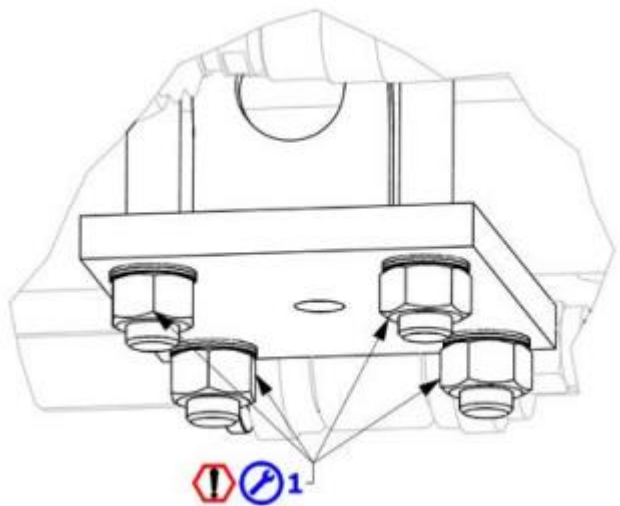

<p> 1 - Axle anchoring to leaf spring.</p> <p>After the first 10 km at full load, after the first 500 working hours (or after the first 8500 km travelled), afterwards every 1500 working hours (or every 25000 km travelled).</p> <p>Check correct axle anchor housing to the suspension leaf springs and make sure they are correctly tightened.</p> <p>Check torque with a torque wrench according to the diagonals of each anchor indicated in the illustration.</p> <p>For torque instructions, refer to the table below.</p>	
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Table 7.24. Axle anchoring to leaf spring.


U bolt	wrench	tightening torque (kgm)	tightening torque (Nm)
Ø 18	27	23 min / 27 max	230 min / 270 max
Ø 22	34	45 min / 50 max	450 min / 500 max
Ø 24	36	55 min / 60 max	550 min / 600 max
Ø 27	41	60 min / 72 max	600 min / 720 max
Ø 30	46	90 min / 100 max	900 min / 1000 max

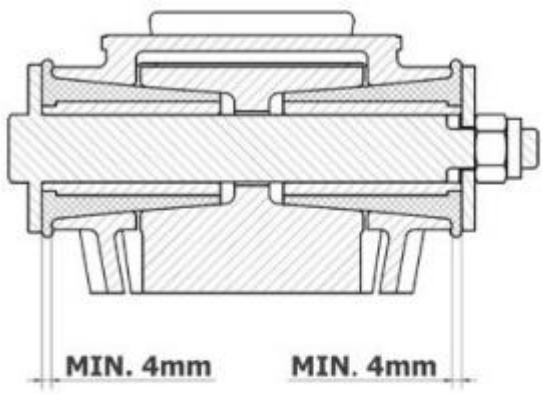
Table 7.25. Part (Table 7.24) torque instructions.

 **2 – Threaded pin torque check on rocker arm support.**

Every 1500 working hours (or every 25000 km travelled).
Check threaded pin torque using the torque wrench and referring to the tightening torque indicated in the table below.

 **A minimum gap of about 4mm should remain visible between the threaded pin head and rocker arm support with this torque value. Should the gap be small or null, replace the joint silent blocks.**

 **Contact ADR - Colaert customer service to replace the silent blocks.**



MIN. 4mm MIN. 4mm

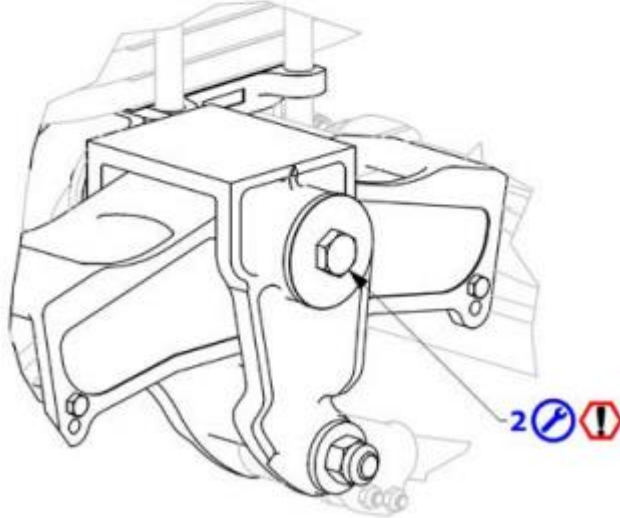


Table 7.26. Threaded pin torque check on rocker arm support.

id	screw	wrench	Number of pins to be tightened		tightening torque (kgm)	tightening torque (Nm)
			Tandem	Tridem		
2	M 24	36	2	4	27 min / 30 max	270 min / 300 max

Table 7.27. Part (Table 7.26) torque instructions.




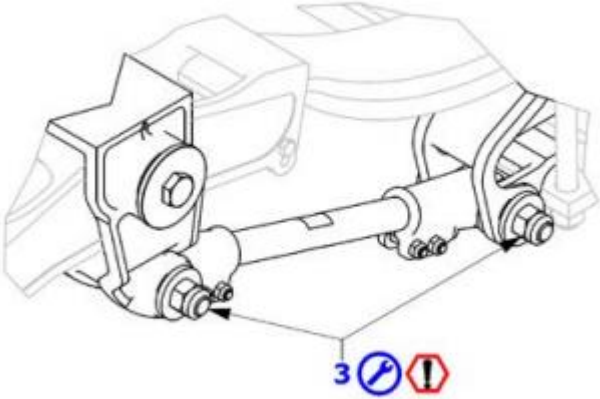
<p> 3 – Threaded pin torque check on axle reaction rods</p> <p>After the first 10 km at full load, afterwards every 1500 working hours (or every 25000 km travelled). Check threaded pin torque on reaction rod ends using the torque wrench and referring to the table at the bottom of the page for tightening torque.</p> <p> The threaded pin head should remain visible with this torque value. The threaded pin should not be in contact with the support, otherwise the joint silent blocks must be replaced.</p> <p> Contact ADR - Colaert customer service to replace the silent blocks.</p>	
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Table 7.28. Threaded pin torque check on axle reaction rods.



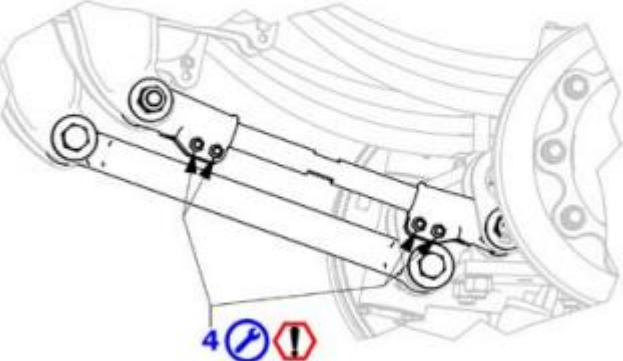
<p> 4 – End terminal screw torque check on axle reaction rods</p> <p>Every 1500 working hours (or every 25000 km travelled). Check sleeve bolt torque on variable length reaction rod ends using the torque wrench and referring to the tightening torque indicated in the table at the bottom of the page.</p> <p> Insufficient sleeve torque can alter rod regulation and axle alignment.</p>	
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Table 7.29. End terminal screw torque check on axle reaction rods.

id	screw	wrench	tightening torque (kgm)	tightening torque (Nm)
3	M 24	36	10 min / 12 max	100 min / 120 max
4	M 12	19	8 min / 10 max	80 min / 100 max

Table 7.30. Part (Table 7.28 and 7.29) torque instructions.



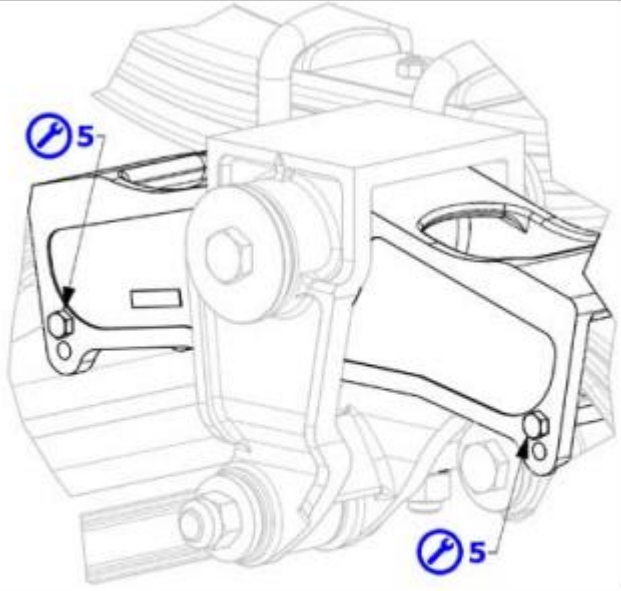

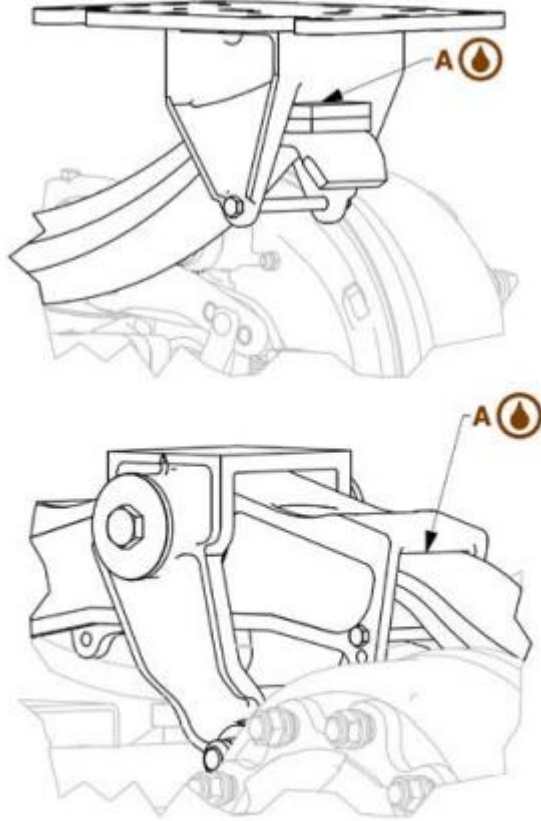
<p> 5 – non-slip screw torque check on leaf springs</p> <p>After the first 10 km at full load, afterwards every 1500 working hours (or every 25000 km travelled). Visually check leaf spring non-slip screws. Make sure the nuts are tightened and the screws do not rock in their housings. If the screws are damaged, only replace them after having checked the cause of the damage.</p> <p> In the event of damages, contact ADR - Colaert customer service.</p>	
<p> A – Leaf spring end runners</p> <p>First 10 km at full load, afterwards every 500 working hours (or every 8500 km travelled). Moderately grease the ends of the leaf springs and relevant sliding housings in the suspension frame (fixed supports and rocker arm) Use grease that has adhesive characteristics, water repellent and with E.P. additive, spreading it on all surfaces with a brush.</p>	

Table 7.31. Non-slip screw torque check on leaf springs; Leaf spring end runners.

7.1.4 Adjustment of wheel hub bearings

The manure spreader is delivered with adjusted hub bearings. After the first 100 km and thereafter after each following 1500-2000 km, it is necessary to check and, if necessary, adjust the wheel hub bearings. Adjustment shall be performed in accordance with the following procedure:

- attach the manure spreader to the tractor and pull up the hand-brake of the tractor;
- place protection wedges under the wheel opposite to the one being adjusted;
- insert a jack under the axle, at the indicated place, and lift the wheel;
- remove the hub cover;
- bend back and remove the cotter-pin;
- loosen the nut;

- check the rotational freedom of the wheel. If necessary, remove the obstruction (the brake drum is pressed by blocks, broken bearings). Adjust the bearings only after that;
- tighten the nut so that the wheel could rotate with effort without wobbling. Turn the wheel in both directions so that the bearing rollers take in the correct position. Further, while rotating the wheel, tighten until the wheel stops;
- turn the nut back by 1/4 - 1/6 of a rotation and fix it by inserting a cotter-pin;
- check the rotational of the wheel. The wheel should rotate freely without sensible wobbling;
- install the hub cover.

If the wheel hub heats up when driving, release the nut by another 1/6 of a rotation.

After the bearing space is adjusted properly, the wheel should rotate smoothly, without disruptions and unusual sounds. If the manure spreader is new or the brake blocks are newly replaced, some friction may be felt between the blocks and drum. It is a normal phenomenon.



ATTENTION!

It is prohibited to perform adjustment works if the tractor engine is running.

7.1.5 Maintenance of the steering axles of the three-axle chassis

Routine maintenance. If the manure spreader is used intensively, the following shall be performed every 3 months:

- lubricate the vertical axles of the hub turns 3 (Figure 7.12);
- tighten up the screw connections of the assemblies mounted on the axle (brakes chamber, wheel locking hydraulic cylinder, shock absorber, and tie-rod);
- make sure that the adjustment rods 7 have not bent;
- if the axle vibrates when driving, check the shock absorbers. A trace of lubricant does not indicate that it is unsuitable for use, but if the leak of lubricant is large, the shock absorber should be replaced. The shock absorber should be replaced if resistance is felt when pushing the cylinder by hand after disconnecting the shock absorber from one side, or if the shock absorber is bent;
- check and eliminate any leak of air or lubricant (the brakes chamber, hydraulic cylinder, shock absorber).

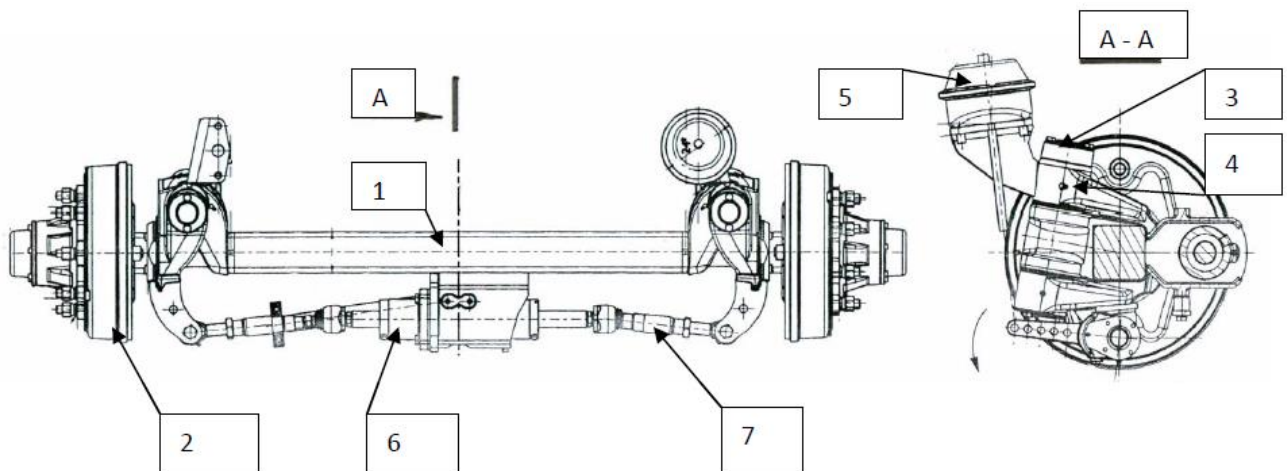


Fig. 7.12. Diagram of a steering axle. 1 – axle; 2 – hub; 3 – hub turning axle; 4 – lubrication point; 5 – brake chamber; 6 – wheel locking hydraulic cylinder; 7 – adjustment rod.

Alignment of axles. The axles of the chassis must be in parallel. If necessary, the position of the axle in respect of the frame in the longitudinal direction can be adjusted by changing the length of the adjustment rod 4 (Fig. 7.13).



Fig. 7.13. Diagram of the installation of the axle. 1 – springs; 2 – axle; 3 – non-adjustment rod; 4 – adjustment rod.

Alignment of wheels. Before performing the alignment of wheels, it is necessary to check whether all the assemblies of the steering axles are in order and, if not, replace the improper ones. Perform the alignment of the wheels when the manure spreader stands on an even site:

- measure the difference between the wheel rims at the front and rear: the distance must be the same;
- move the manure spreader to let the wheels turn 180° and repeat the measurements. If the measurement of the distances between the wheel rims shows that they are not the same, the rods 4 should be adjusted (Fig. 7.14). A distance of around 4 mm greater is allowed at the front, but not otherwise.

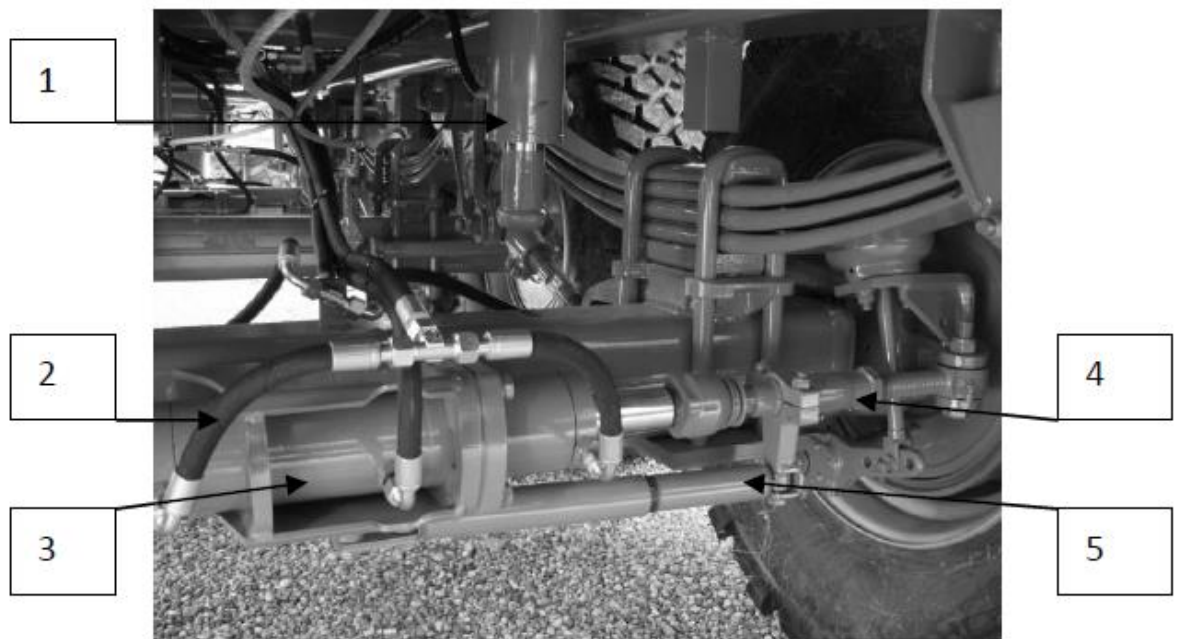


Fig. 7.14. Steering axle. 1 – hydraulic cylinder pressing the rear axle; 2 – hose; 3 – wheel locking hydraulic cylinder; 4 – adjustment rod; 5 – shock absorber.

7.2 Brakes

7.2.1 Servicing of the pneumatic brake system

During the use of the manure spreader, it is necessary to check the tightness of the brake system and condition of its elements, to periodically remove condensate from the reservoir.

The tightness of the system shall be checked under nominal air pressure of 800 kPa. Characteristic hissing or occurrence of bubbles after applying soapy water to the suspicious place is considered as an indication of a leak. If the leak is caused by damaged spacers or other parts of the system, they must be replaced with new ones.

Condensate shall be removed from the reservoir by pressing the drainage valve. Once a year, before the winter season, the drainage valve must be screwed out and cleaned.

7.2.2 Adjustment of the elements of the pneumatic brake system

During the use of the manure spreader, it is necessary to check the efficiency of the brakes and periodically lubricate the marked points.

The adjustment of the brakes shall be performed when:

- the brake blocks are worn-out. The space between the brake blocks and drum increases, causing the impairment of braking efficiency;
- the wheels are braked not simultaneously and not uniformly.

When the brakes are adjusted correctly, the braking force (the sum of braking forces acting upon the wheels being braked) should account for min 27 % of the permissible total mass of the manure spreader when braking with the working brake, and the braking force (the sum of braking forces acting upon the wheels being braked) should account for min 16 % of the permissible total mass of the manure spreader when braking with the hand-brake. Both wheels of one axle should brake uniformly. The difference of the braking forces between the left and right sides of the manure spreader should not exceed 30 %.

The adjustment of the brakes shall be performed only after the adjustment of the bearings of the wheel hub, by changing the brake shaft's brake lever torque or angle of the brake lever in respect of the shaft. For this purpose, it is necessary:

- place protection wedges (blocks) under the wheel opposite to the one being adjusted;
- insert a jack under the axle, at the marked place, and lift the wheel;
- while rotating the wheel, also turn the adjustment bolt 4 (Fig. 7.15) until the braking blocks touch the drum.

The moving distance (motion) of pneumatic brake chamber connector should be 60 - 65 mm, and the difference between the force of the chamber connectors of all the wheel chambers should be not more than 5 mm.

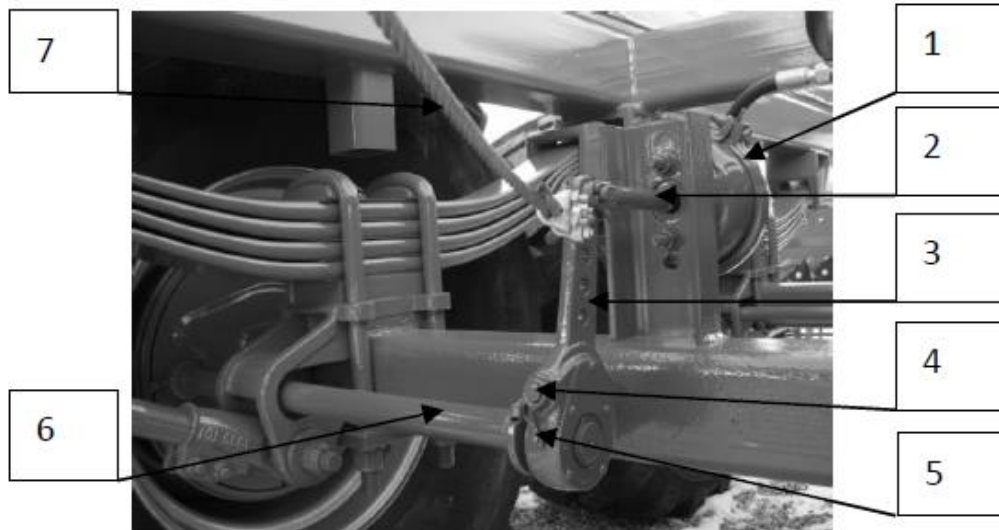


Fig. 7.15. The elements of the braking system. 1 – brake chamber; 2 – tie-rod; 3 – lever; 4 – adjustment bolt; 5 – lubrication point; 6 – cam shaft; 7 – hand-brake cable.

When changing the position of the handles of the braking force regulator, under the full load of the manure spreader, it is necessary to ensure complete air supply to the pneumatic brake chambers.

After adjusting the working brake of the manure spreader, it is necessary to adjust the hand-brake. For this purpose, the length of the cable 7 (Fig. 7.15) connecting the brake lever with the tension mechanism is changed.



ATTENTION!

Constantly check the operation of the braking mechanism. When necessary, adjust or repair it. The brake blocks must be checked once a year and be replaced worn-out brake blocks with new ones. After the motion parts work in, re-adjust them.

7.2.3 Servicing and adjustment of the hydraulic brake system

During the use of the tractor manure spreader, it is necessary to check the tightness of the hydraulic brake system and condition of its elements, to periodically lubricate the marked points.

The adjustment of the brakes shall be performed when:

- the brake blocks are worn-out. The space between the brake blocks and drum increases, causing the impairment of braking efficiency;
- the wheels are braked not simultaneously and not uniformly.

When the brakes are adjusted correctly, the braking force (the sum of braking forces acting upon the wheels being braked) should account for min 27 % of the permissible total mass of the semi-trailer when braking with the working brake, and the braking force (the sum of braking forces acting upon the wheels being braked) should account for min 16 % of the permissible total mass of the semi-trailer when braking with the hand-brake. Both wheels of one axle should brake uniformly. The difference of the braking forces between the left and right sides of the semi-trailer should not exceed 30 %.

The adjustment of the brakes shall be performed only after the adjustment of the bearings of the wheel hub, by changing the brake shaft's brake lever torque or angle of brake lever in respect of the shaft. For this purpose, it is necessary:

- place protection wedges (blocks) under the wheel opposite to the one being adjusted;
- insert a jack under the axle, at the marked place, and lift the wheel;
- while rotating the wheel, also turn the adjustment bolt 3 (Figure. 7.16) until the braking blocks touch the drum.

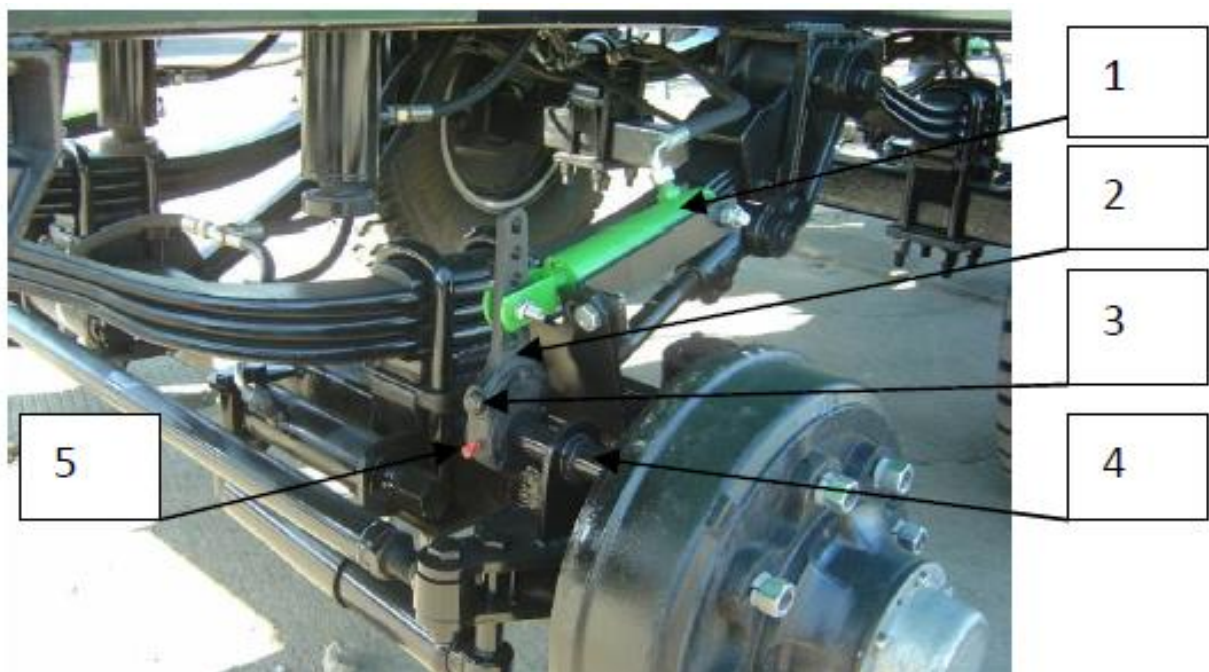


Fig. 7.16. Elements of the braking system. 1 -braking hydraulic cylinder; 2 - leveler; 3 - adjustment bolt; 4 - cam shaft; 5 - lubrication point.



ATTENTION! When performing repair works of the hydraulic and pneumatic systems, make sure that the system is not under pressure.

7.3 Hydraulic system

It is necessary to ensure that lubricant in the hydraulic system of the tractor and in the hydraulic system of the manure spreader is of the same grade. It is prohibited to use lubricant of different grades.

The hydraulic system of the manure spreader must be tight. Check tightness by activating for a short time the body tipping hydraulic cylinder. If any leak of lubricant is found, tighten up the connections. If this does not help, replace the hoses or connections with new ones. If an assembly is mechanically damaged, it must be required with a new one. The connecting elements of the hydraulic system must be clean.

8. TROUBLESHOOTING

Item No	Problem	Cause	Solution
1.	The brake drum heats up	Improperly adjusted brake blocks	Adjust according to Section 7.2.2
2.	The wheel hub heats up	Do not apply too much power when working on the ladder Contaminated bearing lubricant	Adjust according to Section 7.1 Disassemble the hub, replace the lubricant, and adjust as indicated above
3.	Lubricant falls on the brake blocks	Damaged, worn-out or improperly installed hub seal	Disassemble the hub and properly replace the seal. Remove lubricant from the brake blocks and drum and clean them with gasoline. Assemble the hub and adjust as indicated above
4.	Wheels brake not uniformly	Worn-out, contaminated or improperly adjusted brake blocks	Replace worn-out blocks, clean contaminated ones, and adjust according to Section 7.2.2
5.	Wheels brake weakly	Improperly adjusted brake blocks and brake elements	Adjust according to Section 7.2.2
6.	Lubricant on the hoses or connections of the hydraulic system	Insufficiently tightened connections or damaged hoses	Tighten up or replace the parts
7.	Lubricant on the hydraulic cylinder	Damaged spacers of the hydraulic cylinder or bent cylinder	Replace the spacers the cylinder with new ones

Table 8.1. Possible problems and ways of elimination.

9. PERIODICAL SERVICING

9.1 Lubrication

Lubrication is one of the most important factors determining the durability of separate assemblies and mechanisms. Timely lubrication and application of appropriate lubricants considerably decreases the early wear and possibility of the occurrence of failures. Lubricate the manure spreader in compliance with the following principles:

- before applying lubricant to a lubrication point, clean it;
- squeeze lubricant into the lubrication point until used old lubricant appears;
- after lubrication, leave a small amount of lubricant on the head of the lubrication point.

Apply lubricant in accordance with the presented diagram (Figure 9.1, 9.2 and Table 9.1).

Lubrication point No.	Lubrication point location	Lubricant	Lubricant base	Lubrication frequency
1	Towing loop	Litol 24	Li	Once a year
2	Variable-height support foot	Litol-24	Li	Once a year
3	Brake cam shaft	Litol-24	Li	Once a year
4	Brake lever	Litol-24	Li	Once a year
5	Drive shaft bearing	Litol-24	Li	Once a year
6	Hydraulic cylinder head	Litol-24	Li	Once a year
7	Wheel hub and springs	Litol-24	Li	Once a year
8	PTO shaft	Litol-24	Li	Once a year
9	Hand-brake	Litol-24	Li	Once a year
10	Chain transporter sprockets	Litol-24	Li	Once a year
11	Chain transporter driving shaft bearing	Litol-24	Li	Once a year
12	Manure spreader bearings	Litol-24	Li	Once a year
13	Chain transporter tensioning shaft bearing	Litol-24	Li	Once a year

Table 9.1. Lubrication table.

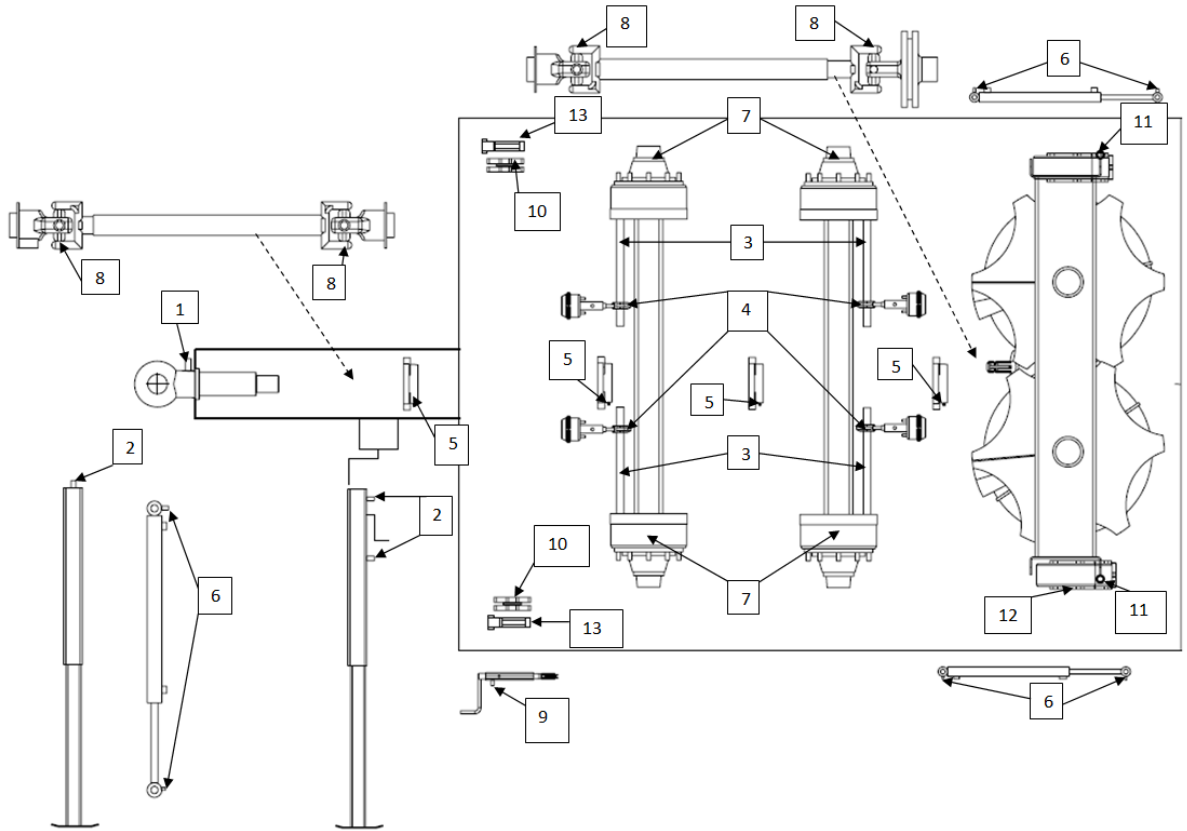


Fig. 9.1. Lubrication ap of a manure spreader.



Fig. 9.2. Lubrication points.



ATTENTION!

Use only high-quality lubricants! The hubs must be with covers!

9.2 Technical maintenance

The durability of tractor manure spreader depends on the conditions and intensity of use, timely maintenance and servicing. Any negligence may have adverse consequences. Timely removed failures require minimal cost but produce maximum effect.

The failures of the manure spreader can be identified and quickly removed only if constant cleaning and monitoring of the technical condition is ensured. If the manure spreader is clean, it is easier to detect shortcomings.

Attention shall be paid to the lubrication of assemblies.

It is preferable to store it under a roof thus avoiding atmospheric effects.

Daily maintenance:

- checking of thread connections and their protection against undesirable loosening;
- checking of the condition of pivot connections (for wear and for the reliability of the pinning of the axles).
- checking of the tightness of the hydraulic system and elimination of inconsistencies;
- checking of the tightness of the pneumatic system and elimination of damage;
- checking of the operation of mechanisms;
- compliance of lubrication with the requirements of the manual;
- checking of the tyre pressure in accordance with the requirements of the manual;
- checking of the closing of the tailgate and discharge port;
- checking of the operation of the brake and light signalling systems.

9.3 Instruction for repairs

When performing minor repairs, pay attention to the cleanliness of works and correct installation and adjustment of parts.

Dismantled parts shall be stored and protected against contamination. Pay attention to the preservation of bearings.

When repairing in outdoor conditions, maintain cleanliness: if any parts drop on the ground, clean them thoroughly.

When performing scheduled and major repairs, it is necessary to comply with the technical rules for the installation of parts and assemblies that guarantee the appropriate quality and efficiency of the works.

Check the operation of the mechanisms of the manure spreader after each repair.

10. DISPOSAL OF THE MANURE SPREADER

When to be disposed of, the manure spreader (as well as any unnecessary parts remaining after its repair) shall be delivered to a metal scrap purchase point. Other unnecessary parts shall be delivered to a secondary raw materials purchase point.



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