PRONAR Sp. z o.o.

17-210 NAREW, UL. MICKIEWICZA 101A, WOJ. PODLASKIE, POLAND

Phone.:	+48 085 681 63 29	+48 085 681 64 29
	+48 085 681 63 81	+48 085 681 63 82
Fax:	+48 085 681 63 83	+48 085 682 71 10

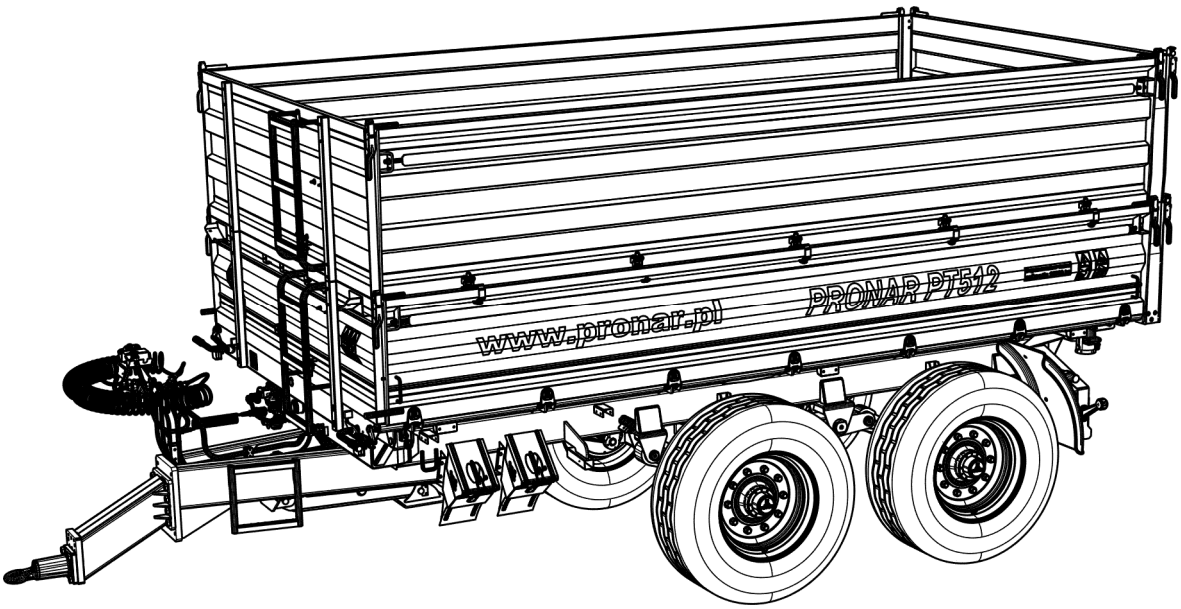
www.pronar.pl

OPERATOR'S MANUAL

TRAILER

PRONAR PT512

TRANSLATION OF THE ORIGINAL DOCUMENT



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Thank you for purchasing our trailer. In the interests of your safety and care for the reliability and durability of the machine, we ask that you familiarise yourself with the content of this manual.

Remember!!!

Before using the trailer for the first time, check if the wheels are properly tightened!!! Regularly check the technical condition of the machine in accordance with the attached schedule.

INTRODUCTION

Information contained herein is current as of the date of its publication. As a result of improvements, some numerical values and illustrations contained in this publication may not correspond to the factual specification of the machine delivered to the user. The manufacturer reserves the right to introduce design changes in manufactured machines that facilitate operation and improve the quality of their work, without making amendments to this Operator's Manual.

This Operator's Manual is an integral part of the machine. Before using the machine, the user must carefully read this Operator's Manual and observe all recommendations. This guarantees safe operation and ensures malfunction-free work of the machine. The machine is designed to meet obligatory standards, documents and legal regulations currently in force.

The manual describes the basic safety and operation rules of Pronar PT512 trailer.

If the information contained in the Operator's Manual needs clarification, the user should refer for assistance to the sale point where the machine was purchased or to the manufacturer.

MANUFACTURER'S ADDRESS

PRONAR Sp. z o.o.
ul. Mickiewicza 101A
17-210 Narew, Poland

PHONE NUMBERS

+48 085 681 63 29 *+48 085 681 64 29*
+48 085 681 63 81 *+48 085 681 63 82*

SYMBOLS USED IN THIS MANUAL

Information, descriptions of danger, precautions, recommendations and orders associated with user safety instructions are indicated as follows:

and preceded by the word **"DANGER".** Failure to observe the instructions may endanger the machine operator's or other person's health or life.

Particularly important information and instructions, the observance of which is essential, are indicated with the sign:

and preceded by the word **"ATTENTION".** Failure to observe the instructions may lead to damage to the machine as a result of improper operation, adjustment or use.

In order to focus the user's attention on the need to perform periodical maintenance, the relevant section of the Operator's Manual is indicated with the sign:

Additional tips contained in this document refer to helpful information on the machine operation and are indicated as follows:

and preceded by the word **"TIP".**

DETERMINING THE DIRECTIONS FOR THE MANUAL'S NEEDS

Left side — a left hand side of the person facing the machine's forward travel direction.
Right side — a right hand side of the person facing the machine's forward travel direction.

SCOPE OF OPERATION STEPS

Operation steps are indicated with the following sign: ➡

The result of an operation/adjustment task or any notes on execution of the tasks performed is indicated with the sign ⇨

PRONAR Sp. z o.o.
ul. Mickiewicza 101 A
17-210 Narew, Polska
tel./fax (+48 85) 681 63 29, 681 63 81, 681 63 82,
681 63 84, 681 64 29
fax (+48 85) 681 63 83
http://www.pronar.pl
e-mail: pronar@pronar.pl

EC DECLARATION OF CONFORMITY OF THE MACHINERY

PRONAR Sp. z o.o. declares with full responsibility, that the machine:

Description and identification of the machinery	
Generic denomination and function:	**Trailer**
Type:	**PT512**
Model:	–
Serial number:	
Commercial name:	**Trailer PRONAR PT512**

to which this declaration relates, fulfills all the relevant provisions of the Directive **2006/42/EC** of The European Parliament and of The Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (Official Journal of the EU, L 157/24 of 09.06.2006).

The person authorized to compile the technical file is the Head of Research and Development Department at PRONAR Sp. z o.o., 17-210 Narew, ul. Mickiewicza 101A, Poland.

This declaration relates exclusively to the machinery in the state in which it was placed on the market, and excludes components which are added and/or operations carried out subsequently by the final user.

Narew, the 10 MAJ 2012

Place and date

Z-CA DYREKTORA
d/s technicznych
członek zarządu
Roman Omelianiuk

Full name of the empowered person position, signature

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CHAPTER

1

GENERAL INFORMATION

1.1 IDENTIFICATION

1.1.1 IDENTIFICATION OF THE TRAILER

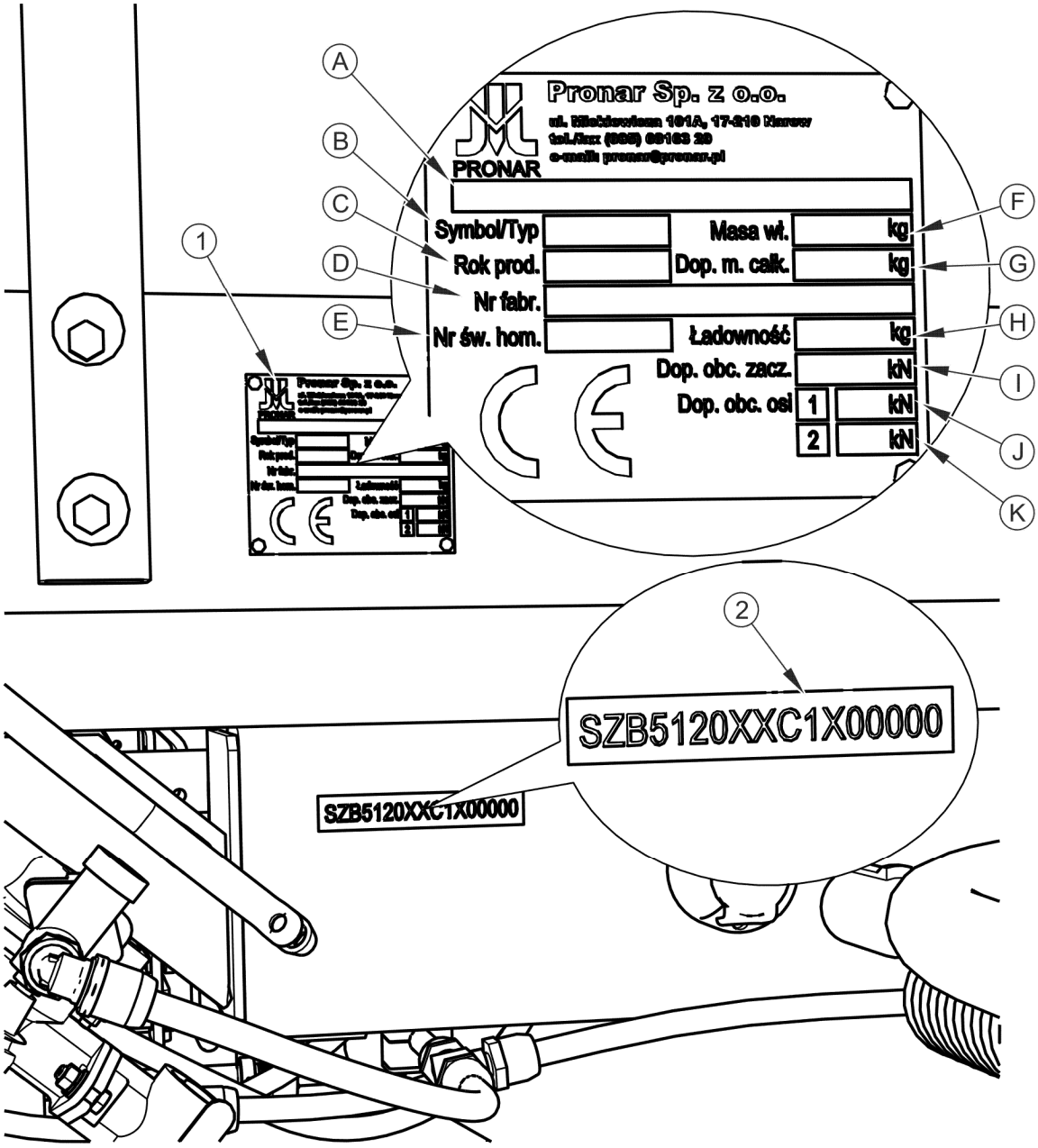


FIGURE 1.1 Location of the rating plate and the serial number

(1) rating plate, (2) serial number

The trailer has been identified by means of a rating plate (1) and a serial number (2) stamped on a rectangular, gold-painted area. The rating plate is located on the front beam of the upper frame and the serial number is punched on the front beam of the chassis – see figure (*1.1*).

When buying the trailer, check that the serial numbers on the machine agree with the number written in the *WARRANTY BOOK*, in the sales documents and the *OPERATOR'S MANUAL*. The meaning of particular fields of the rating plate is presented in the table below.

TABLE 1.1 Meaning of rating plate's fields

ITEM	MARKING
A	General description and purpose
B	Symbol/Type of the trailer
C	Year of manufacture
D	Seventeen digit serial number (VIN)
E	Type approval certificate
F	Empty weight
G	Allowable total weight
H	Load capacity
I	Permissible hitch load
J	Permissible 1st axle load
K	Permissible 2nd axle load

1.1.2 IDENTIFICATION OF THE AXLES

The serial number and the type of an axle is stamped on the rating plate (2) attached to the axle beam (1) – see figure (*1.2*).

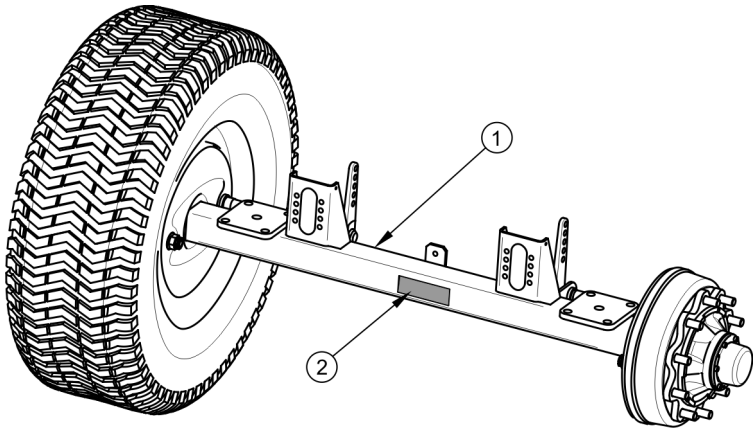


FIGURE 1.2 Location of the axle rating plate

(1) axle, (2) rating plate

1.1.3 LIST OF SERIAL NUMBERS

VIN

S	**Z**	**B**	**5**	**1**	**2**						**X**					

FRONT AXLE SERIAL NUMBER

REAR AXLE SERIAL NUMBER

TIP

In case spare parts must be ordered or in case of problems, it may be required to provide serial numbers of particular components or the trailer's VIN. It is thus advised to enter these numbers in the fields below.

1.2 APPLICATION

This trailer is designed for transporting agricultural commodities (loose, volumetric or long goods) and goods on europallets or collar pallets both within a farm area and on the public roads. This trainer can be used to transport construction materials, mineral fertilizers and other types of materials, provided they meet the requirements stated in the chapter 4. Not

following the manufacturer's recommendations relating to the transport and loading, as well as the traffic regulations of the country the trailer is used in will render the warranty void and will be treated as misuse of the machine.

The trailer has been designed according to all applicable safety requirements and standards. The braking, lighting and signaling systems conform to the requirements of the traffic regulations. According to the Polish Law on Road Traffic (Prawo o ruchu drogowym) of 20 June 1997, Art. 20, the maximum allowable speed of the trailed on public roads is 30 km/h. In countries in which the trailer will be used the maximum allowable speed is limited according to the traffic regulations in force. It must not however exceed the design speed of 40 km/h.

ATTENTION

The trailer must not be used for purposes other than those for which it is intended, in particular:

- **for transporting people, animals, dangerous materials and materials which can chemically react with trailer's structural elements and cause steel corrosion, damage the painted surfaces, melt plastics, damage rubber elements etc.**
- **for transporting improperly secured materials which could fall on the road and pollute the natural environment,**
- **for transporting improperly secured materials which could relocate on the trailer or fall out from the loading case,**
- **for transporting material the center of gravity of which adversely affects the trailer's stability,**
- **for transporting material which exerts an uneven load and/or overloads the axles and suspension.**

The trailer has not been designed and intended for transporting people, animals and any materials classified as dangerous.

Proper use of the machine includes all activities relating to its proper and safe operation and maintenance. The user is thus required to:

- become familiar with the contents of the trailer *OPERATOR'S MANUAL* and the *WARRANTY BOOK* and to follow the recommendations of these documents,

- understand the principle of operation of the machine and its safe and proper use,
- follow the maintenance and adjustment intervals,
- follow general safety regulations,
- prevent accidents,
- follow the traffic and transport regulations of the country in which the trailer is used,
- become familiar with the contents of a tractor operator's manual and follow its recommendations,
- attach the implement only to a tractor which meets all requirements provided by the trailer's manufacturer.

The trailer can only be operated by persons which:

- became familiar with the contents of this manual and the documents delivered with the trailer, as well as the tractor operator's manual,
- have undergone a training in terms of the trailer's operation and safety,
- have all the permits required to drive a vehicle in question and became familiar with the traffic and transport regulations.

TIP

The requirements on a tractor depend on the equipment of the trailer.

TABLE 1.2 Recommended pallet types

PALLET NAME – TYPE	LENGTH [MM]	WIDTH [MM]	HEIGHT [MM]
Europallet – standard	1 200	800	144
Europallet – ½	800	600	144
Europallet – extended	1 200	1 200	144

TABLE 1.3 Requirements on the tractor

ITEM	UNIT	REQUIREMENTS
Braking system – sockets		
Pneumatic, single-line	-	acc. to A DIN 74294
Pneumatic, twin-line	-	acc. to A DIN 74294
Hydraulic	-	acc. to ISO 7421-1
System pressure		
Pneumatic, single-line	bar/kPa	5.8 – 6.5 / 580 - 650
Pneumatic, twin-line	bar/kPa	6.5 / 650
Hydraulic	bar/MPa	150 / 15
Hydraulic tipping system		
Hydraulic oil	-	L HL 32 Lotos (1)
Maximum system pressure	bar/MPa	200 / 20
Oil requirement	l	16
Electrical system		
Voltage	V	12
Connection	-	7-pole, acc. to ISO 1724
Tractor hitch		
Type of hitch	-	Single-axle trailer hitch
	-	Upper transport hitch
Minimum vertical load capacity	kg	1 950
Other requirements		
Minimum tractor power	kW/KM	61.7 / 84

(1) – it is allowed to use other oil, provided it can be mixed with the oil in the trailer's system. Detailed information can be found in the product's data sheet.

When attaching another trailer to this trailer, the second trailer must meet all the requirements given in the table (*1.4*).

TABLE 1.4 Requirements on the second trailer

ITEM	UNIT	REQUIREMENTS
Allowable total weight		
Two-axle trailer	kg	16 500
Braking system – connectors		
Pneumatic, single-line	-	connector acc. to A DIN 74294
Pneumatic, twin-line	-	connector acc. to A DIN 74294
Hydraulic	-	connector acc. to ISO 7421-1
System pressure		
Pneumatic, single-line	bar/kPa	5.8 – 6.5 / 580 - 650
Pneumatic, twin-line	bar/kPa	6.5 / 650
Hydraulic	bar/MPa	150 / 15
Hydraulic tipping system		
Hydraulic oil	-	L HL 32 Lotos (1)
Minimum system pressure	bar/MPa	200 / 20
Electrical system		
Voltage	V	12
Connection	-	7-pole, acc. to ISO 1724
Trailer drawbar		
Drawbar eye diameter	mm	40
Drawbar type	-	swinging (two-axle trailer)

(1) – it is allowed to use other oil, provided it can be mixed with the oil in the trailer's system. Detailed information can be found in the product's data sheet.

1.3 EQUIPMENT

TABLE 1.5 Trailer equipment list

EQUIPMENT	STANDARD	ADDITIONAL	OPTIONAL
Operator's Manual	•		
Warranty Book	•		
Electrical system cable	•		
Single- and twin-line pneumatic system	•		
Twin-line pneumatic system with an automatic regulator			•
Hydraulic braking system			•
Handbrake	•		
Fenders	•		
Fenders, rear + front			•
Hydraulic scissor support	•		
Rotating eye ∅50 mm	•		
Eye ∅40 mm			•
Ball drawbar K80			•
Wheel chokes	•		
Automatic rear hitch		•	
Manual rear hitch		•	
Low speed vehicle warning plate		•	
Reflective warning triangle		•	
Set of extensions (800 mm)	•		

EQUIPMENT	STANDARD	ADDITIONAL	OPTIONAL
Set of extensions (600mm)			•
Set of additional middle extensions (600 mm)		•	
Canvas cover with a frame and a platform		•	
Wall reinforcements	•		
Chute		•	
Under run protective devices		•	
Side pull-off mechanism		•	

Some standard equipment elements detailed in table (*1.4*) may have not be fitted in your trailer. This arises from the possibility to order a new machine with optional equipment which is fitted instead of the standard one.

Information on tires are presented at the end of this document – see *ANNEX A.*

1.4 WARRANTY TERMS

PRONAR Sp. z o.o. Narew guarantees the reliable operation of the machine when it is used according to technical and operation conditions described in the *OPERATOR'S MANUAL*. The repair dates are provided in the *WARRANTY BOOK.*

The guarantee does not apply to those parts and components of the machine which are subject to wear in normal usage conditions, regardless of the warranty period. These parts/components comprise:

- drawbar hitch eye,
- pneumatic system connector filters,
- tires,
- brake shoes,

- bulbs and LED lamps,
- seals,
- bearings.

The warranty service applies only to such cases as: mechanical damage which is not the user's fault, factory defects of parts, etc.

In the event of damage arising from:

- mechanical damage caused by the user or an accident,
- by inappropriate use, adjustment or maintenance, use of the trailer for purposes other than those for which it is intended,
- use of a damaged machine,
- repairs carried out by unauthorized persons and repairs which were carried out in an improper manner,
- making unauthorized alterations to machine design,

the user will lose the right to warranty service.

TIP

Demand that the seller carefully and precisely fills out the Warranty Book and guarantee repair coupons. A missing date of purchase or sale point stamp may make the user ineligible for any warranty claims.

The user is obliged to report immediately on any noticed wear of the paint coating or traces of corrosion, and to have the faults rectified whether they are covered by the guarantee or not. Detailed guarantee regulations are contained in the *WARRANTY BOOK* attached to a new machine.

Modification of the trailer without the written consent of the manufacturer is prohibited. In particular, do not weld, drill holes, cut or apply heat to the main structural elements of the machine which directly affect the machine operation safety.

1.5 TRANSPORT

The trailers are sold completely assembled and do not require packing. Only the machine's technical documentation and extra equipment are packed. The trailer can be delivered to the user either on a vehicle or independently (trailer towed with a tractor).

1.5.1 TRANSPORT ON A VEHICLE.

Loading and unloading of the trailer is to be conducted by means of a loading ramp with the aid of a tractor. During work adhere to the general OSH regulations applicable to reloading works. Persons operating a reloading equipment must have the qualifications required to operate them. The trailer must be properly coupled with a tractor according to the requirements given in this Operator's Manual. The trailer's braking system must be activated and checked before driving off or onto a ramp.

The trailer should be attached firmly to the platform of the vehicle by means of straps, chains or guy ropes with a tightening mechanism. The securing elements must be hitched to the transport lugs designated for that purpose (1) – see figure *(1.3)* – or trailer's structural elements (longitudinal members, cross-bars etc.). Transport lugs are welded to the upper frame longitudinal member (2) – one pair on each side of the trailer. Use only certified and technically reliable securing means. Worn straps, cracked securing catches, bent or corroded hooks and other damage may render a given securing mean unusable. Carefully read the information in the Operator's Manual relating to a given securing mean. Place chocks, wooden beams or other objects without sharp edges under the wheels of the trailer to prevent it from rolling. Objects blocking the trailer wheels must be nailed to the planks of the transporting vehicle platform or secured in other way to prevent their movement. The number of securing elements (cables, straps, chains, stays etc.) and the force required to tension them depends on several factors, including the weight of the trailer, the construction of vehicle transporting the trailer and other conditions. In order to secure the trailer on the platform correctly, support its drawbar on a set of wooden blocks. It is impossible to define the plan to secure the trailer in a precise manner. A correctly secured trailer will not change its position with regard to the transporting vehicle. The securing means are to be selected according to the guidelines of their manufacturer. In case of doubt use a greater number of attaching points and securing means. If necessary, secure sharp edges of the trailer thus protecting securing means against breaking during transport.

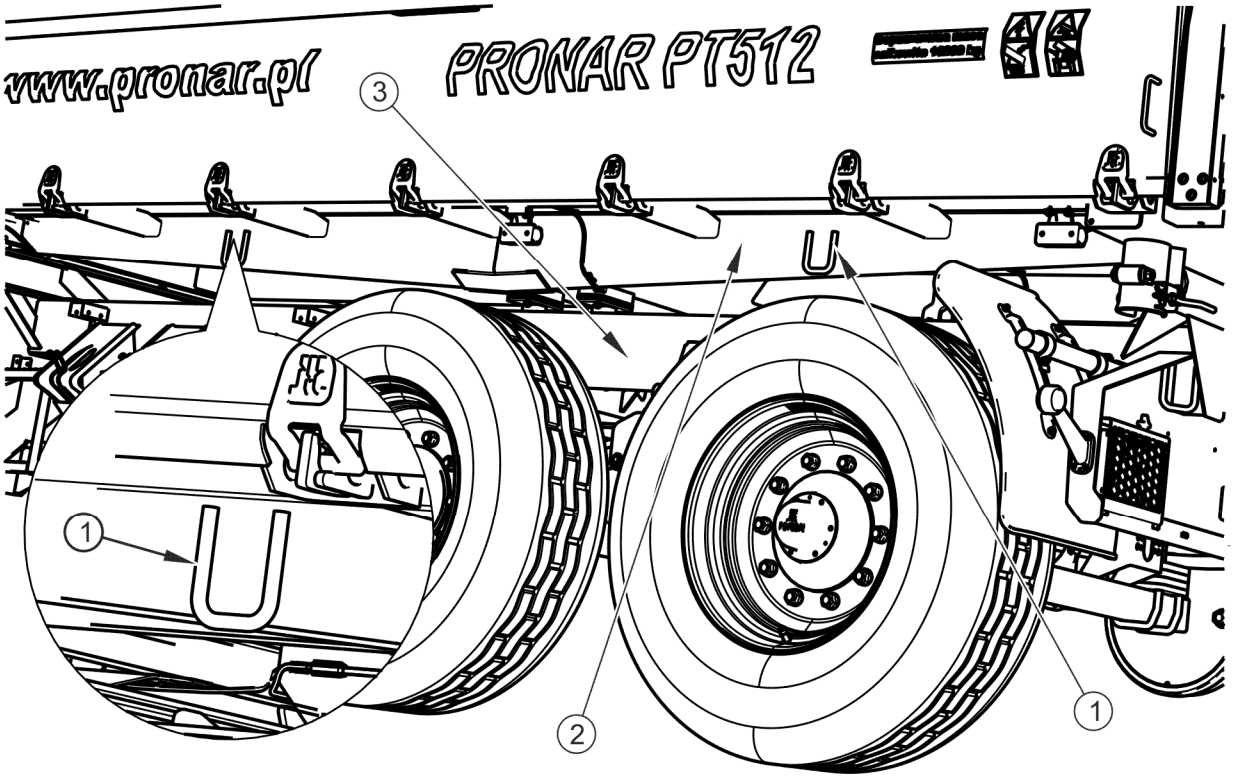


FIGURE 1.3 Location of transport lugs

(1) transport lug, (2) upper frame longitudinal member, (3) lower frame longitudinal member

ATTENTION

If the trailer is transported on a vehicle, it must be secured on the transport vehicle's platform according to relevant safety requirements and regulations.

Driver of the transport vehicle should be particularly careful – the vehicle's center of gravity is shifted upwards when transporting a machine.

Use only certified and technically reliable securing means. Carefully read the instructions of the manufacturer of a securing mean used.

During reloading works, take particular care not to damage parts of the machine's equipment or the lacquer coating. The empty weight of the trailer in condition ready for travel is given in table *(3.1)*.

DANGER

Incorrect application of securing means may cause an accident.

1.5.2 INDEPENDENT TRANSPORT BY THE USER.

If the trailer is transported independently, the user must read the trailer Operator's Manual and adhere to the recommendations contained therein. Independent transport involves towing the trailer with a tractor. During transport adjust the travel speed to the prevailing road conditions and do not exceed the trailer's maximum design speed.

ATTENTION

In the event of independent transport, the user must read the trailer Operator's Manual and adhere to the recommendations contained therein.

1.6 ENVIRONMENTAL HAZARD

A hydraulic oil leak constitutes a direct threat to the natural environment owing to its limited biodegradability. The negligible solubility of oil in water does not cause extreme toxicity of organisms living in the aquatic environment. Oil leaks to bodies of water can however reduce the amount of oxygen.

Maintenance and repair works involving the risk of an oil leak must be carried out on an oil resistant floor or surface. In the event of oil leak into the environment, first of all secure the source of the leak, and then collect the spilled oil using available means. The remaining oil should be collected by mean of sorbents, or by mixing the oil with sand, sawdust or other absorbent materials. The oil pollution, once gathered up, should be kept in a sealed, marked, hydrocarbon resistant container. The container should be kept away from heat sources, flammable materials and food.

DANGER

Used hydraulic oil or its remains mixed with absorbent material should be stored in a precisely marked container. Do not use food packaging for this purpose.

Used up oil or oil unsuitable for further use owing to a loss of its properties should be stored in its original packaging in the conditions described above. Waste oil should be taken to an

appropriate facility recycling or regenerating this type of waste. Waste code: 13 01 10. Detailed information concerning hydraulic oil may be found on the product's Material Safety Data Sheet.

TIP

The hydraulic system of the trailer is filled with L-HL32 Lotos hydraulic oil.

ATTENTION

Waste oil should be taken only to an appropriate facility recycling or regenerating this type of waste. Throwing oil containers or pouring oil into sewerage or water tanks is prohibited.

1.7 WITHDRAWAL FROM USE

When withdrawing the trailer from use, comply with the regulations being in force in the given country concerning withdrawal and recycling of machines. Before dismantling the machine, remove all oil from the hydraulic system and completely reduce the pneumatic brake system air pressure (e.g. using air tank drain valve).

Any parts which are worn or damaged and cannot be reclaimed should be taken to a raw materials collection point. Hydraulic oil should be handed to an appropriate waste management plant.

Use appropriate tools for disassembly and relevant personal protection equipment such as protective clothing, shoes, gloves, goggles etc.

DANGER

Avoid contact with oil. Avoid hydraulic oil leakages.

CHAPTER

2

SAFETY OF OPERATION

2.1 GENERAL SAFETY RULES

2.1.1 USE OF THE TRAILER

- Before operating the trailer, carefully read this Operator's Manual and the *WARRANTY BOOK*. When operating the machine, the operator must comply with the recommendations stated in these documents.
- The trailer may only be used and operated by persons qualified to drive agricultural tractors with trailers.
- If the information contained in the Operator's Manual is difficult to understand, contact a seller who runs an authorized technical service on behalf of the manufacturer or contact the manufacturer directly.
- Careless and improper use and operation of the trailer and non-compliance with the recommendations given in the Operator's Manual poses danger to health.
- Be aware of the existence of a residual risk. For this reason the fundamental basis for using this trailer should be the application of safety rules and reasonable behavior.
- The machine must never be used by persons who are not authorized to drive agricultural tractors, including children and people under the influence of alcohol or drugs.
- Non-compliance with the safety rules can endanger the health and the life of an operator and other persons.
- The trailer must not be used for purposes other than those intended. Anyone who misuses the trailer takes full responsibility for any consequences of this improper use. Use of the machine for purposes other than those for which it is foreseen by the manufacturer may invalidate the guarantee.
- Installation and disassembly of extensions must be carried out by using platforms, ladders or ramps of appropriate height. Condition of this equipment must assure protection against falling. These works should be carried out by at least two persons.

- The user of the trailer is obliged to familiarize oneself with the construction, operation principle and rules of safe operation of the trailer.

2.1.2 HITCHING AND DISCONNECTING FROM TRACTOR

- Do not hitch the trailer to a tractor not fulfilling the requirements stated by the manufacturer (minimal tractor power requirement, inappropriate hitch etc.) – see table (*1.2*) *REQUIREMENTS ON THE TRACTOR*. Before hitching the trailer make sure that oil in external hydraulic system of tractor may be mixed with the hydraulic oil of the trailer.
- Before hitching the trailer to a tractor check that a tractor and the trailer are in good technical condition.
- To hitch the trailer to a tractor, use a tractor hitch for single axle trailers. After completing the hitching process, check if the hitch has been secured properly. Carefully read the tractor Operator's Manual. If a tractor is equipped with an automatic hitch, make certain that the coupling operation is completed.
- Be especially careful when hitching the machine.
- When hitching, no persons must be present between the trailer and the tractor.
- Do not proceed with disconnecting the trailer from the tractor when the loading case is raised.
- Coupling and uncoupling the trailer may only take place when the machine is immobilized by means of the parking brake.
- The trailer must not be moved when the support is extended or when it leans against the ground. Moving the machine in such circumstances can damage the support's cylinder.

2.1.3 COUPLING AND UNCOUPLING THE SECOND TRAILER

- Do not connect the second trailer if it does not fulfill the requirements stated by the manufacturer of (lack of required drawbar eye, exceeding permissible total weight etc.) – see table (*1.3*) *REQUIREMENTS ON THE SECOND TRAILER*. Before coupling the machine make certain that oil in both trailers can be mixed.

- Only double axle trailers having the maximum allowable weight given in table (*1.3*) can be coupled to the trailer.
- Before hitching the trailer to a tractor check that the tractor and the trailer are in good technical condition.
- Be especially careful when coupling the machine.
- When hitching, no persons must be present between both trailers. A person assisting with hitching up the machines must stand outside the area of danger and must be visible to the tractor driver at all times.
- Do not proceed with uncoupling the second trailer when the loading case is raised.
- After completing the hitching process, check if the hitch has been secured properly.

2.1.4 HYDRAULIC AND PNEUMATIC SYSTEMS

- The hydraulic and pneumatic systems are under high pressure during operation.
- Regularly check the technical condition of connections, as well as the hydraulic and pneumatic lines. Oil or air leaks must not be present.
- A cut-off valve in the hydraulic tipping system limits the tipping angle of the loading case when tipping to the rear and sideways. The length of the cable controlling this valve is factory adjusted and must not be changed when the trailer is being used.
- In the event of malfunction of the hydraulic or pneumatic system, do not use the trailer until the malfunction is corrected.
- When connecting the hydraulic lines to a tractor, make sure that the hydraulic systems of the tractor and the trailer are depressurized. If necessary, reduce residual pressure in the system.
- In the event of injuries being caused by pressurized hydraulic oil, contact a doctor immediately. Hydraulic oil may penetrate the skin and cause infections. In the event of contact of oil with eye, rinse with large quantity of water and if irritation

occurs, consult a doctor. In the event of contact of oil with skin, wash the area of contact with water and soap. Do not apply organic solvents (petrol, kerosene).

- Use the hydraulic oil recommended by the manufacturer.
- After changing the hydraulic oil, the used oil should be disposed of properly. Used oil or oil which has lost its properties should be stored in original containers or replacement hydrocarbon resistant containers. Replacement containers must be clearly marked and appropriately stored.
- Do not store hydraulic oil in containers designed for storing food.
- Rubber hydraulic hoses must be replaced every 4 years regardless of their technical condition.

2.1.5 LOADING AND UNLOADING THE TRAILER

- Loading and unloading the trailer must be carried out only by a person having relevant experience.
- Before loading the trailer make sure that the wall reinforcements are installed and secured by means of nuts. If the material being loaded does not exert force on the side walls, the reinforcements may be dismounted. Otherwise the force exerted by loaded material will damage the walls.
- Use only original tipping pins with a handle. Using non original pins could damage the trailer.
- The trailer is not intended for transporting people, animals or hazardous materials.
- The load must be arranged in such a way that it does not affect the stability of the trailer and does not hinder driving.
- The arrangement of the load must not cause an overload on the axle of the trailer.
- Incorrect load distribution and overloading the machine may cause the trailer to tip over or cause damage to its components.
- Do not climb on the loading case during loading.

- The trailer must be loaded and unloaded only when parked on a level and hard surface and hitched to a tractor. The tractor and the trailer must be parked to drive forwards.
- Ensure that during unloading, loading or raising the loading case nobody is near the trailer. Before tipping the loading case, ensure that you have an appropriate visibility and make certain that there are no bystanders.
- When loading and unloading the trailer, the drawbar eye and tractor hitch are subject to dynamic vertical loads.
- Before raising the loading case, the tipping pins should be placed on the intended side. Check if the pins are correctly inserted.
- Keep a safe distance from overhead power lines when the loading case is being raised.
- Pay particular attention when opening and wall locks – the load may exert force on the trailer walls.
- Do not tip the loading case in windy conditions.
- Bulk materials loaded in excess of 1 m can be unloaded only by tipping the loading case to the rear.
- Bulk materials loaded in the trailer with the second set of extensions must be unloaded with particular care.
- When operating Pronar PT512 trailer with the second set of extension installed, the risk of occurrence of following hazards is more significant: losing the trailer's stability, tipping over, compromising the durability of trailer's components, adversely affecting the view on movement of trailer's body components, uncontrolled loading case movement on uneven ground.
- Pay attention to safety when unloading the trailer on uneven ground. Make sure there are no persons in the proximity of the trailer.
- If the load does not pour from the raised load box, immediately cease unloading. The trailer may only be tipped again after removing the obstacle which prevented the unloading.

- During winter pay particular attention to materials which may freeze during transport. When tipping the loading case with frozen load the trailer may become unstable and tip over.
- Do not raise the loading case if there is any danger whatsoever that the case will tip over.
- Do not raise the loaded loading case when the side walls are closed.
- Do not jerk the trailer forwards if the load is bulky or reluctant to pour and does not unload.
- After completing unloading, ensure that the loading case is empty.
- Do not drive with the loading case raised.
- When closing or opening the rear chute slide gate or the walls and extensions, take particular care to avoid crushing fingers.
- Do not enter or place hand between opened side walls and the loading case.
- Lower the loading case before proceeding to deal with a malfunction. If it is necessary to raise the loading case, it should be secured against dropping with the aid of a support. The loading case may not be loaded. The trailer must be hitched to the tractor and secured with chocks and the parking brake.

2.1.6 TRANSPORT RUN

- During travel on public roads comply with the road traffic regulations and transport regulations of the country in which the trailer is used.
- Do not exceed the permitted speed arising from road conditions and design limitations. Adjust the travel speed to the prevailing road conditions, trailer load and road traffic regulations limits.

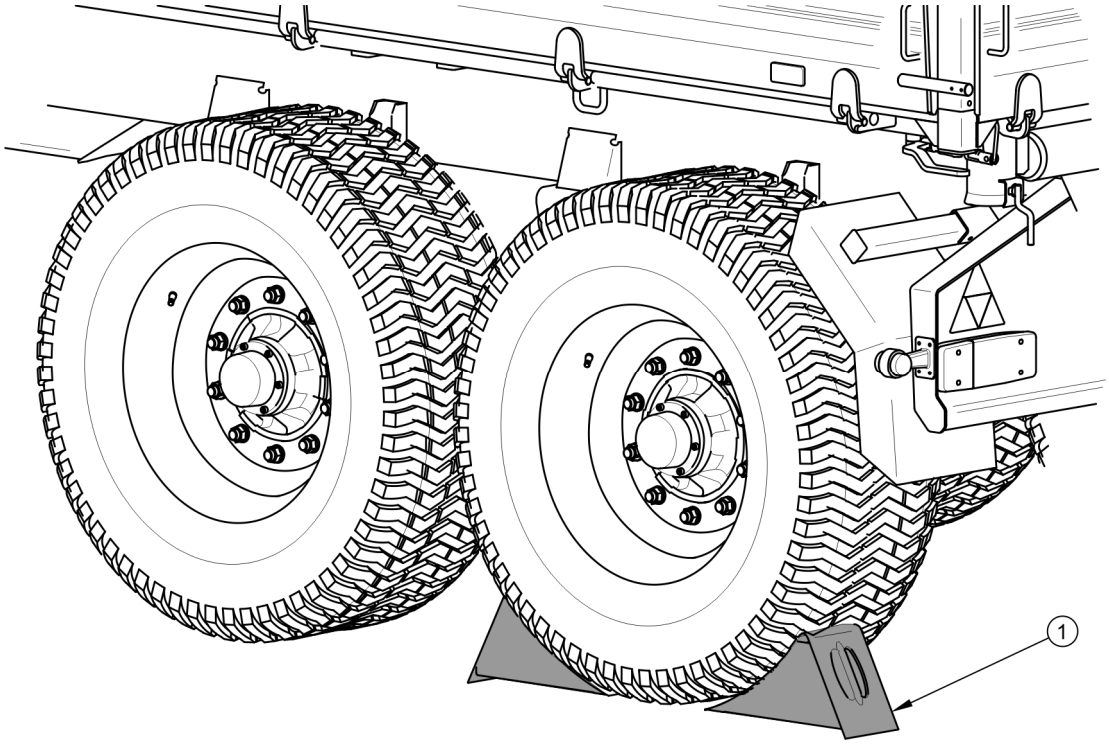


FIGURE 2.1 Method of placing wheel chocks

(1) wheel chock

- The wheel chocks (1) must be placed only under one wheel (one in the front of the wheel, the second behind the wheel
- Do not leave the trailer unattended. The trailed disconnected from a tractor must be secured against rolling by means of the parking brake and the wheel chocks or other objects without sharp edges laid under the wheels of the vehicle.
- Before moving check that the trailer is correctly hitched to a tractor – in particular check if the hitching pins are secured properly.
- Vertical load carried by the trailer drawbar eye affects the steering of a tractor.
- It is prohibited to drive with the loading case raised.
- Before driving off check if the pins attaching the loading case to the lower frame and wall pins are secured against falling out. Check if the rear wall slide gate is secured properly. Make sure that all walls and extensions are properly closed. Check if the tensioning wires are attached correctly and if the wire detaching mechanism is secured.

- Each time before using the trailer always check its technical condition, especially in terms of safety. In particular, check the technical condition of the hitch system, the axle system, the brake system, lights and the connections of the hydraulic, pneumatic and electrical systems.
- Before driving off check that the parking brake is disengaged, the braking force regulator is positioned in a proper position (applies to pneumatic systems with a manual three position regulator).
- The trailer is designed to operate on slopes up to 8^0. Driving trailer on steeper slopes may cause the trailer to tip over as a result of loss of stability.

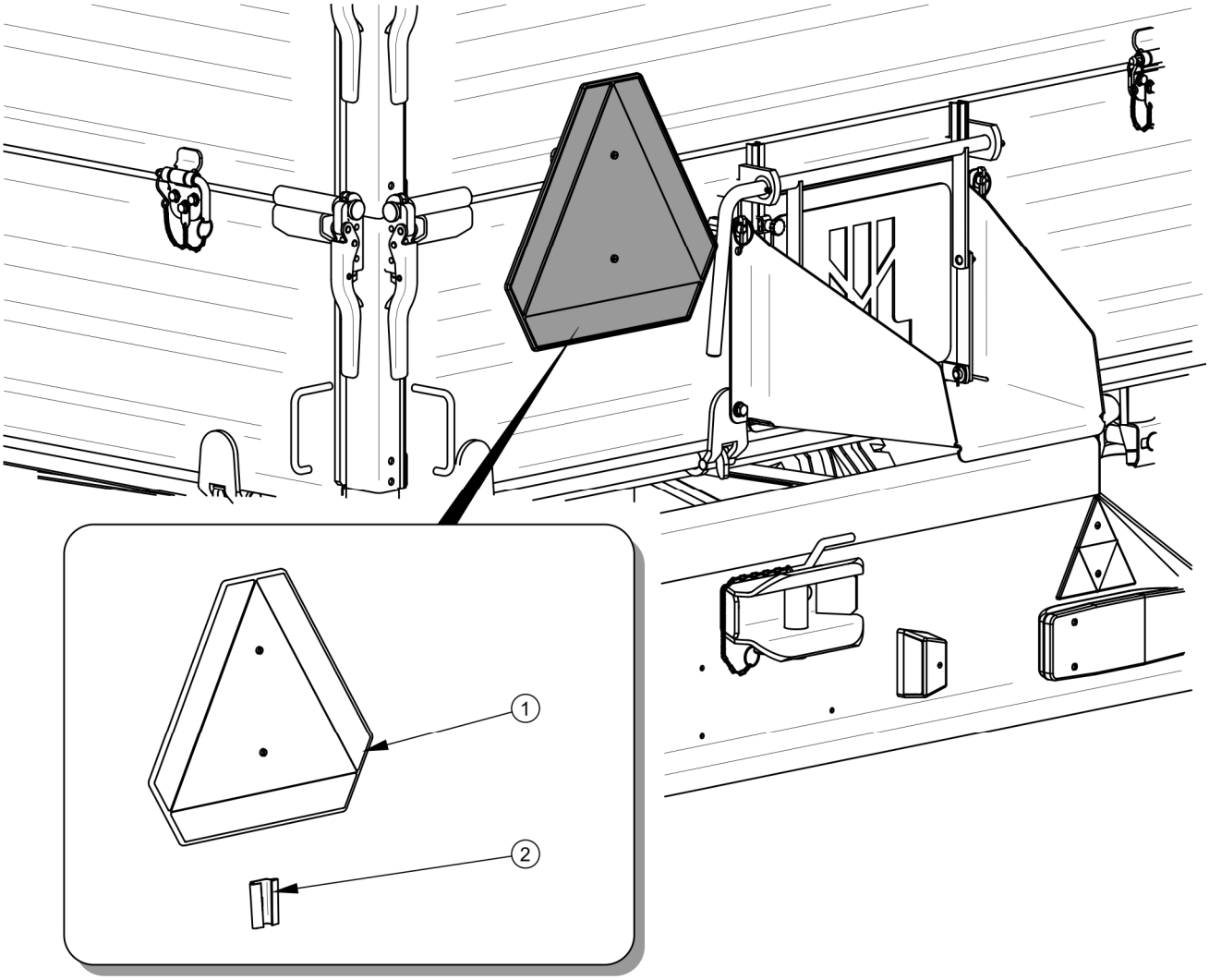


FIGURE 2.2 Location of low speed vehicle warning plate

(1) plate, (2) holder

- While driving on public roads, an approved reflective warning triangle must be available as the trailer's and a tractor's equipment.
- Periodically drain water from the air tank of the pneumatic system. Freezing water may cause damage to pneumatic system components.
- Reckless driving and excessive speed may cause accidents.
- A load protruding beyond the edge of the trailer should be indicated according to the road traffic regulations. Do not transport loads prohibited by the manufacturer.
- Never exceed the trailer's maximum allowable capacity. Doing so may damage the machine, lead to loss of stability, scattering of the load while driving or other types of danger. The brake system is adjusted to the total weight of the trailer; exceeding the weight limit causes drastic reduction of basic braking effectiveness.
- Prolonged driving on steep ground may lead to loss of braking efficiency.
- Place the low speed vehicle warning plate on the rear wall, if the trailer is the last vehicle towed
- The load must be uniformly distributed and must not obstruct visibility or hinder driving.
- The load must be secured so that it cannot move or fall over.
- When reversing, use the assistance of another person. During maneuvering the person must stay within a safe distance from the danger zones and be visible to the tractor driver all the time.
- Do not climb on the trailer while travelling.
- Do not park the trailer on slopes.

2.1.7 TIRES

- When working with tires, the trailer should be immobilized with parking brake and secured against rolling by placing chocks under wheels. A wheel can be dismounted only when the trailer is not loaded.
- Repair works on the wheels or tires should be carried out by persons trained and entitled to do so. These works should be carried out by means of appropriate tools.

- Check the tightening of the nuts after first operation of the trailer, after the first driving with load and then once per 6 months of operation or 25,000 kilometers. In the event of intensive work checking the nut tightening should be done at least every 100 km. The inspection should be repeated if a wheel has been removed from the axle.
- Avoid potholes, sudden maneuvers or high speeds when turning.
- Check the tire pressure regularly. The air pressure should be also checked after the whole day of intensive work. Please note that higher temperatures could raise tire pressure by as much as 1 bar. In case of such temperature and pressure rise, reduce the load or speed. Do not release air from tires to adjust the pressure.
- Protect tire valves using suitable caps to avoid soiling.

2.1.8 MAINTENANCE

- During the warranty period, any repairs may only be carried out by Servicing Center authorized by the manufacturer. After the expiry of the warranty period it is recommended that repairs to the trailer are performed by specialized workshops.
- In the event of any fault or damage, do not use the trailer until the fault is fixed.
- During maintenance works use the proper, tight fitting protective clothing, gloves, protective goggles and appropriate tools.
- Any modification to the trailer renders the manufacturer free from any responsibility for damage or health risk.
- Climb on the trailer only when it is stationary and when the tractor's engine is switched off. Both the tractor and the trailer should be secured by means of the parking brake and chocks should be placed under the trailer wheels. Ensure that unauthorized persons do not have access to the tractor cab.
- Regularly check the technical condition and tightening of bolted joints (in particular that of the drawbar and wheels).
- Regularly service machine according to schedule defined in this Operator's Manual.

- Before beginning works requiring raising the loading case, it must be emptied and secured by a support to prevent accidental falling. At this time the trailer must be hitched to the tractor and secured with chocks and the parking brake.
- Before beginning repair works on hydraulic or pneumatic systems, reduce oil or air pressure completely.
- Service and repair works should be carried out according to the general principles of occupational health and safety rules. In the event of injury, the wound must be immediately cleaned and disinfected. In the event of more serious injuries, seek a doctor's advice.
- Repair, maintenance and cleaning works should be carried out with the tractor's engine switched off and the ignition key removed. Both the tractor and the trailer should be secured by means of the parking brake and chocks should be placed under the trailer wheels. Ensure that unauthorized persons do not have access to the tractor cab.
- During maintenance or repair works the trailer may be unhitched from tractor, but secured with chocks and the parking brake. The loading case must not be raised.
- Should it be necessary to change individual parts, use only parts recommended by the manufacturer. Non adherence to these requirements may put the user and other people's health and life at risk, damage the machine and invalidate the guarantee.
- Before welding or carrying out electrical works, the trailer should be disconnected from the power supply. The paint coating should be cleaned. Burning paint fumes are poisonous to people and animals. Welding works should be carried out in a well lit and well ventilated room.
- When welding, pay attention to flammable or fusible elements (parts of the pneumatic, electrical and hydraulic systems, as well as and plastic parts). If there is a risk that such parts might catch fire or become damaged, they should be removed or covered with nonflammable material before commencing the welding works. When carrying out these works always have a CO_2 or foam extinguisher available.

- If the trailer must be raised, use only proper and approved hydraulic or mechanical jacks for this purpose. After lifting the machine, use stable and durable supports. Works must not be carried out under a trailer which has only been raised by a jack.
- The trailer must not be supported by means of brittle objects (bricks or concrete blocks).
- After completing works associated with lubrication, remove excess oil or grease. The trailer should be kept clean and tidy.
- Exercise caution when climbing on top of the loading case. Climbing on the top of the loading case is possible by use of ladders located on the front wall, extension and the draw bar, as well as by means of foldable steps inside the loading case. Components not intended to aid access may not be used for this purpose. Before entering the loading case, prevent trailer moving with the parking brake and chocks.
- Do not make independent repairs of control valve, brake cylinders, tipping cylinder and braking force regulator. In the event of damage to these components, replace them or have them repaired by an authorized servicing center.
- Do not repair the drawbar and its eye (straightening, repairing or welding). A damaged drawbar must be replaced.
- Do not install additional devices or equipment not conforming to manufacturer's requirements.
- The trailer can only be towed if its traction, lighting and braking systems are operating normally.

2.2 RESIDUAL RISK ASSESSMENT

Pronar Sp. z o. o. with its premises in Narew has made every effort to eliminate the risk of accidents. There is however certain residual risk which could lead to an accident; this is connected mainly with the actions described below:

- using the trailer for purposes other than those for which it is intended,

- being between a tractor and the trailer while the tractor's engine is working and when the machine is being attached or hitched to the second trailer,
- being on the machine during its operation,
- not maintaining safe distance during loading or unloading of the trailer,
- operation of the trailer by unauthorized persons or persons under the influence of alcohol,
- introducing alterations without the consent of the manufacturer,
- cleaning, maintenance and technical inspections of the trailer,
- presence of persons or animals in areas not visible from the driver's position.

The residual risk may be reduced to a minimum by following the recommendations below:

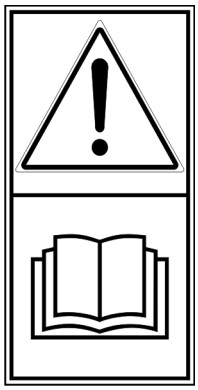
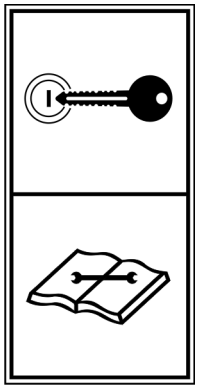
- cautious and unhurried operation of the machine,
- sensible application of the remarks and recommendations contained in the Operator's Manual,
- maintaining safe distance from prohibited or dangerous places during unloading, loading and hitching the trailer,
- carrying out repair and maintenance works according to the operating safety rules,
- carrying out repair and maintenance works by trained persons,
- using tight fitting protective clothing and appropriate tools,
- ensuring that unauthorized persons have no access to the machine, especially children.
- maintaining a safe distance from prohibited or dangerous places
- not riding on the machine during transport, loading or unloading.

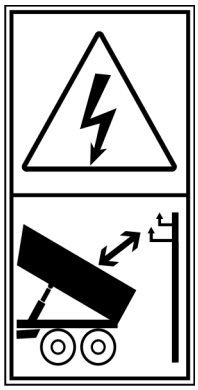
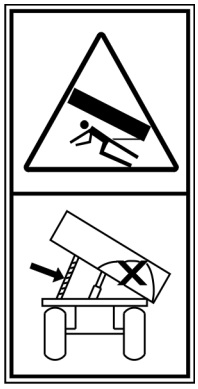
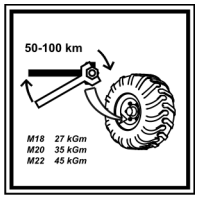
2.3 INFORMATION AND WARNING DECALS

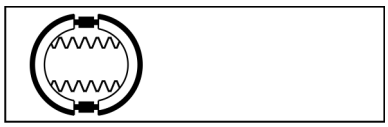
The trailer is labeled with the information and warning decals mentioned in table (*2.1*). The symbols are located as presented in figure (*2.3*). The user must take care that notices, as well as warning and information symbols located on the trailer are clear and legible.

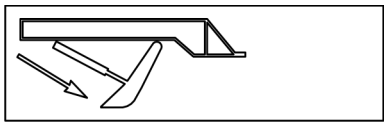
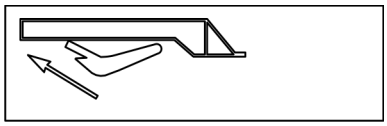
Damaged decals are to be replaced. Safety decals are available from the manufacturer or your local dealer. New assemblies, replaced during repairs, must be relabeled with an appropriate safety signs. When cleaning the trailer, do not use solvents, as they can damage the coating of information decals. Do not subject them to strong water jets.

TABLE 2.1 Information and warning decals

ITEM	DECAL	MEANING
1	PT512 PRONAR	Trailer version.
2		Note. Before starting work, carefully read the Operator's Manual.
3		Before beginning servicing or repairs, switch off the tractor's engine and remove key from ignition. Ensure that unauthorized persons do not have access to the tractor cab.

ITEM	DECAL	MEANING
4		Before climbing onto the trailer, switch off tractor's engine and remove key from ignition.
5		Note. Danger of electric shock. Keep a safe distance from overhead power lines during unloading.
6		Danger of crushing. Do not perform any maintenance or repair works on the loading case that is loaded, raised or not supported.
7		Regularly check if the nuts and bolts fixing the wheels and other components are properly tightened.

ITEM	DECAL	MEANING
8		Grease the trailer according to the recommendations of the Operator's Manual.
9		Hose supplying hydraulic braking system.
10		Hose supplying hydraulic tipping system.
11		Information on typical weight of selected material types.
12		Positions of control valve controlling the operation of hydraulic tipping system.
13		Information decal.
14		Air pressure in the tires. (1)
15		Permissible design speed.

ITEM	DECAL	MEANING
16		Positions of control valve controlling the operation of hydraulic support.
17		Hose supplying the scissor support's hydraulics.
18		Return line of the scissor support's hydraulics.
19		Quality control decal.
20		Allowable total weight.

(1) – pressure value should be adapted to tires

Numbers in the "ITEM" column correspond to labels in figure (2.3)

Decals – items (9), (10), (17) and (18) – are located on hydraulic hoses. Decals (12) and (16) are located near hydraulic valves.

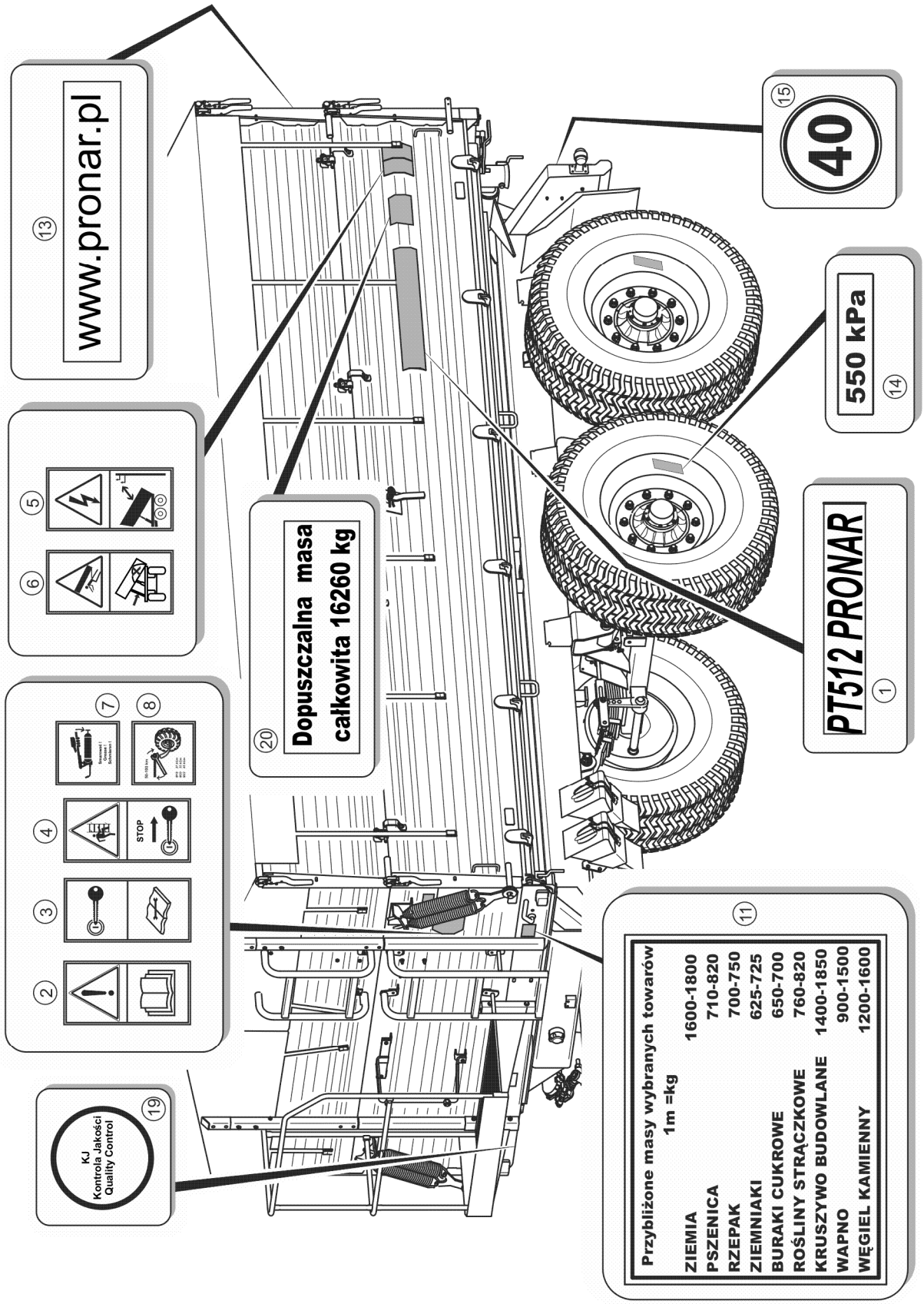


FIGURE 2.3 Locations of information and warning decals

CHAPTER

3

DESIGN AND OPERATION

3.1 TECHNICAL SPECIFICATION

TABLE 3.1 Basic technical data

ITEM	UNIT	PT512
Dimensions		
Total length	mm	6 139
Total width	mm	2 550
Total height	mm	2 652
Internal loading case dimensions		
Length:	mm	4 544
Width:	mm	2 416
Height	mm	600 + 800
Weight and carrying capacity		
Empty weight	kg	4 260
Allowable total weight	kg	16 260
Allowable carrying capacity	kg	12 000
Other information		
Wheel track	mm	1 900
Load volume	m^3	15.4
Loading surface	m^2	11
Loading surface lift	mm	1 252
Loading case tipping angle		
- sideways	(°)	46
- rearwards	(°)	50
Electrical system voltage	V	12
Design speed	km/h	40
Noise emission level	dB	below 70
Tractor power requirement	bhp/kW	84 / 61.7
Hydraulic oil requirement	l	16
Permissible load on drawbar eye	kg	1 950

3.2 TRAILER CONSTRUCTION

3.2.1 CHASSIS

Trailer chassis consists of assemblies indicated on figure (*3.1*). The lower frame (1) of the loading case is welded from steel sections. The lower frame construction depends on the version of a trailer. The main support elements are two longitudinal members connected with crossbars. In the middle section there is a bracket (2) used for seating the hydraulic tipping cylinder. In front of tipping cylinder brackets there is a loading case support (9). At the rear of the lower frame there is a beam (7) with ball pins at the end. The support structure of the upper frame and the interlocking method allows tipping of the loading case sideways and to the rear. Brackets for mounting the upper frame are welded to the left and right sides of a crossbar (8) of the lower frame.

In the rear section of the chassis there is a lights support beam (3) onto which electrical equipment elements, as well as hydraulic and pneumatic system sockets for connection of another trailer are installed.

The trailer suspension comprises two axles (4) attached to leaf springs (17) by means of U-bolts. The suspension is attached the lower frame (1). The axles are made from square bars ended with pivots onto which wheel hubs (5) are mounted by means of conical bearings. The wheels are single, equipped with brake shoes which are activated through mechanical expander cams. The rear wheels are covered by means of fenders (11) attached to trailer frame brackets. In the front part of the trailer, on the left longitudinal member, wheel chocks (12) can be found; just behind their supports there is a support for the parking brake crank mechanism (13).

The hydraulic scissor support (10) is located between the drawbar's longitudinal beams onto which the drawbar plate (6) is welded. The drawbar can be set in two positions, depending on the type of a tractor. A drawbar eye (15) is attached to the plate.

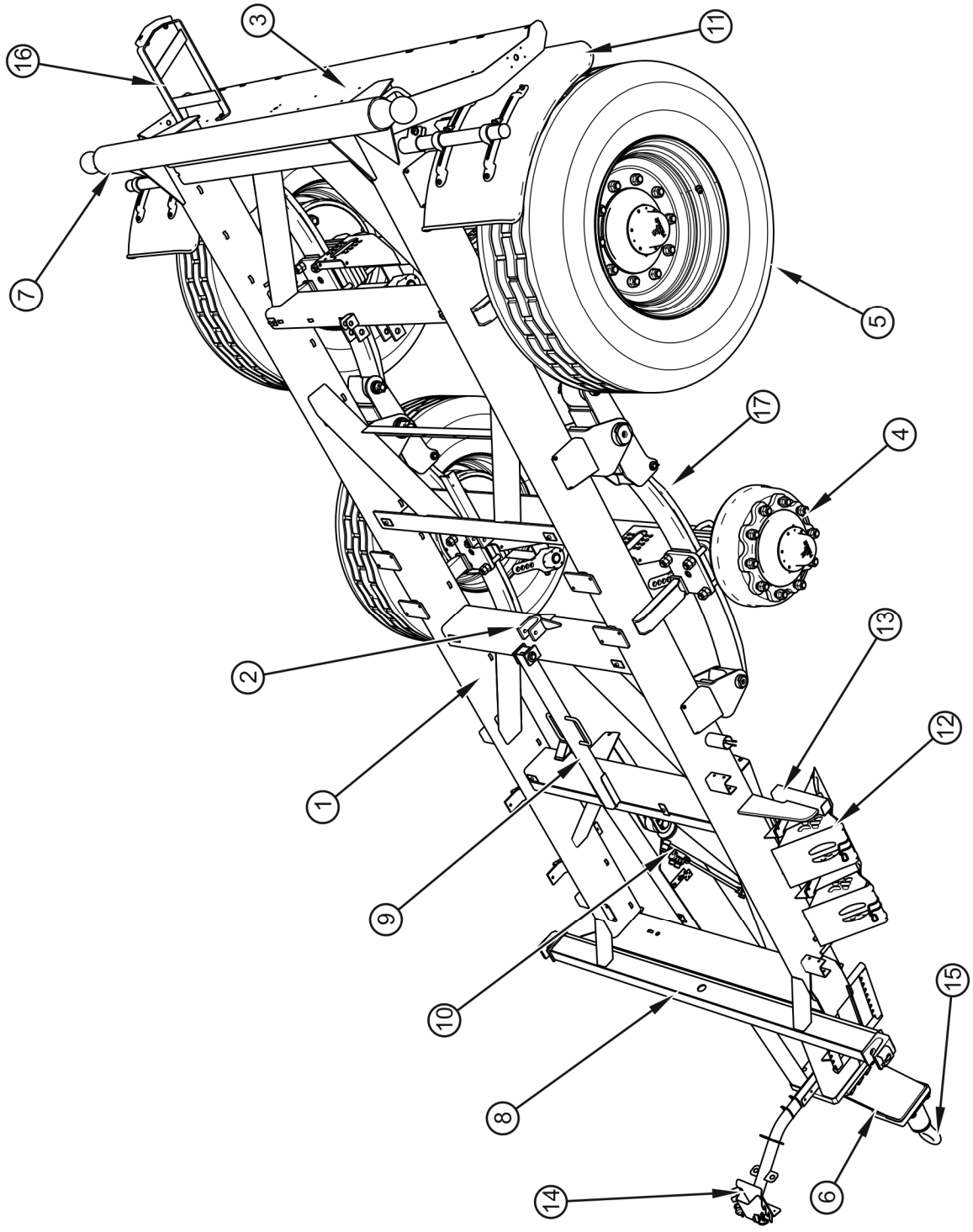


FIGURE 3.1 Chassis

(1) lower frame, (2) tipping cylinder bracket, (3) lights support beam, (4) axle, (5) wheel, (6) drawbar, (7) rear beam, (8) front crossbar, (9) loading case support, (10) trailer support, (11) fender, (12) wheel chocks, (13) brake mechanism, (14) wire harness support, (15) drawbar eye, (16) rear wall stopper, (17) leaf spring

3.2.2 LOADING CASE

The loading case of the trailer comprises: the upper frame (1) – figure (*3.2)* – onto which a steel floor is welded, the side walls (2), the front wall (3) and the rear wall (4). The side walls are 600 mm high. As standard, Pronar PT512 trailer is also equipped with profiled extensions having the height of 800 mm. Optionally additional 600 mm extensions can be fitted (only in 600 + 600 + 600 version).

The loading case is mounted on brackets of the rear beam and the front crossbar of the lower frame – see figure (*3.1*). A tipping direction can be selected by positioning the tipping pins in the profiled openings. Their construction prevents their inappropriate placing by the trailer operator.

The rear and side walls of the loading case are secured using pins seated in the front wall locks and locks welded to rear pillars (5) of the walls. In the lower part they are locked using hooks located in left and right longitudinal members, as well as in the rear beam of the upper frame. The walls can be closed and opened by means of two levers (1) – see figure *(3.3)* – located on the front beam and, in case of the rear wall, the lever (6) – see figure *(3.2)* – located on the left side of the loading case.

The extensions are secured in the same way as the loading case walls. The upper pins of the extensions are secured in the front extension lock and the rear pillars locks (7). In the lower part there are hinges (8) welded to the edge of the wall which are used as a closing mechanism. All hinges are fitted with with cotter pins preventing the pins from falling out.

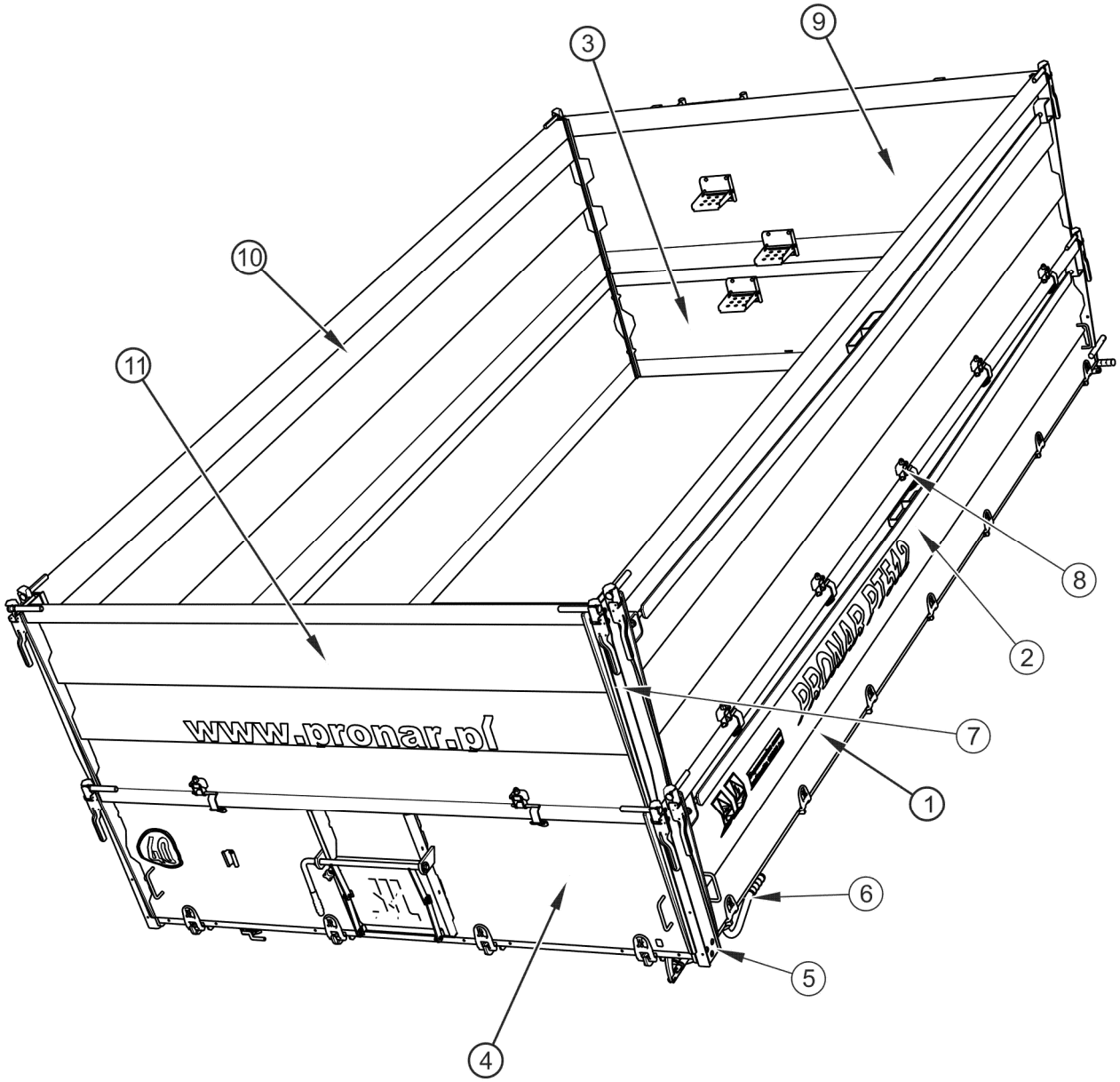


FIGURE 3.2 Loading case – view from the rear

(1) upper frame, (2) side wall, (3) front wall, (4) rear wall, (5) wall rear pillar, (6) lever, (7) extension rear pillar, (8) hinge, (9) front extension, (10) side extension, (11) rear extension

Access ladders (2) and (3) are attached to the front wall and extension. An additional step facilitating access to the loading case is bolted to the inside part of the front extension.

Optionally the trailer can be equipped with a foldable canvas cover (5) with its frame. Another piece of equipment facilitating the canvas cover handling is a platform (4) attached to the trailer's front wall. The pull-off springs (6) facilitate the side walls opening. The springs (6) and the platform (4) are available optionally.

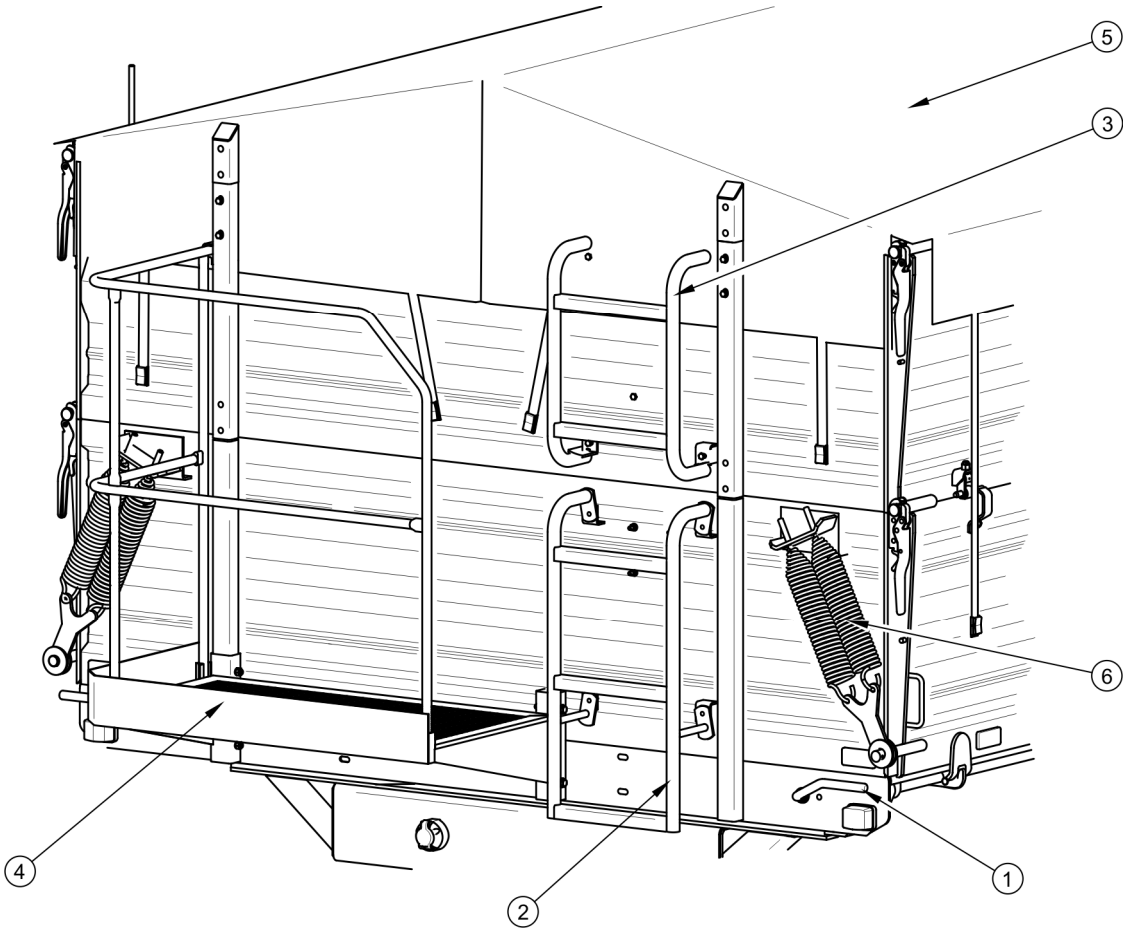


FIGURE 3.3 Loading case – view from the front

(1) side wall closing lever, (2) lower ladder, (3) extension ladder, (4) platform, (5) canvas cover, (6) pull-off springs

In order to enable more precise unloading of loose materials there is a slide gate (1) in the rear wall – see figure (*3.4*) – which can be opened by means of the lever (2). The slide gate, when in the upper position and during transport, must be secured by tightening the locking screw (3). A chute for the trailer slide gate, installed directly below the opening, can be supplied as additional equipment.

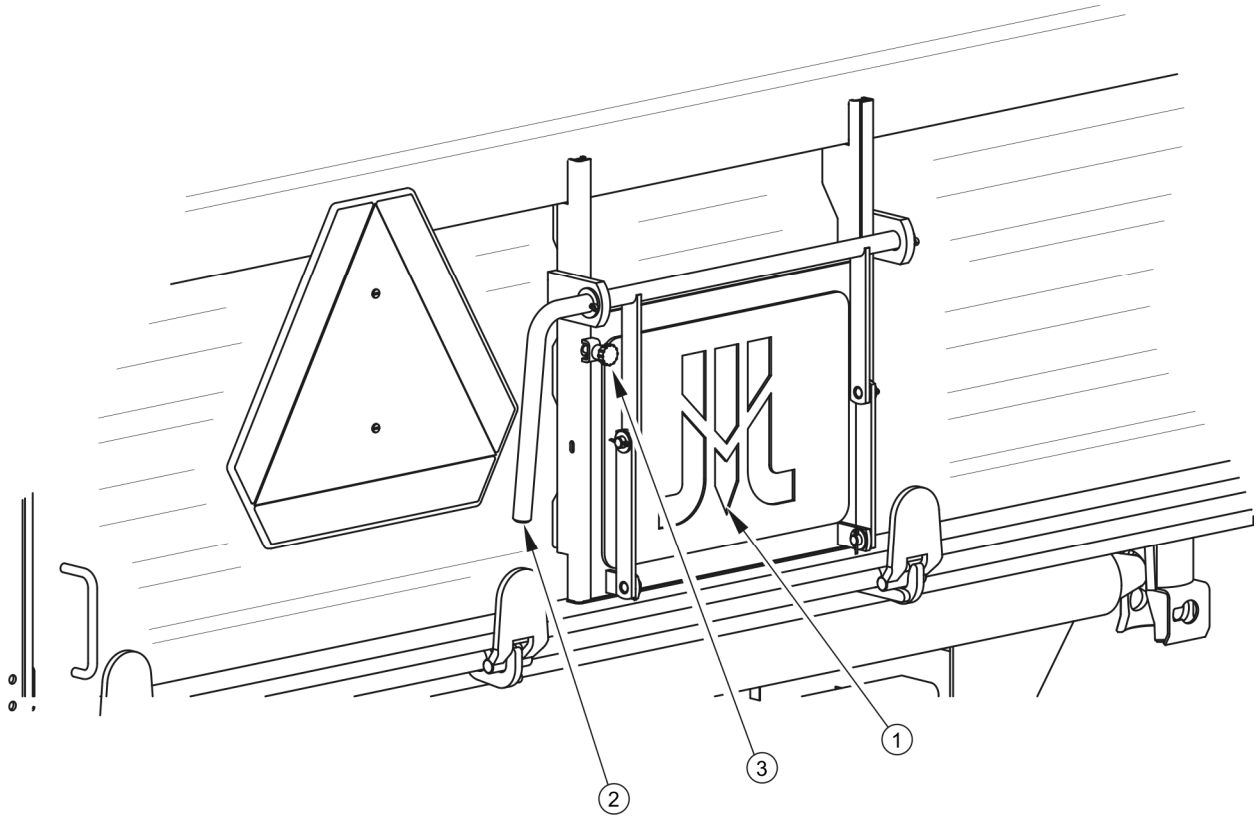


FIGURE 3.4 Rear wall slide gate

(1) slide gate, (2) lever, (3) locking bolt

3.2.3 THE MAIN BRAKE

The trailer can be equipped with one of three of main brake types:

- a single- or twin-line pneumatic braking system with three position manual regulator – see figure (*3.5*),
- twin-line pneumatic braking system with automatic regulator – see figure (*3.6*),
- hydraulic braking system – see figure (*3.8*).

The standard version of the trailer is fitted with a twin-line pneumatic braking system. If there is a need to install a single-line braking system, this can be carried out by the user. Elements required to alter the system are delivered as the standard equipment of the trailer.

Detailed information on installation of the single-line braking system can be found in part *5.3.7 – INSTALLATION OF A SINGLE-LINE PNEUMATIC SYSTEM*.

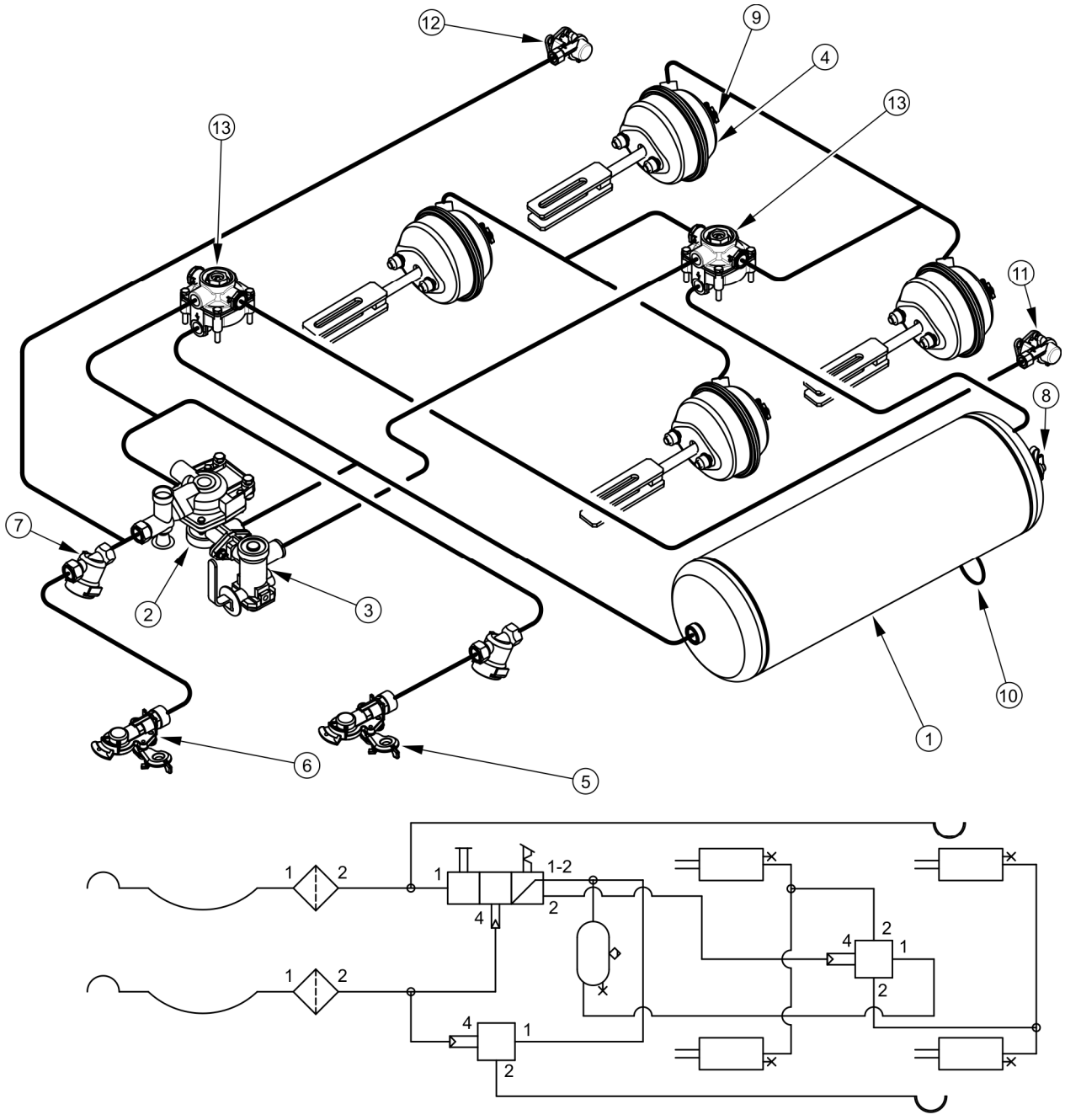


FIGURE 3.5 A single- and twin-line pneumatic braking system with a manual braking force regulator

(1) air reservoir, (2) control valve, (3) braking force regulator, (4) pneumatic cylinder, (5) line connector (yellow), (6) line connector (red), (7) air filter, (8) air reservoir control connector, (9) pneumatic cylinder control connector, (10) drain valve, (11) socket (yellow), (12) socket (red), (13) relay valve

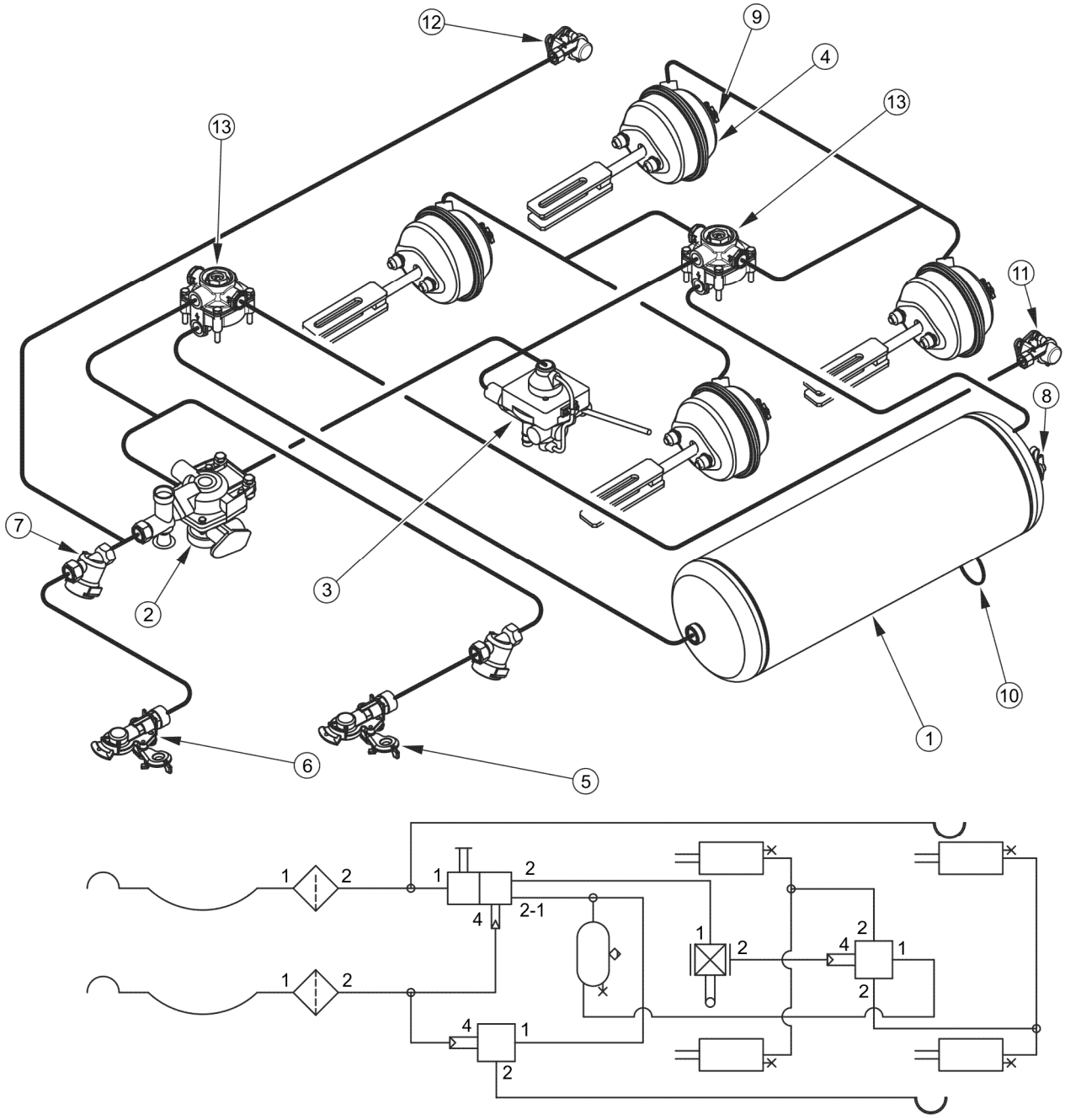


FIGURE 3.6 A twin-line pneumatic braking system with an automatic braking force regulator

(1) air reservoir, (2) control valve, (3) braking force regulator, (4) pneumatic cylinder, (5) line connector (yellow), (6) line connector (red), (7) air filter, (8) air reservoir control connector, (9) pneumatic cylinder control connector, (10) drain valve, (11) socket (yellow), (12) socket (red), (13) relay valve

The main pneumatic brake is activated from the tractor driver's cab by pressing the brake pedal. The function of a control valve (2) – figures (*3.5*) and (*3.6*) – is to operate the trailer brakes simultaneously with the tractor brakes. Furthermore, in case of an incidental disconnection of the line between the trailer and a tractor, the control valve will automatically activate the trailer's brake. The valve used is equipped with a circuit causing the brake to release. It can be used when the trailer is disconnected from a tractor – see figure (*3.7*). After the air line is connected to a tractor, the releasing device is automatically set in a way enabling the normal brake operation.

A three step brake force regulator (2) – figure *(3.7)* – adjusts the braking force depending on the setting. Switching to a suitable working mode is done manually by the operator before driving off, by means of the lever (4). Three working positions are available: A – "no load", B – "half loaded", C – "full load".

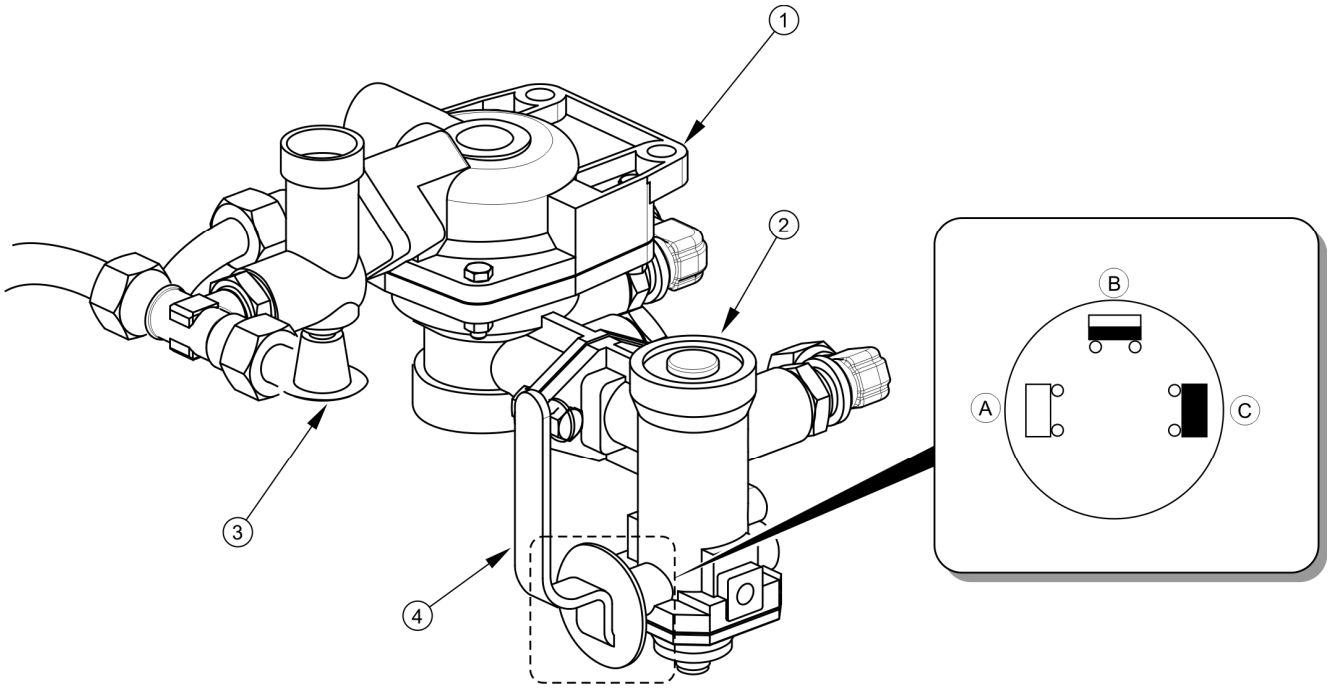


FIGURE 3.7 Control valve and brake force regulator

(1) control valve, (2) brake force regulator, (3) trailer parking brake release button, (4) regulator working mode selection lever, (A) position "NO LOAD", (B) position "HALF LOADED", (C) position "FULL LOAD".

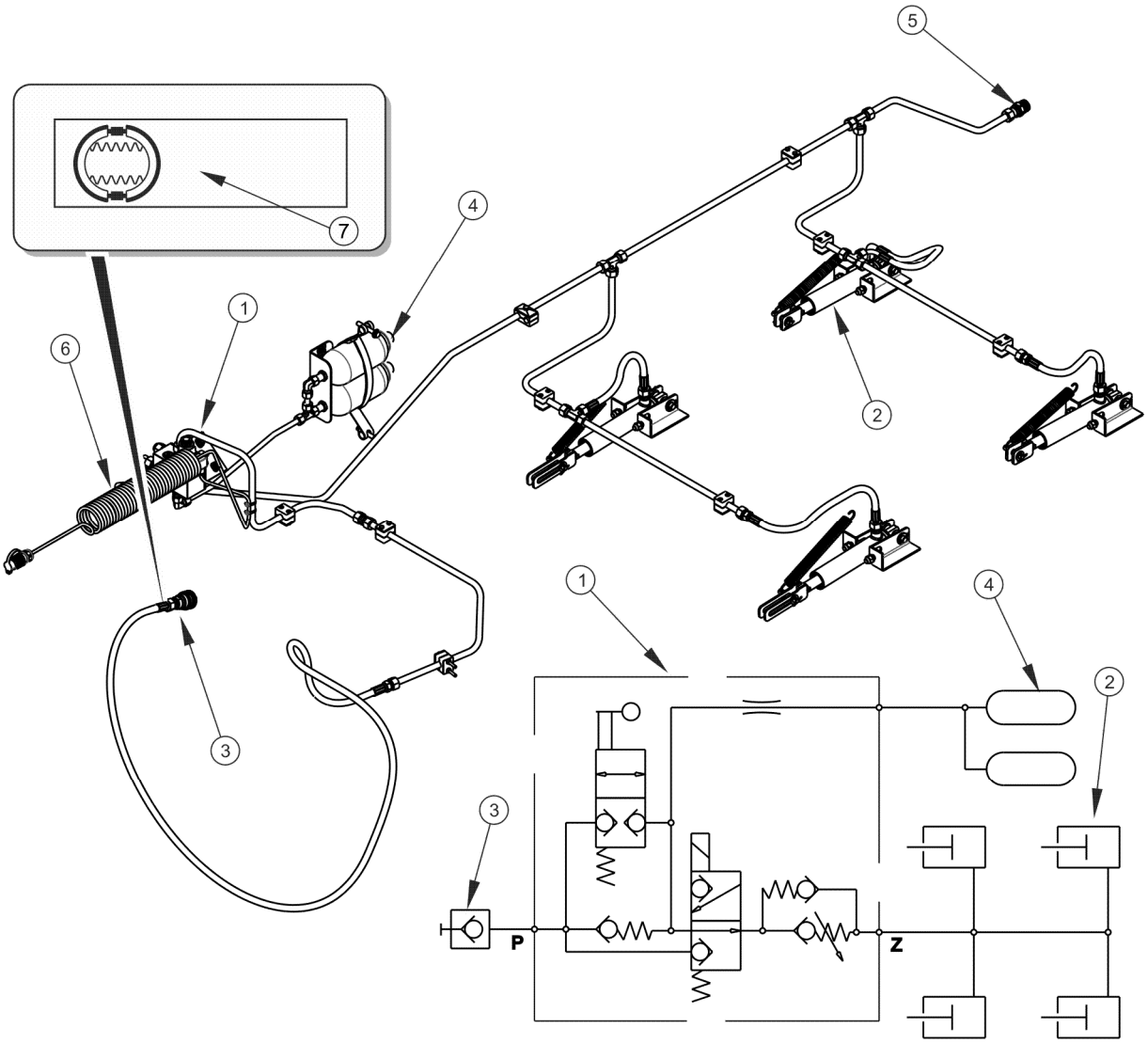


FIGURE 3.8 A single-line hydraulic braking system

(1) electro-hydraulic valve, (2) hydraulic cylinder, (3) hydraulic quick coupling, (4) hydraulic accumulator, (5) socket, (6) valve connector cable, (7) information decal

The main hydraulic brake (available optionally) is activated from the tractor driver's cab by pressing the brake pedal. A tractor with an appropriate hydraulic system is required to operate the trailer's hydraulic braking system. The function of an electro-hydraulic valve (1) – figure (*3.9*) – is to operate the trailer brakes simultaneously with the tractor brakes. Before driving off, check the brakes operation. To do so, press the brake pedal several times to rise a pressure in the hydraulic accumulators. The connector cable (6) is used to connect the trailer's brake valve with a tractor's electrical system. In case of an incidental disconnection of the cable (6) between the trailer and a tractor, the brake valve will automatically activate the

trailer's brake. The same effect of emergency braking is achieved when the engine is turned off and during the loss of voltage on the solenoid.

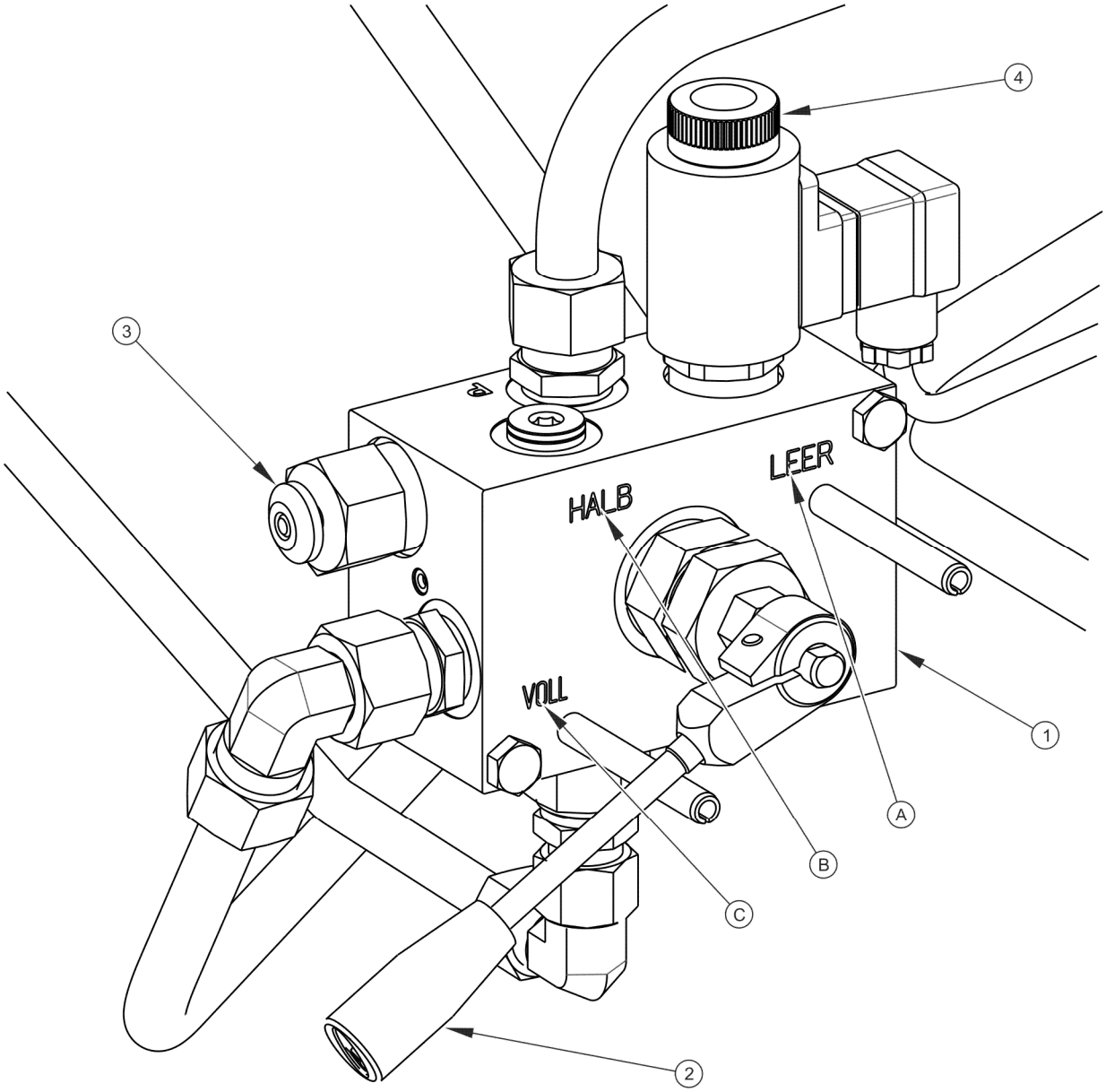


FIGURE 3.9 Electro-hydraulic brake valve

(1) electro-hydraulic valve, (2) valve working mode selection lever, (3) release button, (4) electric coil, (A) position "NO LOAD", (B) position "HALF LOADED", (C) position "FULL LOAD".

The valve used is equipped with a circuit causing the brake to release. It can be used when the trailer is disconnected from a tractor. The brake is released when the pressure in the trailer's system is reduced – see figure (*3.9*). The brakes operate normally after the connector

cable and the supply hose are connected and when the voltage in supplied to the control valve.

The electro-hydraulic brake valve (1) – see figure *(3.9)* – adjusts the braking force depending on the setting. Switching to a suitable working mode is done manually by the operator before driving off, by means of the lever (2). Three working positions are available: A – "no load", B – "half loaded", C – "full load".

3.2.4 HYDRAULIC TIPPING SYSTEM

The hydraulic tipping system allows to automatically unload the trailer by tipping the loading case to the rear or sideways. The hydraulic tipping system is supplied with oil from the tractor's hydraulic system. The tractor's external hydraulic system distributor is used to control the loading case raising.

The trailer tipping system comprises two separate circuits:

- circuit (A) – to supply the trailer's hydraulic cylinder,
- circuit (B) – to supply the second trailer's hydraulic cylinder (if two trailers are hitched to the tractor).

A three-way valve is used to supply these circuits (2) – figure (*3.10*). The lever of this valve can be placed in two positions:

- 1 – trailer's tipping circuit opened – circuit (A),
- 2 – second trailer's tipping circuit opened – circuit (B).

On the connector cable, in the vicinity of socket (4), there is a decal (8) identifying the supply hose of the hydraulic system tipping circuit.

ATTENTION

A cut-off valve (3) – figure (3.10) – limits the tipping angle of the loading case when tipped to the rear and sideways. The length of the control cable (6) controlling this valve is factory adjusted and must not be changed when the trailer is being used.

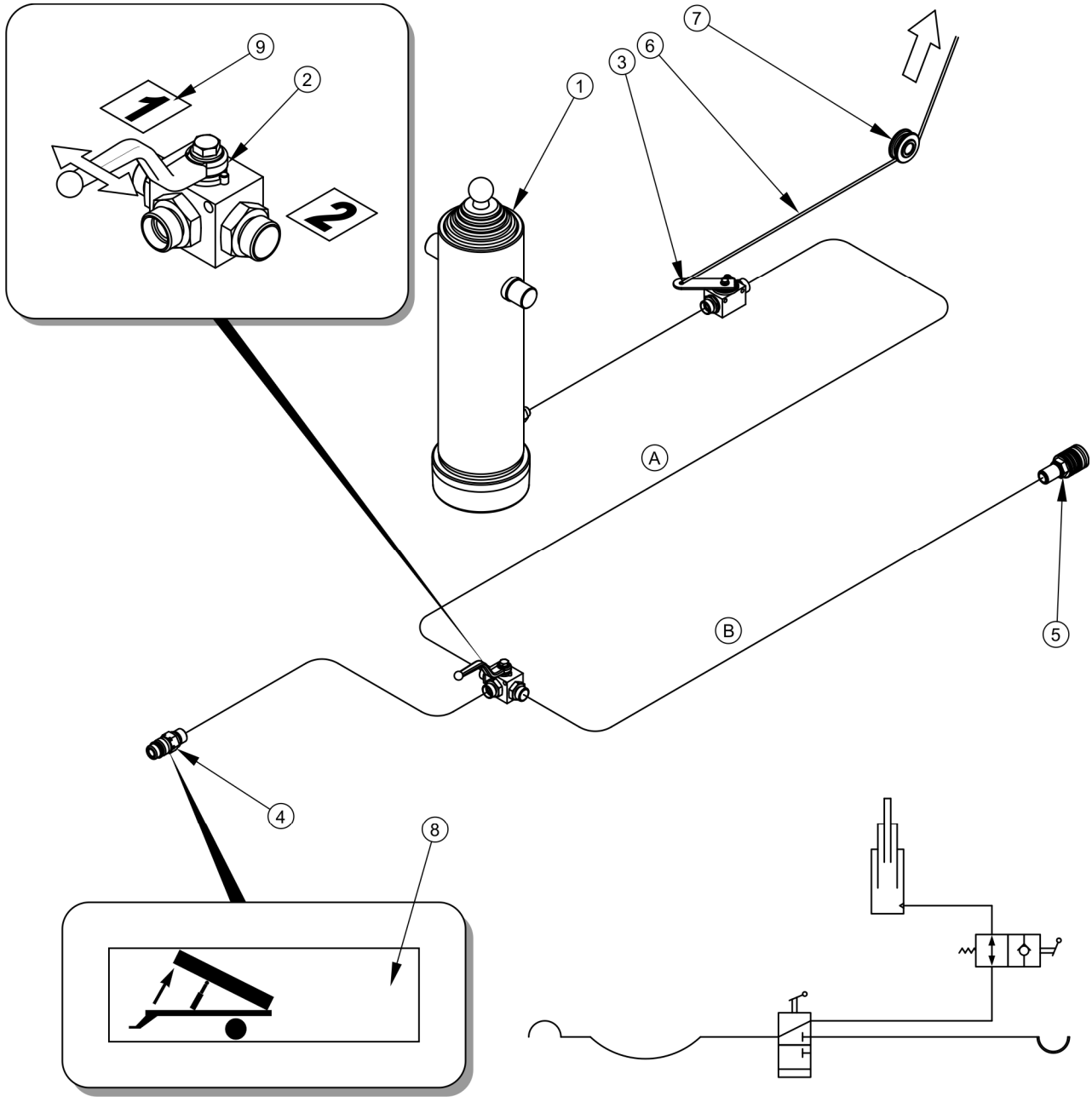


FIGURE 3.10 Hydraulic tipping system

(1) telescopic cylinder, (2) three-way valve, (3) cut-off valve, (4) quick coupling, (5) socket, (6) control cable, (7) guide roller, (8), (9) information decals

TIP

The trailer's hydraulic system is filled with L-HL32 Lotos hydraulic oil.

3.2.5 SUPPORT HYDRAULIC SYSTEM

The support hydraulic system – figure *(3.11)* – allows to automatically extend and fold the support (3). This is achieved by extending or retracting the hydraulic cylinder's rod (4). The oil is supplied to the support hydraulic system from the tractor's system by means of a line (1). The hydraulic cylinder of the support is controlled by means of the tractor's external hydraulic system distributor.

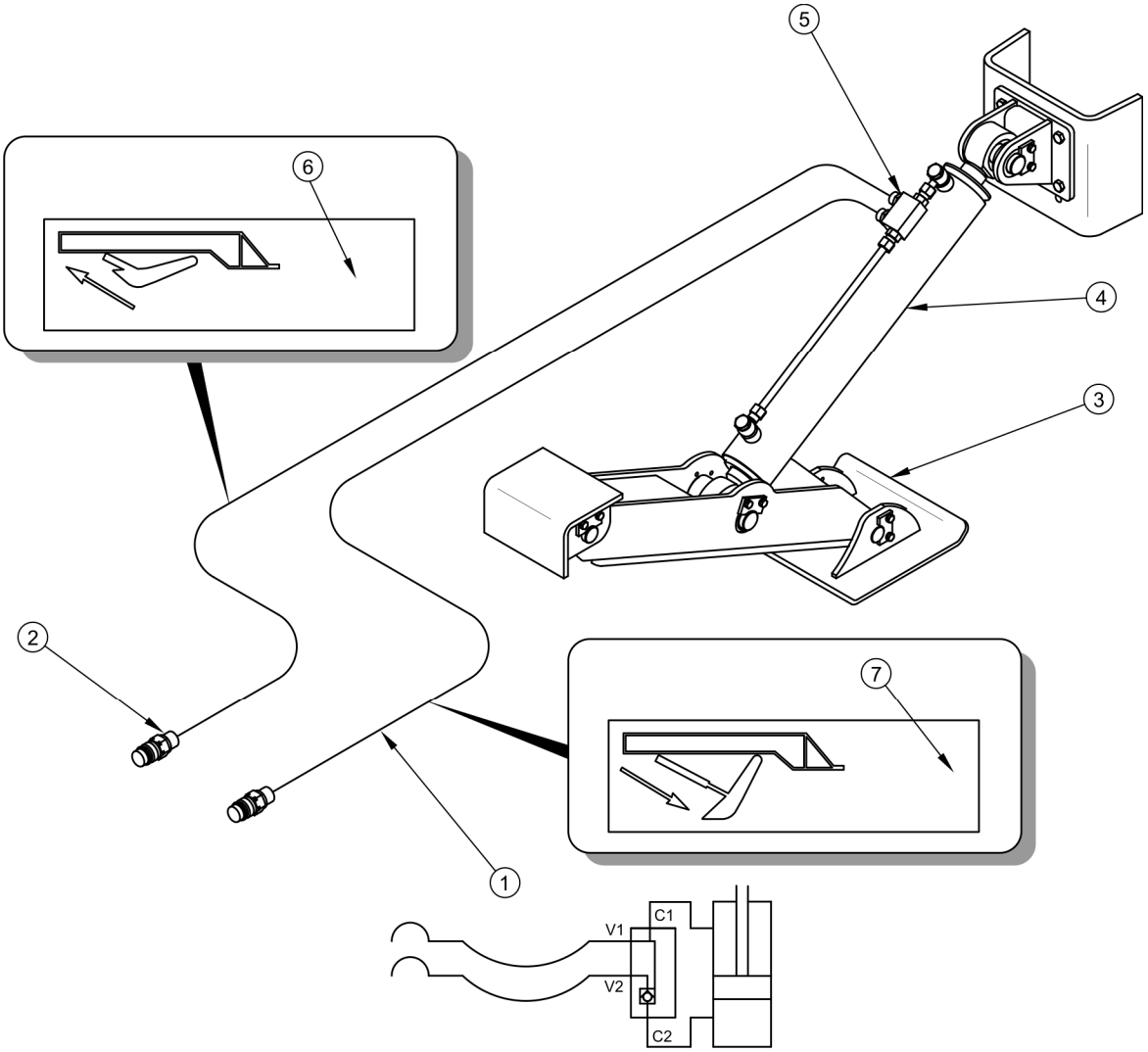


FIGURE 3.11 Scissor support hydraulic system

(1) supply line, (2) return line, (3) scissor support, (4) cylinder, (5) hydraulic locking device, (6), (7) information decals

The system has been fitted with a hydraulic locking device (5) which is installed on the cylinder (4). The hydraulic locking device allows to increase the safety of trailer operation.

When the support is being raised or lowered, the system's lines can become damaged, resulting in depressurization. In such case the hydraulic locking device will lock the cylinder (4) in a given position.

TIP

The support's hydraulic system is filled with L-HL32 Lotos hydraulic oil.

3.2.6 PARKING BRAKE

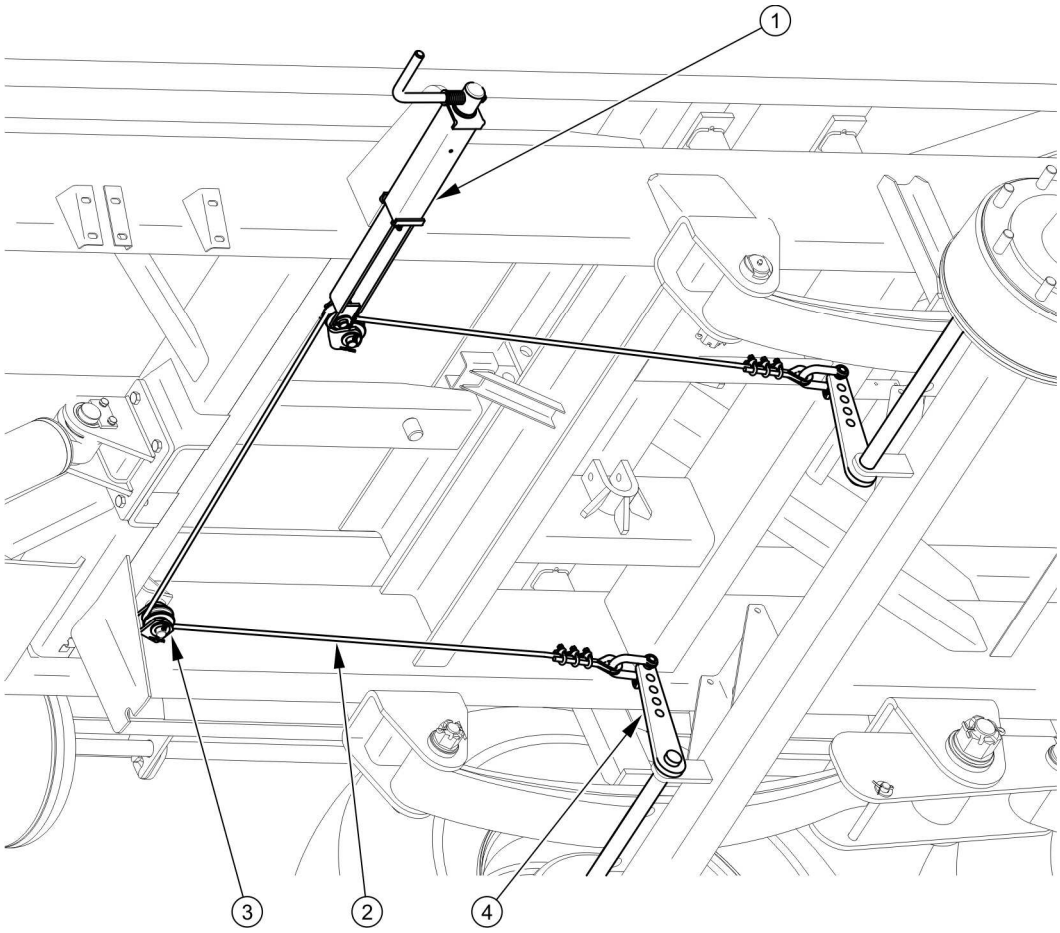


FIGURE 3.12 Parking brake

(1) crank mechanism, (2) cable, (3) guide roller, (4) expander arm

The parking brake is used to immobilize the trailer and secure it against rolling.

Steel cable (2), guided by means of roller (3), is attached to axle expander arms and the brake crank mechanism (1). Tensioning the cable causes the expander arms to tilt; the brake shoes are opened and the trailer is immobilized.

The cable (2) is tensioned by turning the crank clockwise.

3.2.7 LIGHTING SYSTEM

The trailer electrical system is designed for supplied by 12 V DC. Connections of the trailer electrical system with the tractor should be made through an appropriate connection cable delivered with the trailer.

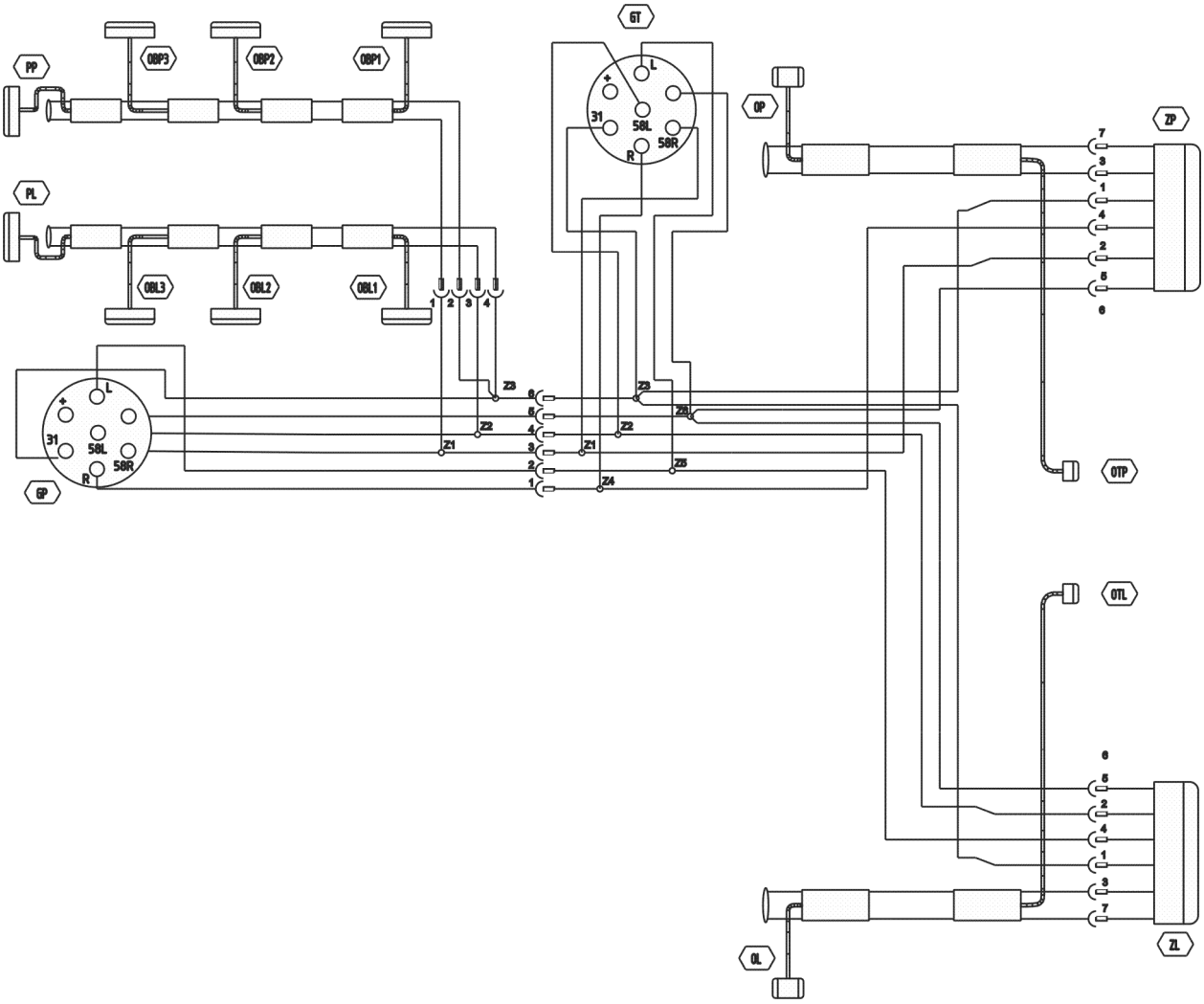


FIGURE 3.13 Electrical system diagram

Designations according to table (3.2)

TABLE 3.2 List of electrical system components designations

DESIGNATION	FUNCTION
ZP	Rear right lamp assembly
ZL	Rear left lamp assembly
GP	Front 7-pin socket
GT	Rear 7-pin socket
OTP	Right license plate light
OTL	Left license plate light
PP	Front right position light
PL	Front left position light
OP	Rear right LED clearance light
OL	Rear left LED clearance light
OBP1–OBP3	Side right LED clearance lights
OBL1–OBL3	Side left LED clearance lights

TABLE 3.3 Designations of GP and GT socket pins

FIELD	FUNCTION
31	Weight
+	Power supply +12 V (not used)
L	Left directional indicator
54	STOP light
58L	Rear left position light
58R	Rear right position light
R	Right directional indicator

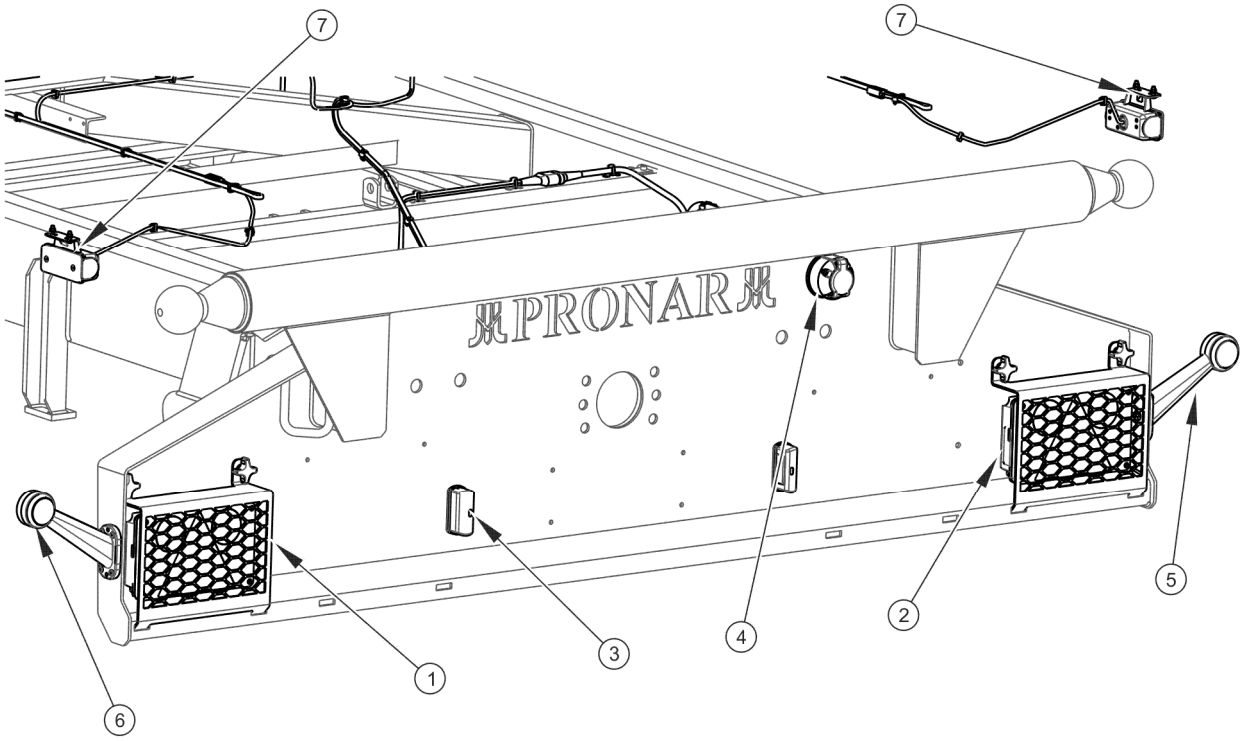


FIGURE 3.14 Locations of electrical system components and reflective lights – rear view

(1) rear left lamp assembly, (2) rear right lamp assembly, (3) license plate light, (4) rear 7-pin socket, (5) Rear right clearance light, (6) rear left clearance light, (7) side position light

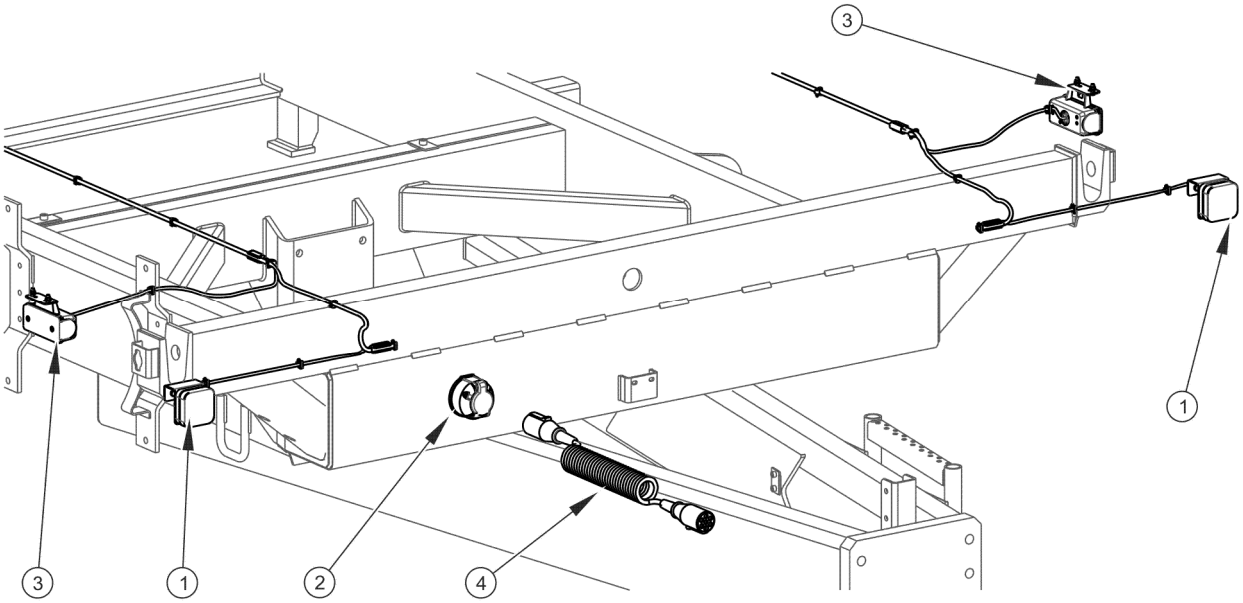


FIGURE 3.15 Locations of electrical system components and reflective lights – front view

(1) front position light, (2) front 7-pin socket, (3) side position light, (4) connector cable

CHAPTER

4

CORRECT USE

4.1 PREPARING FOR WORK BEFORE THE FIRST USE

4.1.1 CHECKING THE TRAILER AFTER DELIVERY

The manufacturer guarantees that the trailer is fully operational and has been checked according to quality control procedures and is ready for normal use. This does not free the user from an obligation to check the machine's condition after delivery and before the first use. The machine is delivered to the user completely assembled.

Before commencing work, the trailer operator must inspect the technical condition of the trailer and prepare it for the first start-up. Carefully read this Operator's Manual, observe all its recommendations and understand the machine design and the principle of its operation.

ATTENTION

Before proceeding to hitching the trailer and starting its operation, carefully read this Operator's Manual and observe all its recommendations.

External inspection

- Check completeness of the machine (standard and optional equipment).
- Check the condition of protective paint coating.
- Inspect the trailer's components for mechanical damage resulting from incorrect transport (dents, pierced, bent or broken components).
- Check the technical condition of tires and tire air pressure.
- Check the technical condition of hydraulic flexible lines.
- Check the technical condition of pneumatic lines.
- Check that there are no hydraulic oil leaks.
- Check lamps.
- Check all cylinders for hydraulic oil leaks.

4.1.2 PREPARING A TRAILER FOR FIRST HITCHING

Preparation

- Check all the trailer's lubrication points; if necessary, lubricate the machine as needed according to recommendations provided in chapter 5.
- Check if the nuts and bolts fixing the wheels and drawbar are properly tightened.
- Drain the air reservoir of the braking system.
- Ensure that the pneumatic, hydraulic and electric connections in a tractor conform to the requirements; if not, the trailer should not be hitched to the tractor.
- Adjust the height of the drawbar to the top tractor hitch.
    - ⇨ A detailed description can be found in chapter 5.

Test operation

If all the above checks have been performed and there are no doubts as to the trailer's technical condition, it can be hitched to a tractor. Start the tractor, check all systems and test run the trailer without load (no load in the loading case). It is recommended that the inspection is carried out by two persons – one of them should always remain in the tractor operator's cab. Test start should be carried out according to the sequence presented below.

- Attach the trailer to an appropriate hitch on a tractor.
- Connect braking, electrical and hydraulic system lines and cables.
- Lift the support to the transport position.
- Switch on individual lights and check correct operation of the electrical system.
- Switch the hydraulic tipping system valve to position "O". Carry out test tipping of the loading case backwards and sideways.
- When moving off, check if the main brake operates correctly.
- Test drive the trailer.

TIP

Service operation: hitching or disconnecting the trailer, drawbar adjustment, tipping the loading case etc. are described in detail in further parts of the Operator's Manual in chapters 4 and 5.

The trailer can be hitched only when all preparations were finished and if the visual inspection of its technical condition was carried out. If during the test run the following symptoms occur:

- noise and abnormal sounds originating from the abrasion of moving elements of the trailer's structure,
- hydraulic oil leak,
- pressure drop in the braking system,
- incorrect operation of the hydraulic and/or pneumatic cylinders,

or other symptoms, find the cause of the problem. If a fault cannot be rectified or the repair could void the guarantee, please contact a sales point for additional clarifications or to perform repairs.

DANGER

Careless, improper use and operation of the trailer and non-compliance with the recommendations given in the Operator's Manual pose danger to health.

The trailer must not be used by persons unauthorized to drive agricultural tractors, including children and people under the influence of alcohol.

Non-compliance with the safety rules can endanger the health and the life of an operator and other persons.

After completing the test drive, check tightness of wheel nuts.

4.2 HITCHING AND DISCONNECTING FROM TRACTOR

The trailer can be hitched only if all pneumatic, hydraulic and electrical system connections, as well as the tractor's hitch conform to the manufacturer's requirements.

In order to hitch the trailer to a tractor, perform the actions below in the sequence presented. Machine must be immobilized by parking brake.

Hitching

- ➡ Immobilize the trailer with the parking brake.
  - ⇨ Rotate the brake mechanism clockwise to release the brake.
- ➡ Position a tractor directly in front of drawbar eye.
- ➡ Connect the scissor support's hydraulic lines.
  - ⇨ The scissor support's hydraulic lines are indicated by means of information decals (4) and (5) – see figure *(4.1)*.

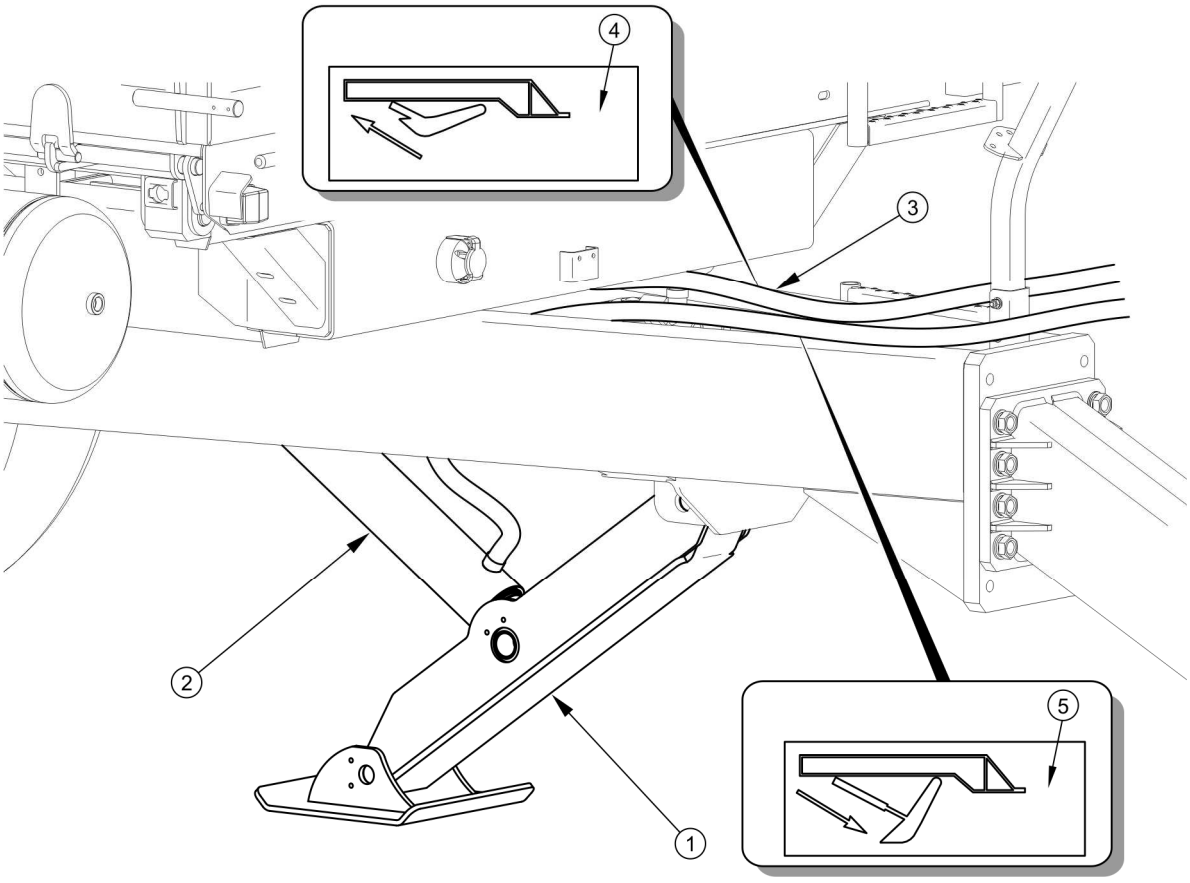


FIGURE 4.1 Trailer's support

(1) support, (2) cylinder, (3) hydraulic line, (4)–(5) information decals

- ➡ Using the support adjust the height of the drawbar eye, so that it is possible to hitch machines.
- ➡ Reverse the tractor, hitch the trailer, check the coupling protection securing the machine against accidental uncoupling.

- ⇨ If the tractor is equipped with an automatic coupling, ensure that the hitching operation is completed and that drawbar eye is secured.

➡ Turn off the engine. Close the tractor cab and secure it against access by unauthorized persons.

➡ Connect pneumatic system lines (applies to twin-line pneumatic systems):

- ⇨ Connect yellow pneumatic line with a yellow socket in the tractor.
- ⇨ Connect red pneumatic line with a red socket in the tractor.

➡ Connect pneumatic system lines (applies to single-line pneumatic systems):

- ⇨ Connect black pneumatic line with a black socket in the tractor.

➡ Connect hydraulic brake system lines (applies to trailers with hydraulic brake).

- ⇨ The hydraulic brake system line is marked with an information decal (7) – figure (*3.8*).
- ⇨ Connect the valve connector cable (6) – figure *(3.8)*.

➡ Connect hydraulic tipping system lines.

- ⇨ The hydraulic brake system line is marked with an information decal (10) – table (*2.1*).

➡ Connect the main power cable for electric lighting system.

➡ Lift the support to the transport position.

DANGER

When hitching the trailer, no persons must be present between the trailer and the tractor. When hitching the machine, the tractor driver must exercise caution and make sure that nobody is present in the hazard zone.

When connecting the hydraulic lines to a tractor, make sure that the hydraulic systems of the tractor and the trailer are depressurized.

Ensure sufficient visibility during hitching.

Exercise caution when lifting the support – there is a risk of crushing.

When connecting the braking system lines (pneumatic twin-line), pay particular attention to the correct sequence of connection. First connect the yellow connector to yellow socket of

the tractor and only then connect the red connector to the red socket of the tractor. Once the 2nd line is connected, the brake releasing system will switch to normal mode of operation (disconnection or breaking of the pneumatic lines causes the trailer's control valve to automatically apply brakes). The lines are marked with colored protective caps which identify the appropriate system line.

ATTENTION

Pay attention to the compatibility of oil in the tractor's hydraulic systems and the trailer's tipping system.

When connecting the hydraulic braking system lines, remember to connect the hydraulic line first. Then connect the electrical cable of the electro-hydraulic brake valve. After connecting this cable and starting the engine (applying the voltage to the connector cable), the braking system will be ready for operation. In case no voltage is applied to the connector cable, the trailer will be immobilized by means of the brake.

ATTENTION

The trailer can only be hitched to a tractor which has the appropriate hitch and connection sockets for braking, hydraulic, as well as electrical systems and if hydraulic oil in both machines can be mixed.

When hitching is completed, secure the electrical cables and hydraulic and braking system lines so that they do not become entangled in tractor's moving parts when driving and do not become broken or cut when making turns.

Disconnecting the trailer

In order to disconnect the trailer from the tractor, perform the actions below in the sequence presented.

- ➡ Immobilize the tractor and the trailer with the parking brake.
- ➡ By controlling the valve, adjust the drawbar eye height so that it is possible to disconnect the trailer.
- ➡ Lower the support.

- Turn off the engine. Close the tractor cab and secure it against access by unauthorized persons.
- Disconnect hydraulic tipping system lines from the tractor.
- Disconnect the electric cable.
- Disconnect the pneumatic system lines (applies to twin-line pneumatic systems).
    - Disconnect the pneumatic line marked as red.
    - Disconnect the pneumatic line marked as yellow.
- Disconnect pneumatic system lines (applies to single-line pneumatic systems).
    - Disconnect the pneumatic line marked as black.
- Disconnect the hydraulic brake system lines (applies to trailers with hydraulic braking system).
    - Disconnect the electric connector cable.
    - Disconnect the hydraulic line.
- Disconnect the support's hydraulic lines.
- Protect the ends with covers. Place the connectors in appropriate sockets.
- Insert the chocks under the trailer's wheel.
    - The wheel chocks must be inserted so that one is in front of the wheel, and the second one behind it – see chapter *2,* figure *(2.1)*.
- Unlock the tractor hitch, disconnect the trailer's drawbar from the hitch and drive the tractor away.

DANGER

Exercise caution when disconnecting the trailer from the tractor. Ensure good visibility. Unless it is necessary, do not enter between a tractor and the trailer.

Before disconnecting the lines and drawbar eye, close the tractor cab and secure it against access by unauthorized persons. Turn off the engine.

ATTENTION

Do not park a loaded trailer if it is disconnected from the tractor and supported by means of the support.

4.3 COUPLING AND UNCOUPLING THE SECOND TRAILER

The second trailer must have a dual axle chassis and fulfill all the requirements specified in chapter 1.

Coupling the second trailer requires experience in driving an agricultural tractor with a trailer. It is recommended to use help of another person to guide the tractor driver while coupling the second trailer.

Coupling the second trailer

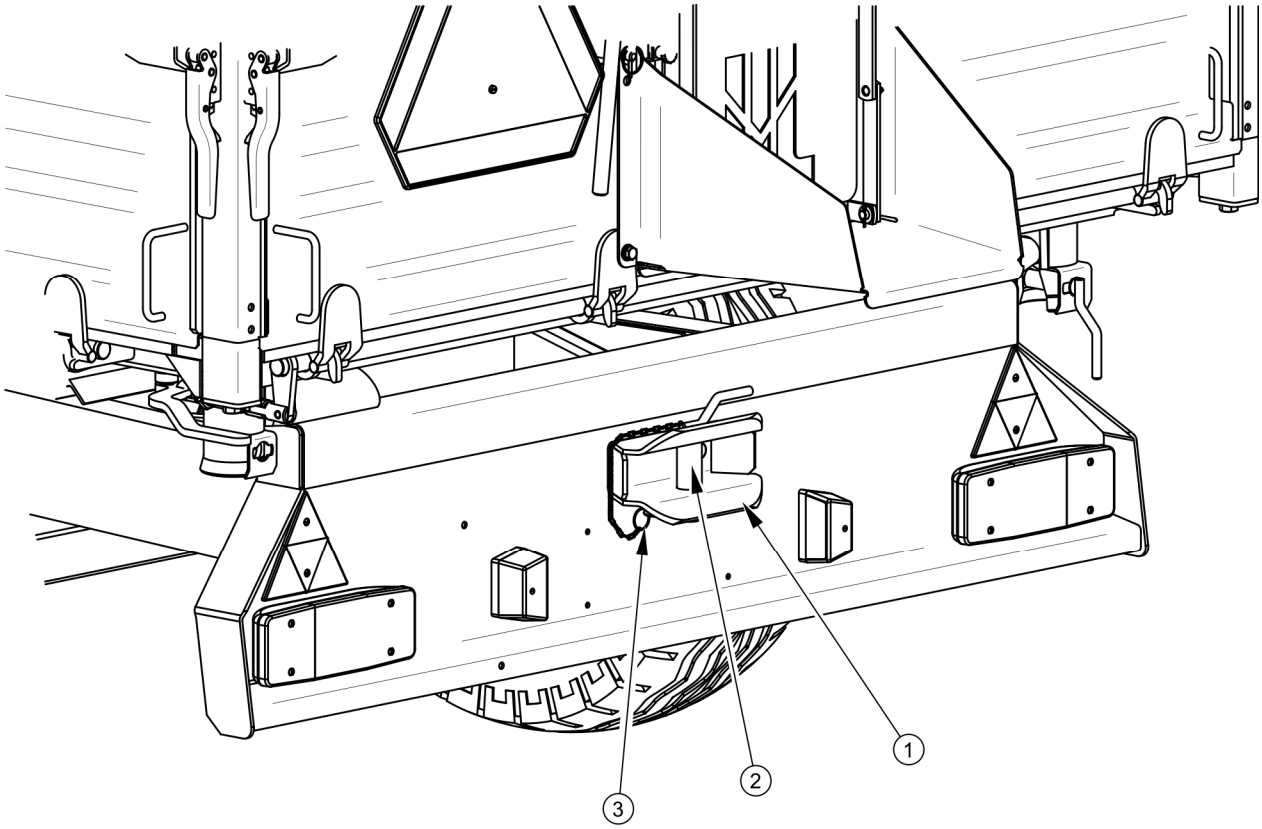


FIGURE 4.2 Rear hitch

(1) hitch body, (2) hitch pin, (3) chain with a cotter pin

- Remove the cotter pin and remove the hitch pin (2) from the first trailer – figure (*4.2*).
- Adjust the height of the drawbar of the second trailer to enable coupling the machines.
- By reversing the tractor, insert the rear hitch of the first trailer onto the drawbar of the second trailer
- Insert the pin and the cotter pin.
- Connect the pneumatic and hydraulic system lines and electrical cables according to instructions contained in chapter *(4.2).*

Disconnecting the second trailer

- Immobilize the tractor and the trailer with the parking brake.
- Turn off the engine. Close the tractor cab and secure it against access by unauthorized persons.
- Disconnect the pneumatic and hydraulic system lines and electric cables according to instructions contained in chapter *(4.2).*
- Release the hitch pin in the first trailer. Remove the pin and the tractor away.

DANGER

The person assisting coupling the second trailer must stand in a place visible to the tractor driver at all times. Exercise extreme caution and avoid dangerous areas – in particular between both trailers.

ATTENTION

Do not couple the second trailer which does not have dual axle chassis.

4.4 LOADING AND SECURING THE LOAD

A canvas cover is used to secure the load. The cover must be used each time the trailer will transport load on public roads.

Securing the load by means of a canvas cover

- When standing on the front platform, start unfolding the cover (2) by means of a crank (1).
- Pass all tensioning straps (4) through clamps (3) located on the trailer's loading case.
- Pull the cover on the right side.
- Pull the cover on the front and than on the rear wall of the loading case.

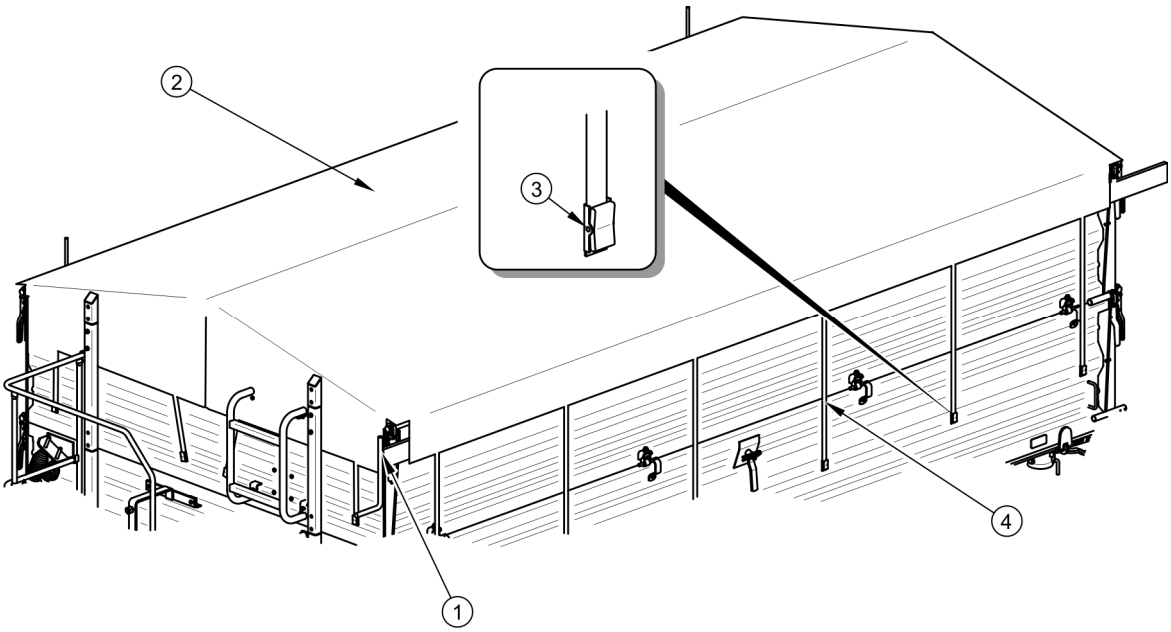


FIGURE 4.3 Canvas cover

(1) slat and a crank, (2) canvas cover, (3) clamp, (4) tensioning strap

4.4.1 GENERAL INFORMATION ON THE LOADING

Before beginning loading, make certain that the loading case walls, extensions and the rear slide gate are properly closed and secured. The trailer's wheels must be in line with the tractor's wheels and the trailer must be hitched to the tractor. Loading should only take place when the trailer is parked on a level surface.

Regardless of the type of load carried, the user is obliged to secure it in such a manner that the load is unable to move and fall out on the road. If this is impossible, do not transport this type of load.

Materials which can come in contact with painted or steel surfaces and damage them, should be transported in sealed packaging (sacks, boxes, barrels etc.); after completing the transport, thoroughly wash the loading case with strong water jet.

When transporting loads which exert significant force in one spot of the loading case floor, protect the floor by means of thick planks, plywood or other similar means.

ATTENTION

Attempt to place the load in the case in an uniform manner.

Never exceed the trailer's maximum allowable capacity.

Due to the various density of materials, using the total loading case capacity may cause exceeding the permissible carrying capacity of the trailer. Guideline specific weight of selected materials is presented in table (*4.1*) It is necessary to pay particular attention not to overload the trailer. The trailer must be loaded only by an experienced person who is authorized to operate relevant loading equipment (if required).

TABLE 4.1 Guideline specific weights of selected loads per volume

TYPE OF MATERIAL	VOLUMETRIC WEIGHT kg/m^3
Root crops:	
raw potatoes	700 - 820
steamed crushed potatoes	850 - 950
dried potatoes	130 - 150
sugar beet – roots	560 - 720
fodder beet – roots	500 - 700
Organic fertilizers:	
old manure	700 - 800
mature manure	800 - 900
fresh manure	700 - 750
compost	950 – 1 100
dry peat	500 - 600

TYPE OF MATERIAL	VOLUMETRIC WEIGHT kg/m^3
Mineral fertilizers:	
ammonium sulphate	800 - 850
potash salt	1 100 – 1 200
super phosphate	850 – 1 440
basic slag phosphate	2 000 – 2 300
potassium sulphate	1 200 – 1 300
kainite	1 050 – 1 440
milled lime fertilizer	1 250 - 1 300
Building materials:	
cement	1 200 – 1 300
dry sand	1 350 – 1 650
wet sand	1 700 – 2 050
solid bricks	1 500 – 2 100
hollow bricks	1 000 – 1 200
stones	1 500 – 2 200
soft wood	300 - 450
hard sawn timber	500 - 600
impregnated timber	600 - 800
steel structures	700 – 7 000
milled burnt lime	700 - 800
slag	650 - 750
gravel	1 600 – 1 800
Straw litter and bulk feeds:	
meadow hay dried in the swath	10 - 18
hay wilted in the swath	15 - 25
hay in gathering trailer (dry wilted)	50 - 80
wilted cut hay	60 - 70
dry baled hay	120 - 150
wilted baled hay	200 - 290
stored dry hay	50 - 90
stored cut hay	90 - 150
clover (lucerne) wilted in the swath	20 - 25

TYPE OF MATERIAL	VOLUMETRIC WEIGHT kg/m^3
clover (lucerne) cut wilted on trailer	110 - 160
clover (lucerne) wilted on gathering trailer	60 - 100
dry stored clover	40 - 60
cut dry stored clover	80 - 140
dry straw in round bales	8 - 15
damp straw in round bales	15 - 20
cut damp straw in bulk trailer	50 - 80
cut dry straw in bulk trailer	20 - 40
cut dry straw in gathering trailer	50 - 90
cut dry straw in stack	40 - 100
baled straw (lightly compacted)	80 - 90
baled straw (heavily compacted)	110 - 150
cut cereal mass in bulk trailer	35 - 75
cut cereal mass in gathering trailer	60 - 100
green fodder in swath	28 - 35
cut green fodder in bulk trailer	150 - 400
green fodder in gathering trailer	120 - 270
fresh beet leaves	140 - 160
cut fresh beet leaves	350 - 400
beet leaves in gathering trailer	180 - 250
Concentrated and mixed fodders:	
stored chaff	200 - 225
pressed cake	880 – 1 000
milled dry feed	170 - 185
mixed feeds	450 - 650
mineral mixtures	1 100 – 1 300
ground oats	380 - 410
wet sugar beet pulp	830-1 000
pressed sugar beet pulp	750 - 800
dry sugar beet pulp	350 - 400
bran	320 - 600

TYPE OF MATERIAL	VOLUMETRIC WEIGHT kg/m^3
bone meal	700 – 1 000
pasture salt(1)	1 100 – 1 200
molasses	1 350 – 1 450
silage (pit silo)	650 – 1 050
hay silage (tower silo)	550 - 750
Seeds:	
broad beans	750 - 850
mustard	600 - 700
peas	650 - 750
lentils	750 - 860
beans	780 - 870
barley	600 - 750
clover	700 - 800
grass	360 - 500
maize	700 - 850
wheat	720 - 830
rape	600 - 750
linseed	640 - 750
lupins	700 - 800
oats	400 - 530
lucerne	760 - 800
rye	640 - 760
Others:	
dry soil	1 300 – 1 400
wet soil	1 900 – 2 100
fresh peat	700 - 850
garden soil	250 - 350

Source: "Technology of machine work in agriculture", PWN, Warszawa 1985

NOTE

The trailer is designed for transporting agricultural commodities (volumetric or loose loads) and goods on europallets or collar pallets. It is permissible to transport other loads (timber, building materials, packed loads) if the loading case is properly protected against damage.

DANGER

The load on the trailer must be secured against moving and falling out on the road. Do not transport loads which cannot be properly secured.

When loading the trailer, the drawbar eye and tractor hitch are subject to significant dynamic vertical loads.

Loose materials

Loose materials are normally loaded by means of loaders, conveyors or manually. Do not load loose materials to a height greater than that of side walls or extensions. When the loading is complete, the load should be evenly spread over the whole surface of the loading case. When loading loose materials the walls and extensions must be connected with a cable. Secure the cable detaching mechanism by means of a cotter pin.

Small seeds, such as rape, or powdered materials can be transported only if those gaps in the loading case, the width of which is smaller than the diameter of grains, are sealed. Use profiled rubber seals, silicone sealants, foil, ropes or textile materials used as covers to seat the gaps.

Some loose materials (building materials like slag or gravel) can damage the painted surfaces relatively quickly.

Solid materials

Solid materials are generally hard and have significantly greater dimensions than loose materials (stones, coal, bricks and aggregate). These materials can cause indentations of the loading case floor and walls and damage the painted surfaces, unless they are properly secured. Thus it is necessary to cover the floor and, if required, walls and extensions by means of thick plywood, chipboard, planks or other similar materials. If these requirements are not followed, the warranty may be invalidated. Solid materials must be loaded from low

height. The material must not fall on the loading case floor with great force, even if the floor has been covered.

Hazardous materials

According to the European ADR agreement concerning international road transport of hazardous materials, transporting this type of load (defined in detailed by this agreement) by means of agricultural trailers is prohibited. The only exception are plant protection materials and artificial fertilizers which may be transported on agricultural trailers on the condition that they are transported in appropriate packaging and in quantities envisaged by the ADR agreement.

DANGER

If it is necessary to transport permitted hazardous materials, familiarize yourself with the regulations concerning transport of hazardous materials in force in your country, as well as with the ADR agreement.

Carefully read the information leaflets provided by the load manufacturer and observe the instructions for transporting and handling the load. Make sure if it is necessary to use additional means of personal protection during loading (masks, rubber gloves etc.)

Volumetric loads

Volumetric loads (which are light but have high volume), such as hay, straw bales (rectangular or round), green fodder etc. are recommended to be loaded with the aid of the appropriate mechanical equipment: bail grapples, forks etc. or directly by means of relevant machines such as a straw cutter or a combine harvester. Although the load may be loaded even higher than the loading case extensions, pay attention to the stability of the trailer. Remember that in this case the load will adversely affect the stability.

Loads in packaging

Loads transported in packaging (boxes, sacks), must be laid closely side-by-side, beginning from the front of the trailer. If it is required to lay several layers of goods, particular groups should be stacked alternately (in block system). The load must be laid tightly together and on the whole surface of the trailer floor. Otherwise the load will move. With regard to the trailer construction (adaptation of the loading case to the transport of agricultural commodities, lack

of load securing points), materials in packaging may not be loaded above the top of the walls or extensions of the loading case. The top layer may move during travel.

DANGER

If there is a danger that the packaged goods will move, do not transport this type of loads. A moving load constitutes a serious hazard for the tractor driver and other road users.

Materials which may cause steel corrosion, chemical damage or otherwise react with trailer's structural elements can be transported only if the load has been appropriately prepared. Materials must be tightly packed (in plastic sacks, plastic containers etc.). During transport the contents of packaging must not come into contact with the loading case. Ensure appropriate tightness of containers.

Final remarks

Because of a variety of loads, tools, load fastening and securing means, it is not possible to describe all methods of loading the trailer. Always rely on your own experience and reason. The user of the trailer is obliged to familiarize oneself with road transport regulations and follow them.

DANGER

Overloading the trailer, improper loading and securing of the load is the most frequent cause of accidents during transport.

The load must be arranged in such a way that it does not affect the stability of the trailer and does not hinder driving.

Ensure that during unloading, loading or raising the loading case nobody is near the trailer. Before tipping the loading case, ensure that you have an appropriate visibility and make certain that there are no bystanders.

The trailer has not been designed for transporting people, animals and hazardous materials (with the exception of loads mentioned in chapter 4.4).

The arrangement of the load must not cause the trailer's axle or the drawbar to be overloaded.

4.5 TRANSPORTING LOADS

When driving on public or private roads, respect the road traffic regulations, exercise caution and behave reasonably. Listed below are the key guidelines for driving the tractor with a trailer hitched.

- Before driving off make sure that there are no bystanders, especially children, near the trailer or the tractor. Ensure sufficient visibility.
- Make sure that the trailer is correctly hitched to the tractor and tractor's hitch is properly secured.
- Vertical load carried by the trailer's drawbar eye affects the steering of a tractor.
- The trailer must not be overloaded and the load must be uniformly distributed so that the maximum permissible axle load is not exceeded. The trailer's maximum carrying capacity must not be exceeded as this can damage the trailer and pose a risk to the tractor driver and other road users.
- Never exceed the permissible design speed and the maximum speed allowed by road traffic regulations. The driving speed should be adapted to the current road conditions, trailer loading, type of load being transported and other relevant conditions.
- The trailer may be towed on slopes of up to 8°; unloading must be carried out only on a level surface.
- When not hitched to a tractor, the trailer must be immobilized by means of the parking brake and possibly with chocks or other objects without sharp edges placed under a wheel. Do not leave the trailer unsecured. When the machine breaks down, pull over on the hard shoulder avoiding any risk to other road users and position reflective warning triangle according to traffic regulations.
- When driving on public roads, the trailer must be marked with a low speed vehicle warning plate attached to the rear wall of the loading case, if the trailer is the last vehicle.
- While driving on public roads the trailer must be fitted with a certified or approved reflective warning triangle.

- When driving, comply with all road traffic regulations, indicate an intention to turn by means of directional indicators, keep all lights and indicator lights clean at all times and ensure they are in good condition. Any damaged or missing lamps or indicator lights must be immediately repaired or replaced.
- Avoid ruts, depressions, ditches or driving near roadside slopes. Driving across such obstacles could cause the trailer or the tractor to tilt suddenly. This is very important, as the center of gravity of a loaded trailer shifts upwards (especially a high volume load), which reduces the driving safety. Driving near ditches or channels is dangerous as there is a risk that the slope will collapse under the weight of the trailer or a tractor.
- Speed must be sufficiently reduced before making a turn or driving on an uneven road or a slope.
- When driving, avoid sharp turns especially on slopes.

ATTENTION

Prior to moving off with the trailer hitched, check if:

- **pins connecting the loading case with the lower frame are secured against falling out,**
- **lug pins of extensions are secured against falling out.**

Passing over ruts, ditches and driving through slopes etc. with a volumetric load constitutes a great risk of overturning the trailer. Exercise particular caution.

- Remember that the braking distance of the set of vehicles increases as the weight of load and driving speed increase.
- Control the trailer movement when driving on uneven ground and select the speed according to the road and terrain conditions.

4.6 UNLOADING

The trailer is equipped with a hydraulic tipping system. A suitable structure of the frame and the loading case allows tipping the loading case both sideways and to the rear. Tipping of the loading case is controlled by means of tractor's external hydraulic system distributor.

The trailer is unloaded in the following sequence:

- ➡ the tractor and the trailer must be parked to drive forwards on a flat and hard ground,

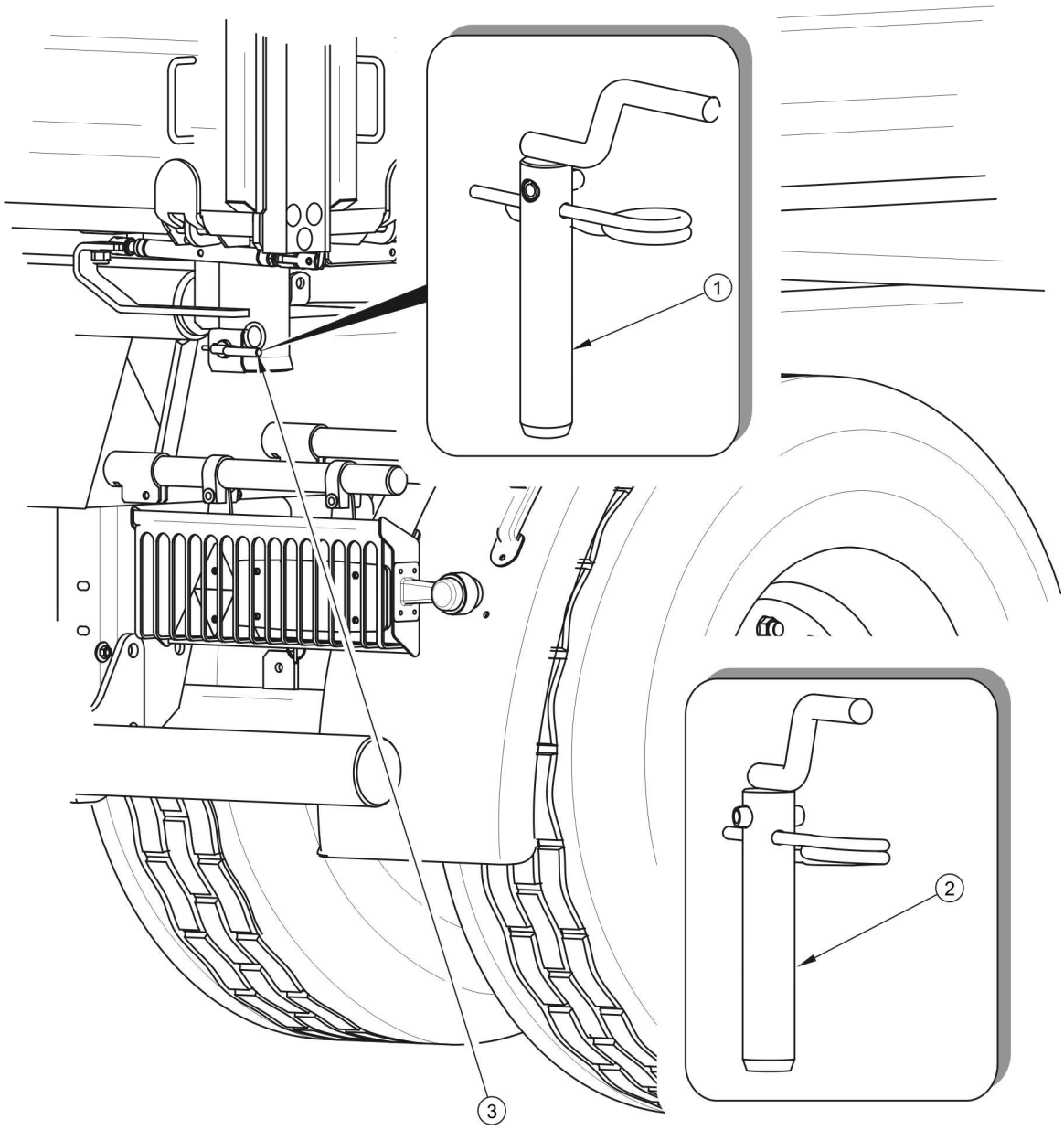


FIGURE 4.4 Securing the tipping pins

(1) tipping pin I, (2) tipping pin II, (3) tipping pin handle

- ➡ immobilize the tractor and the trailer with the parking brake; additionally wheel chocks can be used,

- if the tipping direction has not been planned and set, position the tipping pins (1) and (2) at the side on which the load will be unloaded and secure them – see figure (*4.4*),
  - the tipping pins and the sockets are designed so it is impossible to insert them on the opposite side of the loading case diagonally, which would damage the trailer,
  - a handle (3) of correctly inserted pin is directed downwards – figure (*4.4*); improperly inserted pins would pose the risk of damaging the trailer,
- if the tipping direction has been planned and set beforehand, check the position of pin handles (3),
- open (unlock) the lower locks of walls at the side on which the trailer will be unloaded; if required, open the rear slide gate – see figure *(4.6)*,
  - when opening the walls, exercise caution,
- open the wall locks connecting the wall with the pillar and the front wall,
  - when opening the walls, exercise caution,
- set the tipping hydraulic circuit control lever in position 1 – tipping of the first trailer,
- activate the hydraulic circuit feeding the trailer's hydraulic tipping system to raise the loading case,
- after unloading, lower that loading case and clean edges of the floor and the walls,
- close and secure the walls and extensions or the slide gate,
- before moving off, make sure that the tipping pins are in correct position and are protected by cotter pins.

If a second trailer is attached, unload it only after the first trailer's loading case has been lowered and the hydraulic tipping system's control valve is set to position 2 – unloading the second trailer.

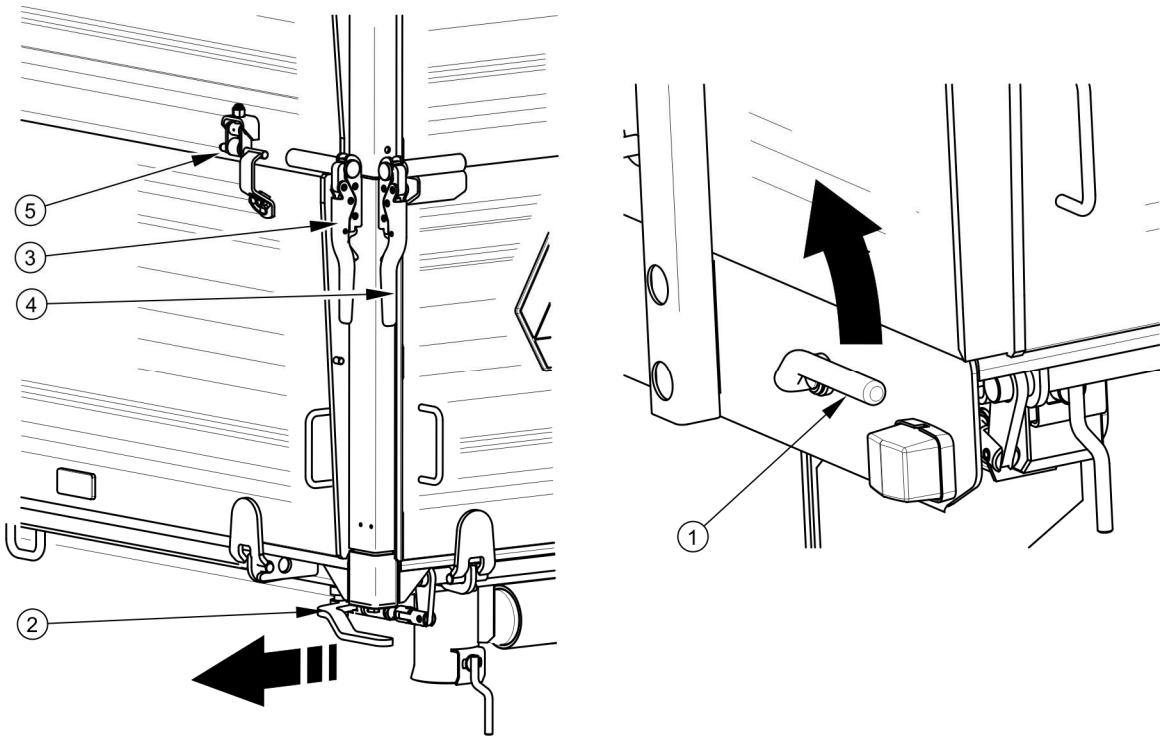


FIGURE 4.5 Wall and extension locks

(1) left side wall closing lever (2), rear wall closing lever (3) side wall lock (left, rear), (4) rear wall lock (left), (5) extension lug

DANGER

Improperly secured tipping pins can cause severe damage to the trailer.

Pay particular attention when opening wall locks – the load may exert force on the trailer walls.

When using the trailer with the second set of extensions installed, pay attention to the trailer's stability and the increased risk of overturning. Control the trailer's movement on uneven ground.

Ensure that during unloading nobody is near the loading case.

Due to the risk of injury, when opening/closing the bolts and the locks wear protective gloves.

Tipping the loading case must be done only on a hard and level ground.

Exercise particular caution when operating the trailer with second set of extensions.

Use only original tipping pins with handles. Using non original pins could damage the trailer. The tipping pins must be properly locked.

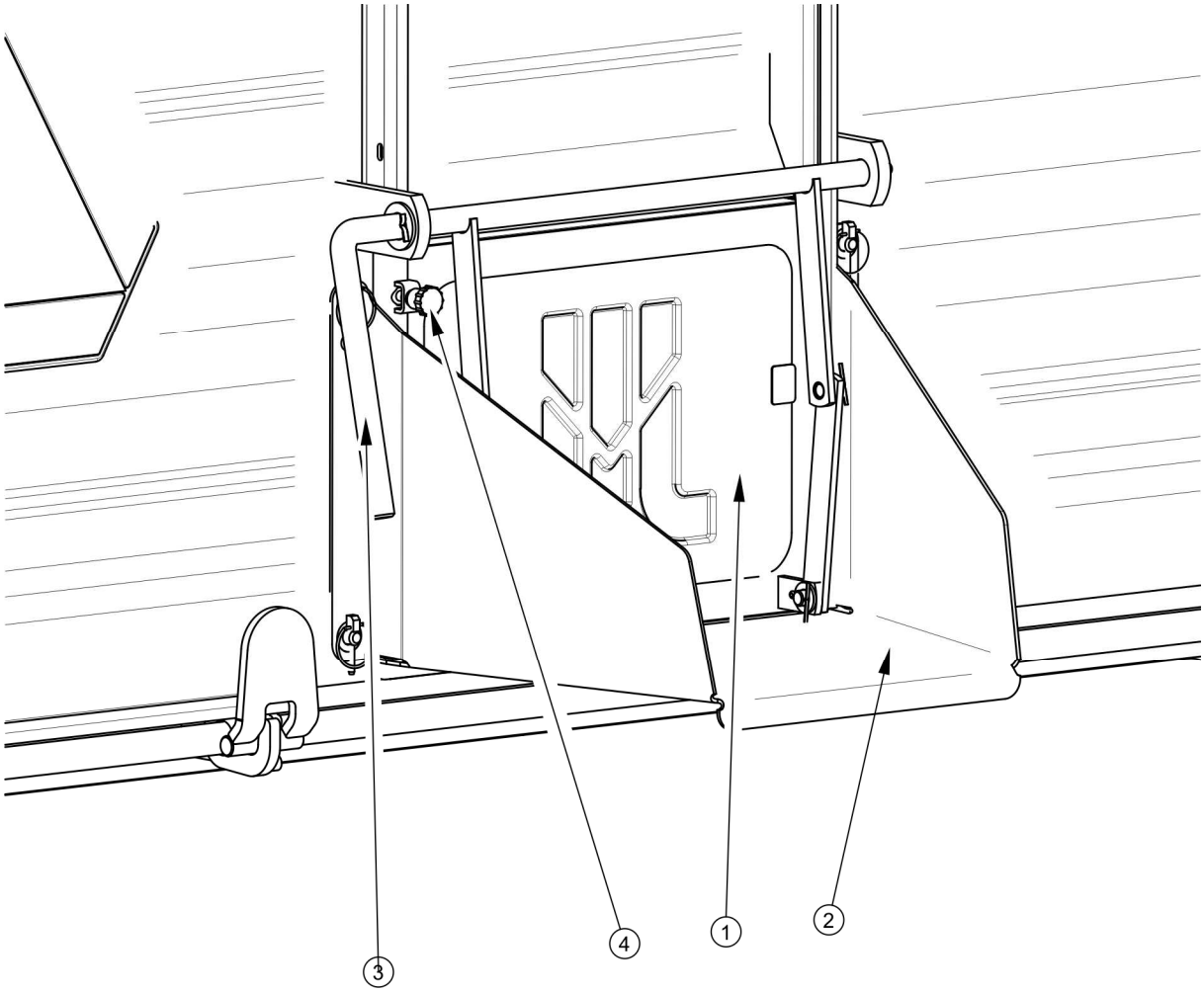


FIGURE 4.6 Chute

(1) slide gate, (2) chute, (3) lever, (4) locking bolt

The rear wall of the loading case is equipped with a slide gate (1) – figure (*4.6*) – and the chute (2) (optional equipment) which is used for unloading loose materials. The chute design allows for very accurate metering of the material to packaging (sacks, boxes etc).

The opening gap size can be controlled by means of a lever (3). In order to do so, loosen the bolt interlocking the slide gate (4), open the slide to a required height and lock again using the bolt. When unloading material through the chute, do not open wall locks or wall extension locks. The loading case must be tipped very slowly and without jerking. Raising the loading case quickly will exert large pressure on its rear part due to displacement of the material and can compromise the trailer's stability.

Be careful while unloading volumetric materials. Do not tip the loading case on uneven or wet ground; do not move and jerk the trailer during unloading. Volumetric materials are usually

difficult to unload therefore proceed cautiously and patiently. Careless operation of the trailer may pose a danger to operators and bystanders can also cause damage to the machine.

ATTENTION

It is not recommended to unload the loading case by opening the walls downwards (with the loading case lower locks bolted). A load may exert pressure on walls and injury the operator or damage the trailer.

DANGER

When closing the walls and the rear slide gate, take particular care to avoid crushing fingers.

Volumetric materials loaded in excess of 1 m can be unloaded only by tipping the loading case to the rear.

Ensure that during unloading nobody is near the tipped loading case and the material pouring out.

The loading case can only be tipped when the trailer is hitched to the tractor.

Do not tip the loading case during strong wind gusts.

It is prohibited to move off and drive with the loading case raised.

TIP

It is recommended to use wheel chocks to secure the trailer during unloading.

When unloading high-volume materials like branches, it is allowed to open the trailer's rear wall downwards. It is recommended to use the assistance of another person during unloading.

4.7 PROPER USE AND MAINTENANCE OF TYRES

- When working on the tires, place chocks or other objects without sharp edges under the wheels of the trailer to prevent it from rolling. A wheel can be dismounted only when the trailer is not loaded.
- Repair works on the wheels or tires should be carried out by persons trained and entitled to do so. These works should be carried out by means of appropriate tools.

- Check the tightening of the nuts after first operation of the trailer, after the first driving with load and then once per 6 months of operation or 25,000 kilometers. In the event of intensive work checking the nut tightening should be done at least every 100 km. The inspection should be repeated if a wheel has been removed from the axle.
- Regularly check and maintain correct pressure in tires according to Operator's Manual (especially if trailer is not used for a longer period).
- The air pressure should be also checked after the whole day of intensive work. Please note that higher temperatures could raise tire pressure by as much as 1 bar. In case of such temperature and pressure rise, reduce the load or speed.
- Do not release air from tires to adjust the pressure.
- Protect tire valves using suitable caps to avoid soiling.
- Do not exceed the trailer's maximum design speed.
- When the trailer is operated all day, stop working for a minimum of one hour in the noon.
- To cool down the tires, stop for 30 minutes each time after driving 75 km or after 150 minutes of continuous travel depending on which occurs first.
- Avoid potholes, sudden maneuvers or high speeds when turning.

4.8 OPERATING THE UNDER RUN PROTECTIVE DEVICE

The trailer can be optionally equipped with two pairs of under run protective devices; both devices can be tilted. Because these devices play an important role in road traffic safety, ensure they are complete and in good condition.

Lifting

- Pull the under run protective device by holding the lower beam of the device.
- Lift the under run protective device as shown on figure (*4.7*)
- Push the device away. The under run protective device can be secured in lifted position by means of a relevant recess and longitudinal holes of the bracket.

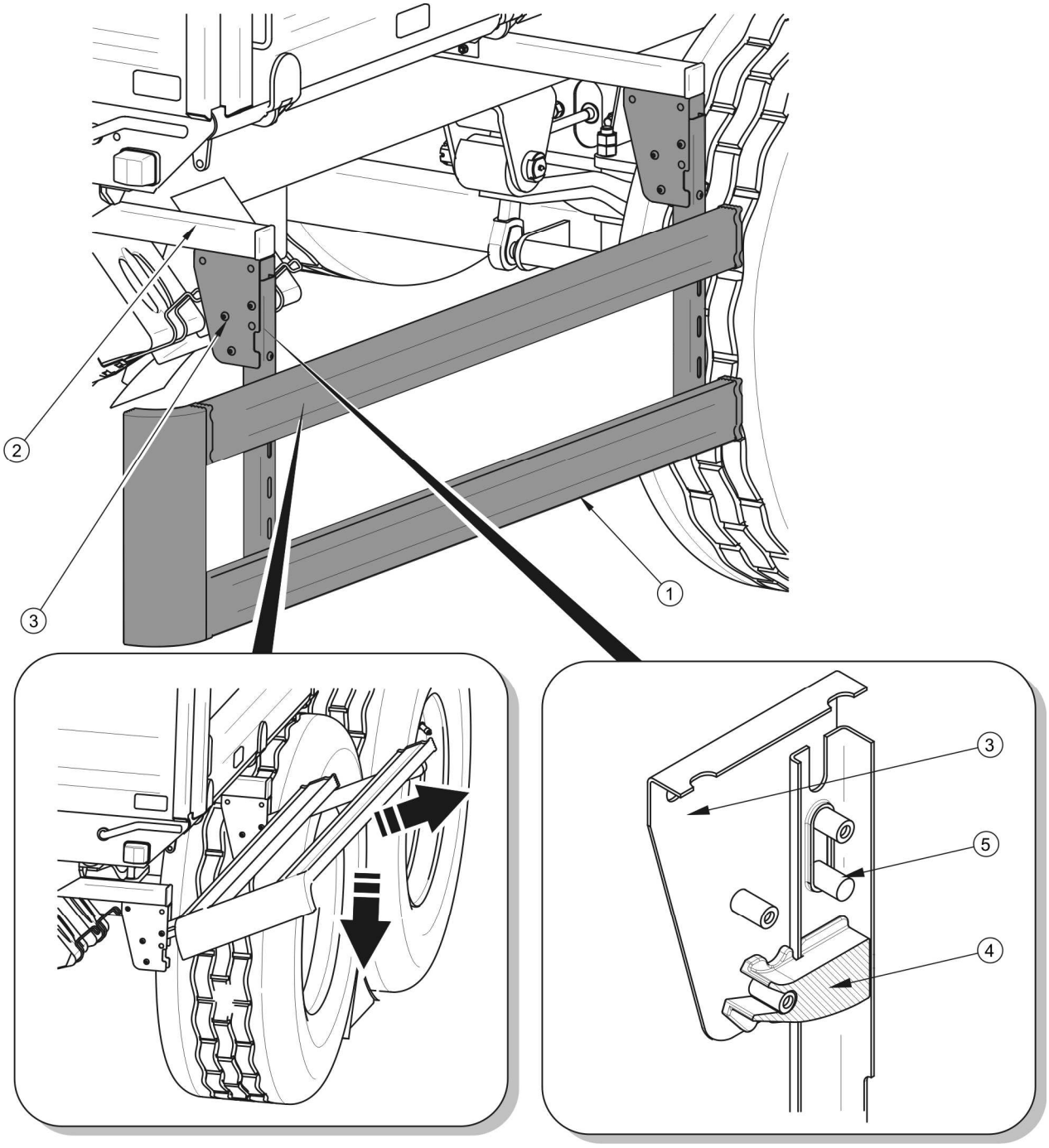


FIGURE 4.7 Left under run protective device

(1) left under run protective device, (2) barrier handle bracket, (3) clamp, (4) catch, (5) lock bolt

Lowering

- Pull the under run protective device.
- Lower the device and push it so that the bracket pin locks in place.

- Secure the devices by means of pins (5).

DANGER

It is prohibited to drive with the under run protective device raised. Before driving off make sure, that the under run protective devices are lowered and locked in place.

Unless necessary, do not leave the devices in the lifted position.

CHAPTER

5

MAINTENANCE

5.1 PRELIMINARY INFORMATION

When using the trailer, regular inspections of its technical condition are essential, as well as performance of maintenance procedures which keep the machine in good technical condition. Therefore, the user is obliged to perform all maintenance and adjustment procedures defined by the manufacturer.

Repairs during the guarantee period may only be performed by authorized service points.

This section describes the detailed procedures and extent of actions which can be done by the user with ones own resources. In the event of unauthorized repairs, changes to factory settings and other actions which are not regarded as possible for the trailer operator to perform, the warranty will be invalidated.

5.2 SERVICING THE BRAKES AND THE AXLE

5.2.1 PRELIMINARY INFORMATION

Work related to repairs, change or regeneration of axle and mechanical brakes elements should be entrusted to specialist workshops having the appropriate technology and qualifications for this type of work.

The responsibilities of the user are limited to:

- initial inspection of axle brakes,
- inspection and adjustment of play of axle bearings,
- mounting and dismounting the wheel, inspection of wheel tightening,
- control of air pressure, evaluating technical condition of wheels and tires,
- adjustment of mechanical brakes,
- replacement of parking brake cable and adjustment of cable tension.

Procedures related to:

- changing grease in axle bearings,
- replacement of bearings, hub seals,
- replacement of brake linings, repairs of brake,

may be performed by specialist workshops.

DANGER

Do not use the trailer when brake system is unreliable.

5.2.2 INITIAL INSPECTION OF AXLE BRAKES

After purchasing the trailer, the user is responsible for general checking of brake system of trailer axle.

Initial inspection of axle brakes must be conducted:

- **after first use,**
- **after the first travel with load.**

Inspection procedures

- ➡ Hitch the trailer to a tractor and place chocks under trailer wheel.
- ➡ Engage and release firstly the main brake and then the trailer parking brake.
  - ⇨ The main brake and the parking brake should be engaged and released without great resistance and severity.
- ➡ Check mounting of cylinders and return springs.
- ➡ Check stroke of cylinders and correct return of piston to start position.
  - ⇨ Assistance of a second person is required, who shall engage the trailer brake.
- ➡ Check if axle elements are complete (cotter pins in castellated nuts, expansion rings etc.).
- ➡ Check hydraulic cylinders or pneumatic cylinders for tightness – see chapters *5.3.2* and *5.4.2*.

5.2.3 INSPECTION OF AXLE BEARINGS PLAY

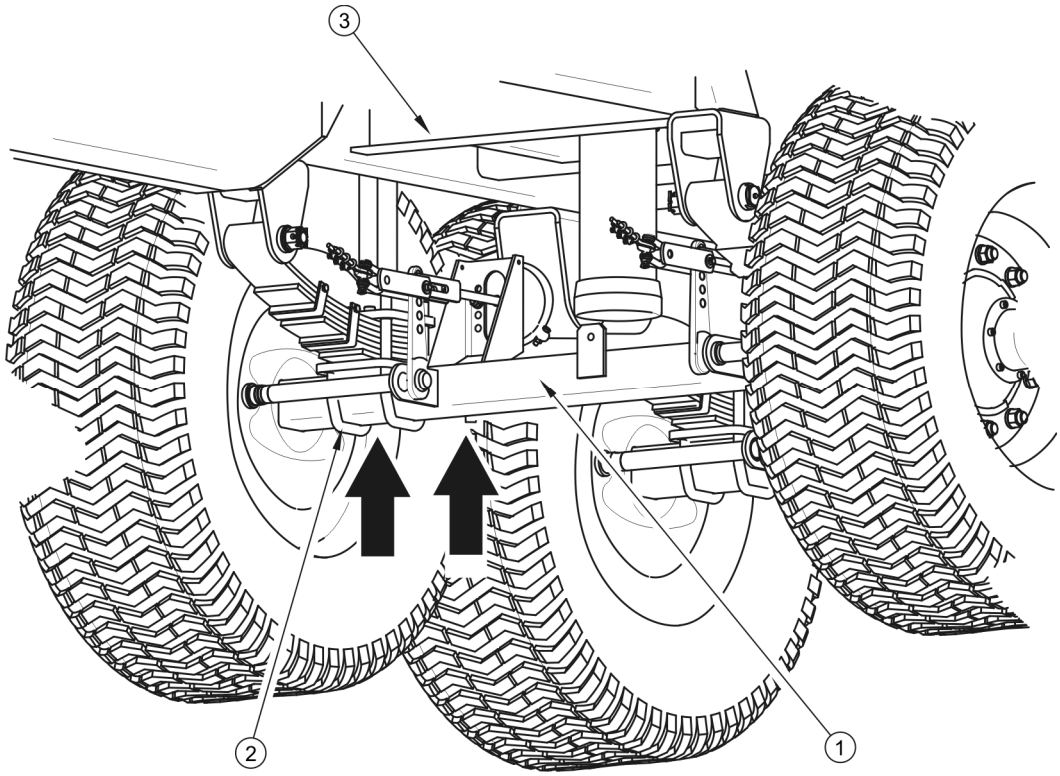


FIGURE 5.1 Lifting jack support point

(1) drive axle, (2) U bolt, (3) lower frame

Preparation procedures

- Hitch the trailer to a tractor; immobilize the tractor with the parking brake.
- Park a tractor and the trailer on hard level ground.
  - ⇨ Tractor must be placed to drive forward.
- Insert the chocks under the trailer's wheel. Ensure that the trailer shall not move during inspection.
- Raise the wheel (opposite to the side where the chocks are placed).
  - ⇨ The lifting jack should be placed between U bolts (2) (figure (*5.1*)) securing axle (1) to springs, or as near as possible to spring mounting. Recommended support points are marked with arrows. Lifting jack must be suited to weight of trailer.

Inspection of axle bearings play

- ➡ Turning the wheel slowly in both directions, check that movement is smooth and that the wheel rotates without excessive resistance and blockages.
- ➡ Turn the wheel so that it rotates very quickly and check if the bearing does not make any unusual sounds.
- ➡ Holding the wheel above and below, try to feel any play.
  - ⇨ You may use a lever placed under the wheel and support the other end on the floor.
- ➡ Repeat the inspection procedure on the other wheels.

If a play is detected, adjust bearings. Unusual sounds coming from bearing may be symptoms of excess wear, dirt or damage. In this case the bearing, together with sealing ring, should be replaced with new parts or cleaned and greased again.

TIP

Damaged hub cover or lack of hub cover causes penetration of contamination and moisture to the hub, which causes significantly faster wear of bearing and hub seals.

Bearing life is dependent on working conditions of trailer, loading, tractor speed and lubrication conditions.

Check axle bearings play:

- **after first 1000 km,**
- **before intensive use of the trailer,**
- **every six months of usage or every 25,000 km.**

DANGER

Prior commencing work, the user should carefully read the lifting jack's Operator's Manual and observe all manufacturer's recommendations.

The lifting jack must be stably supported on the ground and the axle.

Ensure that the trailer shall not move during inspection of axle bearings play.

Check the technical condition of hub cover, if necessary replace with new one. Inspection of bearing play may only be conducted, when the trailer is hitched to a tractor, and the loading case is empty.

5.2.4 ADJUSTMENT OF AXLE BEARINGS PLAY

Preparation procedures

➡ Prepare a tractor and the trailer for adjustment procedures according to description provided in section *5.2.3*.

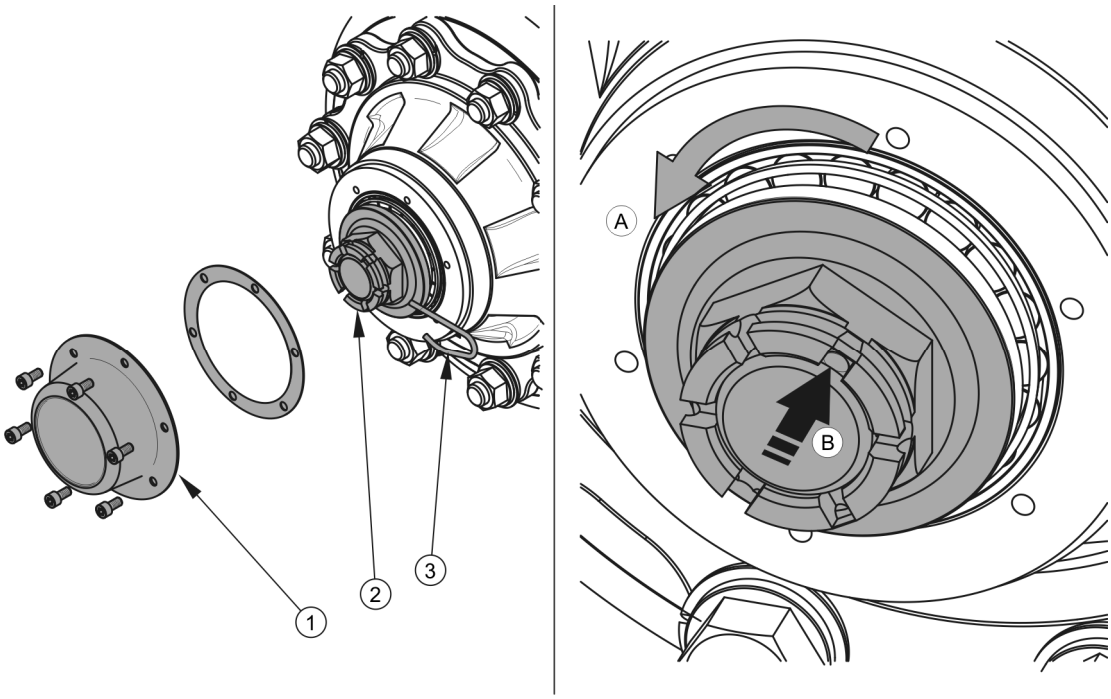


FIGURE 5.2 Adjustment of axle bearings

(1) hub cover, (2) castellated nut, (3) cotter pin

Adjustment of axle bearing play

➡ Remove the hub cover (1) – figure *(5.2)*.

➡ Remove cotter pin (3) securing the castellated nut (2).

➡ Tighten castellated nut in order to eliminate play.

⇨ Wheel should rotate with insignificant resistance.

- ➡ Unscrew nut (not less than 1/3 rotation) to cover the nearest thread groove with alignment to opening in wheel stub axle. Wheel should rotate without excessive resistance.
  - ⇨ Wheel should rotate with insignificant resistance. Do not apply excessive pressure with regard for deterioration of bearing working conditions.
- ➡ Secure castellated nut with a cotter pin and mount hub cover.
- ➡ Delicately tap the hub with rubber or wooden hammer.

The wheel should turn smoothly without stiffness or detectable resistance not originating from abrasion of brake shoes in brake drum. Adjustment of bearing play may only be conducted, when the trailer is hitched to a tractor, and the loading case is empty.

TIP

If the wheel is dismounted, bearing play is easier to check and adjust.

5.2.5 MOUNTING AND DISMOUNTING THE WHEEL, INSPECTION OF WHEEL TIGHTENING

Dismounting the wheel

- ➡ Immobilize the trailer with the parking brake.
- ➡ Place chocks under wheel that will not be dismounted.
- ➡ Ensure that the trailer is properly secured and shall not move during wheel dismounting.
- ➡ Loosen wheel nuts according to sequence given in figure (*5.3*).
- ➡ Place lifting jack and lift the trailer – figure *(5.1)*.
- ➡ Dismount the wheel.

Mounting the wheel

- ➡ Remove dirt from axle pins and nuts.

⇨ Do not grease thread of nuts and pins.

➡ Check the technical condition of pins and nuts, replace if necessary.

➡ Place the wheel on hub, tighten nuts so that wheel rim is exactly fitted on the hub.

➡ Lower the trailer, tighten nuts according to recommended torque and given sequence.

TIP

Wheel nuts should be tightened using a torque of 270 Nm – nuts M18x1.5.

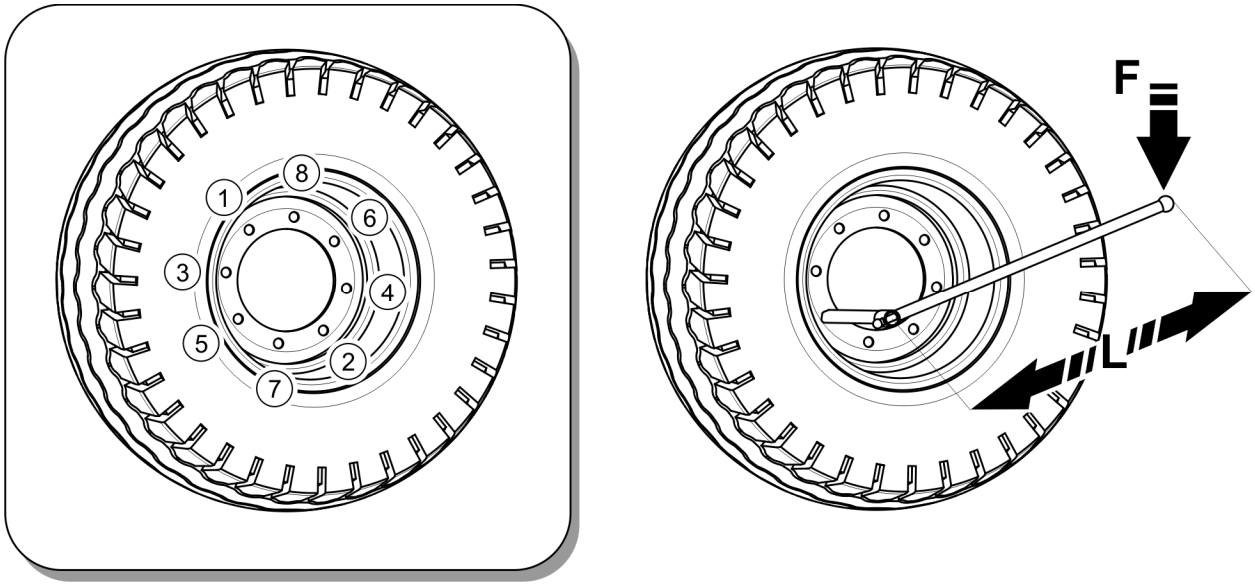


FIGURE 5.3 Sequence of nut tightening

(1) – (6) sequence of nut tightening, (L) spanner length, (F) user weight

Tightening nuts

Nuts should be tightened gradually diagonally (in several stages, until obtaining the required tightening torque) by means of a torque spanner. If a torque spanner is not available, use an ordinary spanner. The arm of the spanner (L), figure (*5.3*), should be selected according to the weight of the person (F) tightening the nut. Remember that this method of tightening is not as accurate as the use of a torque spanner.

Checking the tightening of axle wheels:

- **after first use,**
- **after first travel with load,**
- **after first 1000 km,**
- **per 6 months of operation or 25,000 kilometers.**

In the event of intensive work checking the nut tightening should be done at least every 10,000 km. All procedures should be repeated if a wheel has been removed from the axle.

ATTENTION

Axle nuts may not be tightened with impact wrench, because of danger of exceeding permissible tightening torque, the consequence of which may be breaking the thread or breaking off the hub pin.

The greatest precision is achieved by use of a torque spanner. Before commencing work, ensure that correct tightening torque value is set.

TABLE 5.1 Spanner arm selection

WHEEL TIGHTENING TORQUE	BODY WEIGHT (F)	ARM LENGTH (L)
[Nm]	[kg]	[m]
270	90	0.30
	77	0.35
	67	0.40
	60	0.45

5.2.6 CONTROL OF AIR PRESSURE, EVALUATING TECHNICAL CONDITION OF TIRES AND STEEL WHEELS

The tire pressure should be checked each time after changing spare wheel and not less than every month. In case of intensive use it is recommended to check air pressure more frequently. During this time the trailer must be unloaded. Control should be done before travelling and when tires are not heated, or after an extended period of parking.

TIP

Tire pressure values are specified on information decal which is placed on wheel or on upper frame above the trailer wheel.

DANGER

Damaged tires or wheels may cause the serious accident.

While checking the pressure, pay attention to technical condition of wheels and tires. Look carefully at tire sides and check the condition of tread.

In case of a mechanical damage consult the nearest tire service and check whether the defect requires replacement of the tire.

Wheels should be inspected with regard to distortion, breaking of material, breaking of welds, corrosion, especially in the area of welds and contact with tire.

Appropriate technical condition and appropriate maintenance significantly extends the life of these components and ensures appropriate level of safety to trailer users.

Control of pressure and inspection of steel wheels should be performed:

- **every 1 month of use,**
- **if needed.**

5.2.7 ADJUSTMENT OF MECHANICAL BRAKES

During use of the trailer friction linings of brake drums are subject to wear. Piston stroke is extended and when the limit value is exceeded, braking force is decreased.

Adjustment should be performed when:

- a piston stroke is equal to 2/3 of maximum stroke,
- levers of brake expanders are not in parallel to each other during braking,
- braking system has been repaired.

Trailer wheels must brake simultaneously. Adjustment of brakes involves changing the setting of the expander arm (1) – figure *5.4*), in relation to expander shaft (2).

Scope of maintenance

- Dismantle the pin (3) fixing the cylinder fork (4) to expander arm (3).
- Mark position of expander arm (1) with regard to the shaft (2).
- Dismantle the arm and set it in the appropriate position:
  - in direction (A), if the brakes are applied too early,
  - in direction (B), if the brakes are applied too late,
- Repeat the procedure for the second arm.
- Replace pin fixing the cylinder fork to expander arm.

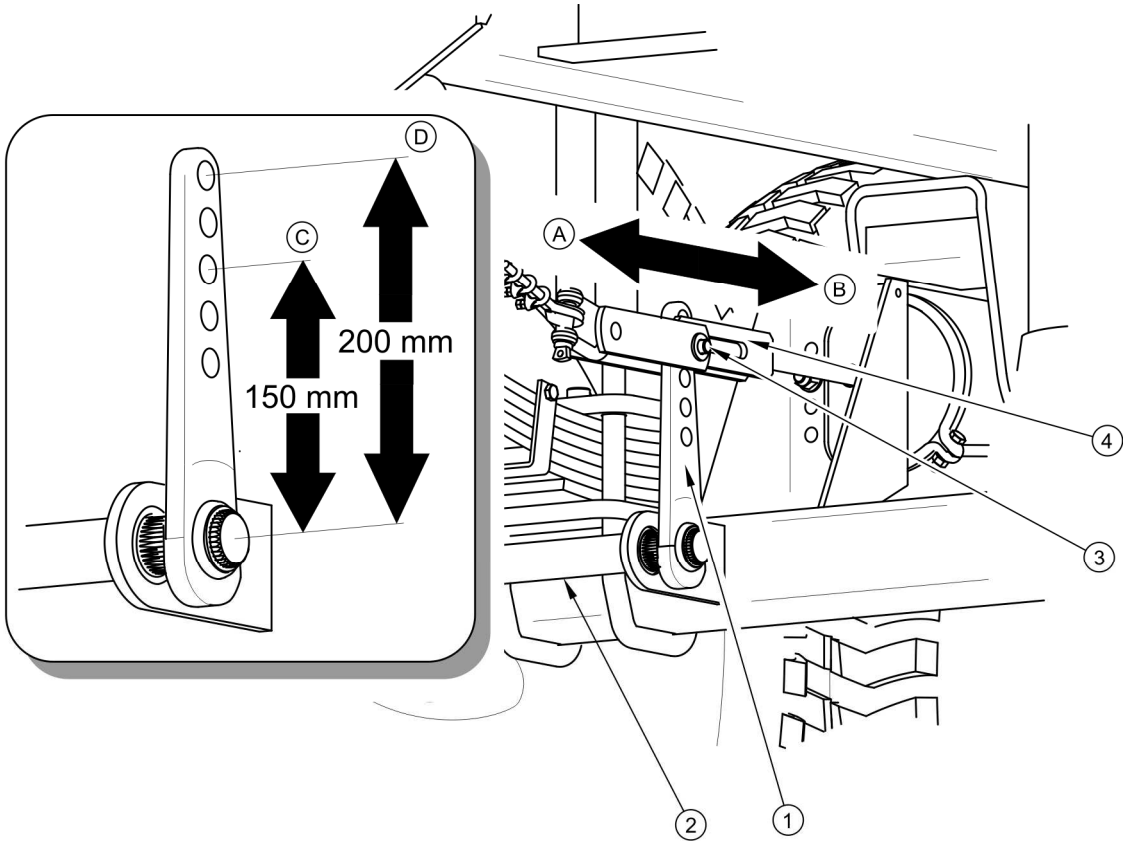


FIGURE 5.4 ADJUSTMENT OF AXLE MECHANICAL BRAKES

(1) expander arm, (2) expander shaft, (3) pin, (4) cylinder fork

Adjustment should be conducted separately for each wheel. Expander arm (1) should be moved by one notch in the selected direction. If the extent of cylinder action is still incorrect, move the lever again. After proper brake adjustment, at full braking the axle shaft expander should create an angle of 90^0 with the cylinder piston, and the stroke should be equal to approximately half the length of the total stroke of the piston. When the brake is released, expander arms may not be supported on any structural elements, because too small withdrawal of a piston may cause abrasion of brake shoes in drum and result in overheating the trailer brakes. Expander arms must be positioned in parallel with regard to each other at full braking. If they are not, adjust the position of the lever which has the longer stroke.

TABLE 5.2 POSITION OF PIN IN EXPANDER ARMS

TYPE OF BRAKING SYSTEM	PIN POSITION – FRONT AXLE [mm] (C)	PIN POSITION – REAR AXLE [mm] (D)
Twin-line system	150	200
Twin-line system ALB	150	200
Hydraulic system	150	200
Single-line system	150	200

5.2.8 REPLACEMENT OF PARKING BRAKE CABLE AND ADJUSTMENT OF CABLE TENSION

Proper operation of the parking brake depends on efficiency of drive axle brakes and proper tension of brake cables.

Replacement of parking brake cable

- Hitch the trailer to a tractor. Park the trailer and a tractor on level surface.
- Insert the chocks under the trailer's wheel.
- Unscrew maximally the bolt of brake crank mechanism (1).
- Remove shackles and pins of guiding rollers (4).
- Unsecure and remove pin of crank mechanism (1).
- Loosen nuts of cable clamps (2).
- Dismount the cable (3).

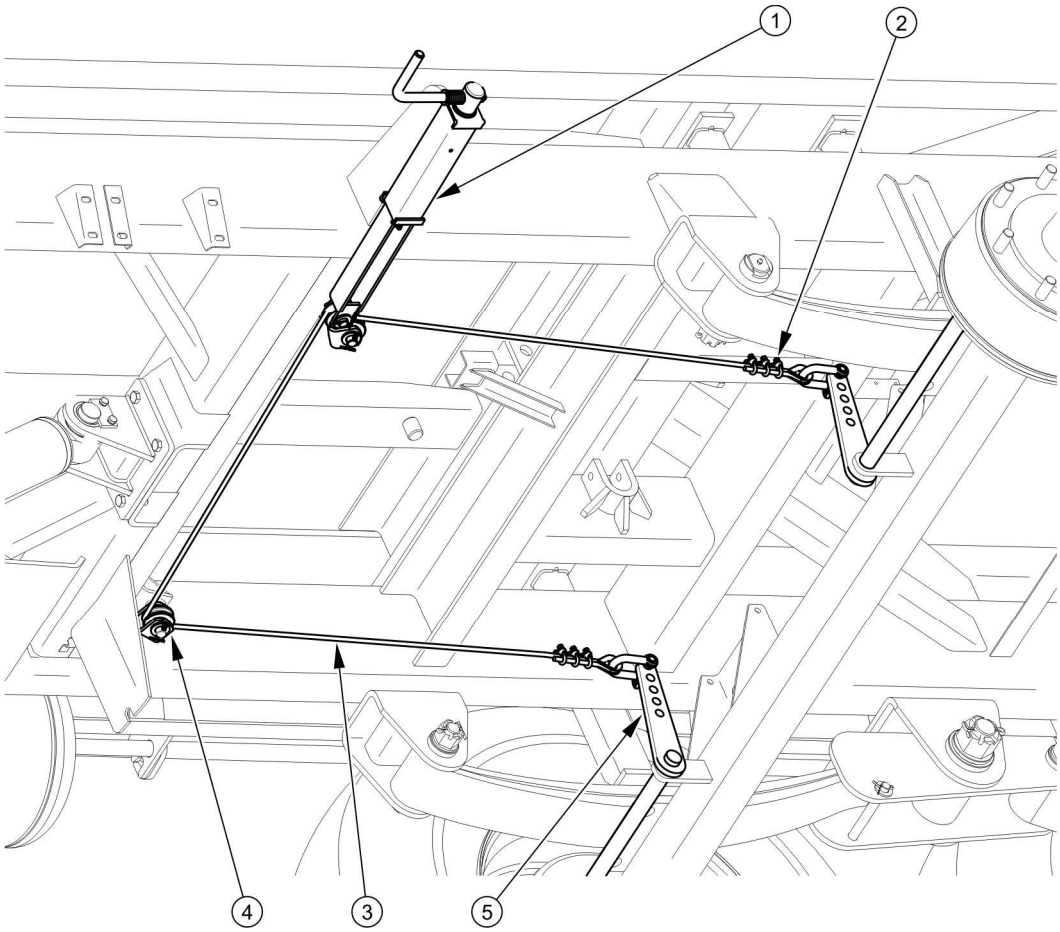


FIGURE 5.5 Adjustment of parking brake cable tension

(1) brake crank mechanism, (2) U-shaped clamp, (3) handbrake cable, (4) guiding roll, (5) expander arm

- Lubricate the parking brake mechanism (1), and pins of cable guiding wheels rolls (4).
- Mount a new cable.
  - Parking brake cable should be installed with care.
  - Cable should be ended with thimble and three clamps (at each end).
  - Clamps should be fully tightened. Distances between clamps should be not less than 15 mm.
  - Clamping jaws should be located at load supporting side of the cable – see figure *(5.6)*.
  - First clamp should be located as close as possible to the thimble.

➡ Insert pins and new cotter pins.

➡ Adjust the tension of parking brake cable.

➡ After first engagement of the brake, check if cable tension is correct. Adjust if necessary.

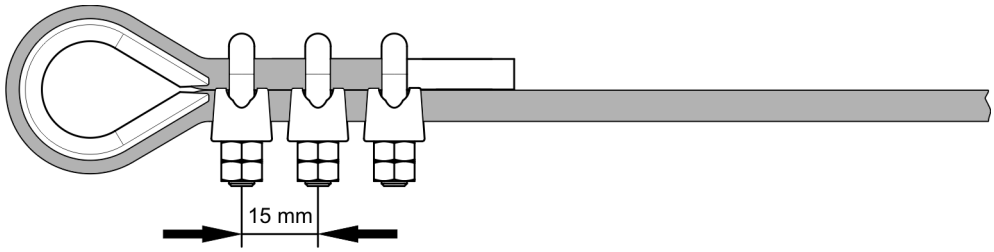


FIGURE 5.6 Mounting the brake cable clamps

Adjustment of parking brake cable tension

➡ Hitch the trailer to a tractor. Park the trailer and a tractor on level surface.

➡ Insert the chocks under the trailer's wheel.

➡ Unscrew maximally the bolt of brake mechanism (1) – figure (*5.5*) (counterclockwise) .

➡ Loosen nuts of parking brake cable clamps (2).

➡ Pull the cable and tighten the clamps.

⇨ Length of parking brake cable should be selected so that these cables were loose and hang down (1 – 2 cm) when the working and parking brakes are released.

Adjustment of parking brake cable tension should be performed in the following cases:

- if the cable is stretched,
- clamps of parking brake cable are loosened,
- after adjustment of drive axle brake,
- after repair on drive axle brake system,
- after repair on parking brake system.

Before adjustment ensure that drive axle brake is correctly adjusted and operates properly.

Inspection and/or adjustment of parking brake should be done:

- **every 12 months,**
- **if needed.**

5.3 MAINTENANCE OF PNEUMATIC SYSTEM

5.3.1 PRELIMINARY INFORMATION

Works connected with the repair, change or regeneration of system components (brake cylinders, hoses, control valve braking force regulator etc.) should be entrusted to specialist workshops, having the appropriate technology and qualifications for this type of work.

The user is obliged to perform following maintenance work on the pneumatic system:

- visual inspection and control of system tightness,
- cleaning the air filter (filters),
- draining water from air reservoir,
- cleaning the drain valve,
- cleaning and maintenance of pneumatic line connectors.

DANGER

Do not use the trailer when brake system is unreliable.

5.3.2 VISUAL INSPECTION AND CONTROL OF SYSTEM TIGHTNESS

Control of pneumatic system tightness

➡ Hitch the trailer to a tractor.

➡ Immobilize the tractor and the trailer with parking brake. In addition, place the chocks under the trailer's wheel.

➡ Start the tractor in order to supplement air in trailer brake system tank.

- ⇨ In single-line systems air pressure should be in range of 5.8 – 6.5 bar.
- ⇨ In twin-line systems air pressure should be approx. 6.5 bar.

➡ Turn off the engine.

➡ Release the brake pedal in a tractor and check the system components.

- ⇨ Pay particular attention to hose connectors and brake cylinders.

➡ Press the brake pedal in a tractor and check the system components again.

- ⇨ Assistance of a second person is required.

In leaks are present, compressed air will get outside with a characteristic hiss. System leakages may be also be detected by covering checked elements with washing fluid or other foaming compounds which will not react aggressively with system components. It is recommended to use commercially available compounds designed to facilitate discovering air leaks. Damaged components should be replaced or repaired. If leaks appear near connectors, user should tighten these connectors. If air continues to escape, replace connector components or seals with new ones.

Control of tightness should be performed:

- **after first 1000 km,**
- **after each repair or replacement of system elements,**
- **once a year.**

Visual inspection of the system

During tightness inspection attention should additionally be paid to the technical condition and degree of cleanness of the system components. Contact of pneumatic lines, seals etc. with oil, grease, petrol etc. may cause damage and accelerate the ageing process. Bent, permanently deformed, cut or worn lines should be replaced.

Visual inspection of the system

- **Visual inspection of the system should be performed simultaneously with control of the system tightness.**

ATTENTION

Repair, replacement or regeneration of pneumatic system components may only be performed in a specialized workshop.

5.3.3 CLEANING THE AIR FILTERS

Depending on trailer working conditions, but not less than once in three months, remove and clean air filter elements which are located on pneumatic system connection lines. Inserts are used many times and are not subject to replacement unless mechanically damaged.

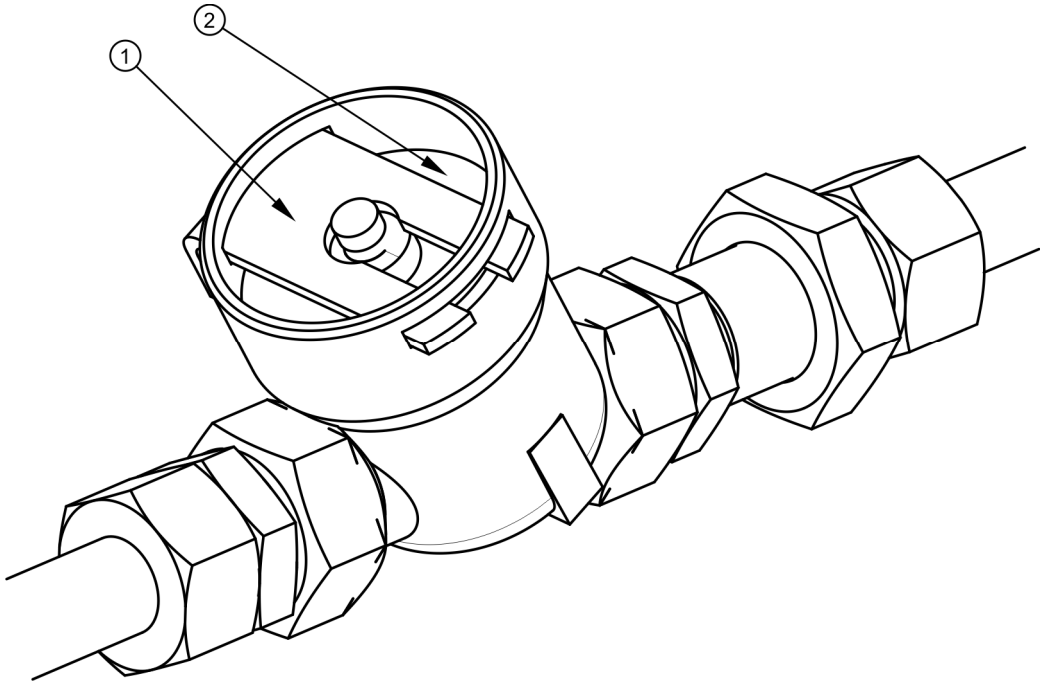


FIGURE 5.7 Air filter

(1) sliding lock, (2) filter cover

DANGER

Before proceeding to dismantle filter, reduce pressure in the supply line. While disengaging filter lock, hold cover with other hand. Filter cover should be directed away from the user.

Scope of maintenance

➡ Reduce pressure in the supply line.

⇨ Reduction of pressure may be achieved by pressing the head of the pneumatic connector until the resistance is felt.

➡ Remove the sliding lock (1) – figure (*5.6*).

⇨ Hold the filter cover (2) with other hand. After removing sliding lock, the cover is pushed off by the spring in the filter housing.

➡ The filter element and body should be carefully washed out and blown through with a compressed air. Assembly should be done in reverse sequence.

Clean the air filter (filters):

- **every 3 months of use.**

5.3.4 DRAINING WATER FROM THE AIR RESERVOIR

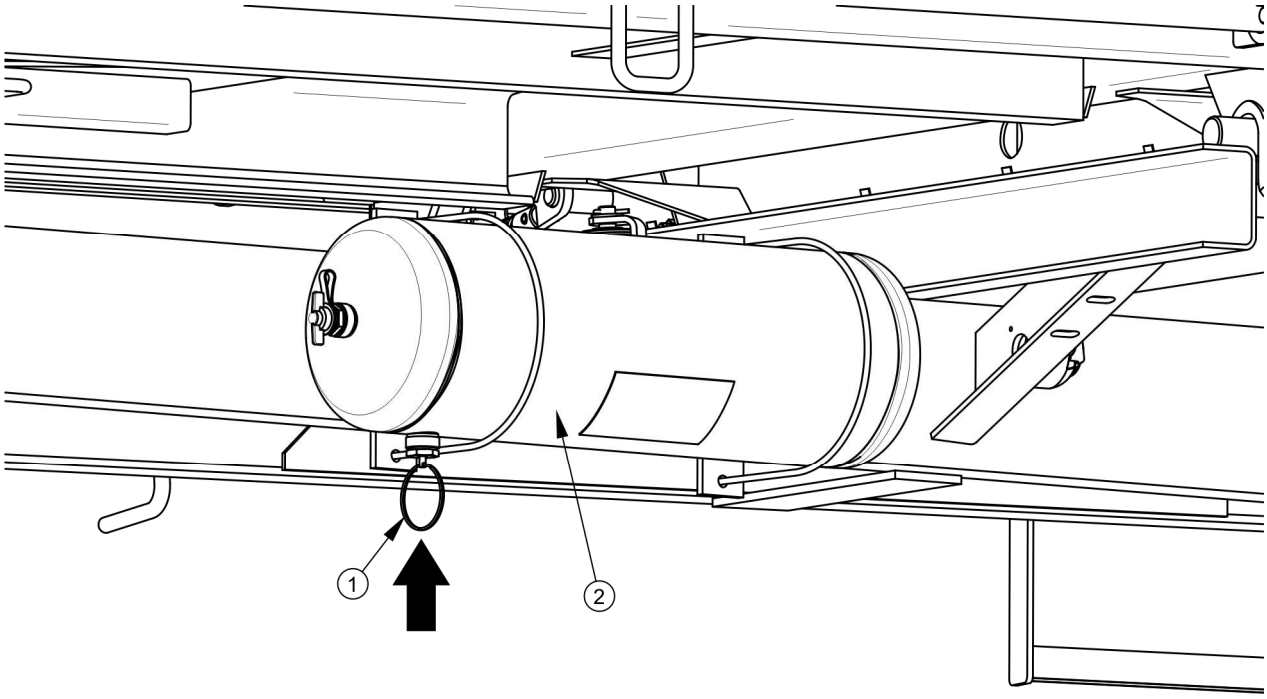


FIGURE 5.8 Draining water from the air reservoir

(1) water drain valve , (2) air reservoir

Scope of maintenance

- ➡ Tilt out drain valve stem (1) placed in lower part of the tank (2) – the tank is placed on brackets of right longitudinal of lower frame.
  - ⇨ The compressed air in the tank will cause the removal of water to the exterior.
- ➡ When the stem is released, valve should be automatically closed and air removal from tank should be stopped.
  - ⇨ If valve stem does not return to its position, then the whole drain valve must be unscrewed and cleaned, or replaced (if damaged) with new one – see chapter *5.3.5*.

Drain water from air reservoir:

- **every 7 days of use.**

5.3.5 CLEANING THE DRAIN VALVE

Scope of maintenance

- ➡ Completely reduce the pressure in the air reservoir.
  - ⇨ Reduction of pressure in tank is achieved by tilting the drain valve stem.
- ➡ Unscrew the valve.
- ➡ Clean valve and blow with compressed air.
- ➡ Replace the copper seal with new one.
- ➡ Screw in the valve, fill the air reservoir and check its tightness.

DANGER

Before dismantling the drain valve, release air from the tank.

Clean the tank:

- **every 12 months (before winter season).**

5.3.6 CLEANING AND MAINTENANCE OF PNEUMATIC SOCKETS AND LINE CONNECTORS

DANGER

Unreliable and dirty trailer connectors may cause faulty functioning of braking system.

Damaged connector body or sockets for connecting the second trailer should be replaced. In case of damage to cover or seal, change these elements with new reliable ones. Contact of pneumatic connector seals with oils, grease, petrol etc. may cause damage and accelerate ageing process.

If the the trailer is disconnected from a tractor, connectors should be protected by cover or placed in sockets specially designated for this purpose. Before the winter season it is recommended to preserve the seal with special compounds (e.g. silicon grease for rubber elements).

Each time before hitching the the machine, inspect technical condition and cleanness of connectors and sockets in a tractor. If necessary, clean or repair tractor socket.

5.3.7 INSTALLATION OF SINGLE-LINE PNEUMATIC SYSTEM

The standard version of the trailer is fitted with a twin-line pneumatic braking system. If use of single-line pneumatic system is required, machine's user can rebuild the system – figure *(5.9)*. Elements required to alter the system are delivered as the standard equipment of the trailer.

Sequence of rebuild procedure:

➡ Completely reduce the pressure in the air reservoir (3).

⇨ Reduction of pressure in tank is achieved by tilting the drain valve stem (4).

➡ Dismount the spiral line (yellow) (5) with line connector.

➡ Uninstall the air filter (6).

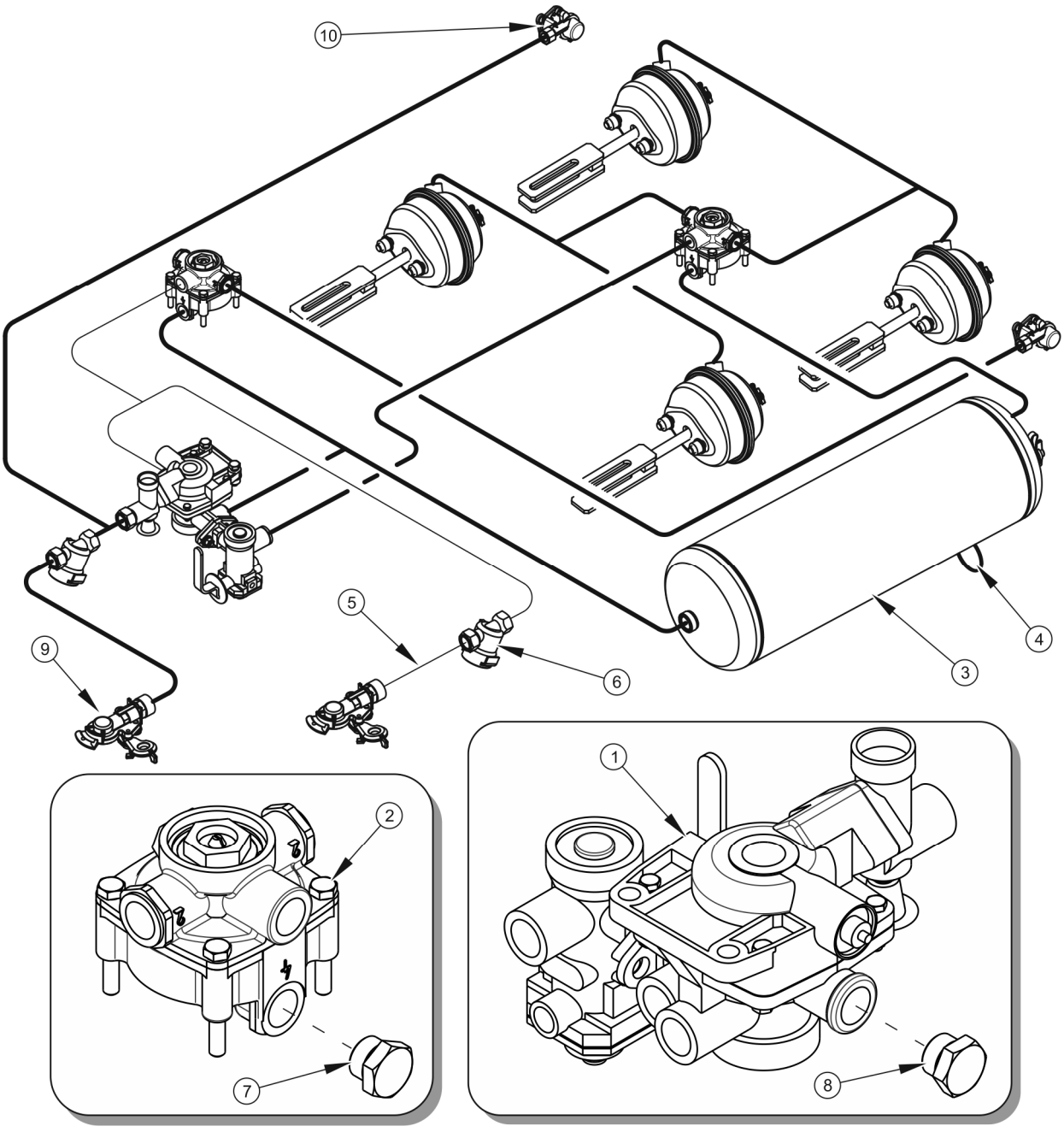


FIGURE 5.9 Altering the twin-line pneumatic system into single-line pneumatic system

(1) control valve, (2) relay valve, (3) air reservoir, (4) water drain valve, (5) spiral line (yellow), (6) air filter, (7) control valve plug, (8) relay valve plug, (9) line connector (red), (10) socket (red)

- ➡ Uninstall Tekalan lines and all connectors from control valve (1) and relay valve (2).
- ➡ Screw appropriate plugs (7) and (8) in place of dismounted connectors in control valve (1) and relay valve (2).
    - ⇨ Valve sockets to which plugs should be screwed are designed by number 4.
- ➡ Front line connector (red) (9) should be replaced with black connector.
- ➡ Read line connector (red) (10) should be replaced with black connector.
- ➡ Drill 9 mm dia. hole in connector latch for proper attachment of front line connector (black).

Checking the trailer connectors:

- **every time when the trailer is to hitched to a tractor or when the second trailer is to be connected.**

5.3.8 REPLACEMENT OF PNEUMATIC LINE

Only permanently deformed, cut or worn pneumatic lines should be

replaced.

Scope of maintenance:

- ➡ Reduce pressure in the system.
    - ⇨ Reduction of pressure is achieved by tilting the drain valve stem.
- ➡ Unscrew the nut (2) and uninstall the pneumatic line.
- ➡ Install new line.
    - ⇨ Inside of the line should be clean.
    - ⇨ Ends of line (1) should be cut exactly at right angle.
    - ⇨ Cutting ring (3) should be installed according to figure *(5.10)*.
    - ⇨ Line reinforcing sleeve (4) should be fully pushed in.
- ➡ Inspect tightness of connectors according to chapter *(5.3.2)*.

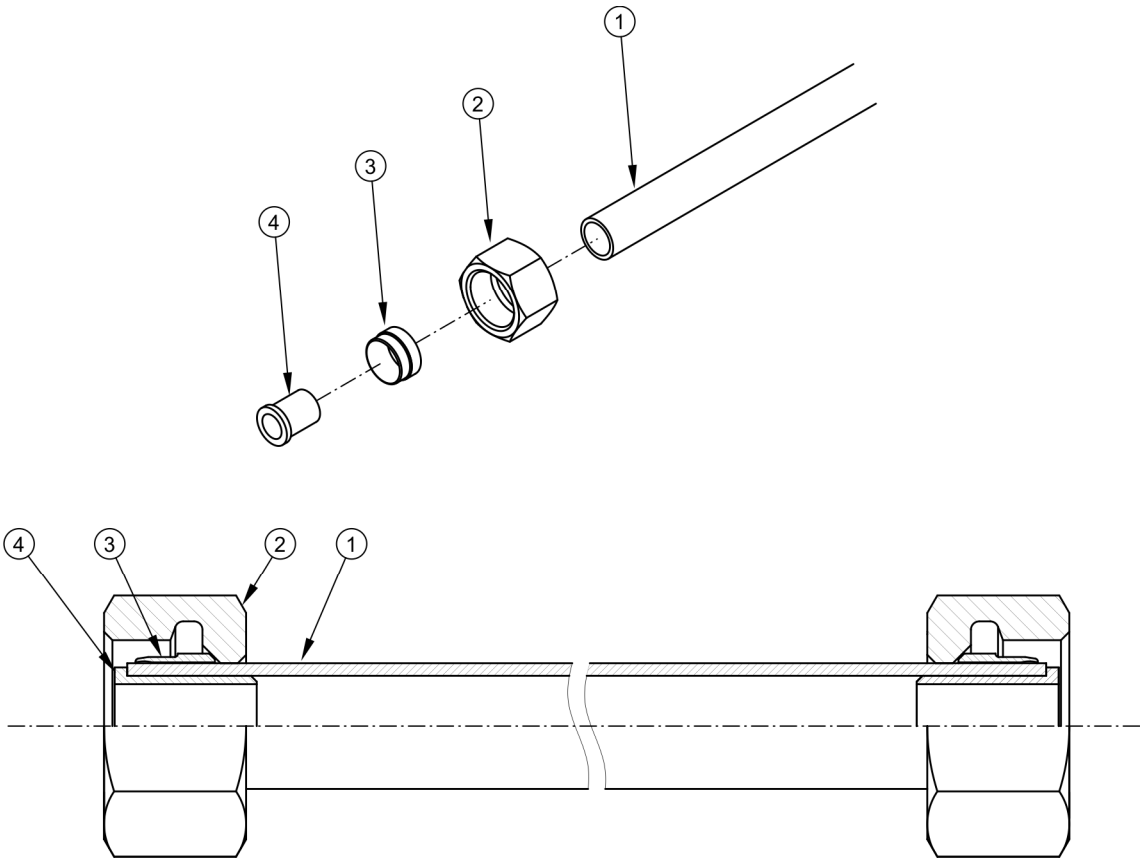


FIGURE 5.10 Construction of pneumatic line

(1) pneumatic line, (2) connecting nut, (3) cutting ring, (4) reinforcing sleeve

5.4 MAINTENANCE OF HYDRAULIC SYSTEM

5.4.1 PRELIMINARY INFORMATION

DANGER

Do not tip the trailer with unreliable hydraulic tipping system.

Do not use the trailer if the hydraulic system of the support is out of order.

Do not use the trailer when hydraulic brake system is unreliable.

Work related to repairs, change or regeneration hydraulic system components (tipping cylinder, valves etc.) should be entrusted to specialist workshops, having the appropriate technology and qualifications for this type of work.

User is obliged to perform only the following maintenance work on the hydraulic system:

- visual inspection and control of system tightness,
- inspection of the technical condition of hydraulic connectors.

5.4.2 CONTROL OF HYDRAULIC SYSTEM TIGHTNESS

Scope of maintenance

- ➡ Hitch the trailer to a tractor.
- ➡ Connect all hydraulic system lines according to instructions in Operator's Manual.
- ➡ Clean connectors and cylinders (tipping cylinder, supports and possible hydraulic brake cylinders).
- ➡ Make a test tipping of loading case to the rear and sideways.
- ➡ Press tractor brake pedal several times.
  - ⇨ If the trailer is equipped with hydraulic brake system.
- ➡ Inspect hydraulic lines and cylinders for tightness.

If oil on hydraulic cylinder body is detected, locate the source of leak. Inspect seals when cylinder is completely extended. Minimum leaks (symptoms of "sweating") are permissible, but if leaks in form of "droplets" are detected, stop using machine until fault is removed. If the fault is related to brake cylinders, stop using the trailer until fault is removed.

Check tightness:

- **after first week of use,**
- **every 12 months of use.**

5.4.3 CHECKING THE TECHNICAL CONDITION OF HYDRAULIC CONNECTORS AND SOCKETS

Hydraulic connectors and sockets used for connecting the second trailer must be in good technical condition and kept clean. Each time before connecting, check if tractor sockets or connectors of second trailer are in good condition. Tractor and trailer hydraulic systems are

sensitive to the presence of solid contamination which may cause damage to precision components of the system (contamination may cause blockages in hydraulic valves, abrasion of cylinder surfaces etc.)

Check hydraulic connectors and sockets:

- **every time when the trailer is to be hitched to a tractor or when the second trailer is to be connected.**

5.4.4 REPLACEMENT OF HYDRAULIC LINES

Rubber hydraulic lines must be replaced every 4 years regardless of their technical condition. Replacement should be performed by specialized workshops.

Replace hydraulic lines:

- **every 4 years.**

5.5 MAINTENANCE OF ELECTRICAL SYSTEM AND WARNING ELEMENTS

5.5.1 PRELIMINARY INFORMATION

Work related to repairs, change or regeneration of electrical system elements should be entrusted to specialist workshops, having the appropriate technology and qualifications for this type of work.

ATTENTION

Do not travel with unreliable lighting system. Damaged lamp lenses, and burned-out bulbs must be replaced immediately before travelling. Lost or damaged reflective lights must be replaced.

The responsibilities of the user are limited to:

- technical inspection of electrical system and reflective lights,

- replacement of bulbs.

Scope of maintenance

➡ Connect the trailer to a tractor with the correct connecting cable.

⇨ Check if the connecting cable is reliable. Check connecting sockets in the trailer and a tractor.

➡ Check completeness, technical condition and reliability of trailer's lights.

➡ Check completeness of all reflective lights.

➡ Check correct mounting of triangular slow-motion vehicle sign.

➡ Before driving on to public road, check that the tractor is equipped with warning reflective triangle.

Check electrical system:

- **each time when hitching the trailer.**

TIP

Before driving make certain that all lamps and reflective lights are clean.

5.5.2 REPLACEMENT OF BULBS

List of bulbs is presented in table (*5.3*). All light lenses are secured by screws and it is not necessary to dismantle the whole lamp or trailer subassemblies.

TABLE 5.3 List of bulbs

LAMP	TYPE OF LAMP	BULB/QUANTITY IN 1 LAMP	NUMBER OF LAMPS
Rear left lamp assembly	WE 549L	R10W/1 pc. P21W/2 pcs.	1
Rear right lamp assembly	WE 549P	R10W/1 pc. P21W/2 pcs.	1

5.6 TRAILER LUBRICATION

Trailer lubrication should be performed by means of manually or foot operated grease gun filled with recommended grease. Before commencing lubrication remove old grease and other contamination as far as possible. After finishing remove excess of grease.

Parts which should be lubricated with machine oil, should be wiped with dry clean cloth and then a small quantity of oil should be applied on surfaces (with oil can or brush). Wipe off excess of oil.

Change of grease in axle hub bearings should be entrusted to specialized service points equipped with the appropriate tools. According to recommendations of the axle manufacturer, dismantle the entire hub, remove bearings and individual sealing rings. After careful washing and inspection, mount lubricated elements. If necessary, bearing and seals should be replaced with new parts. Lubrication of axle bearings shall be performed at least once in 2 years or every 50,000 km. In case of intensive use, lubrication should be performed more frequently.

Empty grease or oil containers should be disposed according to recommendations of the lubricant manufacturer.

TABLE 5.4 Trailer lubrication schedule

ITEM	LUBRICATION POINT	NUMBER OF LUBRICATION POINTS	TYPE OF GREASE	FREQUENCY
1	Hub bearings	4	A	24M
2	Drawbar eye	1	B	14D
3	Expander shaft sleeve	4	A	3M
4	Sockets of tipping cylinder and cylinder suspension	4	B	1M

ITEM	LUBRICATION POINT	NUMBER OF LUBRICATION POINTS	TYPE OF GREASE	FREQUENCY
5	Ball bearing of tipping cylinder(1)	1	B	3M
6	Parking brake mechanism	1	A	6M
7	Pins of parking brake guiding rollers	2	A	6M
8	Articulated joints and sockets for installation of loading case	4	B	2M
9	Side extension lugs	10	A	1M
10				
11	Sliding ramp guides	2	C	1M
12	Pins of sliding ramp links	6	C	1M
13	Pins and locks of walls	8	A	1M
14	Trailer shear type support	1	B	3M
15	Shear type support cylinder bearings	2	B	3M
16	Leaf spring sliding surface	4	B	6M
17	Suspension leaf spring	4	B	6M
18	Rocker arm spring	2	B	3M
19	Leaf spring pin	4	B	3M

ITEM	LUBRICATION POINT	NUMBER OF LUBRICATION POINTS	TYPE OF GREASE	FREQUENCY
20	Pin of side guy ropes mechanism(1)	2	A	2M
21	Locking lever of side walls	2	A	6M

lubrication periods: M – month, D – day

(1) – not shown on the figure

FIGURE 5.13 Recommended lubricants

MARKING FROM TAB. (5.4)	DESCRIPTION
A	General purpose solid machine grease (lithium, calcium)
B	Solid grease for heavily loaded elements with addition of MOS_2 or graphite
C	Regular machine silicon atomized oil

When the machine is being used, the user is obliged to observe lubrication instructions and recommended schedule.

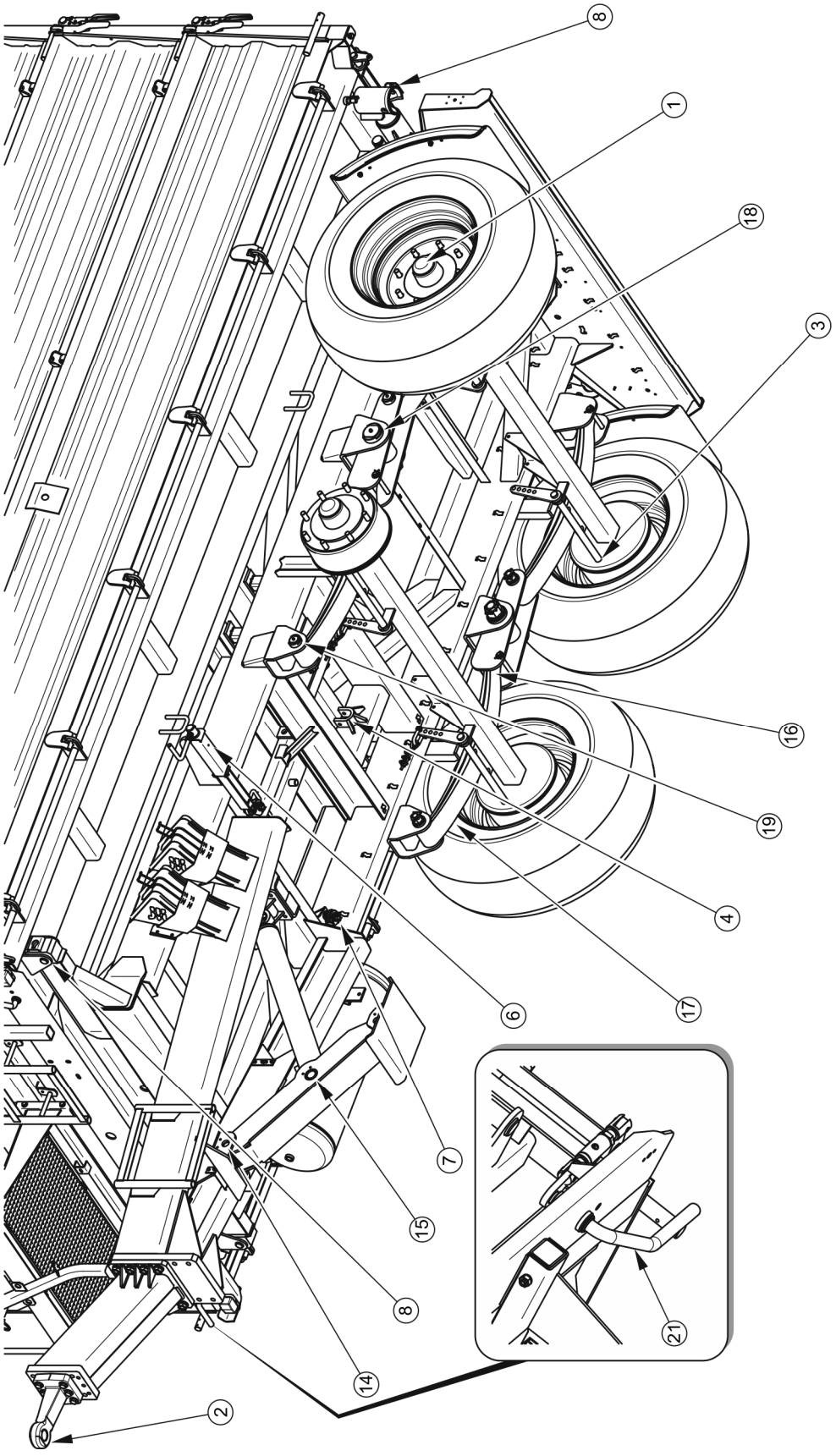


FIGURE 5.11 Trailer lubrication points, part 1

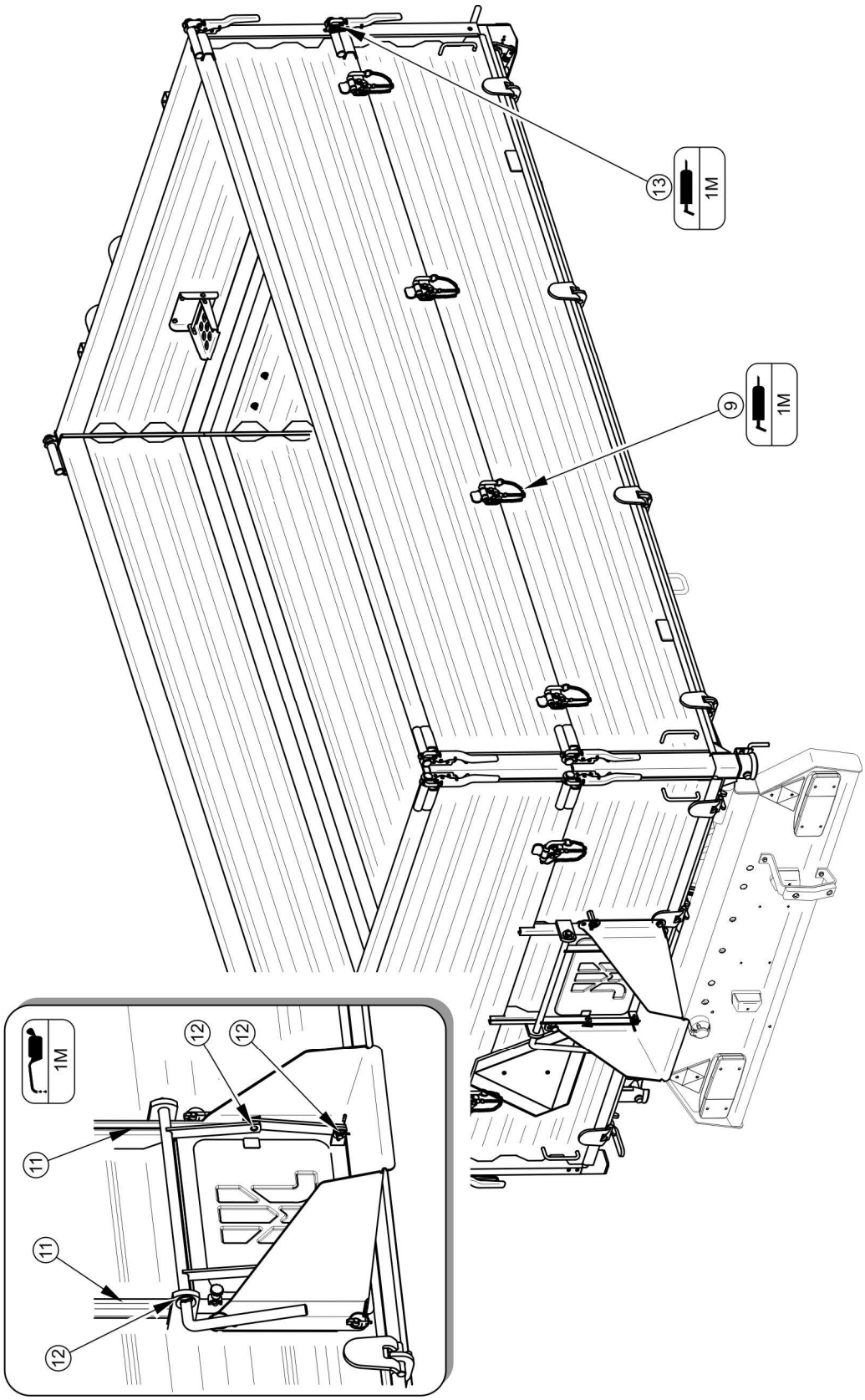


FIGURE 5.12 Trailer lubrication points, part 2

5.7 CONSUMABLES

5.7.1 HYDRAULIC OIL

Always adhere to the principle that the oil in the trailer hydraulic system and in the tractor hydraulic system are of the same type. If oil of different types is used be sure that both hydraulic substances may be mixed together. Application of different oil types may cause damage to the trailer or a tractor. In a new machine, the hydraulic system is filled with L HL32 Lotos hydraulic oil.

Table 5.5 L-HL 32 Lotos hydraulic oil specification

ITEM	NAME	UNIT	VALUE
1	Viscosity classification according to ISO 3448VG	-	32
2	Kinematic viscosity at 40^0C	mm^2/s	28.8 – 35.2
3	Quality classification according to ISO 6743/99	-	HL
4	Quality classification according to DIN 51502	-	HL
5	Ignition temperature	C	230

If hydraulic oil should be changed with oil of other type, carefully read recommendations of oil manufacturer. If it is recommended to flush the system with the appropriate compound, then comply with these recommendations. Note that chemical compounds used for this purpose should not damage materials of the hydraulic system. During normal trailer use change of hydraulic oil is not necessary, but if required, this operation should be entrusted to a specialist service point.

Due to composition of this kind of oil, it is not classified as dangerous substance, however long-term exposition may cause irritation of skin and eyes. In the event of contact of oil with skin, wash the area of contact with water and soap. Do not apply organic solvents (petrol, kerosene). Contaminated clothing should be changed to prevent access of oil to skin. In the event of contact of oil with eye, rinse with large quantity of water and if irritation occurs, consult a doctor. Hydraulic oil in normal condition is not harmful to the respiratory tract. A hazard only occurs when oil is strongly atomized (oil mist) or in case of fire which can cause releasing of toxic compounds. Oil fires should be extinguished by means of carbon dioxide, extinguishing steam or foam. Do not use water.

5.7.2 LUBRICANTS

For parts under heavy load it is recommended to apply lithium grease with molybdenum disulphide (MOS_2) or graphite additive. In the case of less loaded sub-assemblies the application of general purpose machine greases is recommended which contain anticorrosion additive and have significant resistance to being washed away by water. Atomized compounds should have similar properties (silicon greases and anticorrosive lubricants)

Before starting to use greases carefully read the information leaflet for the chosen product. Particularly relevant are safety rules and handling procedures for given lubricant product and waste utilization (used containers, contaminated rags etc). Information leaflet (material safety data sheet) should be kept together with grease.

5.8 CLEANING THE TRAILER

Trailer should be cleaned depending on requirements and before longer idle periods (e.g. before winter season). Before using pressure washer the user is obliged to familiarize with the operating principles and recommendations concerning safe use of this equipment.

Trailer cleaning guidelines

- Before washing the trailer open all walls and extensions. Carefully clean material residues from the loading case (sweep out or blow out with compressed air), especially places of joint between walls and extensions.
- Use only clean running water or water with a washing detergent additive with neutral pH.
- Using pressure washer increases washing effectiveness, but particular care must be taken during work. During washing the washer nozzle may not be closer than 50 cm from the surface being cleaned.
- Water temperature shall not exceed 55^0C.
- Do not direct water stream directly at system and equipment elements of the trailer i.e. control valve, braking force regulator, brake cylinders, hydraulic cylinders, pneumatic, electric and hydraulic connectors, lights, electrical connectors, information and warning decals, identification plates, line connectors

and trailer lubrication points etc. Too high pressure of water may cause mechanical damage to these elements.

- For cleaning and maintenance purposes of plastic surfaces it is recommended to use clean water or special compounds designed for this purpose.
- Do not apply organic solvents, compounds of unknown origin or other substances which may cause damage to lacquered, rubber or plastic surfaces. If doubt, it is recommended to make a test on an unseen surface.
- Surfaces contaminated with oil or grease should be cleaned by application of benzene or other degreasing agents and then washed with clean water with added detergent. Comply with recommendations of the cleaning compound manufacturer.

DANGER

Carefully read the instructions for application of cleaning detergents and preserving compounds.

While washing with detergents wear appropriate protective clothing and splash-proof goggles.

- Washing detergent should be kept in original containers, optionally in replacement containers, but very clearly marked. These compounds may not be stored in food and drink containers.
- Care for the cleanness of flexible hoses and seals. The plastic from which these elements are made may react with organic substances and some detergents. As a result of long-term reaction with some substances, the ageing process may be accelerated and risk of damage increased. Rubber elements should be preserved by means special compounds after previous thorough washing.
- When washing is finished, wait until trailer is dry and then grease all inspection points according to recommendations. Remove excess oil or grease with a dry cloth.
- Observe environmental protection principles; wash the trailer in a place designated for such purpose.
- Washing and drying trailer must be performed at temperatures above 0^{o}C.

- After washing and drying, trailer should be greased at all inspection points regardless of last lubrication period.

5.9 STORAGE

- It is recommended that the trailer should be stored in closed and roofed room.
- If the trailer shall not be used for a long period, immediately protect it against weather conditions, especially these which can cause corrosion and accelerate tire deterioration. During this time the trailer must be unloaded. Trailer should be very carefully washed and dried.
- Corroded places should be cleaned of rust, degreased and protected using primer coat and then painted with surface paint according to color scheme.
- In case of prolonged stoppage, it is essential to lubricate all elements regardless of last lubrication.
- Wheel rims and tires should be carefully washed and dried. During prolonged storage of unused trailer it is recommended to move the trailer every 2 – 3 weeks so that the place of contact of tires with ground is changed. The tires will not be deformed and maintain proper geometry. Also tire pressure should be inspected from time to time, and if necessary pressure should be increased to appropriate value.

5.10 TORQUE VALUES FOR BOLTED JOINTS

TABLE 5.6 TORQUE VALUES FOR BOLTED JOINTS

METRIC THREAD	5.8(1)	8.8(1)	10.9(1)
	Md [Nm]		
M10	37	49	72
M12	64	85	125
M14	100	135	200
M16	160	210	310

METRIC THREAD	**5.8(1)**	**8.8(1)**	**10.9(1)**
	Md [Nm]		
M20	300	425	610
M24	530	730	1 050
M27	820	1 150	1 650
M30	1 050	1 450	2 100

(1) – resistance class according to DIN ISO 898 standard

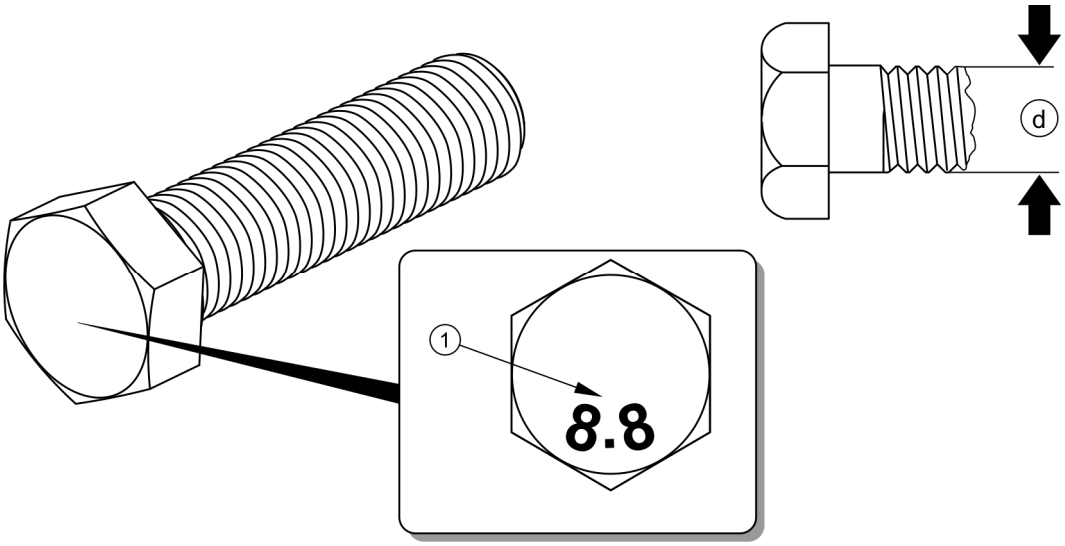


FIGURE 5.14 Bolt with metric thread

(1) resistance class, (d) thread diameter

Unless other tightening parameters are given, during maintenance and repairs apply appropriate torque to tightening nut and bolt connections. Recommended tightening torque of most frequently applied bolt connections are given in table *(5.6)*. Given values apply to non-lubricated steel bolts.

Hydraulic lines should be tightened with torque of 50 – 70 Nm.

5.11 INSTALLATION AND DISASSEMBLY OF EXTENSIONS

DANGER

Installation and disassembly of extensions must be carried out by using platforms, ladders or ramps of appropriate height. Condition of this equipment must assure protection against falling. These works should be carried out by at least two persons. Exercise particular caution.

Installation of extensions

- Mount rear extension posts to rear wall posts.
- Mount the front extension.
- Mount the rear extension.
- Mount side extensions.
  - ⇨ First install upper pins of extension in appropriate locks of rear posts and front walls, and then secure base of extension by means of pin lugs to upper part of side wall.
- Screw in the extension ladder to the front wall.

Disassembly of extensions should be performed in reverse order.

5.12 ADJUSTMENT OF DRAWBAR POSITION

Adjustment of drawbar position is achieved by changing the drawbar body position (1) in relation to lower frame.

Procedure

- Immobilize the trailer with the parking brake.
- Insert the chocks under the trailer's wheels.
- Unscrew the drawbar body from the frame.
- Set the drawbar in new position and tighten with appropriate torque.

⇨ The frame design provides 6 combinations for positioning drawbar, see figure *(5.15)*.

➡ Check degree of drawbar's body and rod tightening after first travel under load.

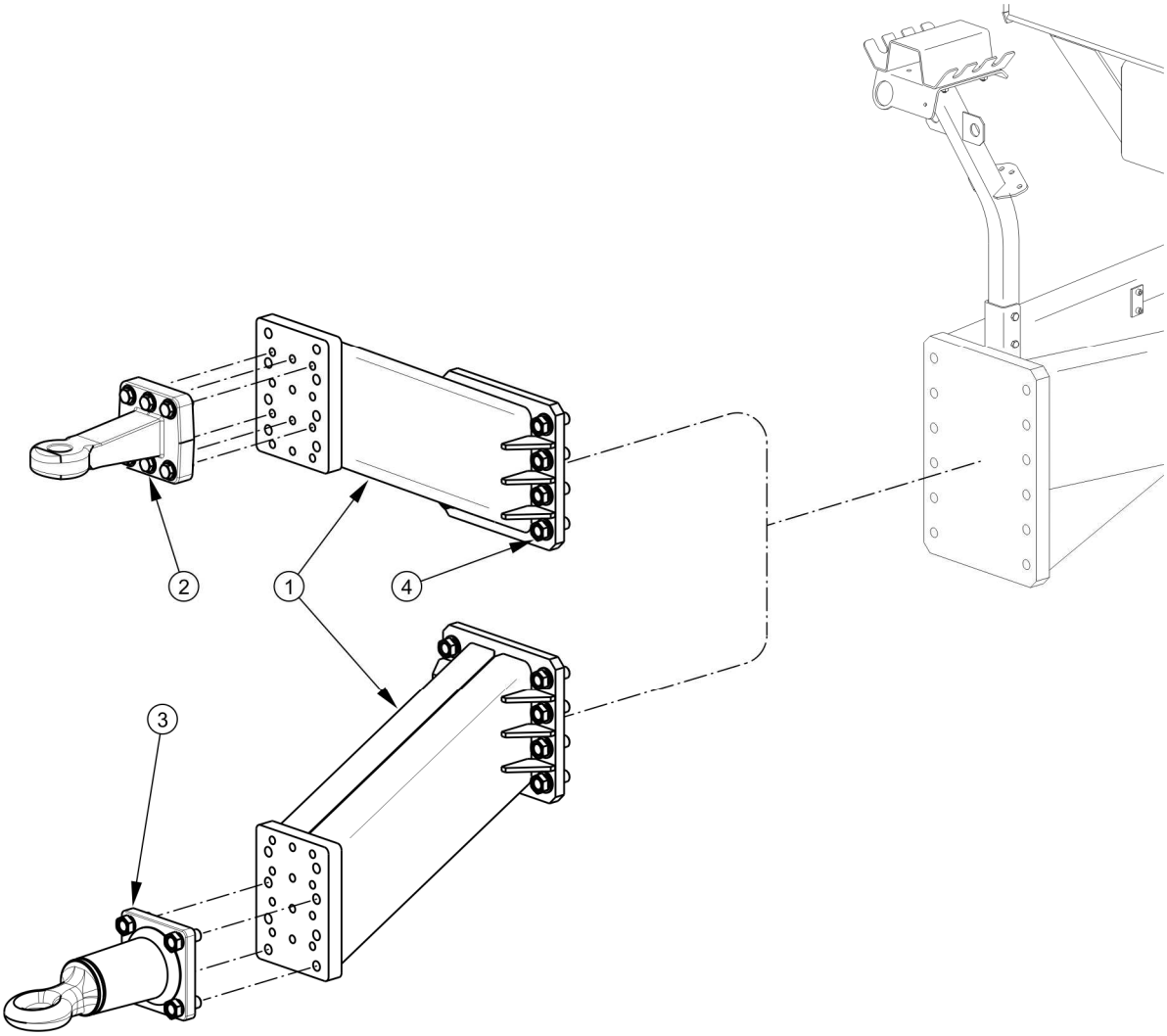


FIGURE 5.15 Adjustment of drawbar position

(1) drawbar body, (2) fixed rod, (3) rotating rod, (4) bolted joint

5.13 TROUBLESHOOTING

TABLE 5.7 TROUBLESHOOTING

FAULT	CAUSE	REMEDY
Problem with moving off	Brake system pneumatic lines not connected	Connect brake lines (applies to pneumatic systems)
	Parking brake engaged	Release parking brake.
	Damaged pneumatic system connection lines	Replace.
	Leaking connections	Tighten, replace washers or seals, replace lines.
	Damaged control valve or braking force regulator	Check the valve, repair or replace.
Noise in drive axle hub	Excessive play in bearings	Check the play and adjust if needed.
	Damaged bearings	Replace bearings
	Damaged hub elements	Replace.
Poor efficiency of braking system	Insufficient pressure in the system	Check pressure on tractor pressure gauge, wait till compressor fills tank to required pressure. Damaged air compressor in the tractor. Repair or replace. Damaged brake valve in the tractor. Repair or replace. Leaks in the system. Check system for tightness
Excessive heating of drive axle hubs	Incorrect adjustment of main or parking brake	Adjust positions of expander arms.
	Worn brake linings	Replace brake shoes.
Incorrect operation of the hydraulic system	Improper hydraulic oil viscosity	Check oil quality, make sure that the oil in both machines is at the same type. If necessary, change oil in a tractor or in the trailer.

FAULT	CAUSE	REMEDY
	Insufficient tractor hydraulic pump output, tractor hydraulic pump is damaged.	Check the tractor's hydraulic pump.
	Damaged or contaminated cylinder	Check cylinder piston (bending, corrosion), check cylinder for tightness (piston seal), repair or replace cylinder if needed.
	Excessive load of the cylinder	Check mechanisms controlled by cylinder for mechanical damage
	Damaged hydraulic lines	Check and ascertain that hydraulic conduits are tight, not fractured and properly tightened. If necessary replace or tighten.

NOTES

ANNEX A

Tire sizes

TRAILER VERSION	FRONT/REAR AXLE
PT512	385/65 R 22.5 PR 385/55 R 22.5 RE 385/55 R 22.5 385/65 R 22.5 TL

Disc wheel 11.75x22.5" ET=0