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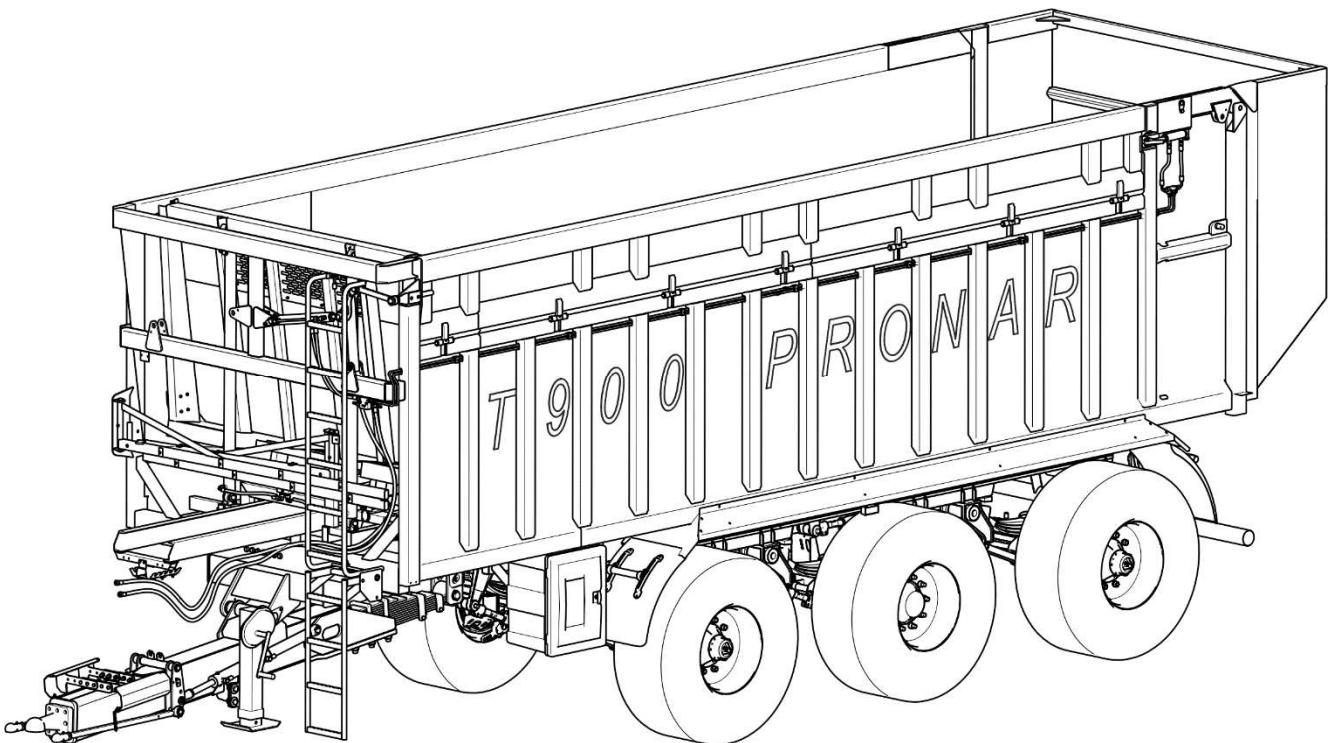
*www.pronar.pl*

# OPERATOR`S MANUAL

## AGRICULTURAL TRAILER

### PRONAR T900

TRANSLATION OF THE ORIGINAL COPY OF THE MANUAL



EDITION 4B-11-2013

PUBLICATION NO. 182N-00000000-UM





# INTRODUCTION

Information contained herein is current at date of 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 supplied to the user. The manufacturer reserves the right to introduce design changes in machines produced that facilitate operation and improve the quality of their work, without making minor amendments to this Operator's Manual.

This Operator's Manual is an integral part of the machine's documentation. Before using the machine, the user must carefully read this Operator's Manual and observe all recommendations. This guarantees safe operation and ensures failure-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 rules and operation of agricultural trailer Pronar T900. If the information contained in the Operator's Manual needs clarification then the user should refer for assistance to the sale point where the machine was purchased or to the Manufacturer.

## **MANUFACTURER'S ADDRESS:**

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## SYMBOLS APPEARING IN THIS OPERATOR'S MANUAL

Information, descriptions of danger and precautions and also recommendations and prohibitions associated with user safety instructions are marked:



and also 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 distinguished in the text by the sign:



and also 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 maintenance, the relevant section of the Operator's Manual is marked with the pictogram:



Additional tips and advice for machine operation are marked with the sign:



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

## **DIRECTIONS USED IN THIS OPERATOR'S MANUAL**

Left side – side to the left hand of the operator facing in the direction of machine's forward travel.

Right side – side to the right hand of the operator facing in the direction of machine's forward travel.

## **REQUIRED MAINTENANCE ACTIONS**

Maintenance actions described in the manual are marked with the sign: ➡

Result of maintenance/adjustment actions or comments concerning the performance of actions are marked with the sign: ⇨



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## 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:	<b>TRAILER</b>
Type:	<b>T900</b>
Model:	-----
Serial number:	
Commercial name:	<b>TRAILER PRONAR T900</b>

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 29.12.2009r.

*Place and date*

Z-CIA DYREKTORA  
d/s technicznych  
członek zarządu

*Roman Odellaniuk*

*Full name of the empowered person  
position, signature*

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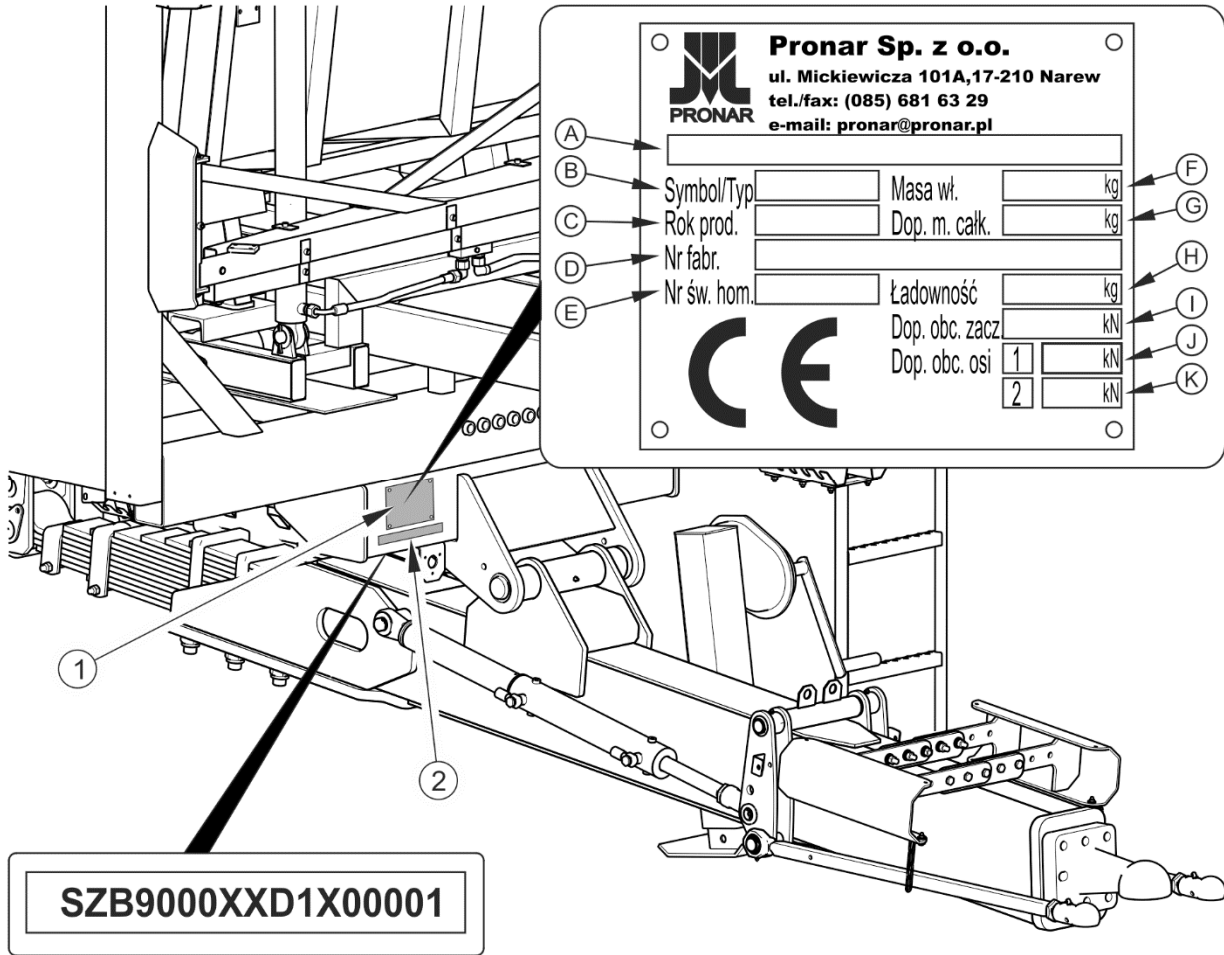
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**BASIC  
INFORMATION**

# 1.1 IDENTIFICATION

## 1.1.1 TRAILER IDENTIFICATION



**FIGURE 1.1** Location of the data plate and serial number

(1) data plate, (2) serial number

The trailer is marked with a data a plate (1) and a serial number (2). The serial number and data plate are located on the front beam of the longitudinal member of the lower frame – figure (1.1).

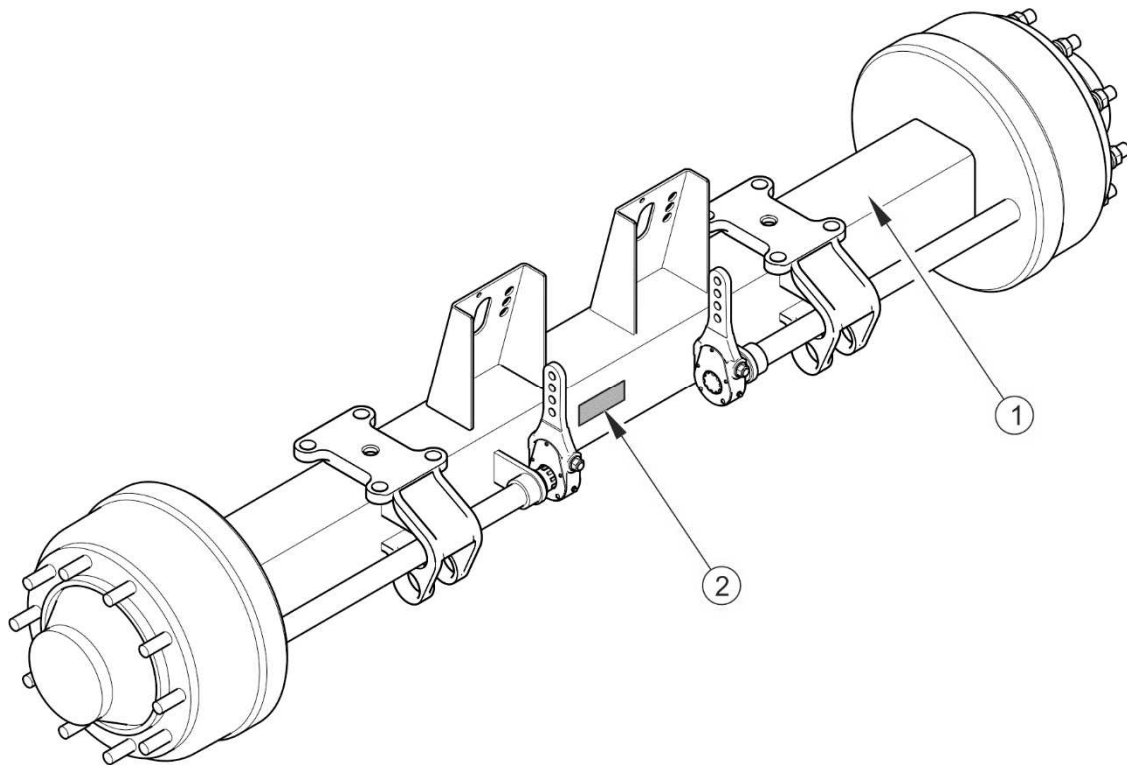
When buying the trailer check that the serial numbers on the machine agree with the number written in the *WARRANTY BOOK*, in the sales documents and in the *OPERATOR'S MANUAL*. The meanings of the individual fields found on the data plate are presented in the table below:

**TABLE 1.1 Markings on data plate**

ITEM	MARKING
<b>A</b>	General description and purpose
<b>B</b>	Symbol / type of trailer
<b>C</b>	Year of manufacture
<b>D</b>	Seventeen digit serial number (VIN)
<b>E</b>	Official certificate number
<b>F</b>	Tare weight
<b>G</b>	Maximum gross weight
<b>H</b>	Carrying capacity
<b>I</b>	Permissible hitching system loading
<b>J</b>	Permissible front axle load
<b>K</b>	Permissible rear axle load

**1.1.2 AXLE IDENTIFICATION**


The serial number of the wheel axle and its type are stamped onto the data plate (2) secured to the wheel axle beam (1) – figure (1.2).



**FIGURE 1.2** Location of the axle data plate

(1) axle, (2) data plate

**1.1.3 LIST OF FACTORY NUMBERS**

	<p><b>TIP</b></p> <p>In the event of ordering a replacement part or in the case of the appearance of problems it is often essential to give the factory numbers of parts or the VIN number of the trailer, therefore it is recommended that these numbers are inscribed in the spaces below.</p>
---	--

**VIN**

S	Z	B	9	0	0	0	X	X			X				
---	---	---	---	---	---	---	---	---	--	--	---	--	--	--	--

**FIXED AXLE FACTORY NUMBER AND TYPE**

--

**STEERING AXLE FACTORY NUMBER AND TYPE**

--

## 1.2 PROPER USE

T900 movable wall trailer is designed for transport of harvested crops and agricultural products as well as loose and bulk materials at the farm and on public roads at a maximum speed of 40 km/h.

It is acceptable to transport construction materials, mineral fertilisers and other loads, if fulfilling conditions indicated in section 4. Non-compliance with the recommendations for the carriage and loading of goods described by the Manufacturer and the road transport regulations in force in the country in which the trailer is used shall void the warranty and is regarded as use of the machine contrary to its intended purpose.

The trailer is not intended or designed for transporting people, animals or goods classified as dangerous materials.

### **DANGER**

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

- for transporting people and animals,
- for transporting loose unsecured toxic materials, if there is a possibility of causing environmental damage,
- for transporting machines and equipment, with high centre of gravity affecting trailer stability,
- for transporting loads with uneven loading and overloading of axles,
- for transporting unsecured loads, which may move in the load box platform,
- for transporting loads which may litter road surface and road shoulder,
- for transporting construction materials such as debris, stones, bricks and similar materials which may cause damage to the trailer.



The trailer is constructed according to current safety requirements and engineering standards. The brake system and the light and indicator system meet the requirements of road traffic regulations. The maximum speed of the trailer on public roads in Poland is 30 km/h (pursuant to Traffic Law Act of June 20th 1997, article 20). In the countries where the trailer is used, the limits stipulated by the road traffic legislation in force in a given country

must be observed. The trailer speed must not, however, be greater than the maximum design speed.

Using it as intended also involves all actions connected with the safe and proper operation and maintenance of the machine. Due to the above, the user is obliged to:

- carefully read the *OPERATOR'S MANUAL* of the trailer and the *WARRANTY BOOK* and conform with the recommendations contained in these documents,
- understand the trailer's operating principle and how to operate it safely and correctly,
- adhere to the established maintenance and adjustment plans,
- comply with general safety regulations while working,
- prevent accidents,
- comply with the road traffic regulations and transport regulations in force in a given country, in which the trailer is used,
- carefully read the Operator's Manual and comply with its recommendations,
- only hitch the trailer to an agricultural tractor, which fulfils all the requirements made by the trailer's Manufacturer.

The trailer may only be used by persons, who:

- are familiar with the contents of this publication and with the contents of the agricultural tractor Operator's Manual,
- have been trained in trailer operation and work safety,
- have the required authorisation to drive and are familiar with the road traffic regulations and transport regulations.



**TABLE 1.2 Requirements for agricultural tractor**

CONTENTS	UNIT	REQUIREMENTS
<b>Brake system - sockets</b>		
Double conduit pneumatic system	--	according to ISO 1728
Hydraulic system	-	according to ISO 7421-1
<b>Maximum system pressure</b>		
Double conduit pneumatic system	bar / kPa	6.5 / 650
Hydraulic system	bar / MPa	150 / 15
<b>Hydraulic system</b>		
Hydraulic oil	-	
Maximum system pressure	bar / MPa	L HL 32 Lotos <sup>(1)</sup>
Oil demand:	l	40
<b>Electrical system</b>		
Electrical system voltage	V	12
Connection socket	-	7-pole socket compliant with ISO 1724
<b>Other requirements</b>		
Minimum power demand	kW / hp	134 / 182
Maximum vertical drawbar load	kg	3 000
Hitching system of the steering system	-	according to ISO 26402

<sup>(1)</sup> – use of other oil is permitted on condition that it may be mixed with the oil in the trailer. Detailed information can be found on the product information card.

## 1.3 EQUIPMENT

Some standard equipment elements, which were listed in table (1.3), may not be present in the delivered trailer. This allows the possibility of ordering new machines with a different set of optional equipment, replacing standard equipment.

Information on tyres is provided at the end of this publication in *ANNEX B*.

**TABLE 1.3 Trailer's equipment**

EQUIPMENT	STANDARD	ADDITIONAL	OPTIONS
The Operator's Manual	•		
Warranty Book	•		
Connection lead for the electrical system	•		
Double conduit pneumatic system	•		
Double conduit pneumatic system with ALB			•
Double conduit pneumatic system with ALB (hydraulic)			•
Hydraulic steering system	•		
Pneumatic parking brake	•		
500mm-high hydraulically openable side gate on the left or on the right side of the trailer			•
500mm-high hydraulically openable side gate on both sides of the trailer			•
Telescopic support with two-stage gear	•		
Hydraulic brake system			•
Wheel chocks	•		
Rotating drawbar eye Ø50	•		
Fixed drawbar eye Ø40			•
Ball drawbar eye K 80			•
Wall extensions		•	
Grain chute trough		•	
Slow-moving vehicle warning sign		•	
Warning reflective triangle		•	

## 1.4 WARRANTY TERMS

PRONAR Sp. z o.o., Narew guarantees the reliable operation of the machine when it is used according to its intended purpose as described in the *OPERATOR'S MANUAL*. The repair period is specified in the *WARRANTY BOOK*.

The warranty does not cover those parts and sub-assemblies of the machine which are subject to wear in normal usage conditions, regardless of the warranty period. Consumables include the following parts/sub-assemblies:

- drawbar hitching eye,
- pneumatic system connector filters,
- tyres,
- brake shoes,
- bulbs and LED lamps,
- seals,
- bearings.

The warranty service only applies to factory defects and mechanical damage that is not due to the user's fault.

In the event of damage arising from:

- mechanical damage which is the user's fault, road accidents,
- incorrect use, adjustment or maintenance, use of the trailer for purposes other than those for which it is intended,
- use of damaged machine,
- repairs carried out by unauthorised persons, repairs carried out improperly,
- making unauthorised alterations to machine design,

the user will lose the right to warranty service.

The user is obliged to report immediately on noticing any wear in the paint coating or traces of corrosion, and to have the faults rectified whether they are covered by the warranty or not.

For detailed Terms & Conditions of Warranty, please refer to the *WARRANTY BOOK* attached to each newly purchased machine.

**TIP**

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

Modification of the trailer without the written consent of the Manufacturer is prohibited. In particular, do NOT weld, drill holes in, cut or heat the main structural elements of the machine, which have a direct impact on the machine operation safety.

## 1.5 TRANSPORT

The trailer is ready for sale completely assembled and does not require packing. Packing is only required for the machine's technical documentation and any extra equipment. The trailer is delivered to the user either transported on a vehicle or, after being attached to a tractor, independently (trailer towed with a tractor).

### 1.5.1 TRANSPORT ON VEHICLE

Loading and unloading of trailer from vehicle shall be conducted using loading ramp with the aid of an agricultural tractor. During work, adhere to the general principles of occupational health and safety (OHS) applicable to reloading work. Persons operating reloading equipment must have the qualifications required to operate these machines. The trailer must be properly connected with the tractor according to the requirements in this Operators Manual. The trailer braking system must be started and checked before driving off or onto ramp.

The trailer should be attached firmly to the platform of the vehicle using straps or chains fitted with a tightening mechanism. Securing elements should be attached to the transport catches designed for this purpose (1) – figure (1.3), or permanent structural elements of the trailer (longitudinal members, crossbars etc.) Transport lugs are welded to the lower frame elements (3), a pair on each side of the trailer, and marked with decals (8) - see table (2.1). Use certified and technically reliable securing measures. Worn straps, cracked securing catches, bent or corroded hooks as well as elements damaged in a different way may be

unsuitable for use. Carefully read the information stated in the Operator's Manual for the given securing measure. Chocks, wooden blocks or other objects without sharp edges should be placed under the wheels of the trailer to prevent it from rolling. Trailer wheel blocks must be nailed to the low platform planks of the vehicle or secured in another manner preventing their movement. The number of securing elements (cables, straps, chains and stay etc.) and the force necessary for their tensioning depends on a number of things, including weight of the trailer, the construction of vehicle carrying trailer, speed of travel and other conditions. For this reason it is impossible to define the securing plan precisely. A correctly secured trailer does not change its position with regard to the transport vehicle. The securing elements must be selected according to the guidelines of the Manufacturer of these elements. In case of doubt apply a greater number of securing straps in order to immobilise the trailer. If necessary, sharp edges of trailer should be protected at the same time protecting the securing straps from breaking during transport.

### **ATTENTION**



**When being road transported on a motor vehicle the trailer must be mounted on the vehicle's platform in accordance with the transport safety requirements and the regulations.**

**Driver of the vehicle should be particularly careful during travel. This is due to the vehicle's centre of gravity shifting upwards when loaded with the machine.**

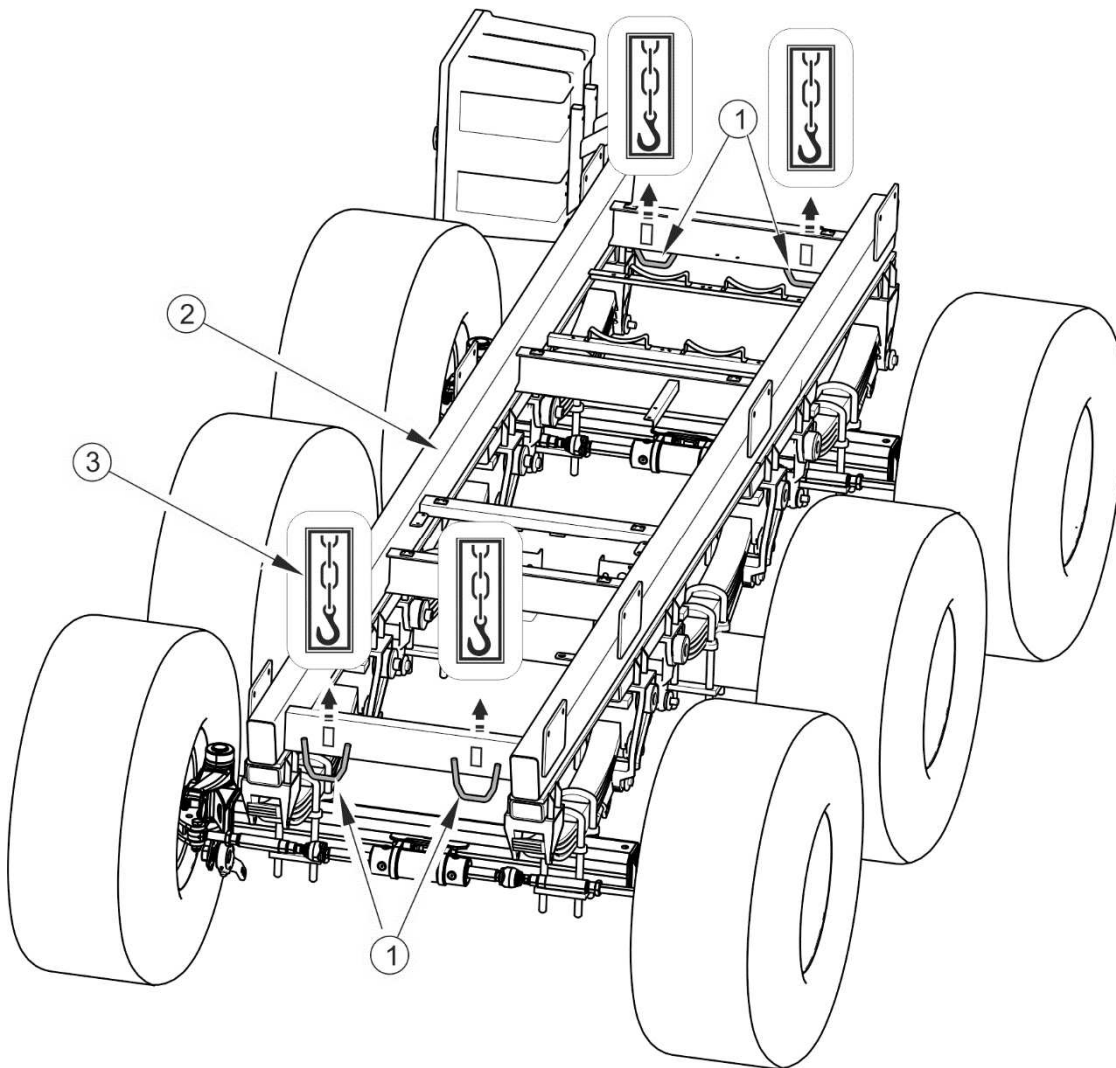
**Use only certified and technically reliable securing measures. Carefully read the information contained in the Operator's Manuals for the given securing measures.**

During reloading work, particular care should be taken not to damage parts of the machine's equipment or the paint coating. The tare weight of the trailer in condition ready for travel is given in table (3.1).



### **DANGER**

**Incorrect use of securing measures may cause an accident.**



**FIGURE 1.3 Positioning of transport lugs**

*(1) transport lug, (2) longitudinal member of lower frame, (3) transport decal*

**1.5.2 INDEPENDENT TRANSPORT BY THE USER.**

In the event of independent transport by the user after purchase of the trailer, the user must read the trailer Operator's Manual and adhere to the recommendations contained therein. Independent transport involves towing the trailer with own agricultural tractor to destination. During transport adjust travel speed to the prevailing road conditions, but do not exceed the maximum design speed.



**ATTENTION**

Before transporting independently, the tractor driver must carefully read this Operator's Manual and observe its recommendations.

## 1.6 ENVIRONMENTAL HAZARDS

A hydraulic oil leak constitutes a direct threat to the natural environment owing to its limited biodegradability. The negligible solubility of hydraulic oil in water does not cause extreme toxicity of organisms living in the aquatic environment. The formation of a film of oil on the water may be the direct cause of physical action on organism, perhaps causing change of oxygen values in the water because of lack of direct contact of air with the water. An oil leak into water reservoirs may however lead to a reduction of the oxygen content.

While carrying out maintenance and repair work, which involves the risk of an oil leak, this work should take place on an oil resistant floor or surface. In the event of oil leaking into the environment, first of all contain the source of the leak, and then collect the leaked oil using available means. Remaining oil should be collected using 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 gathered remains mixed with absorbent material should be stored in a precisely marked container. Do not use food packaging for this purpose.

Used oil or oil unsuitable for further use due to loss of its properties should be stored in its original packaging in the conditions described above. Waste oil should be taken to the appropriate facility dealing with the re-use of 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 only be taken to the appropriate facility dealing with the re-use of this type of waste. Do NOT throw or pour oil into sewerage or water tanks.

## 1.7 WITHDRAWAL FROM USE

In the event of decision by the user to withdraw the trailer from use, comply with the regulations in force in the given country concerning withdrawal from use and recycling of machines withdrawn from use. Before commencing dismantling, totally remove the oil from the hydraulic system and reduce air pressure completely in the pneumatic braking system (e.g. using air tank drain valve).

### **DANGER**



**During dismantling, use the appropriate tools, equipment (overhead travelling crane, crane or hoist etc.) and use personal protection equipment, i.e. protective clothing, footwear, gloves and eye protection etc.**

**Avoid contact of skin with oil. Do not allow used hydraulic oil to spill.**

When spare parts are changed, worn out or damaged parts that cannot be reclaimed should be taken to a collection point for recyclable raw materials. Hydraulic oil should be taken to the appropriate facility dealing with the re-use of this type of waste.



**SECTION**

**2**

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**SAFETY ADVICE**

## 2.1 BASIC SAFETY RULES

### 2.1.1 USE OF TRAILER

- Before using the machine, the user must carefully read this Operator's Manual and the Warranty Book. When operating the machine, the operator must comply with all recommendations contained in the Operator's Manual.
- The trailer may only be used and operated by persons qualified to drive agricultural tractors and agricultural machines and trained in the use of the machine.
- If the information contained in the Operator's Manual is difficult to understand, contact the seller who runs the authorised technical service on behalf of the Manufacturer, or contact the Manufacturer directly.
- Careless and incorrect use and operation of the trailer, and non-compliance with the recommendations given in this operator's manual is dangerous to your health.
- Be aware of the residual risk. Use caution when operating this machine and follow all relevant safety instructions.
- The machine must not be used when not in working order.
- The trailer must not be used when the hydraulic cylinders of the suspension system are set in the extreme positions (applies to the trailer with hydraulic suspension system).
- The machine must never be used by persons who are not authorised to drive agricultural tractors, including children and people under the influence of alcohol, drugs or other abusive substances.
- Non-compliance with the safety rules of this Operator's Manual can be dangerous to the health and life of the operator and others.
- The trailer must not be used for purposes other than those for which it is intended. Anyone who uses the trailer other than the way intended takes full responsibility for himself for any consequences of this potentially incorrect use. Use of the machine for purposes other than those for which it is intended by the Manufacturer may invalidate the guarantee.

- Any modification to the trailer frees the manufacturer from any responsibility for damage or detriment to health, which may arise as a result.

### **2.1.2 HITCHING AND UNHITCHING FROM TRACTOR**

- Do NOT hitch the trailer to tractor if the tractor does not fulfil the requirements specified by the Manufacturer (minimum tractor power demand, wrong hitch, etc.) – compare table (1.2) Requirements for agricultural tractor. Before hitching trailer make certain that oil in external hydraulic system of tractor may be mixed with the hydraulic oil of the trailer.
- Prior to hitching the trailer, check the technical condition of the trailer's and tractor's hitch system and connection elements of the hydraulic, electrical and pneumatic systems.
- The trailer and tractor must not be coupled if the hydraulic oil in the two machines is of different types.
- Hitch the trailer to tractor according to the corresponding description - see section (4.3). Pay special attention to the protections.
- While placing the support in transport position or rest position, do not place hands between moving elements of the support. Make sure that the support is properly locked with a pin.
- When the trailer hitching is completed, raise the support to transport position.
- Carefully read the tractor Operator's Manual.
- When hitching the trailer to tractor, use only the tractor's hitch which meets the requirements of ISO 26402 standard. After completed hitching of the machines check that the hitch is properly secured. Carefully read the tractor Operator's Manual. If the tractor is equipped with an automatic hitch, make certain that the coupling operation is completed.
- Be especially careful when hitching the machine.
- When hitching, there must be nobody between the trailer and the tractor.
- Hitching and unhitching the trailer may only take place when the machine is immobilised with the parking brake.

- Do NOT unhitch the trailer from the tractor when the tailgate and the sliding wall are raised. Exercise caution when disconnecting trailer.

### **2.1.3 HYDRAULIC AND PNEUMATIC SYSTEMS**

- When operating, the hydraulic and pneumatic systems are under high pressure.
- Use the hydraulic oil recommended by the Manufacturer. Never mix two types of oil.
- Regularly check the technical condition of the connections and the hydraulic and pneumatic conduits. There must be no oil or air leaks.
- Periodically drain water from the air tanks in pneumatic system. During frosts, freezing water may cause damage to pneumatic system components.
- 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 conduits to the tractor, make sure that the hydraulic system of the tractor and the hydraulic system of the trailer are not under pressure. If necessary, reduce residual pressure in the system.
- In the event of injuries being caused by pressurised hydraulic oil, contact a doctor immediately. Hydraulic oil may penetrate the skin and cause infections. In the event of contact of oil with eyes, rinse eyes with a large quantity of water and in the event of the occurrence of irritation 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).
- After changing the hydraulic oil, the used oil should be properly disposed of. Used oil or oil which has lost its properties should be stored in original containers or replacement containers resistant to action of hydrocarbons. Replacement containers must be clearly marked and appropriately stored.
- Do not store hydraulic oil in packaging designed for storing food or foodstuffs.
- Rubber hydraulic conduits must be replaced every 4 years regardless of their technical condition.

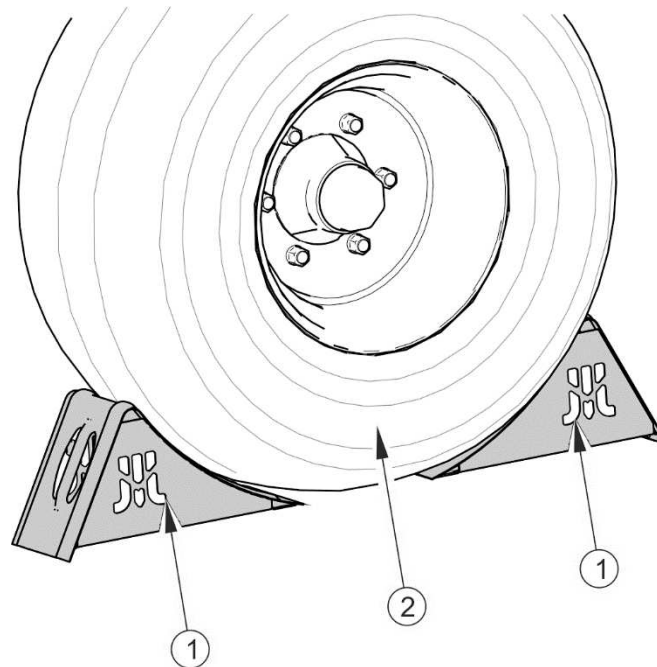
### 2.1.4 LOADING AND UNLOADING

- Loading and unloading work should be carried out by persons experienced in this type of work.
- Unloading and loading of trailer may only take place when the machine is positioned on level and hard surface and connected to tractor. Tractor and trailer must be placed to drive forwards.
- Do NOT climb on the load box during loading and unloading.
- Before loading, make certain that there are no tools or other objects in the load box.
- The load may not protrude further out than the upper edge of the trailer's front wall.
- The load must be arranged in such a way that it does not threaten the stability of the trailer and does not hinder driving.
- Incorrect load distribution and overloading the machine may cause the trailer to tip over or cause damage to its components.
- The trailer is not intended for transporting people, animals or hazardous materials.
- Ensure that nobody is in the unloading zone or near the tailgate. Before unloading, ensure proper visibility and make certain that there are no bystanders near the machine.
- Keep a safe distance from overhead electric power lines when rising the tailgate.
- Do NOT overload the trailer in excess of its load carrying capacity.
- Do NOT load the materials which may damage the trailer.
- Do NOT go or place hand between open tailgate and load box.
- If the load does not pour from the trailer when sliding the wall, immediately cease unloading. Unloading may be started again only after removing the cause of the problem (sticking, clogging).
- During winter, particular attention must be paid to loads which may freeze during transport. Frozen material in the load box may damage the trailer.

- Do NOT slide the trailer's wall to unload when the tailgate is closed.
- Keep a safe distance from electric power lines when rising the tailgate.
- After completed unloading, ensure that the load box is empty.

### 2.1.5 TRANSPORTING THE MACHINE

- During travel on public roads comply with the road traffic regulations and transport regulations in force in a given country, in which the trailer is used.
- Do not exceed the permitted speed arising from road conditions and design limitations. Adjust travel speed to the prevailing road conditions, trailer load and road traffic regulations limits.
- The machine must NOT be left unsecured. Trailer disconnected from the tractor must be immobilized with parking brake and protected against rolling with chocks
- Before driving off, make sure that the trailer is properly hitched to the tractor, especially, check that the drawbar eye and steering mechanism eye are secured.

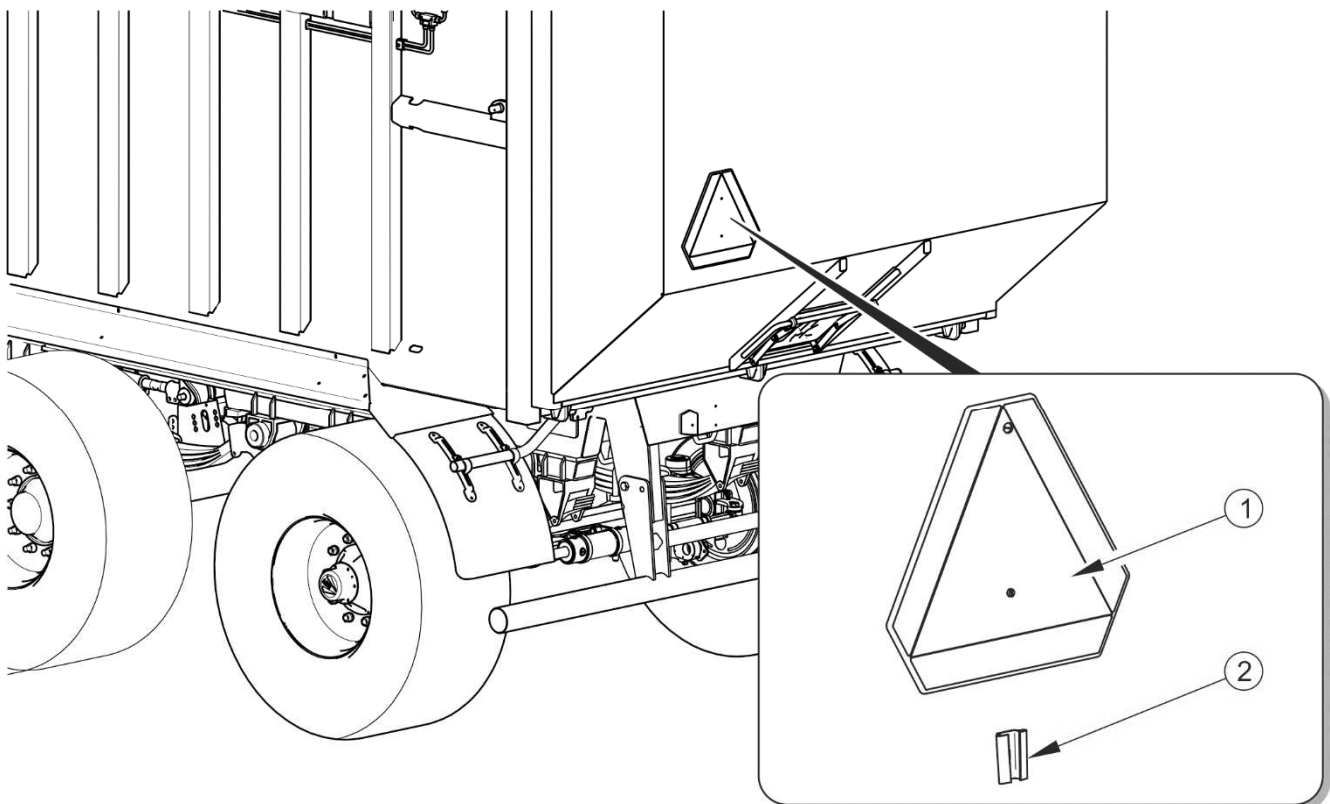


**FIGURE 2.1** Method of placing chocks

(1) wheel chock, (2) axle wheel

- Chocks (1) should be placed only under one wheel (one in front of the wheel, the other behind the wheel - figure (2.1)).
- Do NOT raise the front axle when the trailer is loaded.
- The front axle may be raised only when the trailer is empty.
- Vertical load borne by the trailer drawbar eye affects the steering of the agricultural tractor.
- Do NOT drive with the tailgate raised and the side wall extension opened.
- 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, indicator lights and the connective elements of the hydraulic, pneumatic and electrical systems.
- Do NOT exceed the trailer's maximum carrying capacity. Exceeding the carrying capacity may lead to damage to the machine, loss of stability while driving, scattering of the load and danger while driving. The brake system is adjusted to the gross weight of the trailer. Exceeding the weight limit causes drastic reduction of the main brake force.
- Before driving off, confirm that the trailer's wheels are correctly set and that the pressure in the hydraulic steering system is correct.
- The trailer is designed to operate on slopes up to 8°. Driving trailer across ground with steeper slopes may cause the trailer to tip over as a result of loss of stability.
- While driving on public roads, the trailer and the tractor must be fitted with a certified or authorised reflective warning triangle.
- Reckless driving and excessive speed may cause accidents.
- A load protruding beyond the edge of the trailer should be marked according to the road traffic regulations. Do NOT transport loads forbidden by the Manufacturer.
- Load must be uniformly distributed and it must not obstruct visibility or hinder driving. The load must be secured so that it cannot move or fall over.

- During reversing one should use the assistance of another person. During manoeuvring the person helping must stay at a safe distance from the danger zone and be visible all the time to the tractor driver.
- Do NOT attempt to board trailer while travelling.
- Do NOT park trailer on slope.
- Do NOT drive with the gate raised and the side hinged wall lowered.
- Avoid ruts, ditches or driving on roadside slopes. Driving across such obstacles could cause the machine or the tractor to suddenly tilt.



**FIGURE 2.2** Mounting place for slow-moving vehicle warning sign

(1) *slow-moving vehicle warning sign*, (2) *attachment point*

- If the trailer is the last vehicle in the group, a slow-moving vehicle warning sign should be placed on the trailer's tailgate - figure (2.2). The warning sign (1) should be attached using the specifically prepared holder (2), riveted to the tailgate.
- Speed must be sufficiently reduced before making a turn or driving on an uneven road or a slope.



- Please note that the braking distance of the tractor and trailer combination is substantially increased at higher speeds and loads.

### **2.1.6 TYRES**

- When working with tyres, the trailer should be immobilised with parking brake and secured against rolling by placing chocks under wheel. Wheels can be taken off the trailer axle only when the trailer is not loaded.
- Repair work on the wheels or tyres should be carried out by persons trained and entitled to do so. This work should be carried out using appropriate tools.
- Inspect tightness of nuts after the first use of trailer, after the first travel under load and then every 6 months of use or every 25,000 km. In the event of intensive work, check the nut tightening at least every 10,000 km. The inspection should be repeated individually if a wheel has been removed from the wheel axle.
- Avoid potholes, sudden manoeuvres or high speeds when turning.
- Check the tyre pressure regularly. Air pressure in tyres should be also checked during the whole day of intensive work. Please note that higher temperatures could raise tyre pressure by as much as 1 bar. At high temperatures and pressure, reduce load or speed. Do not release air from warm tyres to adjust the pressure or the tyres will be underinflated when temperatures return to normal.
- Protect tyre valves using suitable caps to avoid soiling.

### **2.1.7 MAINTENANCE**

- The trailer should be cleaned each time after finished work.
- During the warranty period, any repairs may only be carried out by the Warranty Service authorised by the Manufacturer. After the expiry of the warranty period it is recommended that possible repairs to the trailer be performed by specialised workshops.
- In the event of any fault or damage, do not use the trailer until the fault has been fixed.
- During work use the proper, close-fitting protective clothing, gloves, protective goggles and appropriate tools.

- The trailer may only be stood on when the machine is absolutely motionless, the tractor engine is switched off and the ignition key removed from the ignition. Tractor and trailer should be immobilized with parking brake and chocks should be placed under the trailer wheels. Ensure that unauthorised persons do not have access to the tractor cab.
- Regularly check the technical condition of the safety devices and correct tightening of bolt connections (in particular connections of drawbar eye, wheels and suspension system).
- Regularly service machine according to schedule defined by Manufacturer.
- Before beginning repair works on hydraulic or pneumatic systems reduce oil or air pressure completely.
- Servicing and repair work should be carried out in line with the general principles of workplace health and safety. 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 work should be carried out with the tractor engine turned off and the ignition key removed. Tractor and trailer should be immobilized with parking brake and chocks should be placed under the trailer wheels. Ensure that unauthorised persons do not have access to the tractor cab.
- Should it be necessary to change individual parts, use only those parts indicated by the Manufacturer. Non-adherence to these requirements may put the user and other people's health and life at risk, and also damage the machine and invalidate the guarantee.
- Before welding or electrical work, the trailer should be disconnected from the power supply. The paint coating should be cleaned. Burning paint fumes are poisonous for people and animals. Welding work should be carried out in a well lit and well ventilated space.
- During welding work pay attention to flammable or fusible elements (parts of the pneumatic, electric and hydraulic systems, plastic parts). If there is a risk that they will catch fire or be damaged, they should be removed or covered with non-

flammable material before commencing welding work. Before beginning work, prepare a CO<sub>2</sub> or foam extinguisher.

- In the event of work requiring the trailer to be raised, use properly certified hydraulic or mechanical lifts for this purpose. After lifting the machine, stable and durable supports must also be used. Work must not be carried out under a trailer, which has only been raised with a lift or jack.
- The trailer must not be supported using fragile elements (bricks or concrete blocks).
- After completing work associated with lubrication, remove excess oil or grease. The trailer should be kept clean and tidy.
- Do NOT make independent repairs of control valve, brake cylinders, tipping cylinder and braking force regulator. In the event of damage to these elements, repair should be entrusted to authorised service point or elements should be replaced with new ones.
- Do NOT install additional appliances or fittings not according to the specifications defined by the Manufacturer.
- Do NOT make repairs to drawbar eye (straightening, repairing or welding). Damaged drawbar eye should be replaced.

## 2.2 RESIDUAL RISK

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

- using the trailer for purposes other than those for which it is intended,
- being between the tractor and the trailer while the engine is running and when the machine is being hitched,
- being on the machine during work,
- not maintaining safe distance during loading or unloading of trailer,
- operation of the trailer by persons under the influence of alcohol,

- making modifications to the machine without the consent of the Manufacturer,
- cleaning, maintenance and technical checks of the trailer,
- presence of persons or animals in areas invisible from the driver's position.



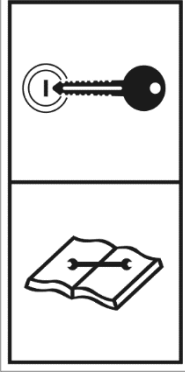
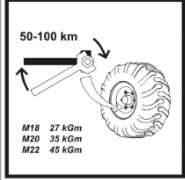

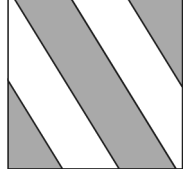
The residual risk may be kept to a minimum by following the recommendations below:

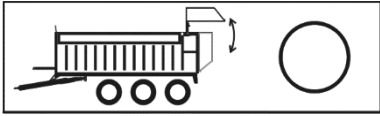

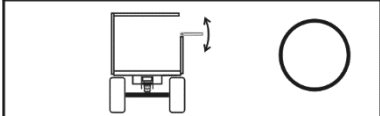
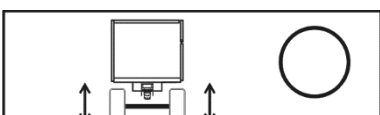


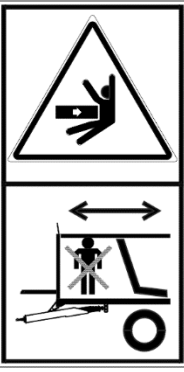

- operate the machine in prudent and unhurried manner,
- reasonably apply all the remarks and recommendations stated in the Operator's Manual,
- maintain a safe distance from forbidden or dangerous places during unloading, loading and hitching trailer,
- carry out repairs and maintenance work in line with operating safety rules,
- repair and maintenance work should be carried out by persons trained to do so,
- use close fitting protective clothing and appropriate tools,
- ensure unauthorised persons have no access to the machine, especially children,
- maintain a safe distance from prohibited or dangerous places
- a ban on being on the machine during travel, loading or unloading.



## **2.3 INFORMATION AND WARNING DECALS**

The trailer is labelled with the information and warning decals mentioned in table (2.1). The symbols are positioned as shown in figure (2.3). Throughout the time it is in use, the user of the machine is obliged to take care that notices and warning and information symbols located on the trailer are clear and legible. In the event of their destruction, they must be replaced with new ones. Safety decals are available from your PRONAR dealer or directly from PRONAR customer service. New assemblies, changed during repair, must be labelled once again with the appropriate safety signs. During trailer cleaning do not use solvents which may damage the coating of information label stickers and do not subject them to strong water jets.

TABLE 2.1 Information and warning decals

ITEM	SAFETY SYMBOL	DESCRIPTION
1		Type of trailer
2		Before starting work, carefully read <i>THE OPERATOR'S MANUAL</i>
3		Before servicing activities or repairs, turn off engine and remove key from ignition
4		Check the condition of the screw and nut connections of the wheel axles
5		Grease according to the recommendations in the Operator's Manual
6		Warning board

ITEM	SAFETY SYMBOL	DESCRIPTION
7		<p>Raising / lowering the tailgate Plug cap - black</p>
		<p>Front wall sliding Plug cap - blue</p>
		<p>Opening/closing the side wall extension. Plug cap (green)</p>
		<p>Rising/lowering the right and the left side of the trailer Plug cap - red</p>
8		<p>Minimum vertical load capacity of tractor's hitch</p>
9		<p>Do not stand near the opening tailgate.</p>
10		<p>Danger of hitting due to movement of machine assemblies. Do not stand near the sliding wall.</p>
11		<p>Air pressure in the tyres <sup>(1)</sup></p>

ITEM	SAFETY SYMBOL	DESCRIPTION
12		Fixing points for the transport <sup>(2)</sup>
13		<i>Rising/lowering the first wheel axle</i> <i>Plug cap - red <sup>(3)</sup></i>

<sup>(1)</sup> – pressure value should be adapted to tyres,

<sup>(2)</sup> - shown in figure (1.2),

<sup>(3)</sup> - glued to hydraulic conduit.

Numbers in the Item column correspond to labels in figure (2.3)

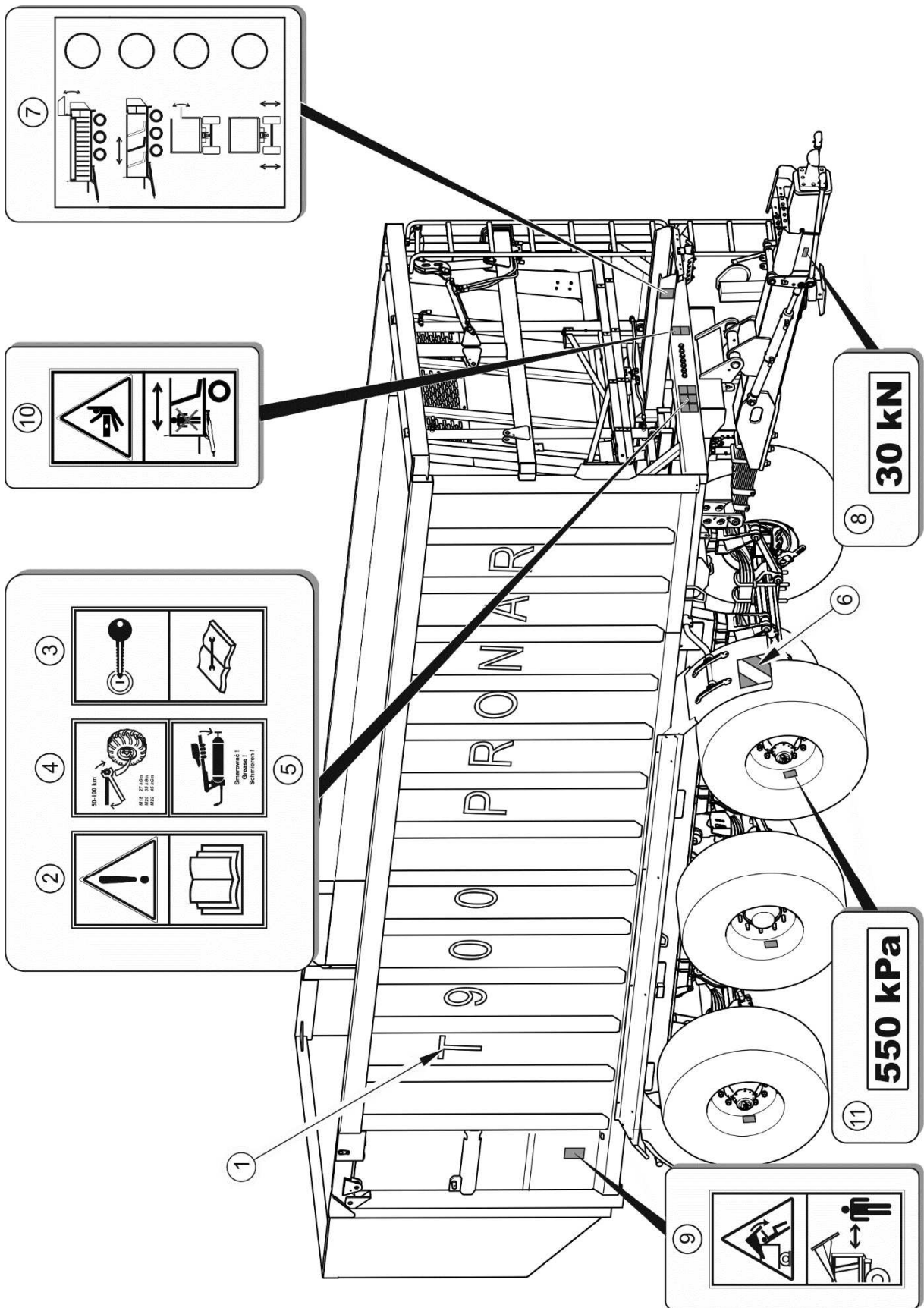


FIGURE 2.3 Decal locations



*SECTION*

**3**

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**DESIGN AND  
OPERATION**

## 3.1 TECHNICAL SPECIFICATION

**TABLE 3.1 Basic technical data of the standard version**

CONTENTS	UNIT	T900
<b>Trailer dimensions</b>		
Total length	mm	10 510
Total width	mm	2 595
Height	mm	3 543
<b>Internal load box dimensions</b>		
Length	mm	8 320
Width	mm	2 370
Height	mm	2 000
<b>Weight and carrying capacity</b>		
Tare weight	kg	9 500
Maximum gross weight	kg	35 000
Maximum carrying capacity	kg	23 500
<b>Other information</b>		
Wheel track	mm	2 200
Height of platform from the ground	mm	1 500
Sliding wall tipping angle	°	55
Maximum drawbar load	kg	3 000
Cargo capacity	m <sup>3</sup>	36.57
Load surface	m <sup>2</sup>	19.7
Electrical system voltage	V	12
Hydraulic oil demand	L	40
Hydraulic system pressure	MPa / bar	20 / 200
Tractor power demand	kW / hp	133,8 / 182
Maximum design speed	km/h	40
Noise emission level	dB (A)	below 70

## 3.2 TRAILER CONSTRUCTION

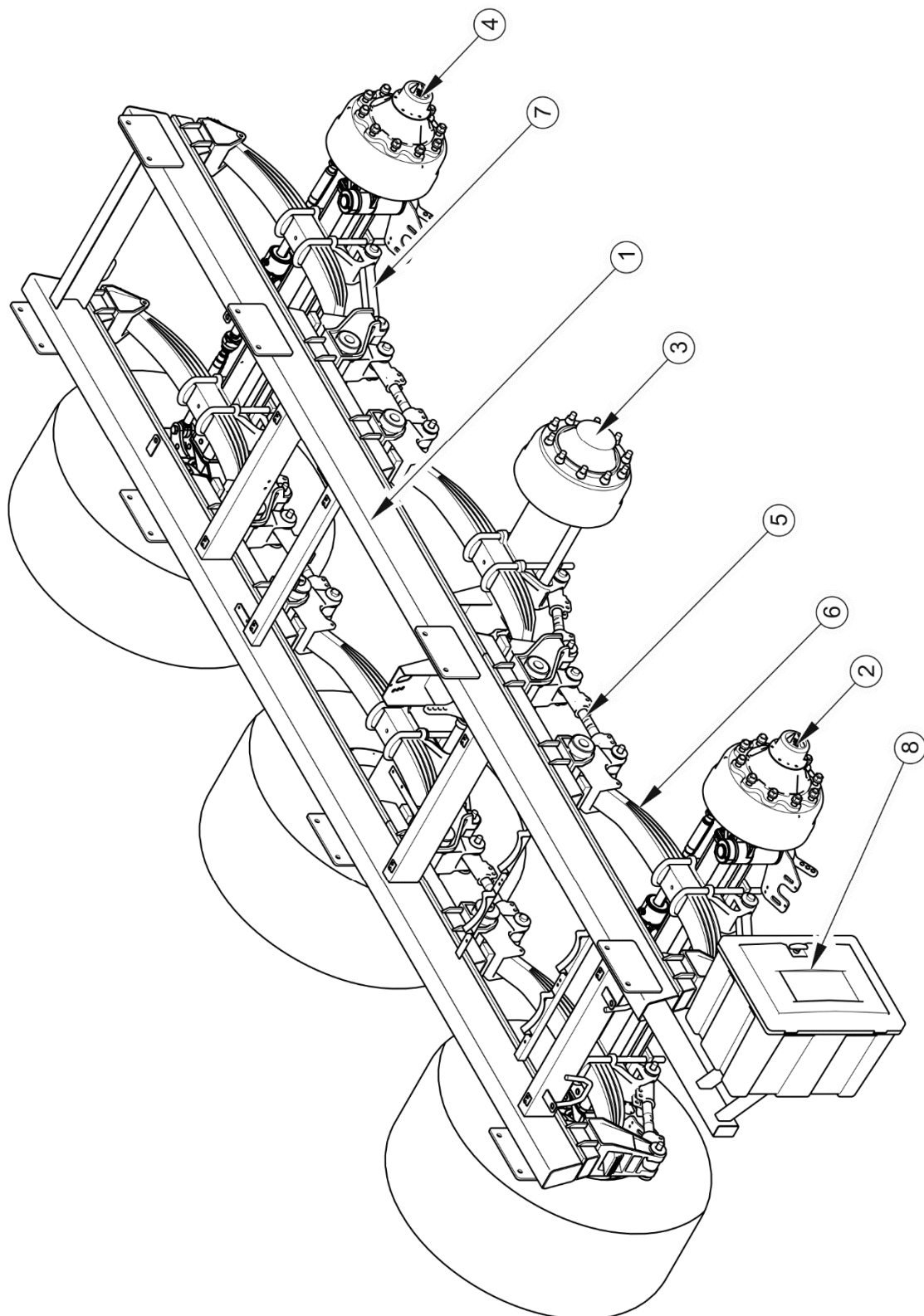
### 3.2.1 CHASSIS

Two versions of T900 trailer chassis are available: with triple axle mechanical suspension (3.1), and with triple axle hydraulic suspension (3.2). The chassis consists of subassemblies shown in figures (3.1) and (3.2). Lower frame (1) of the trailer is a structure welded from steel sections. The main support elements of the frame are two longitudinal members connected with crossbars. The brackets for mounting the suspension are welded to the lower frame.

In the chassis with mechanical suspension – figure (3.1) - the pressure applied by axles is balanced by rocker arms located between leaf springs (6). The rocker arms are suspended on brackets with maintenance-free rubber sleeves. Each axle has an adjustment bolt (5) (bottle screw) on one end and a rigid string (7) on the other end. Adjustment bolts (5) are used between all rocker arms. This solution makes it possible to set the same distance between the axles on the right side and the left side of the trailer and position the wheels in parallel to direction of travel. The chassis of a new trailer is set in the factory. Two external axles (2) and (4) are steering axles while axle (3) is a rigid one.

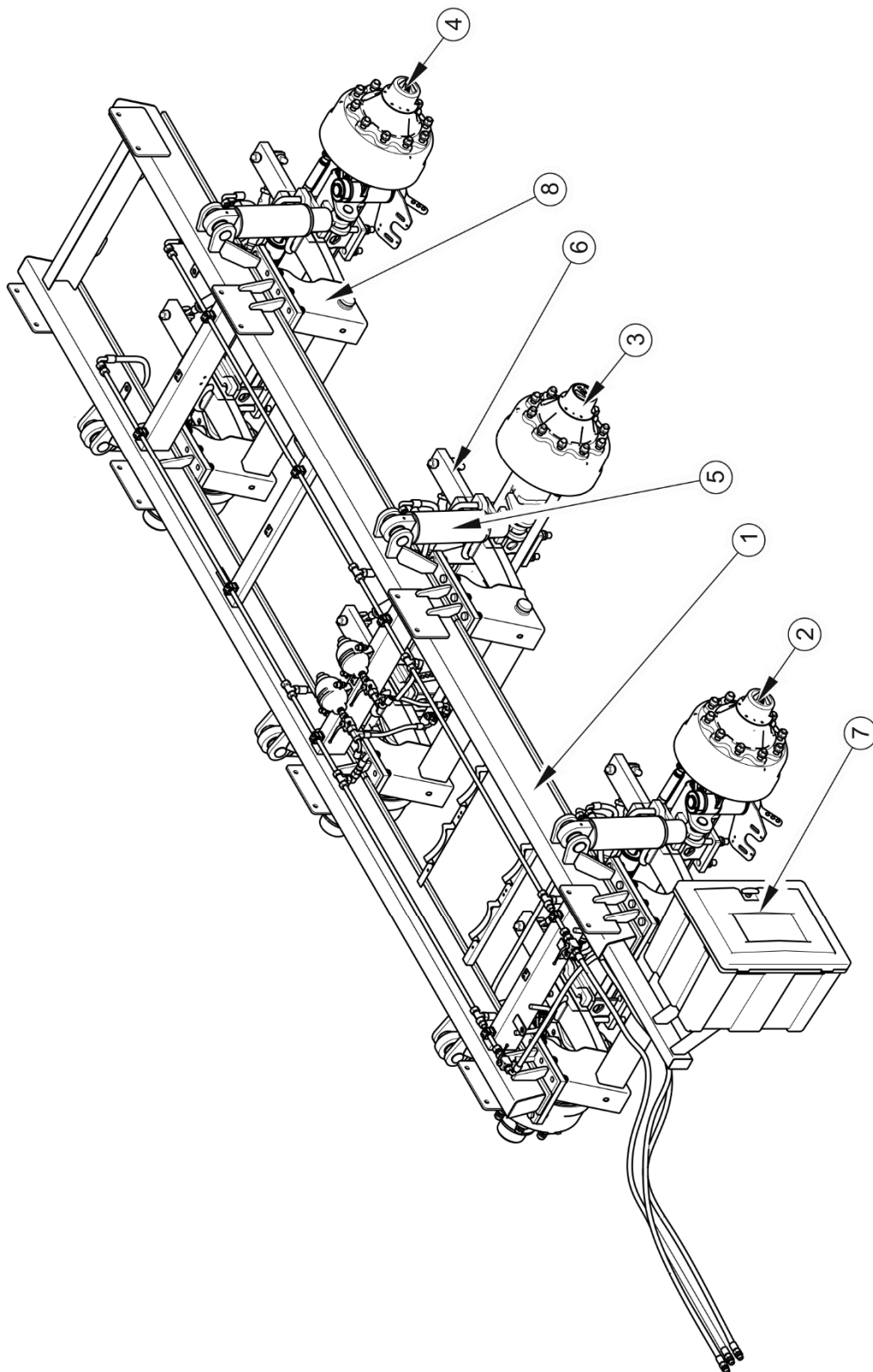
The chassis with hydraulic suspension – figure (3.2) - consists of a lower frame (1), two steering axles (2) and (4) and a rigid axle (3). Hydraulic cylinders (5) are shock absorbing elements that connect the main frame with the axles. Parabolic arms (6) are the trailer guiding elements. Each arm is connected with arm bracket (8) by means of a rotary pin.

The trailer axles are made from square bars terminated with a pin, where wheel hubs are mounted on cone bearings. The wheels are single and equipped with shoe brakes activated by mechanical cam expanders.



**FIGURE 3.1** Chassis with mechanical suspension

(1) lower frame, (2) front steering axle, (3) middle rigid axle, (4) rear steering axle, (5) adjustment bolt, (6) suspension spring, (7) rigid suspension string, (8) hydraulic pump box



**FIGURE 3.2** Chassis with hydraulic suspension

(1) lower frame, (2) front steering axle, (3) middle rigid axle, (4) rear steering axle, (5) hydraulic cylinder, (6) parabolic arm, (7) hydraulic pump box, (8) parabolic arm bracket

### 3.2.2 LOAD BOX

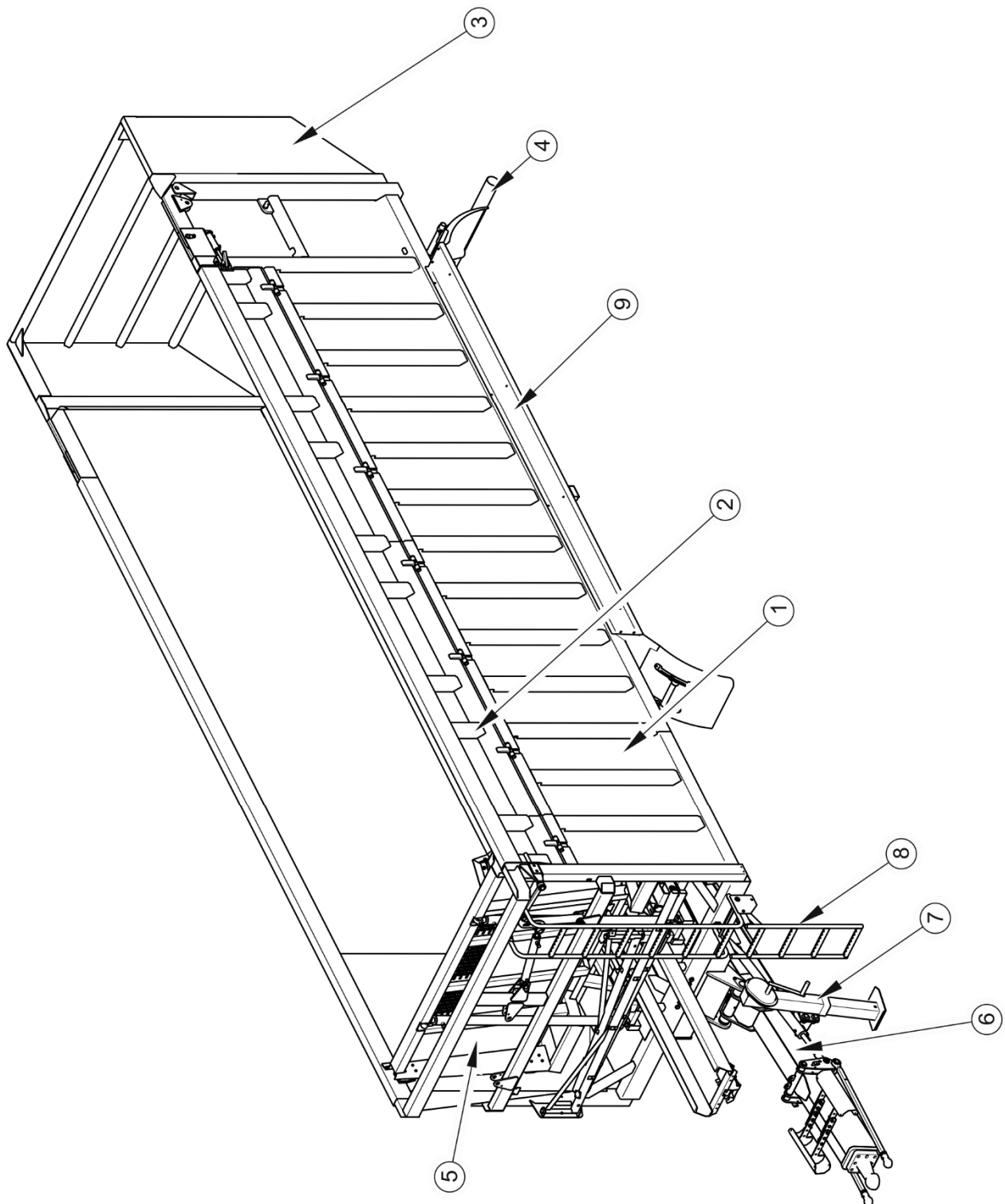
The trailer load box (1) is a welded structure made from steel plates and shapes. Four versions of the T900 trailer's load box are available:

- without hinged walls,
- with a left hinged wall,
- with a right hinged wall,
- with both hinged walls.

Hinged walls facilitate loading the trailer by lowering the loading height. The T900 trailer's load box allows transportation of both heavy materials (soil, gravel) and loose materials (grain, rape). In the front of the load box, there is a drawbar with shock absorber (6) equipped with a hitching eye with load capacity of 3 000 kg (to choose from: K80 ball drawbar eye, Ø50 rotating drawbar eye, Ø40 rotating drawbar eye). The drawbar is fixed to the lower frame of the load box by means of pins. The drawbar position can be adjusted as required – see section (4.3.3) "THE FIRST ADJUSTMENT OF THE DRAWBAR HEIGHT". The mechanical support with gear (7) is attached to the drawbar side. At the front of the load box, there is a ladder (8). The sliding wall (5) is used for unloading the T900 trailer load box. The sliding wall is equipped with elastomeric seals that ensure tightness between the wall and the load box sides. The sliding wall moves on rollers along the load box and pushes the load to the rear. In the last stage of unloading, the wall is hydraulically raised by means of two vertically set cylinders in order to completely empty the load box.

Hydraulically opening tailgate (3) is located in the rear section of the load box. In the central part of the tailgate, there is a grain chute (9) for unloading loose materials. The trailer can be also equipment with a chute trough for precise unloading. Bumper (4), mudguards (9) and lighting system components are attached to the rear of the load box frame.

The trailer can be also equipped with additional 400 mm or 400+100 mm-high wall extensions. The information on the installation method and sequence is provided in *ANNEX A*.

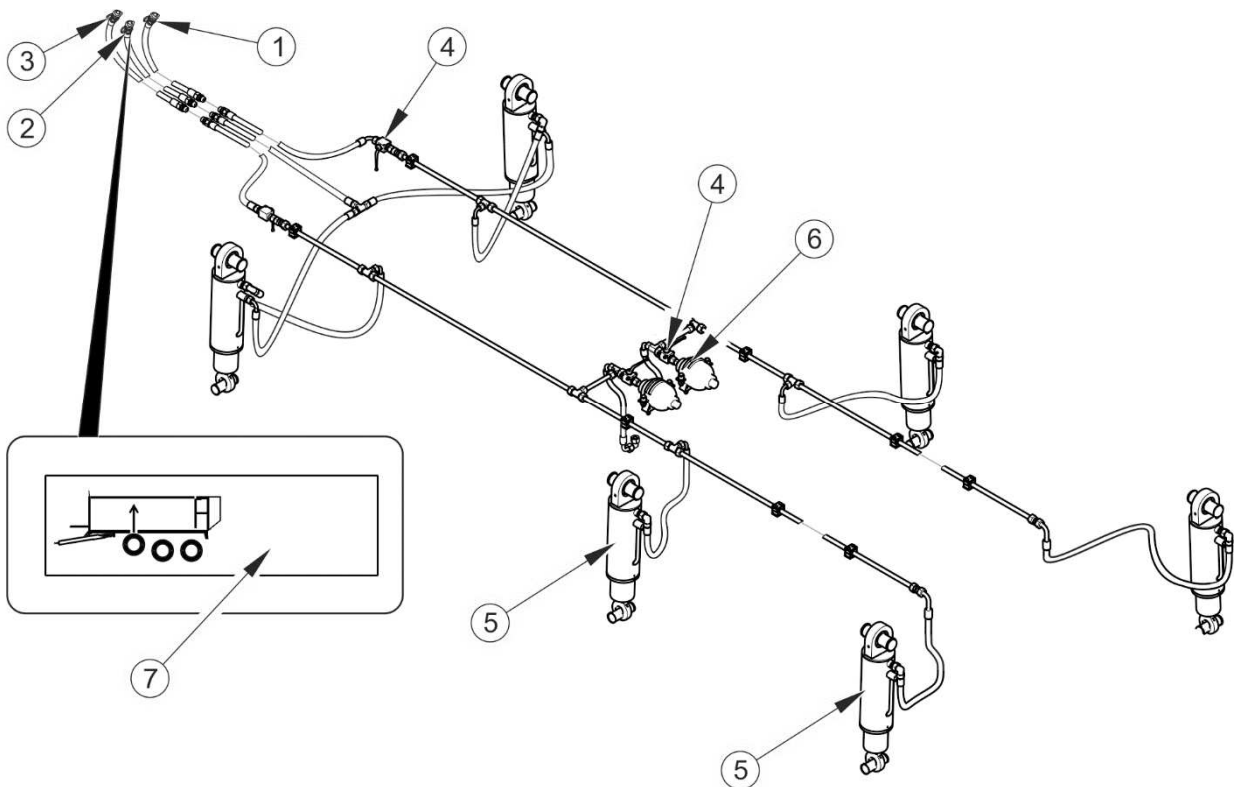


**FIGURE 3.3** Load box

(1) load box, (2) hinged wall extension, (3) tailgate, (4) fender, (5) sliding wall, (6) drawbar, (7) drawbar support, (8) ladder, (9) mudguards

### 3.2.3 SUSPENSION HYDRAULIC SYSTEM

The hydraulic system of the suspension is supplied with hydraulic oil from the tractor's external hydraulic system. The hydraulic system filling is performed only when hitching the trailer to the tractor for the first time - see section (4.3.2) "SETTING THE HYDRAULIC SUSPENSION". There is no need to fill the system with oil before each use of the trailer unless the suspension has to be raised or lowered in order to reduce or increase the total trailer height.



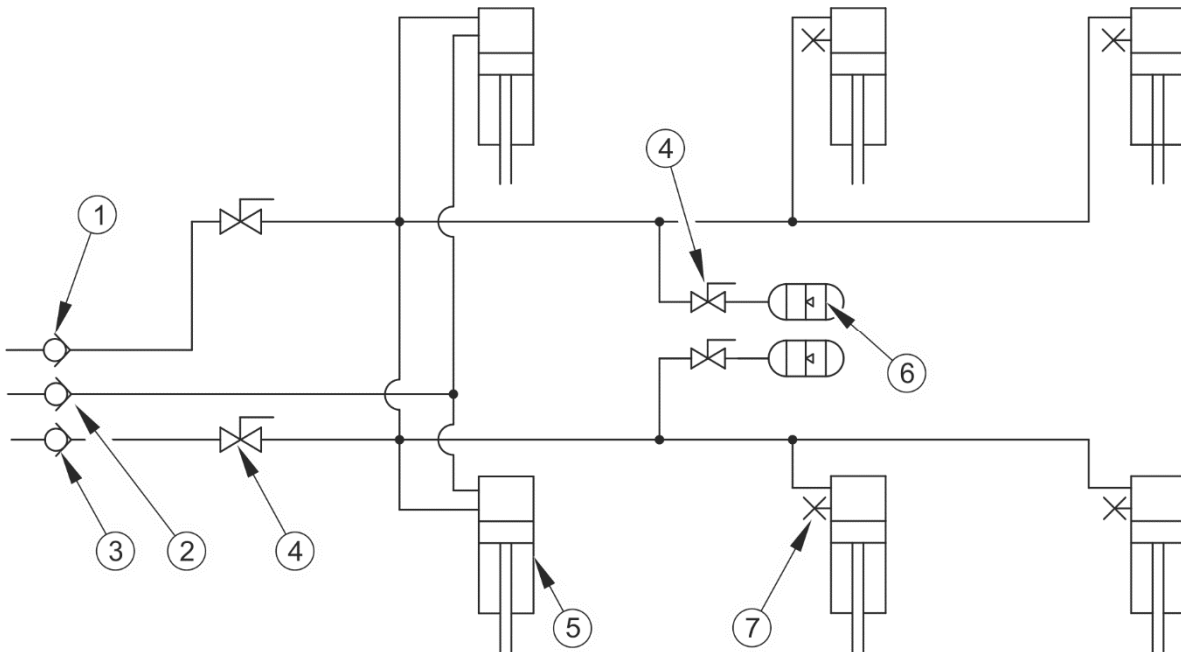
**FIGURE 3.4 Design of the suspension hydraulic system**

(1) quick coupler - plug for rising the right side of the trailer, (2) quick coupler - plug for rising the front axle, (3) quick coupler - plug for rising the left side of the trailer, (4) hydraulic valve, (5) hydraulic cylinder of suspension system, (6) hydraulic accumulator, (7) information decal

The suspension hydraulic system consists of six suspension hydraulic cylinders (5) which serve as shock absorbers. Three hydraulic cylinders are located on the right side and three on the left side of the suspension system. The hydraulic cylinders are connected together by means of hydraulic conduits. Two hydraulic accumulators are installed in the system circuits, whose task is to dampen the suspension vibrations. Connection conduits are terminated with



quick couplers (1), (2), (3) and marked with red plugs. Valves (4) and connection conduits are used for setting and adjusting the trailer suspension - section (4.3.2). After connecting to the hydraulic connection, the conduit marked with label (7) is used for rising the front axle.



**FIGURE 3.5** Concept diagram of the suspension hydraulic system

(1) quick coupler - plug for rising the right side of the trailer, (2) quick coupler - plug for rising the front axle, (3) quick coupler - plug for rising the left side of the trailer, (4) hydraulic valve, (5) hydraulic cylinder of suspension system, (6) hydraulic accumulator, (7) noise silencer

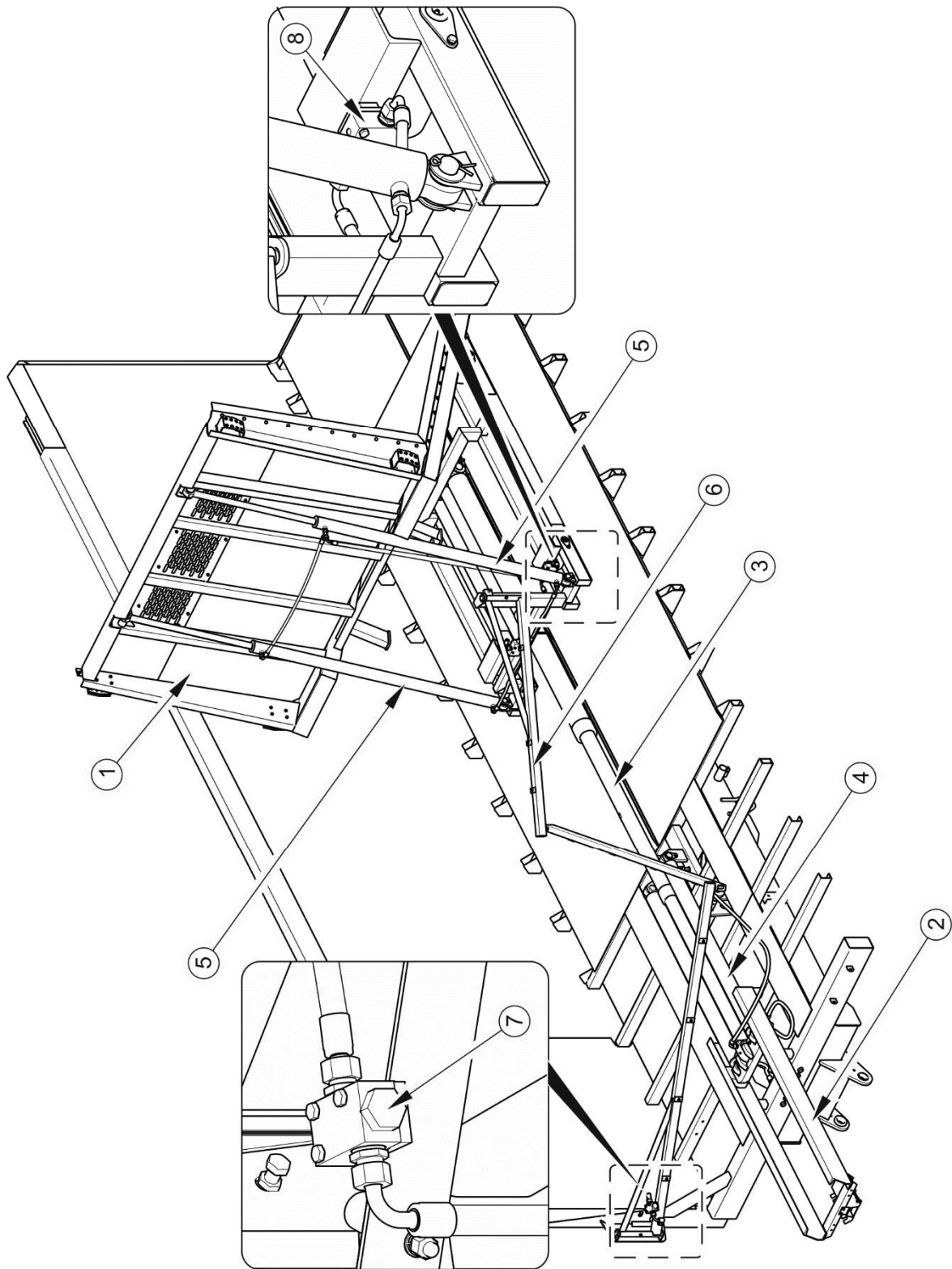


### ATTENTION

Travelling with the front axle raised is allowed only when the trailer is empty.

### 3.2.4 HYDRAULIC MECHANISM OF SLIDING WALL

The hydraulic mechanism of the sliding wall is used for automatic unloading of the trailer by pushing the load to the rear using the front wall of the load box. This system enables unloading in difficult terrain or spatial conditions, for example in low ceiling buildings, on steep slopes or in strong wind.



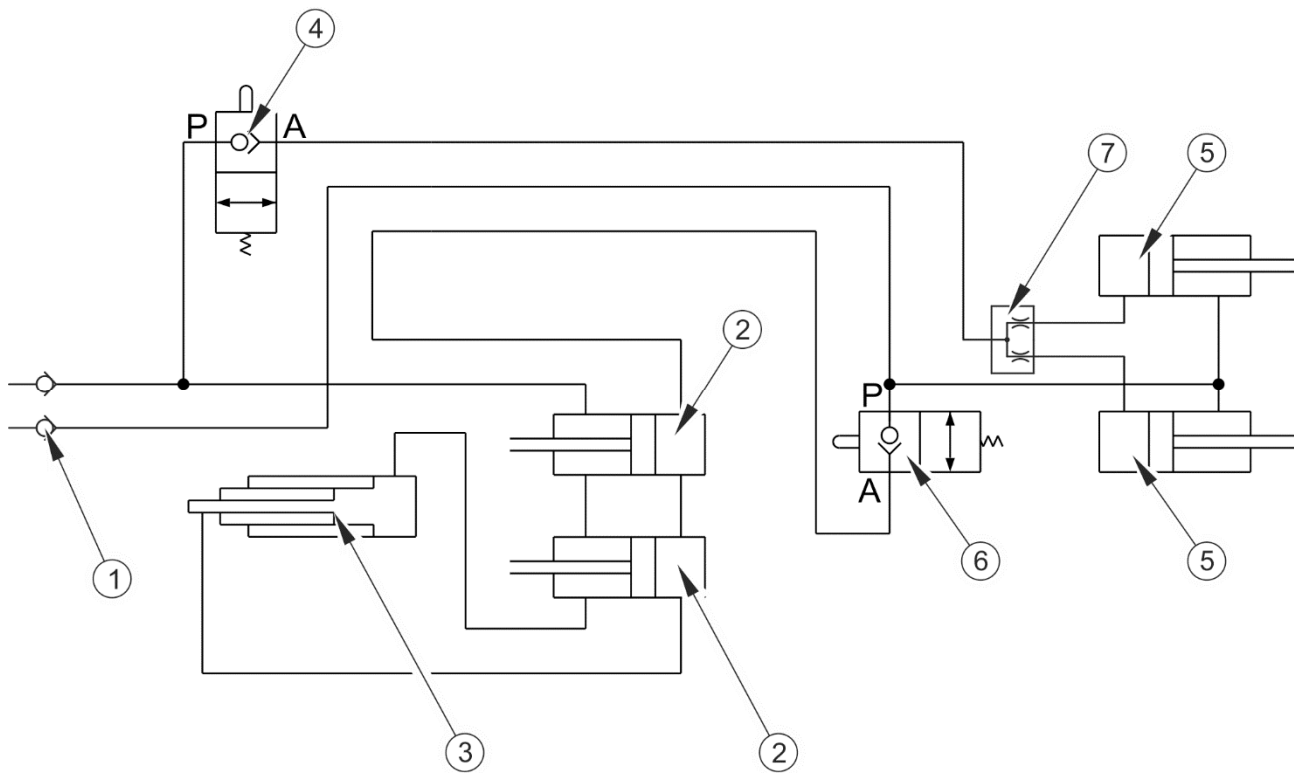
**FIGURE 3.6** Arrangement of sliding wall elements

(1) sliding wall, (2) cylinder carriage, (3) telescopic cylinder, (4) wall sliding cylinder, (5) wall rising cylinder, (6) connecting arm, (7) limit valve I, (8) limit valve II

The sliding wall mechanism makes it possible to compact the material during loading. This is particularly important when harvesting green fodder because silage is compacted by the trailer's sliding wall.

The design of the sliding wall mechanism and the arrangement of the system components are shown in figure (3.6). The system is equipped with two hydraulic cylinders (4) connected with telescopic cylinder (3). These cylinders are set horizontally and they shift the wall to the rear along the load box. Cylinders (5) are used for rising the front wall in the final stage of unloading in order to thoroughly remove the remains of transported material from the load box. The wall is equipped with rollers for shifting the wall along the load box.

The hydraulic system of the mechanism is supplied with oil from the tractor's external hydraulic system. Oil pumped from the tractor's hydraulic system is supplied to the trailer's hydraulic system through hydraulic conduits with quick couplers protected with blue plugs. In the first stage, the pumped oil makes the wall shift to the rear. The wall shifts until the connecting arm (6) reaches the position in which the limit valve (7) switches the oil flow to cylinders (5) that raise the wall. The wall is raised until all remains of transported material are removed from the load box. After switching the control lever in the tractor, oil is pumped through the other circuit of the system and the wall is lowered. When the sliding wall is lowered, the limit valve (8) switches the oil flow from cylinders (5) to the system of horizontal cylinders (3), (4), which return to their initial position.

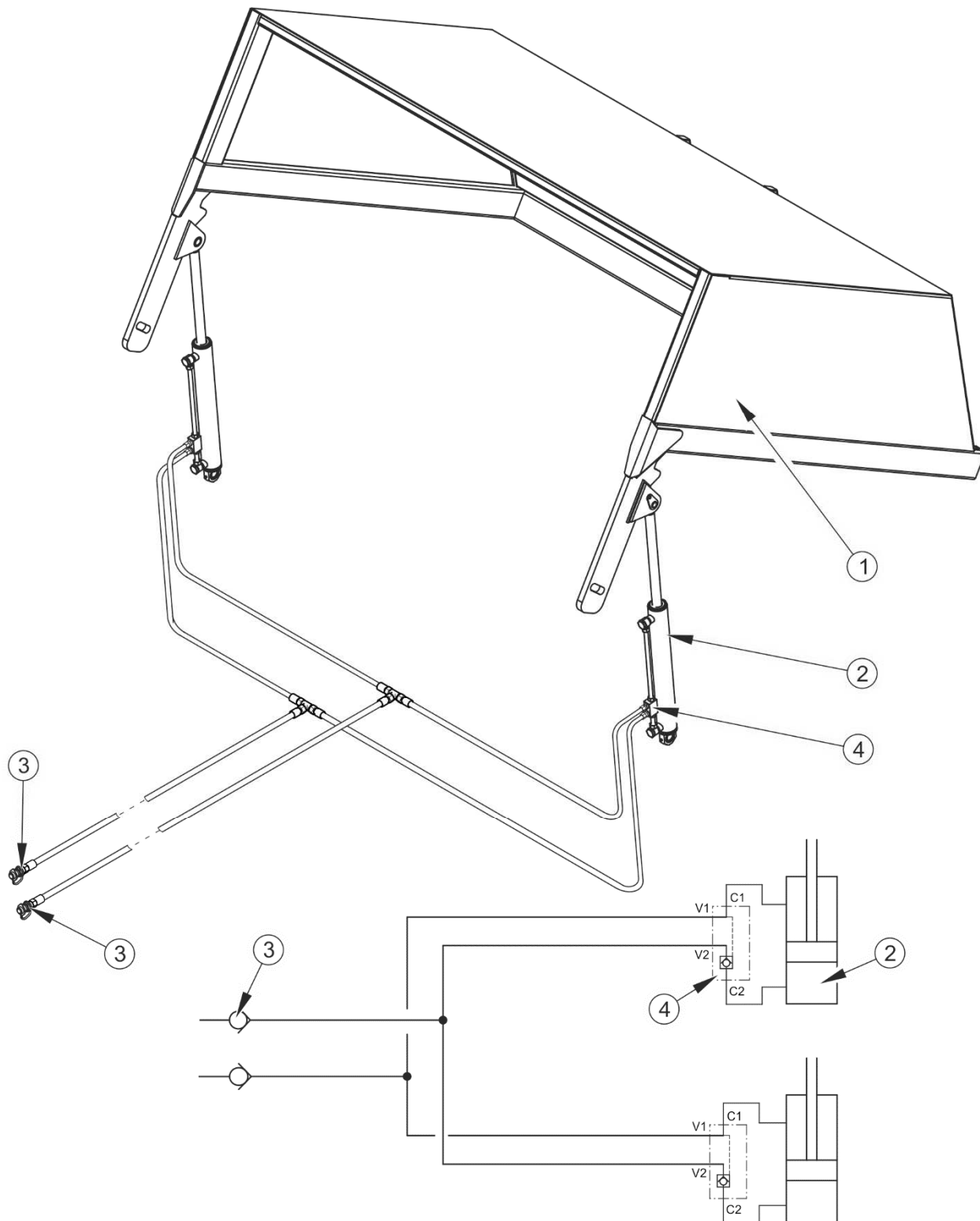


**FIGURE 3.7** The diagram of the hydraulic system of the front sliding wall

(1) quick coupler - plug, (2) hydraulic cylinder I, (3) telescopic cylinder, (4) limit valve I, (5) hydraulic cylinder II, (6) limit valve I, (7) flow divider

**3.2.5 TAILGATE HYDRAULIC SYSTEM**

The tailgate hydraulic system is supplied with oil from the tractor's external hydraulic system and is used for rising and lowering the trailer's tailgate. Pressurised oil is fed through hydraulic conduits connected to the tractor by means of quick couplers (3) to double-acting hydraulic cylinders (2) which open or close the tailgate. Tailgate is controlled from the cab by means of the manifold lever of the tractor's external hydraulic system. The tailgate is protected against sudden dropping by means of hydraulic locks (4) installed on cylinders. The locks are designed to keep the raised tailgate in a fixed position in case of damage to hydraulic conduit.



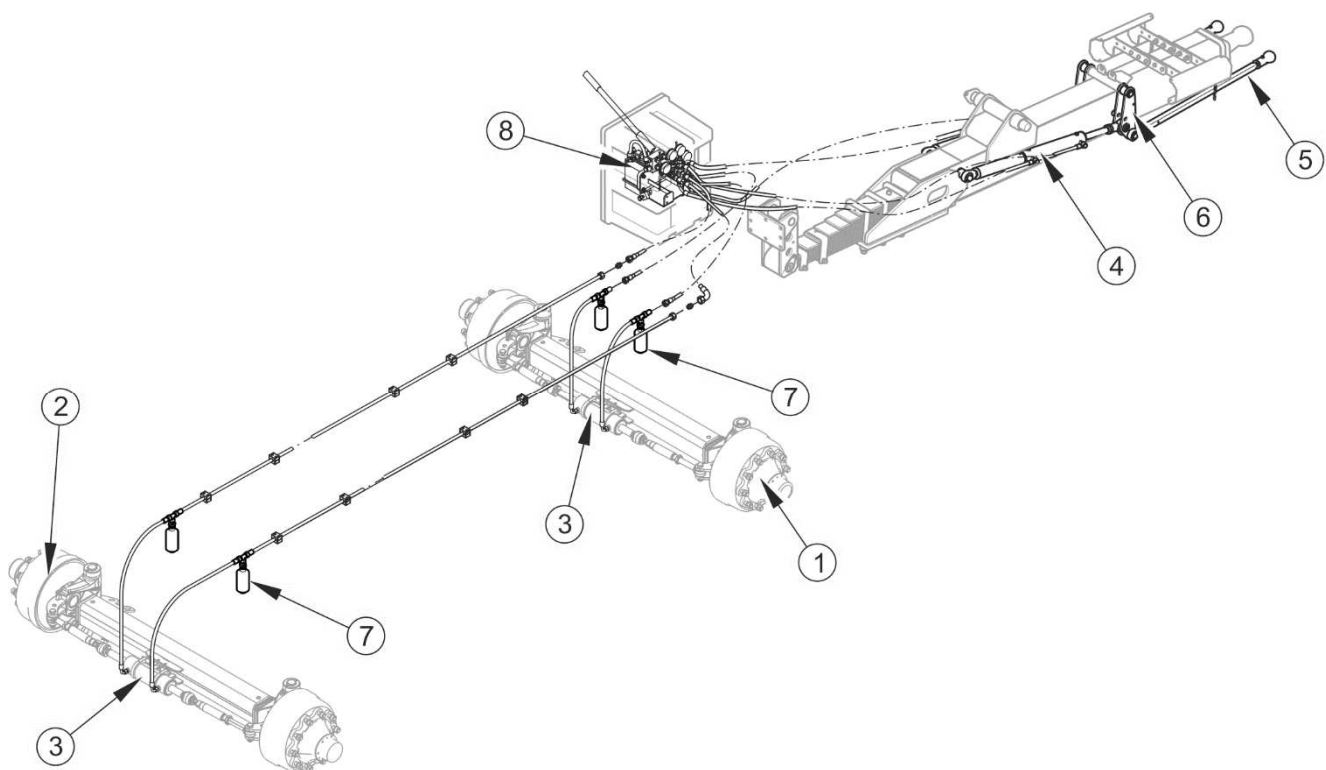
**FIGURE 3.8** Design and diagram of the tailgate hydraulic system

(1) tailgate, (2) hydraulic cylinder, (3) quick coupler - plug, (4) hydraulic lock

### 3.2.6 HYDRAULIC STEERING SYSTEM

As standard, Pronar T900 trailer is equipped with hydraulic steering system for controlling the wheels of the first axle and the third axle of the trailer.

Two external axles (1) and (2) are steering axles. They are equipped with cylinder (3) that is connected through hydraulic conduits and pipes with double-acting hydraulic cylinders (4) located on both sides of the drawbar, forming a closed circuit. The drawbar's cylinders (4) are connected with the strings (5) by means of the lever (6). The strings' ball-shaped ends (5) are connected with the tractor's hitch which meets the requirements of ISO 26402 standard.



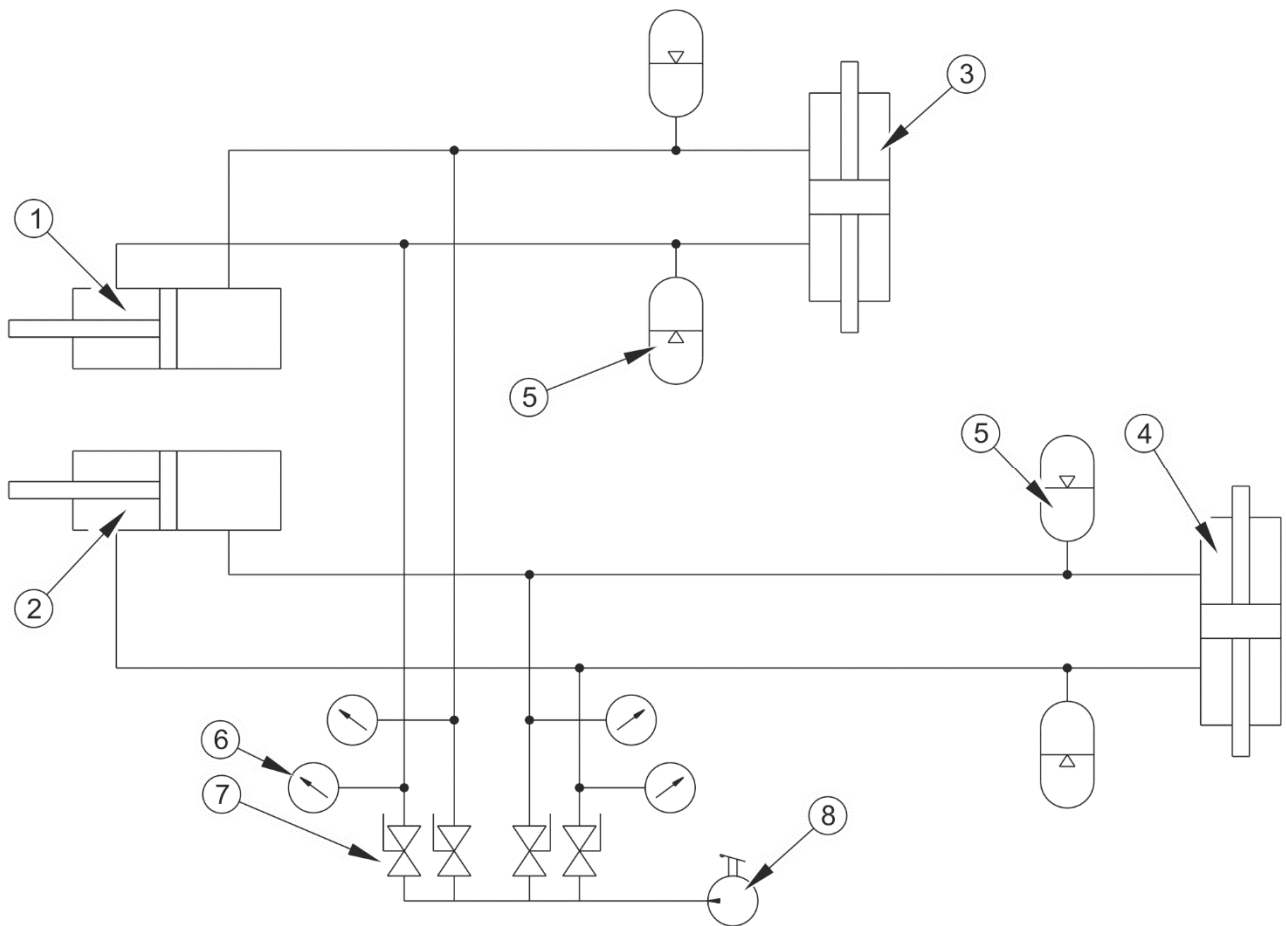
**FIGURE 3.9** Design of the hydraulic steering system

(1) front steering axle, (2) rear steering axle, (3) axle cylinder, (4) drawbar cylinder, (5) string, (6) lever, (7) hydraulic steering accumulator, (8) hand pump

The system is filled with oil in the amount of approximately 10 litres. The reference list of oils is included in *ANNEX C TO THIS PUBLICATION*. During movement of cylinder rods (4), oil flows to steering cylinders (3) located on the external axles and causes turning the trailer's wheels. Rods of cylinders (4) move when the trailer's drawbar changes its angular position with regard to tractor hitch when manoeuvring. Thanks to this solution, tyre wear is reduced, power required to manoeuvre the trailer is smaller and damage to soil is reduced when

turning the trailer's wheels. Hydraulic accumulators (7) are used in order to eliminate minimal swing of axle steering cylinders and reduce load applied to the system when manoeuvring (7). Under the load box, on the left side, there is a hydraulic hand pump (8) for filling and setting the pressure in the steering system – see section (4.3.4) „SETTING THE WHEEL STEERING SYSTEM”.

Diagram of the hydraulic steering system is shown in figure (3.10).

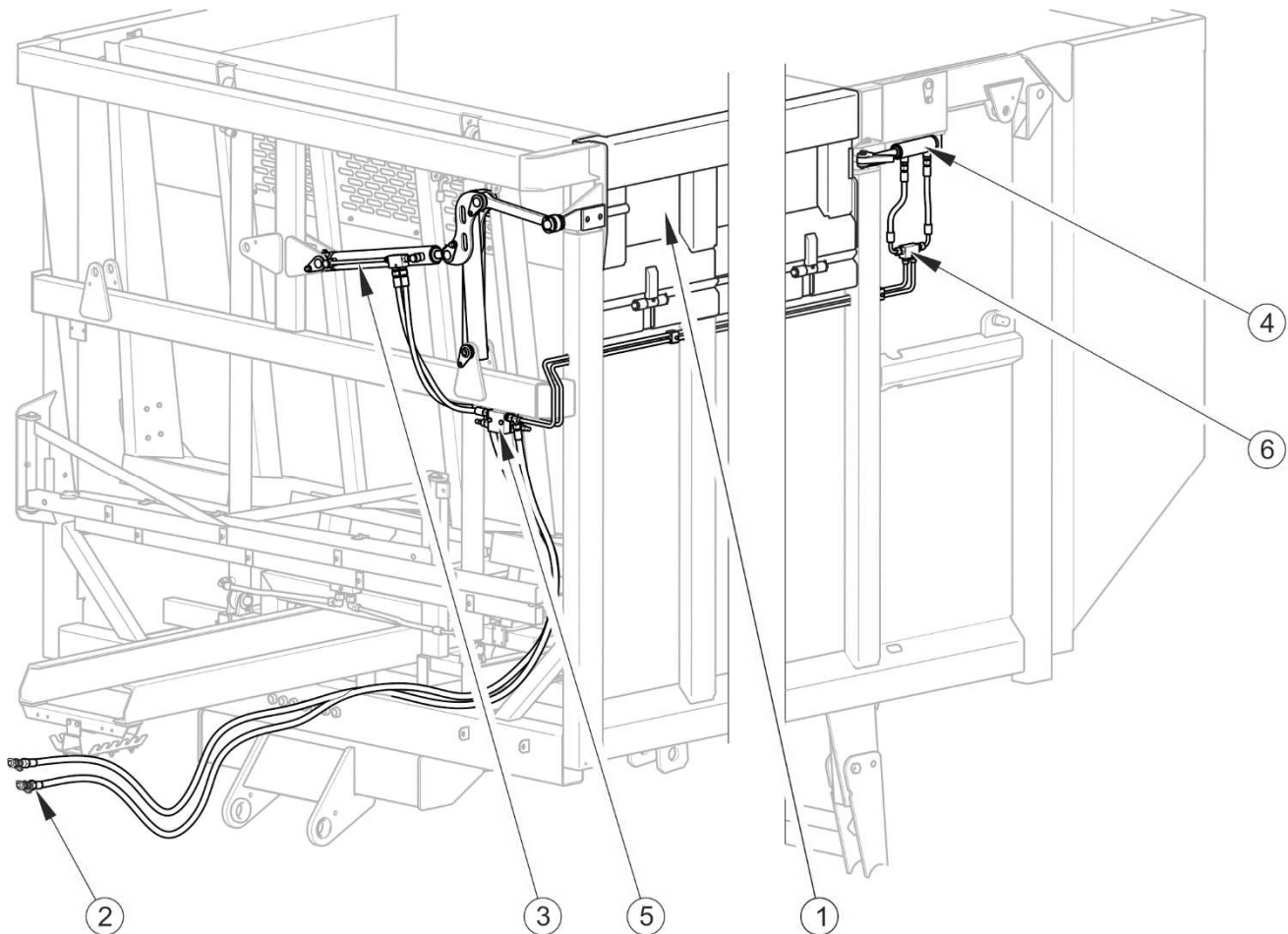


**FIGURE 3.10** Diagram of the hydraulic steering system

(1) drawbar cylinder, right, (2) drawbar cylinder, left, (3) front axle cylinder, (4) rear axle cylinder, (5) hydraulic accumulator, (6) pressure gauge, (7) hydraulic valve, (8) hand pump

### 3.2.7 HYDRAULIC SYSTEM OF THE HINGED WALL

Standard version of Pronar T900 trailer is equipped with the load box with two fixed side walls. Three optional versions of the load box are also available: with the left hinged wall, with the right hinged wall or with both hinged walls.

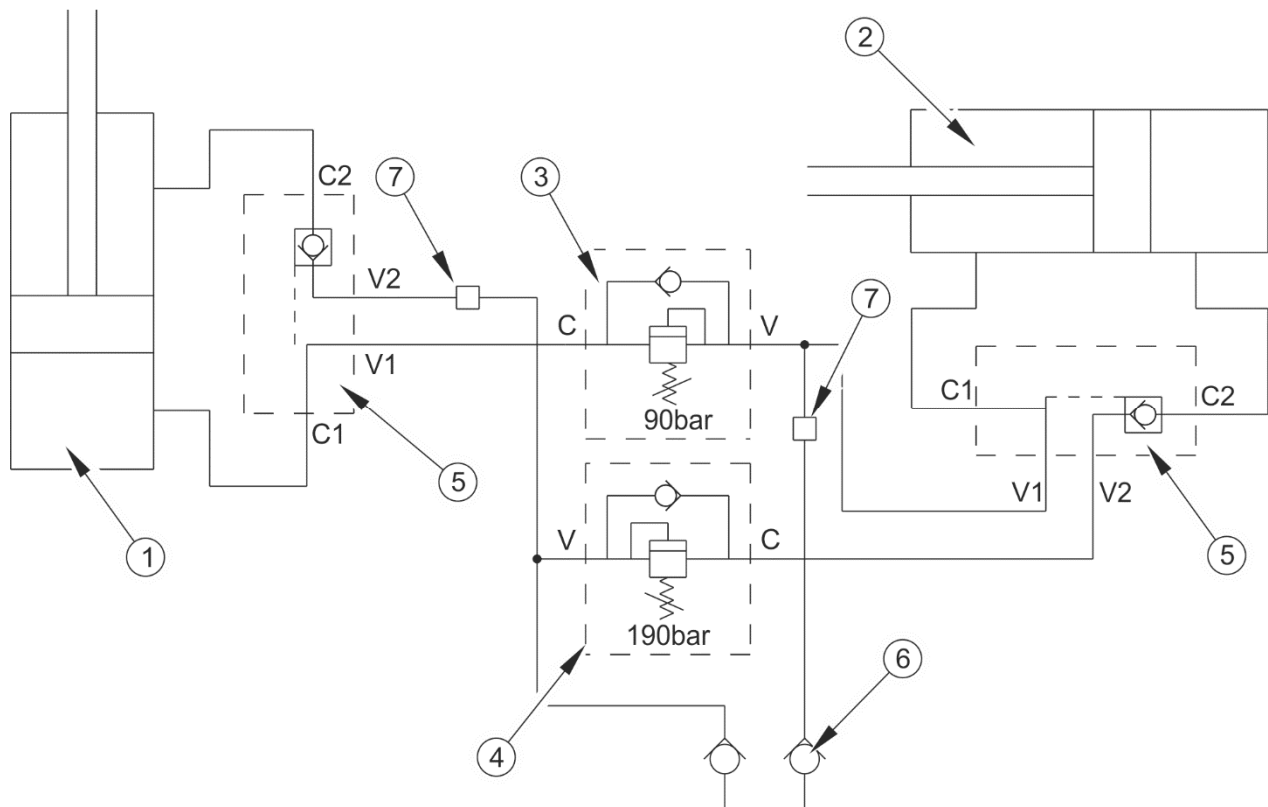


**FIGURE 3.11** Design of the hydraulic system of the hinged wall

(1) hinged wall, (2) quick coupler - plug, (3) hydraulic cylinder for opening the side gate, (4) hydraulic clamp locking cylinder, (5) sequence valve, (6) hydraulic lock

The hydraulic system for opening the hinged wall is supplied with oil from the tractor's hydraulic system. The system is controlled by means of the lever of the manifold of the tractor's external hydraulic system. Connections are made using hydraulic conduits terminated with quick-couplers (2) marked with green plugs. Oil pumped from the tractor's hydraulic system is supplied first to the sequence valve (5) and is directed to cylinders (3) and (4) - consequently, the wall is unlocked and tilted. When the setting of the manifold lever in the tractor is changed, oil is supplied through the other circuit to the second sequence valve - consequently, the clamp is closed and locked.





**FIGURE 3.12** Diagram of the hydraulic system of the hinged wall

(1) hydraulic cylinder for opening the side gate, (2) hydraulic clamp locking cylinder, (3) sequence valve (opening the side gate), (4) sequence valve (clamp locking), (5) hydraulic lock, (6) quick coupler - plug, (7) gland

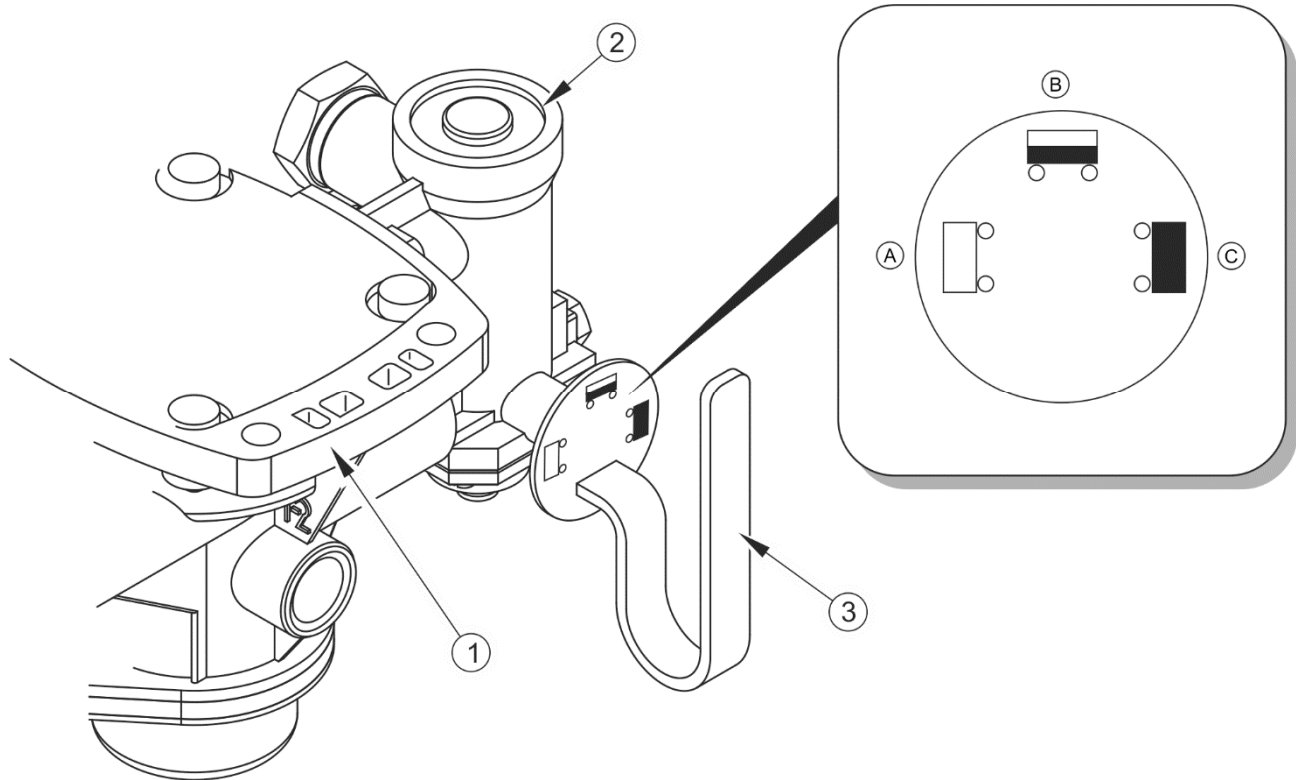
### 3.2.8 BRAKING SYSTEM

Depending on the version, T900 trailer is equipped with one of the four types of main brake system:

- double conduit pneumatic system with manual regulator,
- double conduit pneumatic system with ALB mechanical regulator,
- double conduit pneumatic system with ALB hydraulic regulator (hydraulic suspension system),
- Hydraulic braking system

Working brake is activated from the tractor driver's seat by depressing the brake pedal in the tractor. The control valve activates the trailer brakes when the brake pedal is depressed in the tractor. Furthermore, in case of an inadvertent disconnection of the conduit between the

trailer and the tractor, the control valve will automatically activate trailer's brakes. When the conduit is connected to the tractor's connection, the system automatically changes its position to allow normal brake operation.

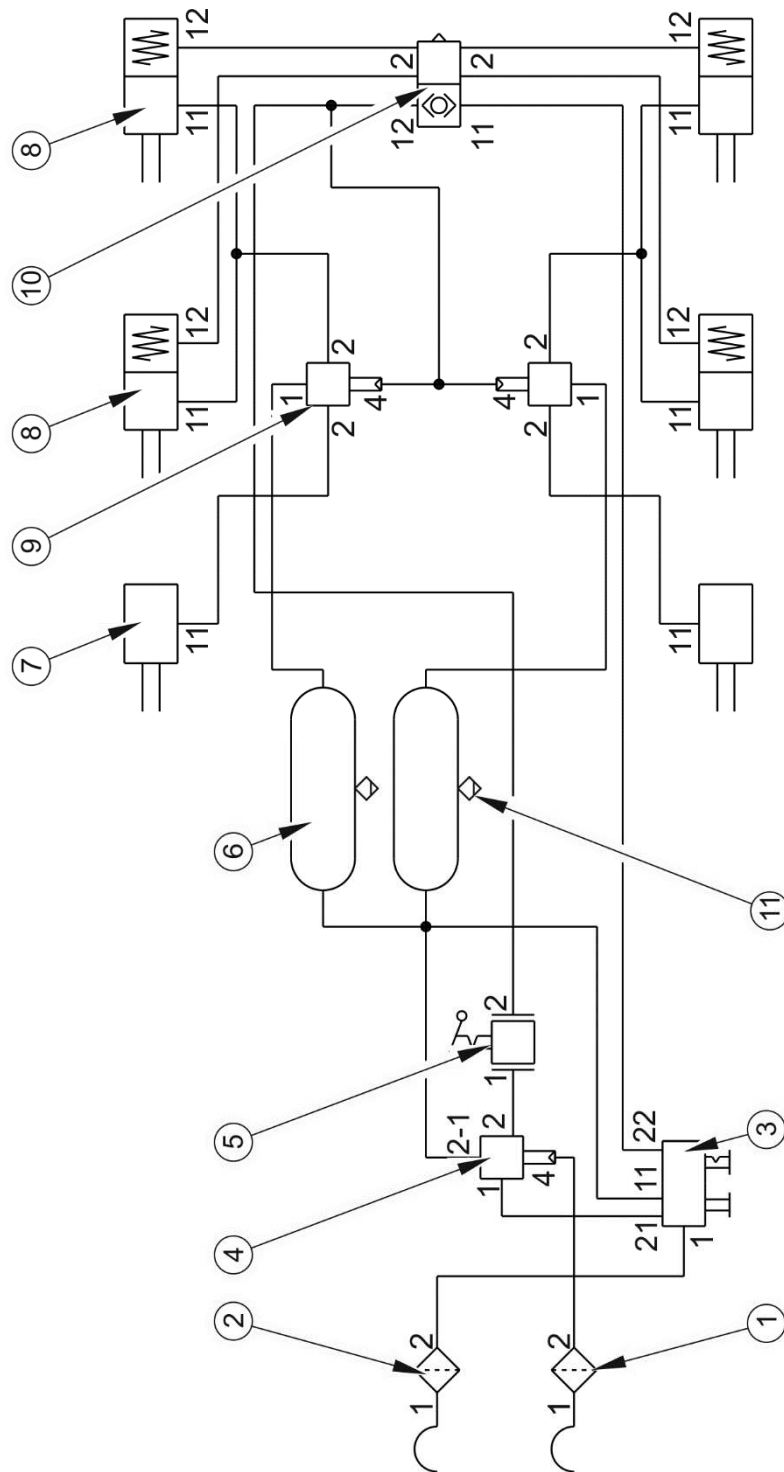


**FIGURE 3.13 Three-step braking force regulator**

(1) control valve, (2) three-step braking force regulator, (3) lever for controlling the regulator settings, (A), (B), (C) regulator working positions

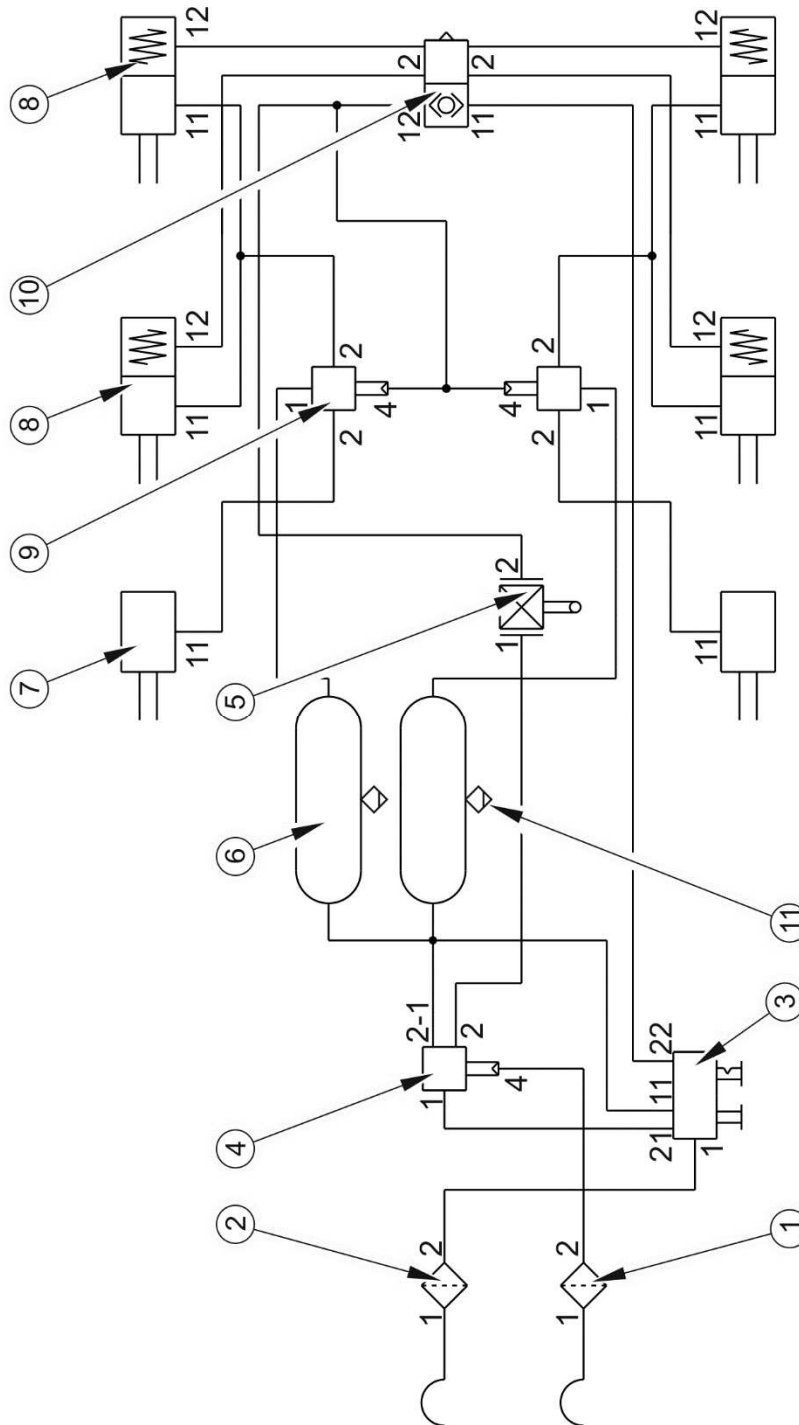
Double conduit pneumatic system with a manual regulator is equipped with a three-step braking force regulator (2) - figure (3.13), the regulator adjusts braking force depending on setting. Switching to a suitable working mode is done manually by the machine operator prior to moving off, using the lever (3). Three working positions are available: A - "no load", B - "half load" and C - "full load".

Depending on type of the trailer suspension system (hydraulic or mechanical suspension), the double conduit braking system with an automatic regulator is equipped with a mechanical or hydraulic braking force regulator. The regulator adjusts braking force depending on trailer load and, during normal operation, it does not require any attention of the trailer operator.



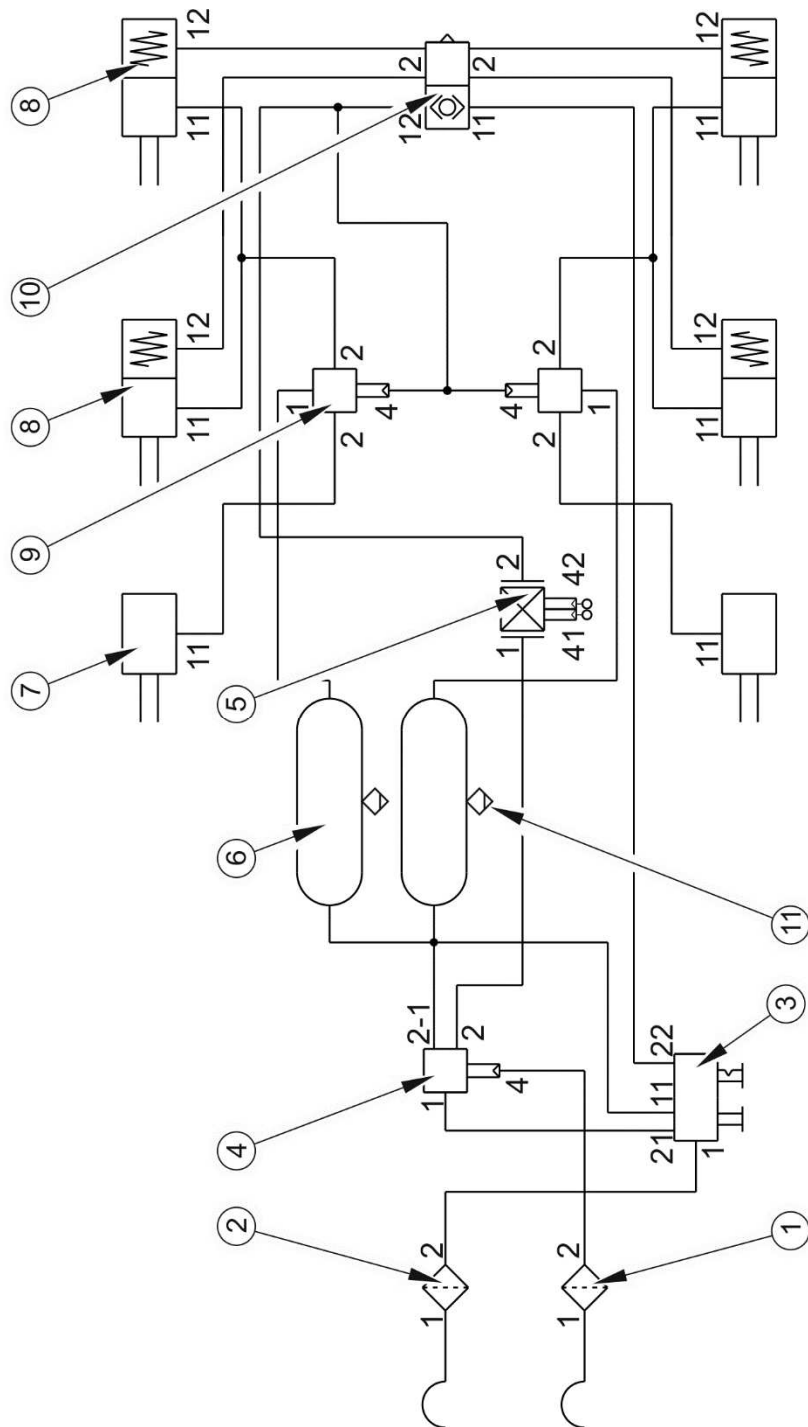
**FIGURE 3.14** Diagram of double conduit pneumatic system with manual regulator

(1) control conduit connection with a filter (yellow), (2) supply conduit connection with a filter (red), (3) releasing-parking valve, (4) brake valve without brake release, (5) manual braking force regulator, (6) air tank, (7) diaphragm actuator, (8) diaphragm-spring actuator, (9) relay valve (10) two-way valve with quick air bleeding, (11) drain valve



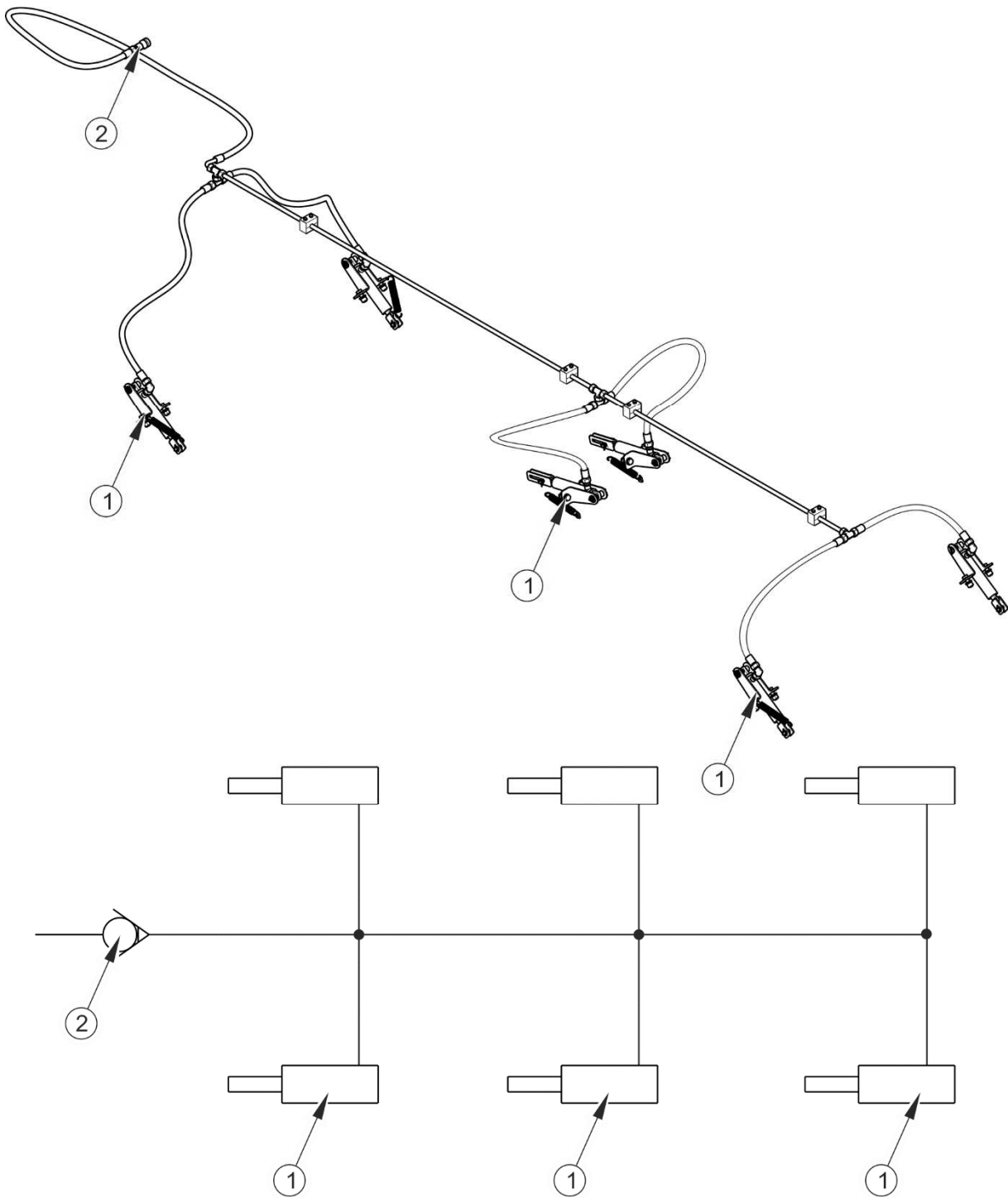
**FIGURE 3.15** Diagram of pneumatic system with ALB mechanical regulator

(1) control conduit connection with a filter (yellow), (2) supply conduit connection with a filter (red), (3) loosening-parking valve, (4) brake valve without brake release, (5) ALB mechanical regulator, (6) air tank, (7) diaphragm actuator, (8) diaphragm-spring actuator, (9) relay valve (10) two-way valve with quick air bleeding, (11) drain valve



**FIGURE 3.16** Diagram of pneumatic system with ALB hydraulic regulator

(1) control conduit connection with a filter (yellow), (2) supply conduit connection with a filter (red), (3) loosening-parking valve, (4) brake valve without brake release, (5) ALB hydraulic regulator, (6) air tank, (7) diaphragm actuator, (8) diaphragm-spring actuator, (9) relay valve (10) two-way valve with quick air bleeding, (11) drain valve



**FIGURE 3.17 Design and diagram of the hydraulic braking system**

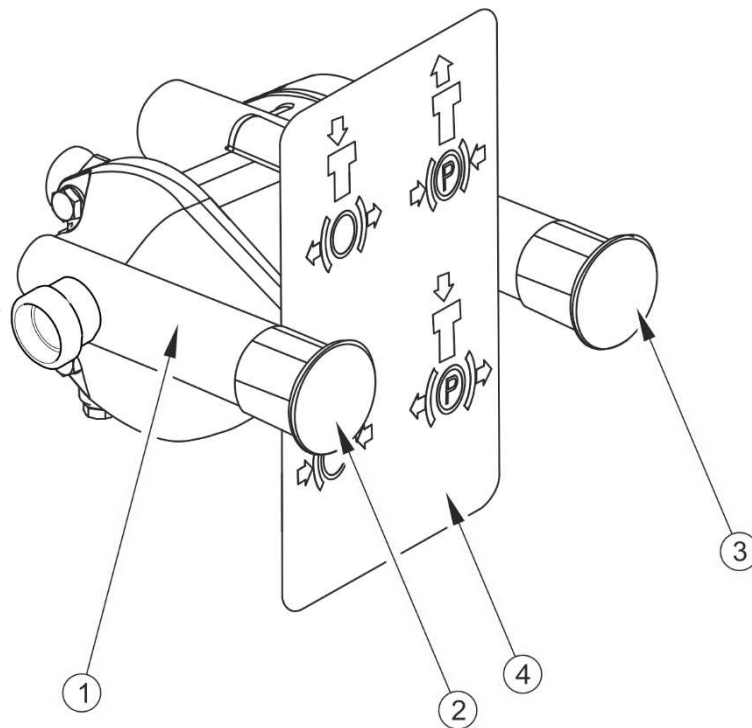
*(1) hydraulic cylinder, (2) hydraulic quick coupler*

The main hydraulic brake (available as optional equipment) is activated from the tractor driver's cab by depressing the brake pedal. Agricultural tractor equipped with suitable hydraulic system is required to operate the hydraulic braking system.

### 3.2.9 PNEUMATIC PARKING BRAKE

The parking brake is used for immobilising trailer while standing motionless. The parking brake is activated by loosening-parking valve (1) – figure (3.18). Two push-buttons located in this valve make it possible to set the trailer to an appropriate working mode. Black push-button (2) controls the loosening valve, that is designed for releasing or engaging the brake if the trailer is unhitched from the tractor. There is no possibility of pressing this push-button if pneumatic connections are connected to tractor.

Red push-button controls operation of parking valve. In the trailer that is correctly hitched to the tractor by means of connections (red and yellow), the black push-button of the loosening valve should be pulled out. Braking of the trailer wheels is carried out by pulling out the red push-button (3).

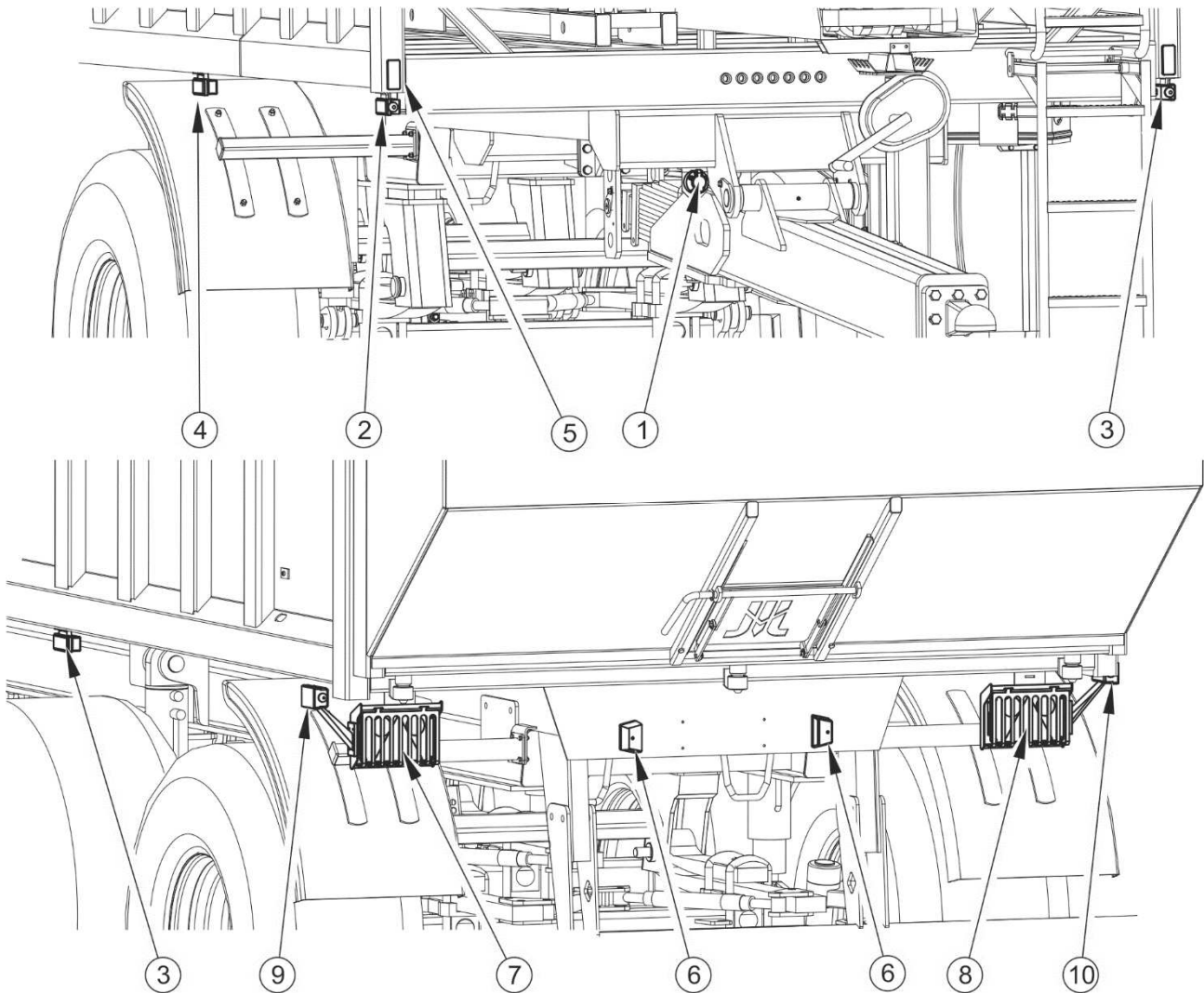


**FIGURE 3.18** Loosening-parking valve

(1) loosening-parking valve, (2) black push-button, (3) red push-button, (4) information plate

### 3.2.10 ELECTRICAL LIGHTING SYSTEM

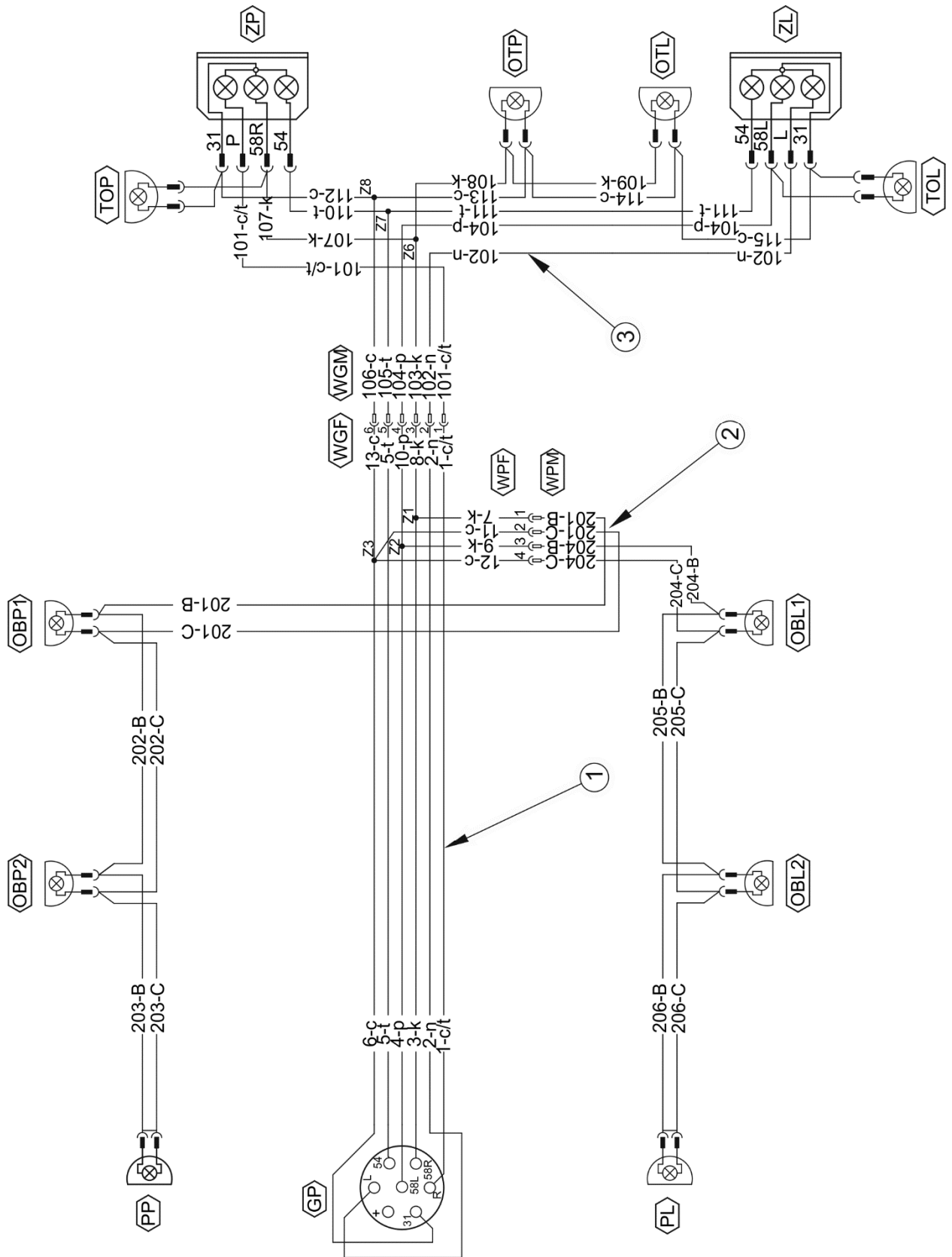
The trailer's electrical system is designed for supply from a direct current source of 12 V. Connection of the trailer electrical system with the tractor should be made using an appropriate connection lead delivered with the trailer.



**FIGURE 3.19** Location of reflective elements and lights

(1) front seven pin socket, (2) front clearance lamp and right side parking light, (3) front clearance lamp and left side parking light, (4) side parking light, (5) white reflector, (6) license plate light, (7) left rear lamp assembly, (8) right rear lamp assembly, (9) front-rear lamp and side left parking light, (10) front-rear lamp and side right parking light





**FIGURE 3.20 Electric lighting system diagram**

(1) central wiring harness, (2) front wiring harness, (3) rear wiring harness

**TABLE 3.2 List of electrical component markings**

<b>SYMBOL</b>	<b>NAME</b>
ZP	Rear right lamp assembly
ZL	Rear left lamp assembly
GP	Front seven pin socket
GT	Rear seven pin socket
OTP	Right license plate light
OTL	Left license plate light
PP	Front right parking light
PL	Front left parking light
TOP	Rear right clearance light
TOL	Rear left clearance light
OBL	Left side clearance lamp
OBP	Right side clearance lamp

**TABLE 3.3 Marking of GP socket connections**

<b>MARKING</b>	<b>FUNCTION</b>
31	Ground
+	Power supply +12V (not used)
L	Left indicator
54	STOP light
58L	Rear left parking light
58R	Rear right parking light
R	Right indicator

**TABLE 3.4 Lead colour marking**

<b>MARKING</b>	<b>COLOUR</b>
B	White
C	Black
K	Red
N	Blue
P	Orange
T	Green
C/T	Black and green



***SECTION***

**4**

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**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 release the user from an obligation to check the machine's condition after delivery and before first use. The machine is delivered to the user completely assembled.

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



#### **ATTENTION**

**Before hitching to tractor and using the trailer, the user must carefully read this Operator's Manual and observe all recommendations.**

#### **External inspection**

- ➔ Check completeness of machine (standard and optional equipment).
- ➔ Check condition of protective paint coat,
- ➔ Inspect trailer's individual components for mechanical damage resulting from incorrect transport (dents, piercing, bent or broken components).
- ➔ Check technical condition of tyres and tyre pressure.
- ➔ Check technical condition of elastic hydraulic conduits.
- ➔ Check technical condition of pneumatic conduits.
- ➔ Check that there are no hydraulic oil leaks.
- ➔ Check electric lamps.
- ➔ Check all hydraulic cylinders for leaks of hydraulic oil.

## 4.1.2 PREPARING THE TRAILER FOR THE FIRST HITCHING TO TRACTOR

### Preparation

- ➔ Ensure that the hitch, pneumatic, hydraulic and electric connections in the tractor are according to the requirements; otherwise, the trailer should not be hitched to the tractor.
- ➔ Check all the trailer's lubrication points, lubricate the machine as needed according to recommendations provided in section 5.
- ➔ Check if the nuts and bolts fixing the wheels, the load box, the drawbar and other components are properly tightened.
- ➔ Check if the nuts and bolts in the suspension system are properly and sufficiently tightened.
- ➔ Drain air tanks of the brake system.
- ➔ Adjust the height of the drawbar eye to the tractor hitch
  - ⇒ A detailed description can be found in section (4.3.3).

### Test start

If all the above actions are completed and if the technical condition of the trailer is not a cause of concern then hitch it to the tractor according to section (4.3). Start the tractor, check all systems and conduct test run of trailer without load (no load in load box). It is recommended that the inspection is conducted by two people, one of which should always remain in the tractor cab. Test drive should be conducted according to the sequence shown below.

- ➔ Connect the trailer to appropriate hitch on agricultural tractor.
- ➔ Connect conduits of pneumatic system and hydraulic system and electric leads.
- ➔ Switch on individual lights, check correct operation of electrical system.
- ➔ Start the following systems and check if they work correctly:
  - ⇒ tailgate control system,
  - ⇒ control of front wall sliding mechanism,
  - ⇒ control of the right and/or left wall extension rising (option),

- ⇒ control of the front axle rising (hydraulic suspension system),
- ➔ when moving off, check if the main brakes operate correctly,
  - ➔ when driving, check operation of the wheel turning system,
  - ➔ check if the parking brake of the trailer operates correctly,
  - ➔ ensure that the pneumatic system does not have any leaks.
  - ➔ perform test drive.

### ATTENTION



**Before using the trailer, the user must carefully read this Operator's Manual.**

**The trailer must not be used for purposes other than those for which it is intended.**

**Before using the trailer always check its technical condition. In particular, check technical condition of hitch system, axle system, braking system, lighting system and front wall sliding mechanism.**

If during test run worrying symptoms occur such as:

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

or other faults, find the cause of the problem. Vibrations of walls and entire trailer as well as abnormal noise and vibrations coming from loose nut and bolt connections are not acceptable. If a fault cannot be rectified or the repair could void the guarantee, please contact retailer for additional clarifications or to make a repair.

### DANGER



**Careless and incorrect use and operation of the trailer, and non-compliance with the recommendations given in this operator's manual is dangerous to your health.**

**The trailer must never be used by persons who are not authorised to drive agricultural tractors, including children and people under the influence of alcohol or other drugs.**

**Non-compliance with the safety rules of this Operator's Manual can be dangerous to the health and life of the operator and others.**

**Keep a safe distance from the danger zones when starting and checking the trailer's control systems.**




## 4.2 TECHNICAL INSPECTION OF THE TRAILER

When preparing the trailer for normal use, check individual elements according to guidelines presented in table (4.1).

**TABLE 4.1 Technical inspection schedule**

DESCRIPTION	MAINTENANCE ACTIVITIES	FREQUENCY
Operation of brake system	Attach trailer to the tractor and test the brakes after moving off.	Before each use
Correct operation of lights and indicators.	After connecting trailer to the tractor activate in sequence individual lights, check if all reflectors are installed, check if slow-moving vehicle warning sign is in place.	
Operation of hydraulic system	Check operation and tightness of the hydraulic system during work.	
Check technical condition of tyres and tyre pressure,	Visually inspect the tyres and if they are properly inflated.	
Check technical condition of tyres and tyre pressure,	Check the condition of tyre tread, lateral surfaces, wheel rim and if necessary inflate the tyres up to recommend pressure.	Every month
Maintenance of spring drawbar	Tighten all nuts of the fixing bolts using recommended tightening torque specified in table (5.7). Grease the drawbar rocker pin.	After the first travel with load. Every 6 months or before intensive work
Check if all main nut and bolt connections are properly tightened	Tightening torque values should be according to table (5.7).	Every six months
Suspension system maintenance	According to the guidelines presented in section "Suspension system maintenance".	According to section (5.6)

DESCRIPTION	MAINTENANCE ACTIVITIES	FREQUENCY
Lubrication	Lubricate elements according to guidelines presented in section "Trailer lubrication".	According to table (5.4)
Tightening of wheel nuts	According to the guidelines presented in subsection "Mounting and dismounting wheel, inspection of wheel nut tightening".	According to subsection (5.2.4)



**ATTENTION**


The trailer must not be used when not in working order.

Prior to connecting hydraulic system conduits the user must carefully read the tractor operator's manual and observe all recommendations of the Manufacturer.

### 4.3 HITCHING AND UNHITCHING THE TRAILER

The trailer may be hitched to the tractor only if all connections (electric, pneumatic, hydraulic) and the hitch in the tractor meet the requirements of the trailer Manufacturer specified in table (1.2) "Requirements for agricultural tractor".

In standard configuration, the trailer is equipped with the hydraulically controlled wheel steering system. The tractor must be equipped with a proper hitch that meets the requirements of ISO 26402 standard concerning the connection of the trailer steering system with the tractor (the tractor hitch system diagram is shown in figure (4.3). The tractor should have at least three hydraulic sections. The first hitching of T900 trailer to a given tractor should be performed according to the description in subsections (4.3.1) - (4.3.4).



**DANGER**

Prior to hitching the trailer, check the technical condition of the trailer's and tractor's hitch system and connection elements of the hydraulic, electrical and pneumatic systems.

When hitching, there must be nobody between the trailer and the tractor. When hitching the machine, the tractor driver must exercise particular caution and make sure that nobody is present in the hazard zone.

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

### Hitching to tractor

- ➔ Position the agricultural tractor in front of the trailer's drawbar eye.
- ➔ With the aid of the support adjust the height of the drawbar with regard to the hitch of the tractor.
- ➔ Reverse the tractor, hitch the drawbar eye.
- ➔ Hitch the trailer steering mechanism strings.
- ➔ Check the hitch lock protecting the trailer against accidental unhitching.
- ➔ Turn off tractor ignition.
- ➔ Raise the parking stand and secure it with a pin.
- ➔ Connect the pneumatic brake system conduits (applies to double conduit pneumatic system):
  - ⇒ Connect pneumatic conduit marked yellow with yellow socket in tractor.
  - ⇒ Connect pneumatic conduit marked red with red socket in tractor.
- ➔ Connect the hydraulic brake system conduit (applies to trailer version with hydraulic brake system).

### ATTENTION



Trailer may be hitched exclusively to a tractor which meets the requirements for a minimum power demand, is equipped with suitable connection sockets of the braking and hydraulic systems, hydraulic oils in both machines can be mixed and the tractor's hitch is capable of withstanding vertical load of loaded trailer drawbar of minimum 3 000 kg. The connection of the trailer steering system with the tractor must meet the requirements of ISO 26402 standard.

When hitching is completed, secure the electrical leads and hydraulic and braking system conduits in such a way that they do not become entangled in tractor's moving parts and are not at the risk of breaking or being severed when making turns.

After hitching the trailer to tractor, check and secure all ball connections.

- ➔ Connect main lead supplying electrical lighting system.
- ➔ Connect the hydraulic conduits of the tailgate (marked black).

- ➔ Connect the hydraulic conduits of the sliding wall (marked blue).
- ➔ Connect the hydraulic conduits of the side hinged wall marked green (option).

When connecting double-conduit braking system conduits, first connect the yellow conduit to yellow socket in the tractor and only then connect the red conduit to the red socket in the tractor. Once the 2nd conduit is connected, the braking system will switch to normal mode of operation (disconnection or interruption of the conduits causes the trailer's braking system control valve to automatically apply brakes). Trailer's conduit connectors and the tractor's connection sockets must be free from any contamination. Pneumatic system conduit connectors are equipped with rubber seals which must not be damaged or soiled.

### **Unhitching the trailer**

In order to unhitch the trailer from the tractor follow these steps.

- ➔ Immobilise tractor and trailer with parking brake.
- ➔ Place chocks under trailer wheel.
  - ⇒ Wheel chocks shall be so placed that one is in front of the wheel and the second is behind wheel of rear axle - see section 2.
- ➔ Take out securing pin and lower the support to the ground.
  - ⇒ When a proper drawbar height is set, secure the drawbar support with securing pin.
- ➔ Turn off tractor engine. Ensure that unauthorised persons do not have access to the tractor cab.
- ➔ Disconnect hydraulic conduits of tailgate and sliding wall from the tractor.
  - ⇒ Before disconnecting the conduits, reduce (release) pressure in the hydraulic system.
- ➔ Disconnect electric lead.
- ➔ Disconnect pneumatic system conduits (applies to double conduit pneumatic system).
  - ⇒ Disconnect pneumatic conduit marked red.
  - ⇒ Disconnect pneumatic conduit marked yellow.

- ➔ Disconnect hydraulic brake system conduit (applies to trailer version with hydraulic brake system).
- ➔ Protect conduit ends with covers. Place conduit plugs in appropriate conduit hanger sockets.
- ➔ Unlock and disconnect the drawbar hitching eye and disconnect the steering system control strings from the tractor hitch and drive the tractor away.



### **DANGER**

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

Before disconnecting conduits and drawbar eye, close tractor cab and secure it against access by unauthorised persons. Turn off tractor engine.

#### **4.3.1 TRAILER SUPPORT OPERATION**

Proper height of the drawbar eye in relation to the tractor hitch is set using the support with mechanical gear - figure (4.1).

Position (C) is used for fast rising and lowering the support foot in order to reduce the distance between the support foot and the ground. Position (B) is used for lowering and rising the drawbar of unloaded trailer. In position (B), the support foot (2) moves slowly and a large force is not required to raise the machine drawbar.

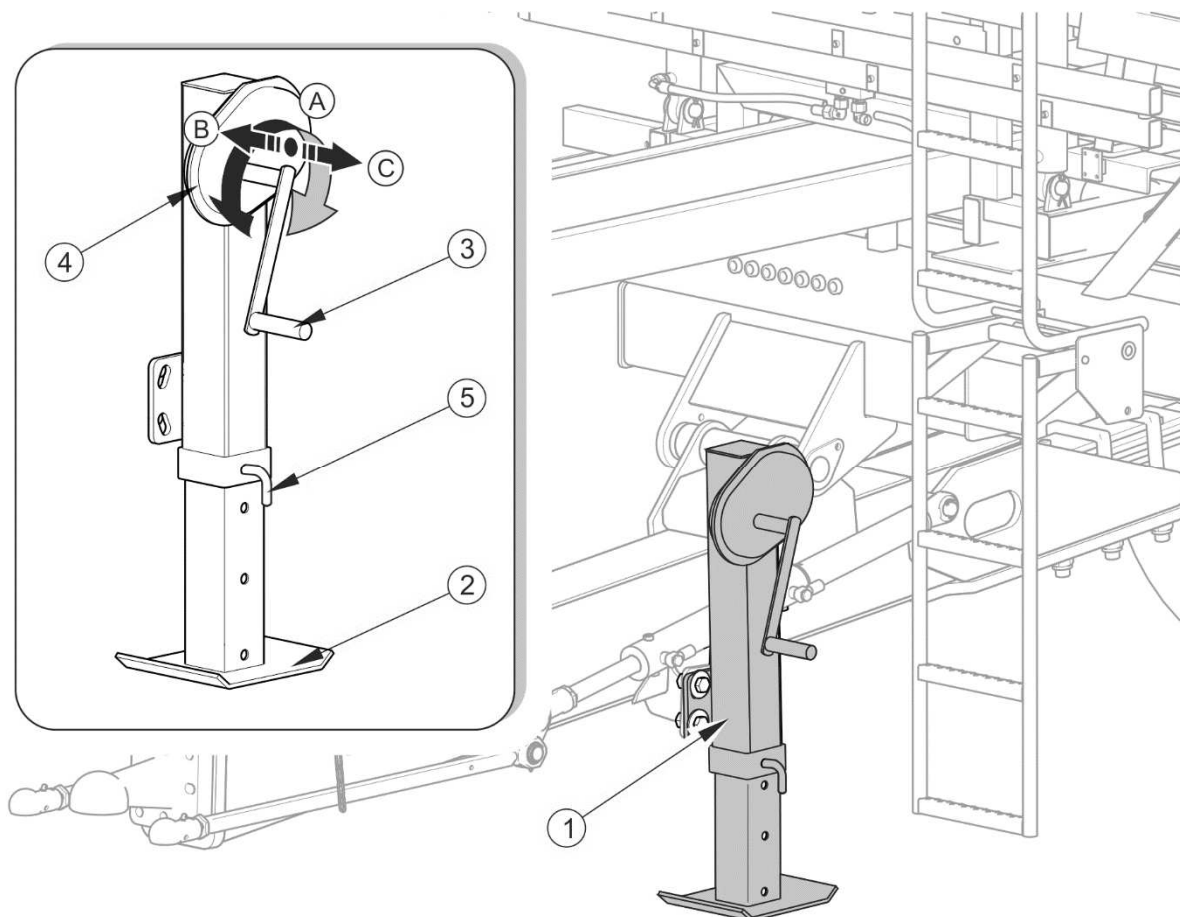
##### **Raising the support**

- ➔ Remove safety pin (5).
- ➔ Move support crank (3) from neutral position (A) to position (B).
- ➔ Turn the crank in proper direction in order to raise the support foot (2) maximally upwards.
- ➔ Install securing pin.
- ➔ Set the crank in neutral position (A).

##### **Lowering the support**

- ➔ Remove safety pin.
- ➔ Move crank (3) to position (B) or (C).

- ➔ Turn the crank in proper direction in order to lower the support to the ground or adjust the drawbar eye height in relation to the hitch (if the trailer is to be hitched to tractor)



**FIGURE 4.1** Adjusting the drawbar height

(1) support, (2) support foot, (3) crank, (4) gear, (5) securing pin, (A) neutral position, (B) position – I gear (speed under load), (C) position – II gear (high speed)

#### 4.3.2 SETTING THE HYDRAULIC SUSPENSION

The first setting of the hydraulic suspension involves levelling and proper adjusting of the suspension system. The trailer has conduits marked with colour plugs on quick couplers. The hydraulic suspension conduits (3 connectors) are marked with red plugs. Two of them are used for rising the left and the right side of the trailer, while the third conduit (additionally marked with a label) is used for rising the front axle. The suspension setting should be performed when the trailer is empty and positioned on a level ground. In order to do this:

- ➔ reverse the tractor to the trailer's drawbar,

- ➔ connect the hydraulic conduit for front axle rising (marked with the label) (item 13 - table 2.1) to the drain connector in the tractor, so called "free drain",
- ➔ connect the two remaining supply conduits marked with red plugs to two separate sections of the tractor's hydraulic system so as to make it possible to supply both systems simultaneously,
- ➔ position the trailer horizontally on a level surface,
- ➔ close the cut-off valves of hydraulic accumulators,
- ➔ unlock the ball valves of the hydraulic suspension system by turning the valve levers to open position,
- ➔ using two levers of the manifold of the tractor's external hydraulic system, apply pressure simultaneously to two sections in order to raise the trailer maximally (the maximum stroke of the cylinder is 200 mm),
- ➔ set the lever of the manifold of the tractor's external hydraulic system to floating position on both sections - the suspension will start lowering under the machine's weight,
- ➔ stop lowering halfway the cylinder stroke so that the extension of the cylinders is 100 mm,
- ➔ when the suspension system is set and levelled at a required working position, close the hydraulic valves of the supply system, disconnect supply conduits from the tractor manifold connectors and place them on the conduit bracket,
- ➔ open the cut-off valves of hydraulic accumulators,
- ➔ Relocate the conduit for front axle rising from the drain connector to any hydraulic connector on the tractor. This makes it possible to raise (switch supply on) or lower the front axle (set the manifold in floating position). When rising the front axle, one can notice that the entire trailer is being raised because the oil in the front suspension cylinders above the piston is pushed to the other cylinders.

The suspension setting procedure may be performed only when hitching the trailer to the tractor for the first time. This procedure does not have to be repeated unless the trailer must be lowered or raised.

**ATTENTION**



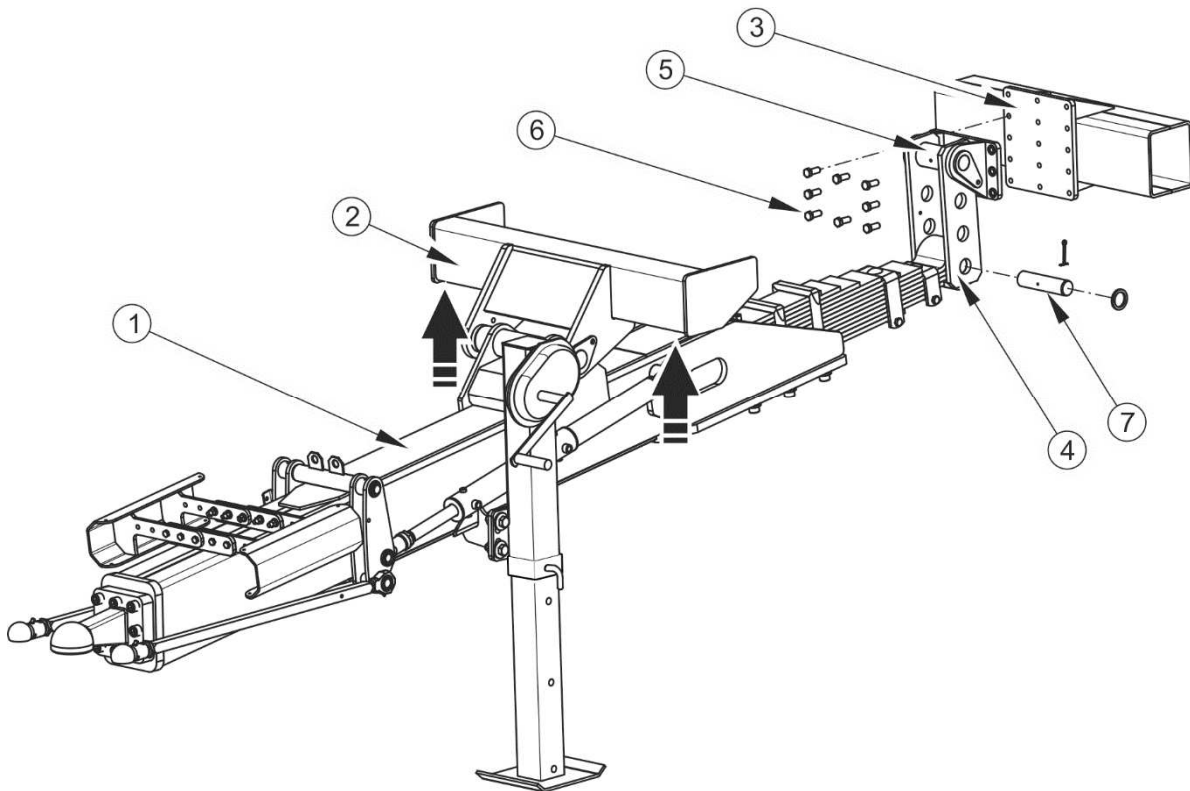
To ensure correct operation of the trailer's suspension, the hydraulic cylinder rods in unloaded trailer should be extended to half the length of the stroke (100mm).

The trailer must not be used when the hydraulic cylinders are set in the extreme positions.

Travelling with the front axle raised is allowed only when the trailer is empty.

**4.3.3 THE FIRST ADJUSTMENT OF THE DRAWBAR HEIGHT**

Drawbar position can be adjusted by changing the position of the rocker arm lug (5) with regard to drawbar fixing plate (3) to a proper height.



**FIGURE 4.2 Adjusting the drawbar height**

(1) drawbar, (2) front beam, (3) drawbar mounting plate (4) spring rocker arm, (5) rocker arm lug, (6) rocker arm lug securing bolts (7) rocker arm pin

To set the drawbar, proceed as follows:

- ➔ immobilise trailer with parking brake,
- ➔ prevent the trailer from rolling by placing chocks under the wheels,



- ➔ support the front beam (2) of the trailer on both sides of the drawbar (in the places indicated by arrows) using supports of a proper height.
- ➔ support the drawbar underneath using a jack shaft,
- ➔ remove the rocker arm lug (5) by loosening the mounting bolts (6) on the drawbar mounting plate,
- ➔ while adjusting the lifting jack, transfer the rocker arm lug (5) to the correct height (there are 3 possible settings) and secure with bolts (6).

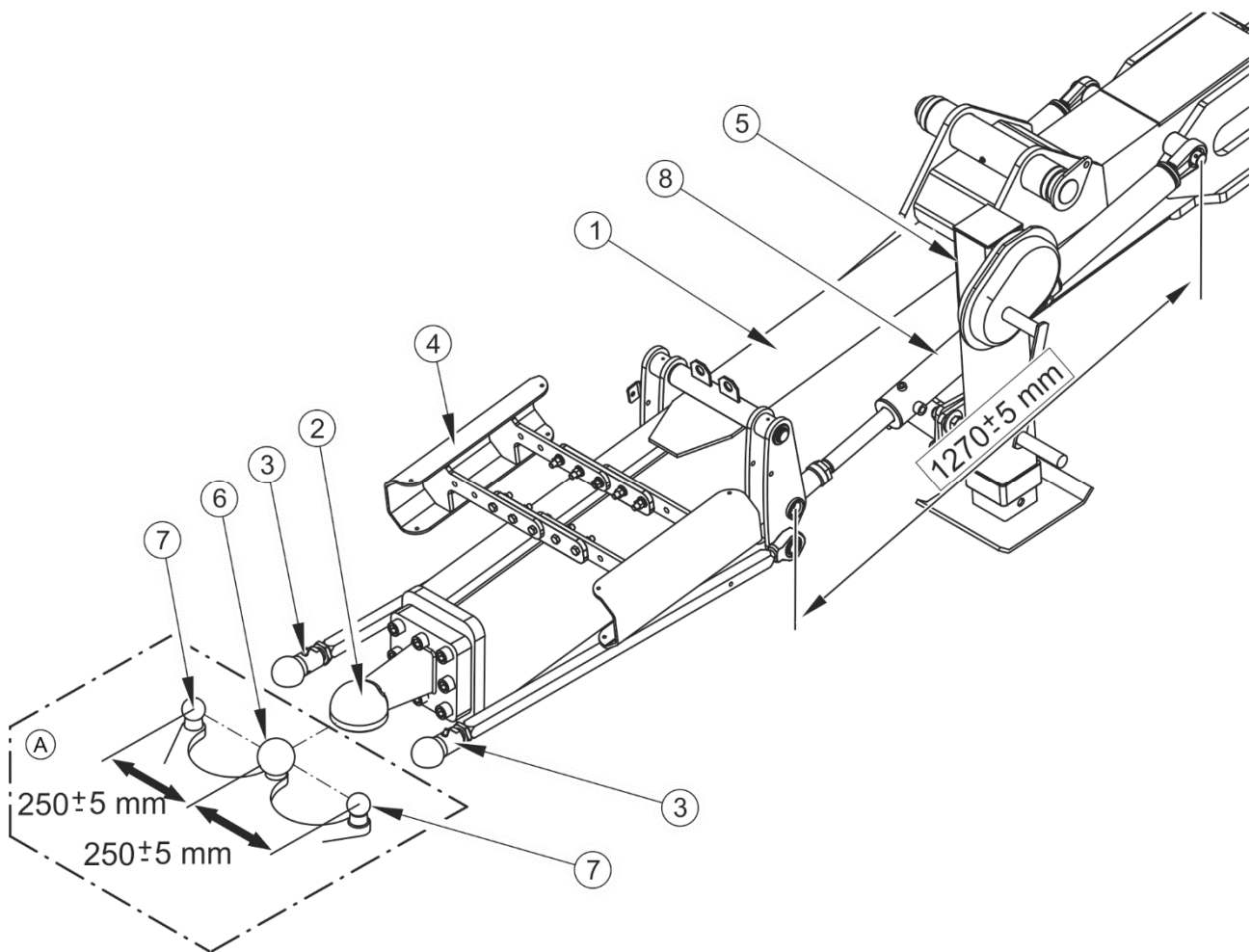
You can also adjust drawbar position by transferring the rocker arm pin (7) to the corresponding hole of the spring (4) rocker arm to obtain different height settings. The mounting height and position of the drawbar should be individually matched to tractor hitch.

#### **4.3.4 SETTING THE WHEEL STEERING SYSTEM**

Pronar T900 trailer with the hydraulic steering system should be hitched using suitable and certified tractor hitches equipped with two additional ball hitches (or attachments) with a ball diameter of Ø50 arranged according to the tractor hitch system diagram – see detail (A) figure (4.3). These hitches are designed for connecting to strings controlling the hydraulic cylinders responsible for turning the first wheel axle and the third wheel axle. The connection of the trailer steering system with the tractor meets the requirements of ISO 26402 standard.

During the first hitching of the trailer to the tractor, check correctness of operation of the wheel steering system. If system operation is found to be incorrect, follow these steps:

- ➔ position the agricultural tractor in front of the trailer's drawbar,
- ➔ using the support (5), set the height of the drawbar hitching eye (2) in relation to the tractor hitch system,
- ➔ reverse the tractor, connect the drawbar hitching eye (2) to the tractor hitch (6),
  - ⇒ check the hitch lock protecting the trailer against accidental unhitching,
- ➔ the drawbar's cylinders (8) should be set halfway the cylinder stroke so that their total length is approximately 1270 mm,



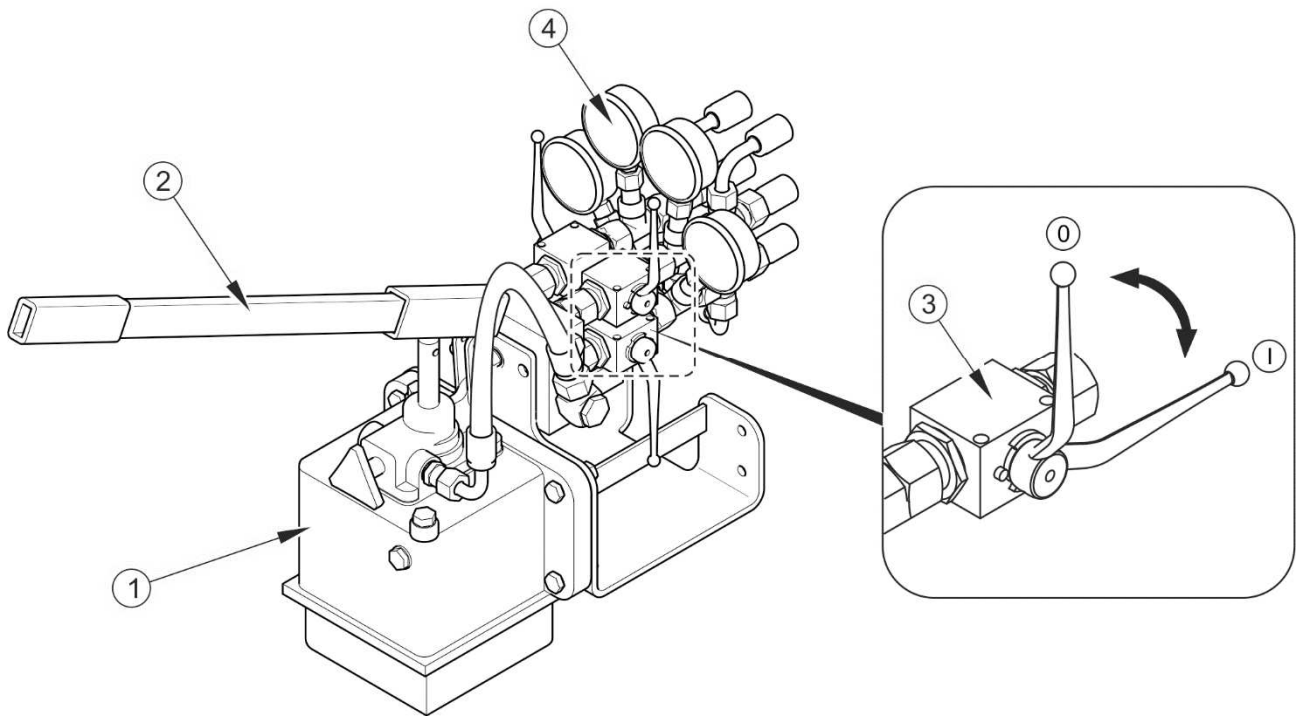
**FIGURE 4.3 Connecting the trailer steering system with the tractor**

(1) drawbar, (2) drawbar hitching eye, (3) string, (4) limiter, (5) mechanical support, (6) ball hitch with a ball diameter of  $\text{Ø}80$ , (7) ball hitch for connecting the steering system with a ball diameter of  $\text{Ø}50$ , (8) drawbar cylinder, (A) the tractor hitch system diagram meeting the requirements of ISO 26402 standard

- ➔ connect the strings (3) of the trailer steering mechanism with the tractor's ball hitches (or attachments) (7) and secure,
- ➔ set four hydraulic valves (3) located near the hand pump in "I" open position - figure (4.4),
- ➔ drive the tractor with the trailer attached at such a distance as to position the trailer wheels for forward driving,
- ➔ fill the system by means of the pump using hand lever (2) until each pressure gauge (4) indicates pressure of 80 bar - figure (4.4),

- ➔ close all valves (3) and set the pump lever (2) aside,
- ➔ drive the tractor with the trailer attached and check correctness of the system operation.

If the system malfunctions during the trailer use, perform the above adjustments.



**FIGURE 4.4** Hydraulic hand pump

(1) oil tank, (2) hand pump lever, (3) hydraulic valve, (4) manometer,  
(0)- closed position, (1)- opened position



### ATTENTION

Do not drive if the steering system is incorrectly adjusted.

## 4.4 OPERATION OF PNEUMATIC PARKING BRAKE

**TABLE 4.2** Operation of the T900 trailer's parking brake

NO.	LOOSENING VALVE (BLACK PUSH-BUTTON)	PARKING VALVE (RED PUSH-BUTTON)	TRAILER CONNECTED WITH TRACTOR BY MEANS OF PNEUMATIC CONDUITS	WORKING CONDITIONS	PARKING BRAKE
1	pulled out	pressed	yes	driving	released
2	pulled out	pulled out	yes	parking (tractor connected)	started
3	pressed	pressed	no	loosening	released
4	pressed	pulled out	no	parking (trailer is disconnected)	started

If the trailer is pneumatically connected with the tractor in a correct manner (line 1 and 2), the black push-button should be pulled out; the trailer's wheels are blocked by pulling the red push-button out – figure (3.18).

## 4.5 LOADING OF MATERIAL

Load box can be loaded only when the trailer is connected to the tractor and positioned horizontally. Always aim at distributing the load uniformly in the load box. This will ensure trailer stability when travelling and correct wheel axle and drawbar loads. When loading the load box, it is recommended to use a loader or belt conveyor. When loading silage directly from a self-propelled forage harvester or combine harvester, the load can be compacted by pressing with the sliding wall - consequently, much more silage can be transported.

When compacting the load, the sliding wall should be moved very slowly so as not to apply excessive pressure to the tailgate.

Before loading, check that the tailgate and chute slide gate are closed. Confirm that there are no objects in the load box. Avoid throwing material into the load box from a great height

because the trailer may be damaged. Loading of materials other than those recommended by the Manufacturer is forbidden.

### ATTENTION

Do **NOT** exceed the permissible load weight of trailer because this may cause danger to road traffic and cause damage to the machine.

People or animals must not be carried on the trailer.



The trailer is also designed for transport of harvested crops and agricultural products (volumetric or loose). It is permissible to transport other loads (building materials, packed loads), on the condition of securing the load box against damage (abrasion of paint covering, corrosion etc.).

Load must be uniformly distributed in the load box and it must not hinder driving. Loading and unloading work should be carried out by someone experienced in this type of work.

While loading harvested silage or grain on the go, maintain a constant distance between machines and adjust the speed of tractor with trailer to the speed of combine.

Due to the various density of materials, using the total load box capacity may lead to exceeding permissible carrying capacity of the trailer. Guideline specific weight of selected materials is given in table (4.3). Take care not to overload the trailer.

**TABLE 4.3 Guideline weights by volume of selected materials**

TYPE OF MATERIAL	WEIGHT BY VOLUME kg/m <sup>3</sup>
<b>Root crops:</b> raw potatoes steamed crushed potatoes dried potatoes sugar beet - roots fodder beet - roots	700 - 820 850 - 950 130 - 150 560 - 720 500 - 700
<b>Mineral fertilisers:</b> ammonium sulphate potash salt super phosphate basic slag phosphate potassium sulphate milled lime fertiliser	800 - 850 1 100 – 1 200 850 – 1 440 2 000 – 2 300 1 200 – 1 300 1 250 - 1 300

TYPE OF MATERIAL	WEIGHT BY VOLUME kg/m <sup>3</sup>
<b>Building materials:</b>	
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
cinders	650 - 750
gravel	1 600 – 1 800
rubble	1 050 – 1 200
<b>Concentrated feeds and mixed feeds:</b>	
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
bone meal	700 – 1 000
pasture salt	1 100 – 1 200
molasses	1 350 – 1 450
silage (pit silo)	650 – 1 050
hay silage (tower silo)	550 – 750

TYPE OF MATERIAL	WEIGHT BY VOLUME kg/m <sup>3</sup>
<b>Seeds and grains:</b> beans mustard peas lentils runner beans barley clover grass maize wheat oil seed rape linseed lupins oats lucerne rye	750 - 850 600 - 700 650 - 750 750 - 860 780 - 870 600 - 750 700 - 800 360 - 500 700 - 850 720 - 830 600 - 750 640 - 750 700 - 800 400 - 530 760 - 800 640 - 760
<b>Others:</b> dry soil wet soil fresh peat garden soil	1 300 – 1 400 1 900 – 2 100 700 - 850 250 - 350

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



### DANGER

The load on the trailer must be secured against slipping and contaminating the road during travel. If it is not possible to properly secure the load, do not transport it.

During loading the trailer, the drawbar eye and the tractor hitch are subjected to great vertical loads.

## Bulk materials

Loading bulk materials is normally conducted with the use of loaders or conveyors and possibly loading manually. Do not load bulk materials to a height greater than that of side walls or extensions. On completion of loading, the load should be evenly spread over the whole surface of the load box. Loading should be carried out by a person experienced in this type of work and having appropriate authorisation for operating equipment (if required).



### TIP

Damage to the paint coat inside the load box is normal and is not covered by warranty.

## Loads of pieces or solid lumps

Loads of pieces or solid lumps are generally hard materials of significantly greater dimensions than bulk loads (stones, coal, bricks and ballast). Loading of materials must take place from a low height. The load must not fall with great force on the floor of the load box.

## Hazardous loads

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



### DANGER

If it is necessary to carry permitted hazardous materials, acquaint yourself with the regulations concerning transport of hazardous materials in force in the given country and also the regulations of the ADR agreement.

Carefully read the information leaflets provided by the load manufacturer and observe the instructions for transporting and handling the load. Ensure whether during loading work it is necessary to apply additional personal protective equipment (masks, rubber gloves etc.)



## Loads in packaging

Loads transported in packaging (boxes, sacks) must be laid closely side-by-side beginning from the front side of the trailer. If it is essential to lay several layers, 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 during travel. Due to the trailer design (no load anchorages), packaged materials can be only arranged below the load box wall height.

### **DANGER**



If there is a danger of load packaging moving, do **NOT** transport this type of material. A moving load constitutes a serious hazard during travel for the tractor driver and other road users.

**Overloading the trailer, erroneous 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 threaten the stability of the trailer and does not hinder driving.**

**Ensure that there are no bystanders in the unloading and loading zone. Before unloading the load box ensure proper visibility and make certain that there are no bystanders near the trailer.**

Materials which may cause corrosion of steel, chemical damage or react in any other way negatively affecting the trailer structure may be transported only on condition of appropriate load preparation. Materials must be tightly packed (in plastic foil sacks, plastic containers etc.). During transport, packaging contents may not come into contact with load box. Therefore, ensure the appropriate tightness of containers.

It is impossible to describe all methods of loading due to the diversity of materials, tools, means of fixing and securing a load. While working be guided by caution and own experience. The trailer user must carefully read the regulations concerning road transport and comply with them.

## 4.6 TRANSPORTING THE MACHINE

When driving on roads, respect the road traffic regulations, exercise caution and prudence. Listed below are the key guidelines for driving the tractor and trailer combination.

- Before moving off, make sure that there are no bystanders, especially children, near the trailer or the tractor. Ensure that the driver has sufficient visibility.
- Make sure that the trailer is correctly hitched to the tractor and tractor's hitch is properly secured.
- Do NOT drive on public roads with the side hinged wall lowered.
- Travelling with the front axle raised is allowed only when the trailer is empty.
- Vertical load borne by the trailer drawbar eye affects the steering of the agricultural tractor.
- The trailer must not be overloaded, loads must be uniformly distributed so that the maximum permissible axle loads are not exceeded. The trailer's maximum carrying capacity must not be exceeded as this can damage the trailer and pose a risk to the operator or other road users.
- Permissible design speed and maximum speed allowed by road traffic law must not be exceeded. The towing speed should be adapted to the current road conditions, load carried by the trailer, road surface conditions and other relevant conditions.
- When not connected to the tractor, the trailer must be immobilised using parking brake and with chocks placed under the wheels. Do NOT leave unsecured trailer. In the event of machine malfunction, 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 slow-moving vehicle warning sign attached to the rear wall of load box, if the trailer is the last vehicle in the group.
- While driving on public roads the trailer must be fitted with a certified or authorised reflective warning triangle.

- When driving, comply with all road traffic regulations, indicate an intention to turn using indicator lamps, keep all road lights and indicator lights clean at all times and ensure they are in good condition. Any damaged or lost lamps or indicator lights must be immediately repaired or replaced.
- Avoid ruts, depressions, ditches or driving on roadside slopes. Driving across such obstacles could cause the trailer or the tractor to suddenly tilt. This is of special importance because loaded trailer's centre of gravity is higher (especially a high volume load), which reduces safety. Driving near ditches or channels is dangerous as there is a risk of the wheels sliding down the slope or the slope collapsing.
- 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.
- Please note that the braking distance of the tractor and trailer combination is substantially increased at higher speeds and loads.
- Monitor trailer's behaviour when travelling on an uneven terrain, and adjust driving speed to road conditions, slow down early enough when turning.
- The trailer is designed to operate on slopes up to 8°. Driving trailer across ground with steeper slopes may cause the trailer to tip over as a result of loss of stability. Prolonged driving across steep ground may lead to loss of braking efficiency.

### **ATTENTION**



**Travelling with a high-volume load over ruts, ditches, roadside slopes etc. constitutes a great risk of overturning the trailer. Exercise due caution.**

**Do NOT drive on public roads with the side hinged wall lowered.**

**Travelling with the front axle raised is allowed only when the trailer is empty.**

## 4.7 UNLOADING

Unloading of the T900 trailer's load box is performed by means of the front sliding wall mechanism. The hydraulic mechanism of the sliding wall is used for automatic unloading of the trailer by pushing the load to the rear. This system enables unloading in difficult atmospheric or spatial conditions, for example in low ceiling buildings, on steep slopes or in strong wind. In the last stage of unloading, the wall is hydraulically raised in order to thoroughly remove the remains of transported material from the load surface.

The trailer should be unloaded by performing the below-specified activities in the following sequence:

- ➔ place tractor and trailer to drive forwards on flat, stable and hard ground,
- ➔ immobilise tractor and trailer with parking brake,
- ➔ open the trailer tailgate by operating a lever of the tractor hydraulic manifold,
- ➔ shift the front wall to the rear by activating the shifting mechanism using the lever of the tractor hydraulic manifold,
- ➔ after unloading, reverse the front wall to the initial position by operating the lever of the tractor hydraulic manifold,
- ➔ close the tailgate by operating the suitable hydraulic circuit from the tractor,

### **DANGER**

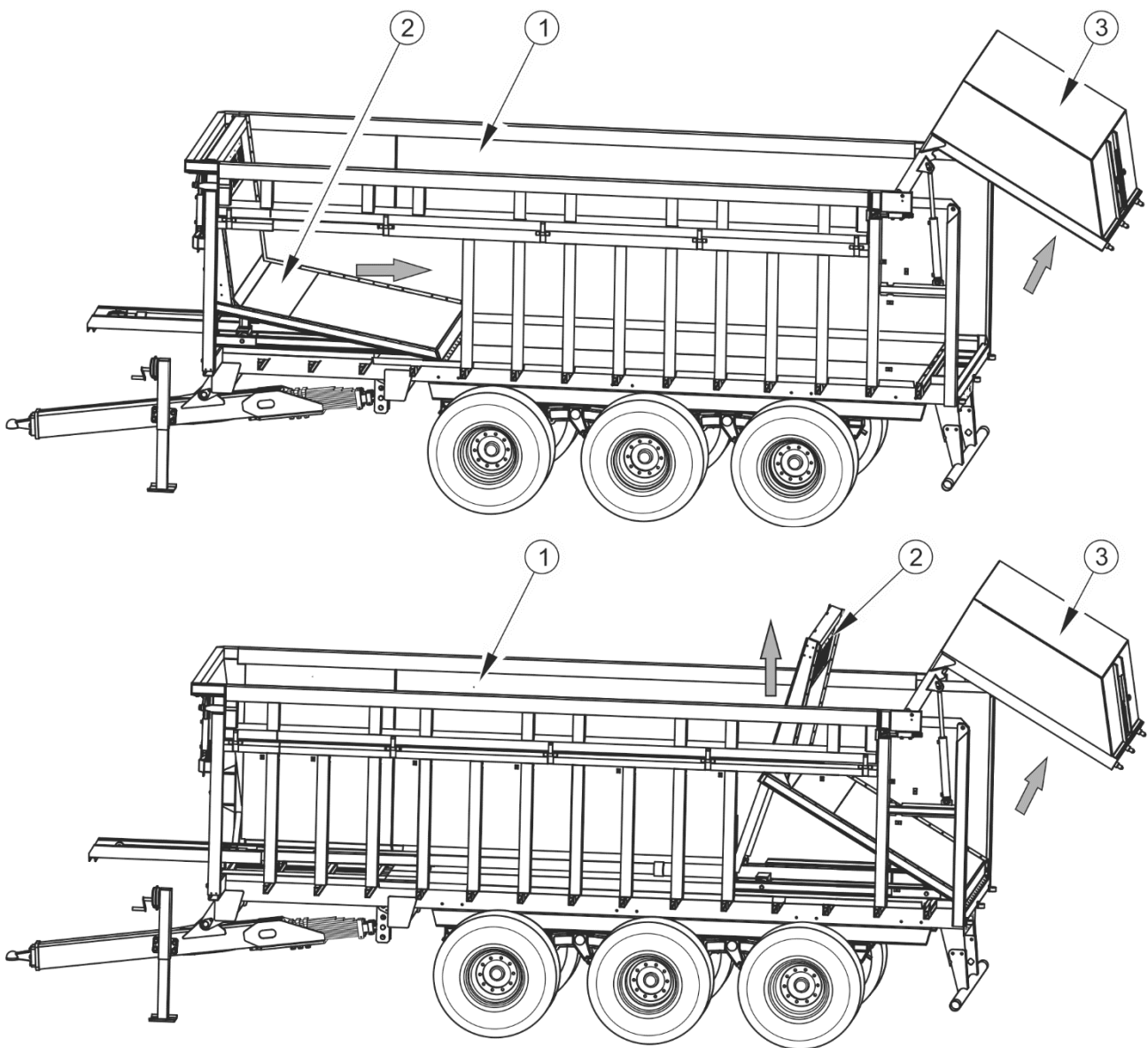


**DO NOT unload the trailer on unstable surface.**

**Ensure that during unloading nobody is in the vicinity of the load handled.**

**When closing the tailgate, take particular care as there is a risk of sustaining a serious injury.**

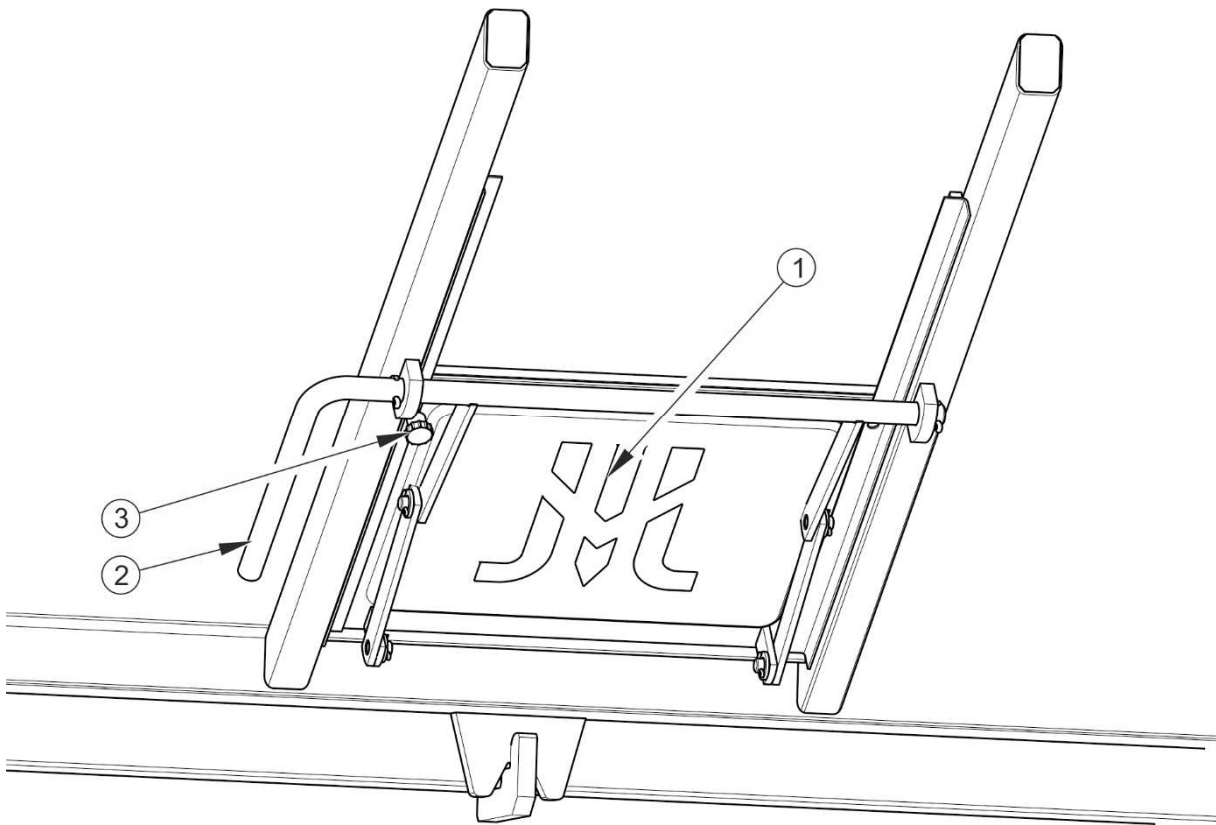
**When closing the grain chute, take particular care to avoid crushing fingers.**



**FIGURE 4.5 Unloading the load box**

*(1) load box, (2) sliding wall, (3) tailgate*

The load box tailgate is equipped with the grain chute – figure (4.6) for unloading loose materials. The width of the grain chute (1) opening can be adjusted by means of lever (2). The locking screw (3) must be loosened in order to open the grain chute gate.



**FIGURE 4.6 Grain chute**

*(1) grain chute, (2) lever, (3) locking screw*

## 4.8 PROPER USE AND MAINTENANCE OF TYRES

- When working on the tyres, chocks or other objects without sharp edges should be placed under the wheels of the trailer to prevent it from rolling. Wheels can be taken off the trailer axle only when the trailer is not loaded.
- Repair work on the wheels or tyres should be carried out by persons trained and entitled to do so. This work should be carried out using appropriate tools.
- Inspect tightness of nuts after the first use of trailer, after the first travel under load and then every 6 months of use or every 25,000 km. In the event of intensive work, check the nut tightening at least every 10,000 km. The inspection should be repeated individually if a wheel has been removed from the wheel axle.
- Regularly check and maintain correct air pressure in tyres according to Operator's Manual (especially if trailer is not used for a longer period).

- Air pressure in tyres should be also checked during the whole day of intensive work. Please note that higher temperatures could raise tyre pressure by as much as 1 bar. At high temperatures and pressure, reduce load or speed.
- Do not release air from warm tyres to adjust the pressure or the tyres will be underinflated when temperatures return to normal.
- Tyre valves should be protected with 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 afternoon.
- Take a 30 minute-break for cooling tyres after driving 75 km or after 150 minutes of continuous travel, depending on which occurs first.
- Avoid potholes, sudden manoeuvres or high speeds when turning.





***SECTION***

**5**

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**MAINTENANCE**

## 5.1 PRELIMINARY INFORMATION

When using the trailer, regular inspections of its technical condition are essential and the performance of maintenance procedures, which keep the machine in good technical condition. In connection with this the user of the trailer is obliged to perform all the maintenance and adjustment procedures defined by the Manufacturer.

Repairs during the warranty period may only be performed by authorised service points.

Detailed procedures and extent of activities which the user may perform by himself are described in this section. In the event of unauthorised repairs, changes to factory settings and other actions, which are not regarded as possible for the trailer operator to perform, the user shall invalidate the guarantee.

## 5.2 MAINTENANCE OF WHEEL AXLE

### 5.2.1 PRELIMINARY INFORMATION

Work connected with the repair, change or regeneration of axle components should be entrusted to specialist establishments, having the appropriate technology and qualifications for this type of work.

The responsibilities of the user are limited to:

- inspection and adjustment of slackness of axle bearings,
- mounting and dismounting wheel, inspection of wheel tightening,
- checking and maintaining proper air pressure in tyres, evaluating technical condition of wheels and tyres,
- checking thickness of brake shoe linings,
- mechanical brakes adjustment,

Procedures connected with:

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

- other axle repairs,

may be performed by specialized vehicle service stations.

### 5.2.2 CHECKING WHEEL AXLE BEARINGS FOR SLACKNESS

Wheel bearings are subject to wear. Their durability depends on use conditions, load, vehicle speed, adjustment and lubrication of bearings, etc. In order to check the condition of bearings, perform the actions below.

#### Preparation procedures

- ➔ Hitch trailer to tractor, immobilize tractor with parking brake.
- ➔ Park tractor and trailer on hard level ground.
  - ⇒ Tractor must be placed to drive forward.
- ➔ Place chocks under the trailer's wheel that will not be raised. Ensure that machine will not move during inspection.
- ➔ Raise the wheel (opposite to the side where chocks are placed).
  - ⇒ The lifting jack should be placed under the axle between U bolts fixing shock absorber leaf springs to the axle. Lifting jack must be suitable for the weight of the trailer.
- ➔ Release parking brake.

#### Checking wheel axle bearings for slackness

- ➔ Turning the wheel slowly in both directions check that movement is smooth and that the wheel rotates without excessive resistance.
- ➔ Turn the wheel so that it rotates very quickly, check that the bearing does not make any unusual sounds.
- ➔ Moving the wheel try to detect slackness.
  - ⇒ You may use a lever placed under the wheel supporting the other end of the lever on the floor.
- ➔ Repeat the procedure for each wheel individually, remembering that the jack must be on the side opposite to the chocks.

If slackness is felt, adjust bearings. Unusual sounds coming from bearing may be symptoms of excessive wear, dirt or damage. In such an event the bearing, together with sealing ring, should be replaced with new parts. During inspection of bearings, ensure that possibly detected slackness comes from the bearing and not from the suspension system (e.g. slackness of leaf spring pins etc.).

### TIP



If hub cover is damaged or missing, contamination and dampness enter the hub, which causes significantly faster wear of bearings and hub seals.

Life of bearings is dependent on working conditions of the trailer, loading, speed of travel and lubrication conditions.

Check condition of hub cover, if necessary replace it with a new cover. Inspection of bearing slackness may only be conducted when the trailer is hitched to a tractor and the load box is empty.

### Checking wheel axle bearings for slackness:



- after travelling the first 1,000 km,
- after intensive use of trailer,
- every six months use or every 25,000 km.

### DANGER



Before commencing work, the user must read the instructions for lifting jack and adhere to the manufacturer's instructions.

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

Ensure that trailer shall not move during inspection of axle bearing slackness.

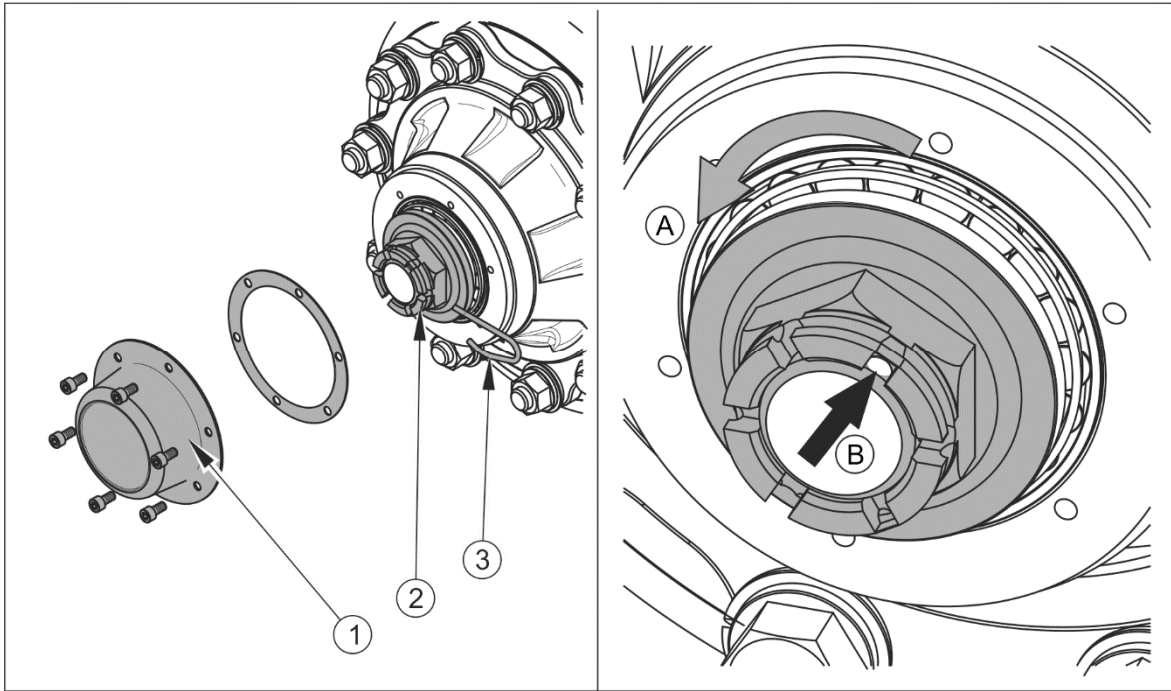
## 5.2.3 ADJUSTMENT OF AXLE BEARING SLACKNESS

The wheel should turn smoothly without jamming and detectable resistance. Adjustment of bearing slackness may only be conducted when the trailer is not loaded and is hitched to the tractor.

Ensure that the trailer is properly secured and will not move during wheel dismounting.

### Preparation procedures

- ➔ Prepare tractor and trailer for adjustment procedures according to description provided in section 5.2.2.



**FIGURE 5.1 Adjustment of wheel axle bearings**

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

### Adjustment of slackness of wheel axle bearing

- ➔ Take off hub cover (1), figure (5.2).
- ➔ Take out cotter pin (3) securing castellated nut (2).
- ➔ Tighten castellated nut in order to eliminate slackness.
  - ⇒ Wheel should rotate with insignificant resistance.
- ➔ Undo nut (not less than 1/3 rotation) to align the nearest thread groove with the opening in wheel axle pin. Wheel should rotate without excessive resistance.
  - ⇒ Nut may not be excessively tightened. Do not apply excessive pressure because working conditions of the bearings may deteriorate.
- ➔ Secure castellated nut with cotter pin and mount the hub cap.
- ➔ Delicately tap the hub cap with rubber or wooden mallet.

**TIP**

If the wheel is dismantled, bearing slackness is easy to check and adjust.

## 5.2.4 MOUNTING AND DISMOUNTING WHEEL, INSPECTION OF WHEEL NUT TIGHTENING

### Dismounting wheel

- ➔ Immobilise trailer with parking brake.
  - ⇒ If possible, wheels should be dismantled when the trailer is not loaded.
- ➔ Place the wheel chocks under the wheel opposite to the dismantled wheel.
- ➔ Ensure that trailer shall not move during wheel dismantling.
- ➔ Loosen wheel nuts according to sequence shown in figure (5.2).
- ➔ Place a lifting jack and raise the trailer to a sufficient height so that the wheel to be replaced does not touch the ground.
  - ⇒ The lifting jack should have sufficient lifting capacity and should be technically reliable.
  - ⇒ The lifting jack must be positioned on a level and hard surface so as to prevent sinking into the ground or relocating the jack during lifting.
  - ⇒ If necessary, use proper backing plates in order to reduce unit pressure of the jack's base on the ground and prevent its sinking into the ground.
- ➔ Dismount wheel.

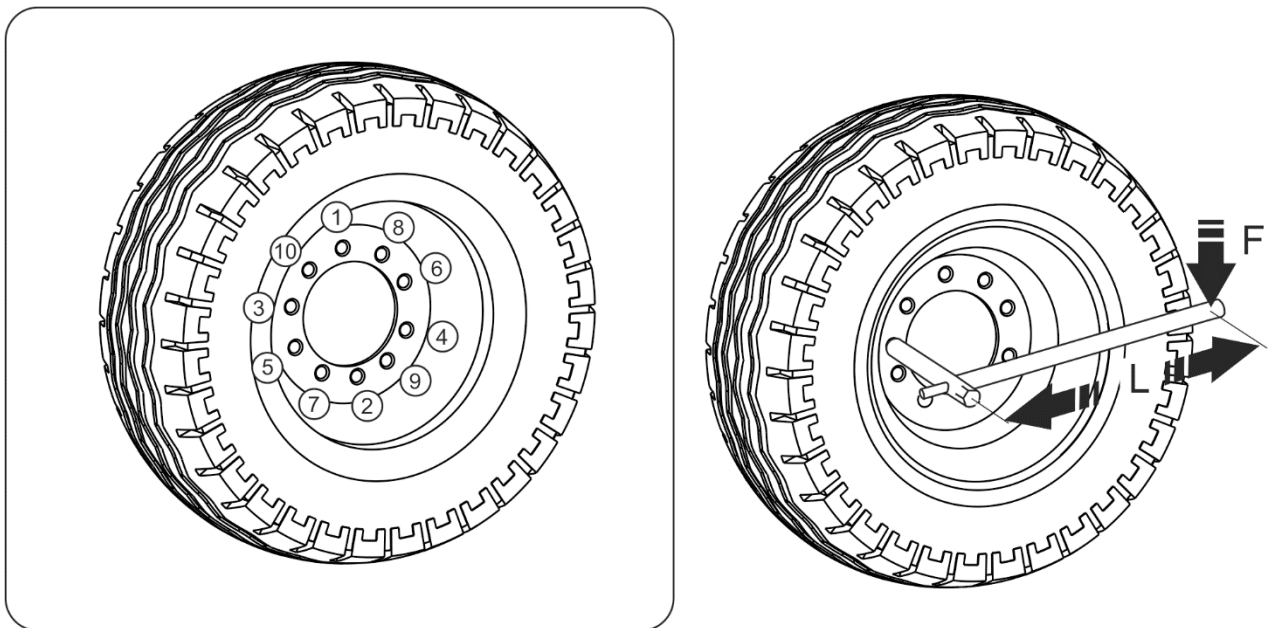
### Wheel mounting

- ➔ Clean axle pins and nuts of contamination.
  - ⇒ Do not grease thread of nuts and pins.
- ➔ Check condition of pins and nuts, if necessary replace them.
- ➔ Place wheel on hub, tighten nuts so that wheel rim tightly fits the hub.

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

### Tightening nuts

Nuts should be tightened gradually diagonally, (in several stages, until obtaining the required tightening torque) using a torque spanner. If a torque spanner is not available, one may use an ordinary spanner. The arm of the spanner ( $L$ ), figure (5.2), 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.



**FIGURE 5.2** Sequence of tightening nuts, axles with 10 M22x1.5 pins

(1) - (10) sequence of nut tightening, ( $L$ ) spanner length, ( $F$ ) user weight

**TABLE 5.1** Spanner arm

WHEEL TIGHTENING TORQUE	BODY WEIGHT ( $F$ )	ARM LENGTH ( $L$ )
[Nm]	[kg]	[m]
450	90	0.5
	80	0.55
	70	0.65
	60	0.75

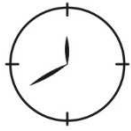
**TIP**

Wheel nuts should be tightened using the torque of 450 Nm - M22x1.5 nuts.

**ATTENTION**

Wheel 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 connection or breaking off the hub pin.

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

**ATTENTION**

Checking the wheel nut tightening:

- after first use,
- after first travel with load,
- after travelling the first 1,000 km,
- every six months of use or every 25,000 km.

In the event of intensive work the wheel nut tightening should be checked at least every 10 000 km. The above actions should be repeated individually if a wheel has been removed from the wheel axle.

### 5.2.5 CHECKING AIR PRESSURE IN TYRES, EVALUATING TECHNICAL CONDITION OF TYRES AND STEEL WHEELS

Air pressure in tyres should be checked each time after changing a spare wheel and at least once a month. In the event of intensive use, air pressure in tyres should be checked more frequently. During this time, the trailer must be unloaded. Checking should be done before travelling when tyres are not heated, or after an extended period of parking.

**TIP**

Tyre pressure values are specified in information decal, placed on wheel or on upper frame above trailer wheel.



While checking pressure pay attention to technical condition of wheels and tyres. Look carefully at tyre sides and check the condition of tread.

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



## **DANGER**

**Damaged tyres or wheels may be the cause of a serious accident.**

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

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



### **Checking air pressure in tyres and visual inspection of steel wheels:**

- every 1 month of use,
- if needed.

## **5.2.6 CHECKING THICKNESS OF BRAKE SHOE LININGS**

During use of trailer, friction lining of brake drums is subject to wear. In such a case, the complete brake shoes should be replaced with new ones. Excessive wear of brake shoes is the condition in which the thickness of linings which are glued or riveted to steel structures of brake shoes is smaller than the minimum value. This condition is indicated by extended cylinder piston stroke. Check technical condition of brake shoe linings through inspection openings (3) – figure (5.3).

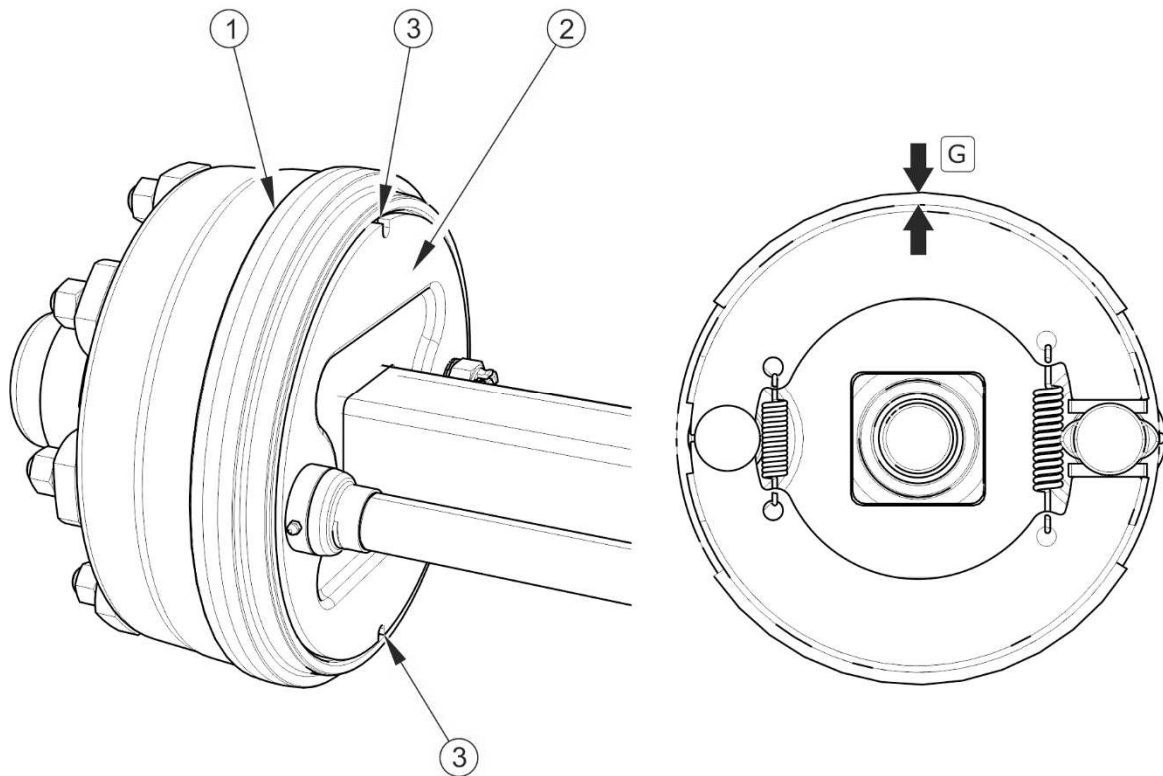


## **TIP**

**Minimum thickness of brake shoe linings is 5 mm.**



- **Thickness of brake shoe linings should be checked every 6 months.**



**FIGURE 5.3** Checking brake shoe linings

(1) brake drum, (2) disc, (3) inspection openings, (G) thickness of brake shoe lining

### 5.2.7 ADJUSTMENT OF MECHANICAL BRAKES

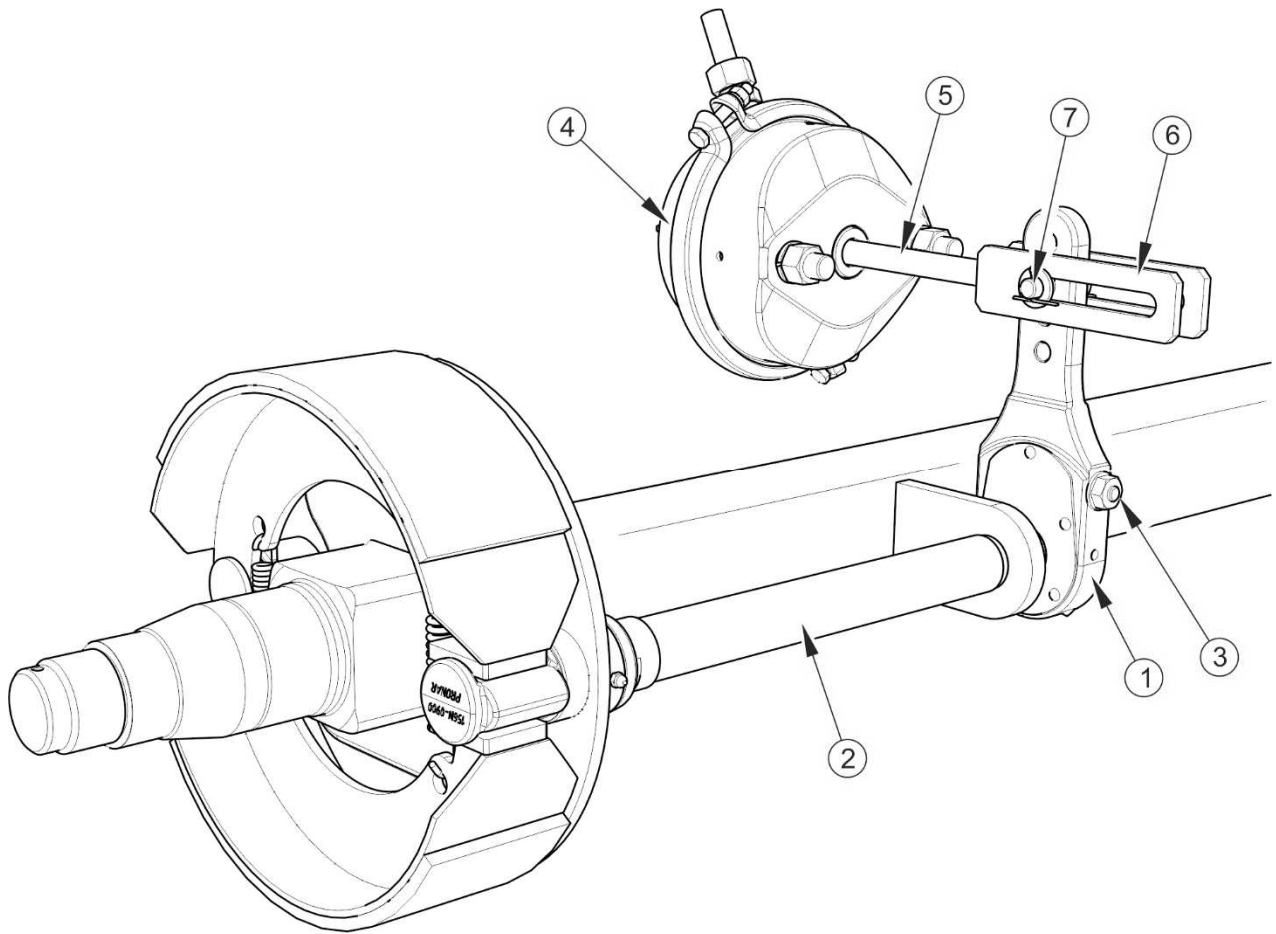
Considerable wear of brake shoe linings results in increased brake cylinder rod stroke and worse braking efficiency.



**TIP**

Correct brake cylinder piston stroke should be within the range of 25 – 45 mm.

During braking, the brake cylinder piston stroke should be within the specified operating range and the angle between brake cylinder piston (1) and expander arm (3) should be about 90° – compare figure (5.5).

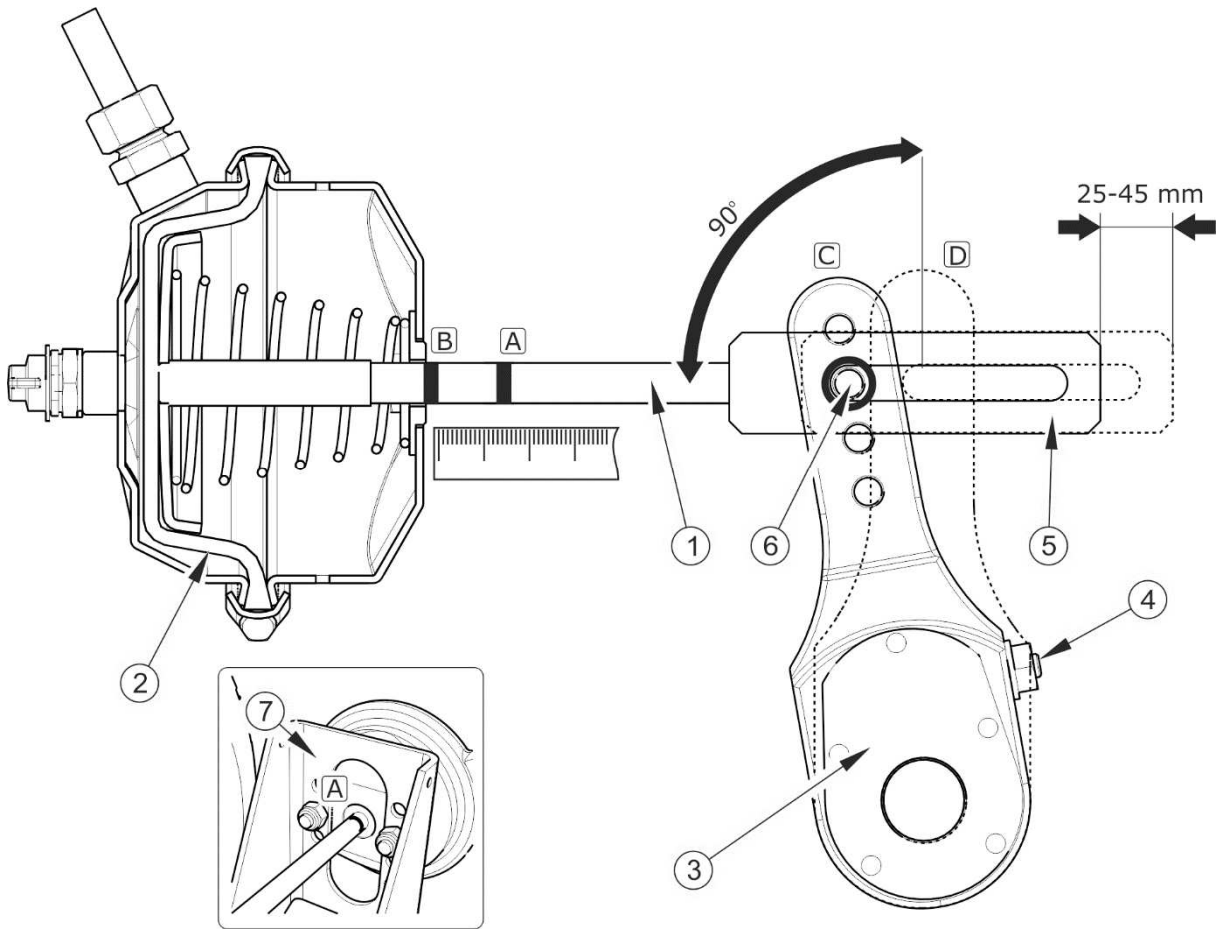


**FIGURE 5.4 Design of wheel axle brake**

(1) *expander arm*, (2) *expander shaft*, (3) *adjustment bolt*, (4) *brake cylinder*, (5) *brake cylinder piston*, (6) *cylinder fork*, (7) *fork pin*

Braking force decreases also when the operating angle of the brake cylinder rod (5) – figure (5.4) in relation to the expander arm (1) is wrong. In order to obtain the optimum mechanical operating angle, the cylinder piston fork (6) must be installed on the expander arm (1) in such a manner as to ensure that the operating angle at full braking is about 90°.

The inspection involves measuring the extension length of each brake cylinder rod while braking at parking. If the brake cylinder rod stroke exceeds the maximum value (45 mm), the braking system should be adjusted.



**FIGURE 5.5 Principle of brake adjustment**

(1) brake cylinder piston, (2) brake cylinder membrane, (3) expander arm, (4) adjustment bolt, (5) cylinder fork, (6) position of fork pin, (7) brake cylinder bracket, (A) mark on the brake cylinder at brake release position, (B) mark on the brake cylinder at full braking position, (C) position of arm at brake release position, (D) position of arm at full braking position



**ATTENTION**

Incorrectly adjusted brake may cause rubbing of brake shoes against brake drums, which may lead to faster wear of brake linings and/or brake overheating.



- Check technical condition of brake every 6 months.

**Required maintenance actions**

- ➔ Hitch trailer to tractor.
- ➔ Turn off tractor engine and remove key from ignition.
- ➔ Immobilise the tractor with parking brake.
- ➔ Make sure that the trailer's brakes are not engaged.
- ➔ Secure the trailer against moving by placing wheel chocks.
- ➔ Make a line (A) on the brake cylinder piston (1) to indicate the position of the maximum withdrawal of the brake cylinder piston rod when the trailer's brakes are released.
- ➔ Press the tractor brake pedal and mark the position of the maximum extension of the brake cylinder piston rod with a line (B).
- ➔ Measure the distance between lines (A) and (B). If the brake cylinder rod stroke is outside the proper operating range, adjust the expander arm.
- ➔ Dismantle brake cylinder fork pin.
- ➔ Remember or mark the original position of pin (6) – figure (5.5), brake cylinder fork (5) in expander arm opening (3).
- ➔ Check if the brake cylinder piston rod moves freely and within the whole nominal range.
- ➔ Check if the brake cylinder vent holes are not blocked with impurities and that there is no water or ice inside the brake cylinder. Check if the brake cylinder is correctly installed.
- ➔ Clean the brake cylinder. If necessary, defrost the brake cylinder and drain water through the unblocked vent holes. Replace damaged brake cylinder with a new one. When installing the brake cylinder, maintain its original position with regard to bracket (7).
- ➔ Rotate adjustment bolt (4) to align the marked expander arm opening with the brake cylinder fork opening.
  - ⇒ During adjustment, membrane (2) must rest on the rear wall of the brake cylinder – compare figure (5.6).

- ➔ Install the brake cylinder fork pin and washers and secure the pin with cotter pins.
- ➔ Rotate adjustment bolt (4) to the right until one or two clicking sounds are heard in the expander arm regulating mechanism.
- ➔ Repeat adjustment activities for the other brake cylinder on the same axle.
- ➔ Engage the brake.
- ➔ Remove previous marks and measure the brake cylinder piston rod stroke again.
- ➔ If the brake cylinder piston rod stroke is outside the proper operating range, repeat the adjustment.



- Before the period of intensive use.
- Every 6 months.
- After repair of braking system.
- In case of uneven trailer wheel braking.



### **ATTENTION**

The positions for fixing the brake cylinder in the bracket openings and the brake cylinder pin in the expander arm are determined by the Manufacturer and must not be changed.

Each time when dismantling the pin or brake cylinder, the original fixing position should be marked.

## **5.3 PNEUMATIC SYSTEM MAINTENANCE**

### **5.3.1 PRELIMINARY INFORMATION**

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

The duties of the operator connected with the pneumatic system maintenance include:

- checking tightness and visual inspection of the system,
- cleaning the air filter (filters),
- draining water from air tank,
- cleaning drain valve,
- cleaning and maintaining pneumatic conduit connections,
- replacement of the pneumatic conduit.

**DANGER**

Do NOT use the trailer when brake system is unreliable.


### 5.3.2 CHECKING AIR TIGHTNESS AND VISUAL INSPECTION OF PNEUMATIC SYSTEM

#### Checking air tightness of pneumatic system

- ➔ Hitch trailer to tractor.
- ➔ Immobilise tractor and trailer with parking brake, place the wheel chocks under the trailer wheels.
- ➔ Connect the pneumatic conduits.
- ➔ Start tractor in order to supplement air in trailer brake system tank.
  - ⇒ In double conduit systems air pressure should amount to approx. 8 bar.
- ➔ Turn off tractor engine.
- ➔ Check system components by releasing brake pedal in tractor.
  - ⇒ Pay particular attention to conduit connections and brake cylinders.
- ➔ Repeat the system check with depressed tractor brake pedal.
  - ⇒ The help of a second person is required.


In the event of the appearance of leaks, compressed air will escape at the places of damage, with a characteristic hiss. Lack of system tightness may be detected by covering checked


elements with washing fluid or other foaming preparations, which will not react aggressively with the system components. Damaged components should be replaced or repaired. If leaks appear at connections then tighten the connections. If air continues to escape, replace connection components or seals with new ones.

	<b>Check system tightness</b>
	<ul style="list-style-type: none"><li>• after travelling the first 1,000 km,</li><li>• each time after making repairs or changing system components,</li><li>• annually.</li></ul>

### Visual inspection of the system


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

	<b>Visual inspection of the system</b>
	<ul style="list-style-type: none"><li>• Conduct inspection of system at the same time as when checking tightness.</li></ul>

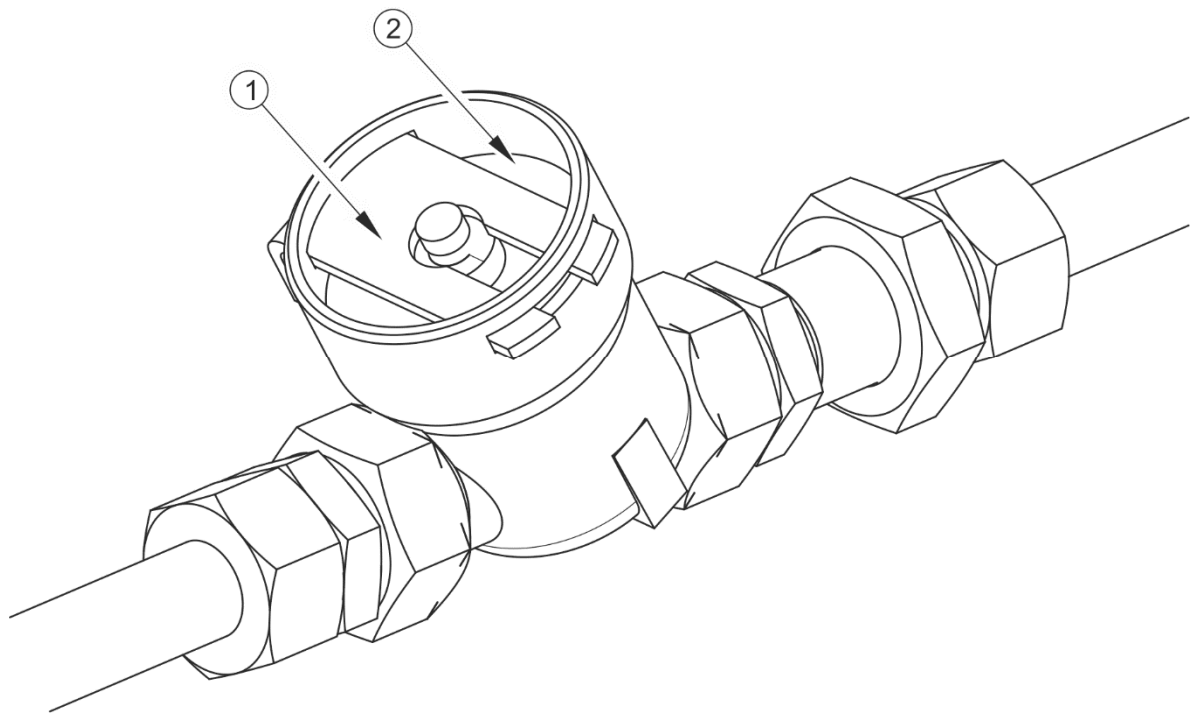
	<b>ATTENTION</b>
	Repair, exchange or regeneration of pneumatic system components may only be performed in a specialised workshop.

### 5.3.3 CLEANING THE AIR FILTERS

Depending on trailer working conditions, but not less than once in three months, take out and clean air filter elements, which are located in pneumatic system connection conduits. Filter elements are reusable and are not subject to change unless they are mechanically damaged.

	<b>DANGER</b>
	Before proceeding to dismantle filter, reduce pressure in supply conduit. While dismantling the slide lock, hold the cover with the other hand. Stand away from filter cover vertical direction.





**FIGURE 5.6 Air filter**

*(1) securing slide lock, (2) air filter cover*

#### **Required maintenance actions**

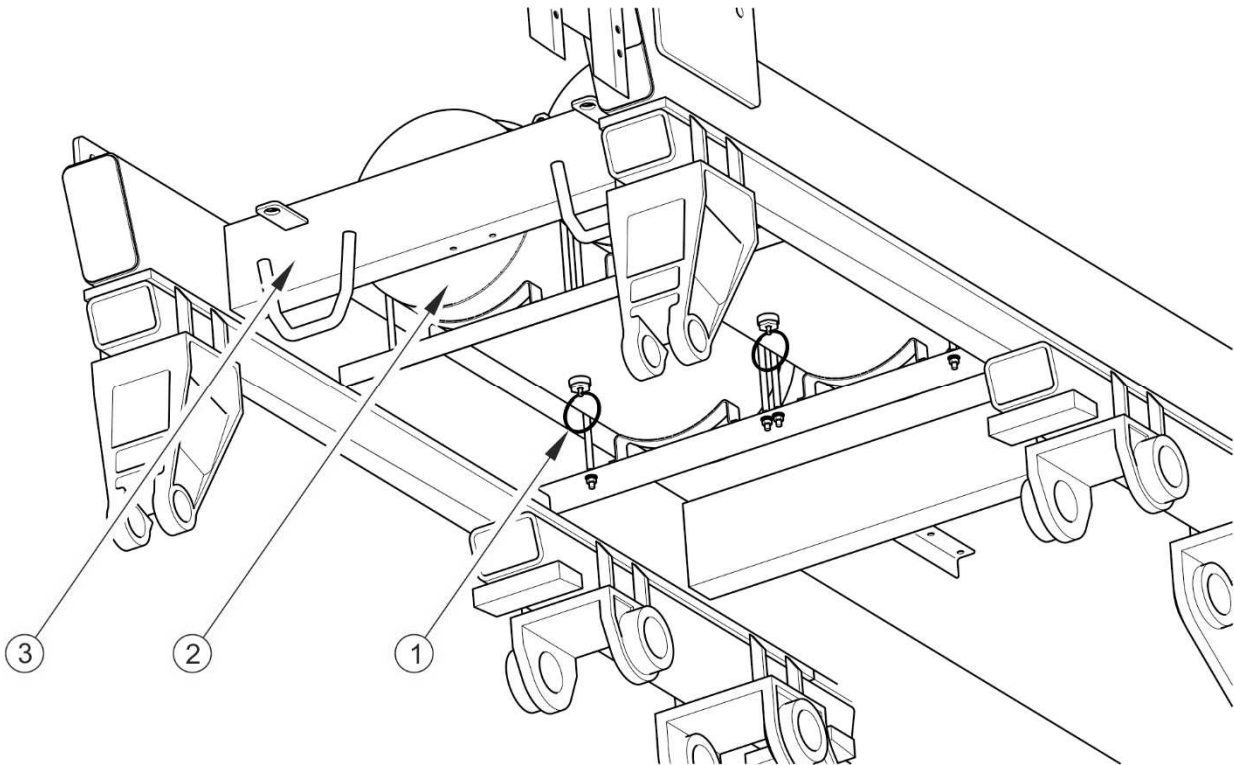
- ➔ Reduce pressure in supply conduit.
  - ⇒ Reduction of pressure in conduit may be achieved by pressing the head of the pneumatic connection until resistance is felt.
- ➔ Slide out securing slide lock (1) – figure (5.6).
  - ⇒ Hold the filter cover (2) with the other hand. After removing slide lock, the cover is pushed off by the spring located in the filter housing.
- ➔ The filter element and the filter body should be carefully cleaned and blown through with compressed air. Assembly should be done in reverse order.



#### **Cleaning the air filter (filters):**

- every 3 months of use,

### 5.3.4 DRAINING WATER FROM AIR TANK



**FIGURE 5.7** Draining water from air tank

(1) drain valve, (2) air tank, (3) lower frame

#### Required maintenance actions

- Tilt drain valve stem (1) located in the lower part of tank (2).
  - ⇒ The compressed air in the tank causes the removal of water to the exterior.
- Released valve stem should automatically close and stop flow of air from the tank.
  - ⇒ In the event, that the valve stem resists returning to its setting, then the whole drain valve must be unscrewed and cleaned, or replaced (if it is damaged) - see section (5.3.5).
- Repeat all above steps for the other tank.



#### Draining water from air tank:

- after each week of use.

### 5.3.5 CLEANING THE DRAIN VALVE



#### **DANGER**

Release air from the air tank before dismantling drain valve.

#### **Required maintenance actions**

- ➔ Completely reduce pressure in air tanks.
  - ⇒ Reduction of pressure in tank is achieved by tilting the drain valve stem.
- ➔ Unscrew valve.
- ➔ Clean the valve, blow it with compressed air.
- ➔ Change copper seal.
- ➔ Screw in valve, fill tank with air and check tank tightness.



#### **Cleaning valve:**

- every 12 months (before winter period).

### 5.3.6 CLEANING AND MAINTAINING PNEUMATIC CONDUIT CONNECTIONS AND PNEUMATIC SOCKETS

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

If the trailer is unhitched from the tractor, connections should be protected by covers or placed in their designated sockets. Before the winter, it is recommended to preserve the seal with special preparations (e.g. silicon grease for rubber elements).



#### **DANGER**

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

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



**Inspecting trailer connections:**

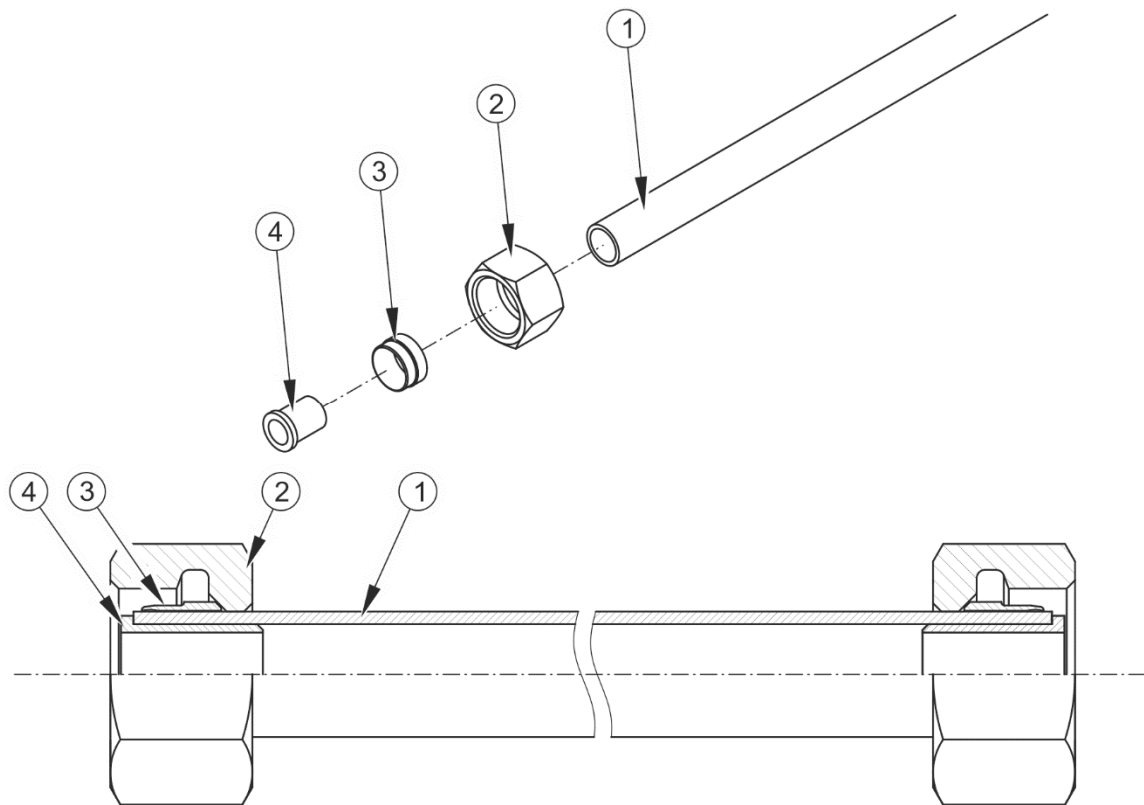
- each time before hitching trailer to tractor.

### 5.3.7 REPLACEMENT OF PNEUMATIC CONDUIT

Pneumatic conduits should be replaced when permanently deformed, cut or frayed.

#### Required maintenance actions

- Release all pressure from the system.
  - ⇒ Reduction of pressure is achieved by tilting the drain valve mandrel.
- Remove the pneumatic conduit by loosening the nut (2).
- Fit the new conduit.
  - ⇒ The interior of the conduit should be clean.
  - ⇒ The ends of the pneumatic conduit (1) must be cut exactly at right angles.
  - ⇒ Clamping ring (3) should be fitted according to figure (5.8).
  - ⇒ Reinforcing sleeve (4) of the conduit must be thoroughly depressed.
- Check tightness of connections in accordance with section (5.3.2).



**FIGURE 5.8 Installation of pneumatic conduit**

(1) pneumatic conduit, (2) connecting nut (3) clamping ring, (4) reinforcing sleeve

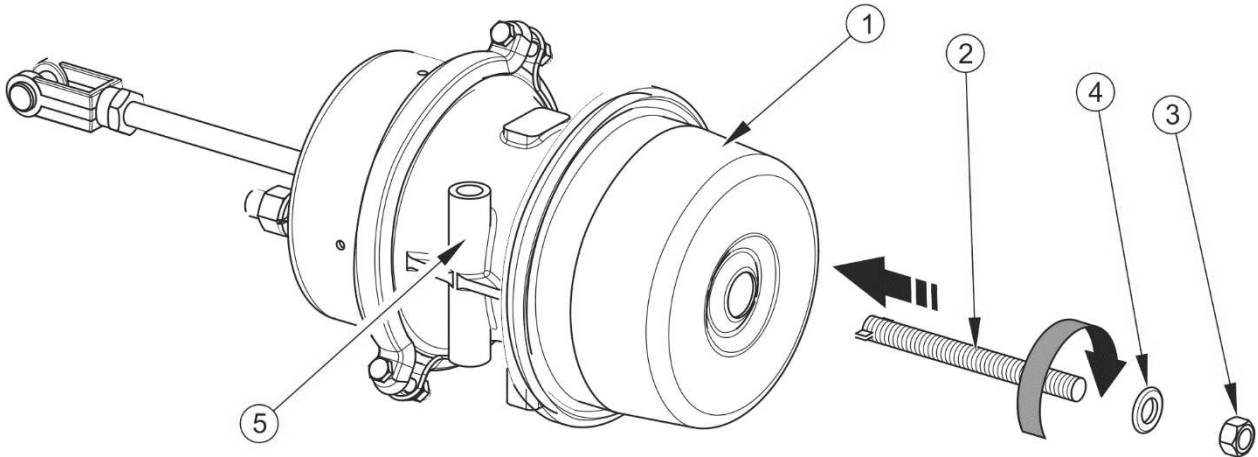
## 5.4 EMERGENCY RELEASE OF DIAPHRAGM ACTUATOR

Pneumatic system failure causing air release from brake cylinders results in braking the trailer by means of diaphragm actuators. Emergency release of these actuators involves putting a spring under tension by means of a tensioning bolt. During normal operation, the bolt is located in the actuator holder (5).

### Emergency release of diaphragm actuator

- Immobilise the trolley screen by placing wheel chocks under the wheels.
- Remove stopper from the opening of the rear actuator.
- Insert tensioning bolt (2) into rear opening of the actuator (1).
- Turn the bolt by 90°.
- Install washer (4) and screw nut (3) on.

- Tighten the nut until resistance is felt,
- Repeat the above steps for the other actuator.



**FIGURE 5.9 Emergency release of diaphragm actuator**

(1) diaphragm-spring actuator, (2) tensioning bolt, (3) nut, (4) washer, (5) tensioning bolt holder

In order to return to actuator normal operation mode, undo nut (3) and take tensioning bolt (2) out of the actuator. After completion of the activities, place the bolt together with other elements in the actuator holder (5) and protect the rear opening with a plastic stopper.

**DANGER**



Exercise caution while working. During putting the actuator spring under tension, the trailer is not immobilised with parking brake. That is why chocks must be placed under the trailer wheels in order to secure the trailer against rolling.

The actuator may be repaired only in an authorised service centre.

Do NOT travel with unreliable brake system.

**5.5 HYDRAULIC SYSTEM MAINTENANCE**

**5.5.1 PRELIMINARY INFORMATION**

Work connected with the repair, change or regeneration of hydraulic system components (hydraulic cylinders, valves etc.) should be entrusted to specialist establishments, having the appropriate technology and qualifications for this type of work.

The duties of the operator connected with the hydraulic system maintenance include:

- checking tightness and visual inspection of the system,
- checking technical condition of hydraulic connections.



### **ATTENTION**

Use the hydraulic oil recommended by the Manufacturer. Never mix two types of oil.  
The condition of hydraulic systems should be inspected regularly while using trailer.



### **DANGER**

Do NOT use the trailer with unreliable hydraulic system of the sliding wall.  
Do NOT use the trailer if hydraulic suspension system (option) is unreliable.  
Do NOT use the trailer if hydraulic brake system is unreliable.  
Do NOT use the trailer if hydraulic tailgate system is unreliable.  
The hydraulic system is under high pressure when operating.

## **5.5.2 CHECKING HYDRAULIC SYSTEM TIGHTNESS**


### **Required maintenance actions**

- ➔ Hitch trailer to tractor.
- ➔ Connect all hydraulic system conduits according to maintenance instructions.
- ➔ Clean connections and cylinders (cylinders of sliding wall, tailgate cylinders and possibly, hydraulic brake cylinders and suspension cylinders).
- ➔ Shift the sliding wall maximally to the rear and tip it – repeat the actions several times.
- ➔ Open and close the tailgate several times.
- ➔ Press tractor brake pedal several times.
  - ⇒ Only if the trailer is equipped with hydraulic brake system.
- ➔ Perform test drive while observing the operation of the hydraulic steering system.
  - ⇒ The help of a second person is required.
- ➔ Open and close the side hinged wall several times.

⇒ If the trailer is equipped with the side hinged wall.

- ➔ Check hydraulic cylinders and conduits for tightness.

In oil is found on hydraulic cylinder bodies ascertain origin of leak. Inspect seals when hydraulic cylinder is completely extended. Minimum leaks are permissible with symptoms of "sweating", however in the event of noticing leaks in the form of "droplets" stop using the trailer until faults are remedied. If unreliability is evident in brake cylinders, do NOT use trailer with damaged system until faults are remedied.




**Checking tightness:**

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

### 5.5.3 INSPECTION OF HYDRAULIC COUPLERS AND SOCKETS:

Hydraulic couplers and sockets of the trailer and tractor must be technically reliable and kept clean. Tractor and trailer hydraulic systems are sensitive to the presence of permanent contamination, which may cause damage to precision system components (jamming of hydraulic valves, scratching of cylinder surfaces etc.)




**Inspection of hydraulic couplers and sockets:**

- each time before hitching trailer to tractor.

### 5.5.4 REPLACEMENT OF HYDRAULIC CONDUITS

Rubber hydraulic conduits must be replaced every 4 years regardless of their technical condition. This should be done in specialised workshops.



**Replacement of hydraulic conduits:**

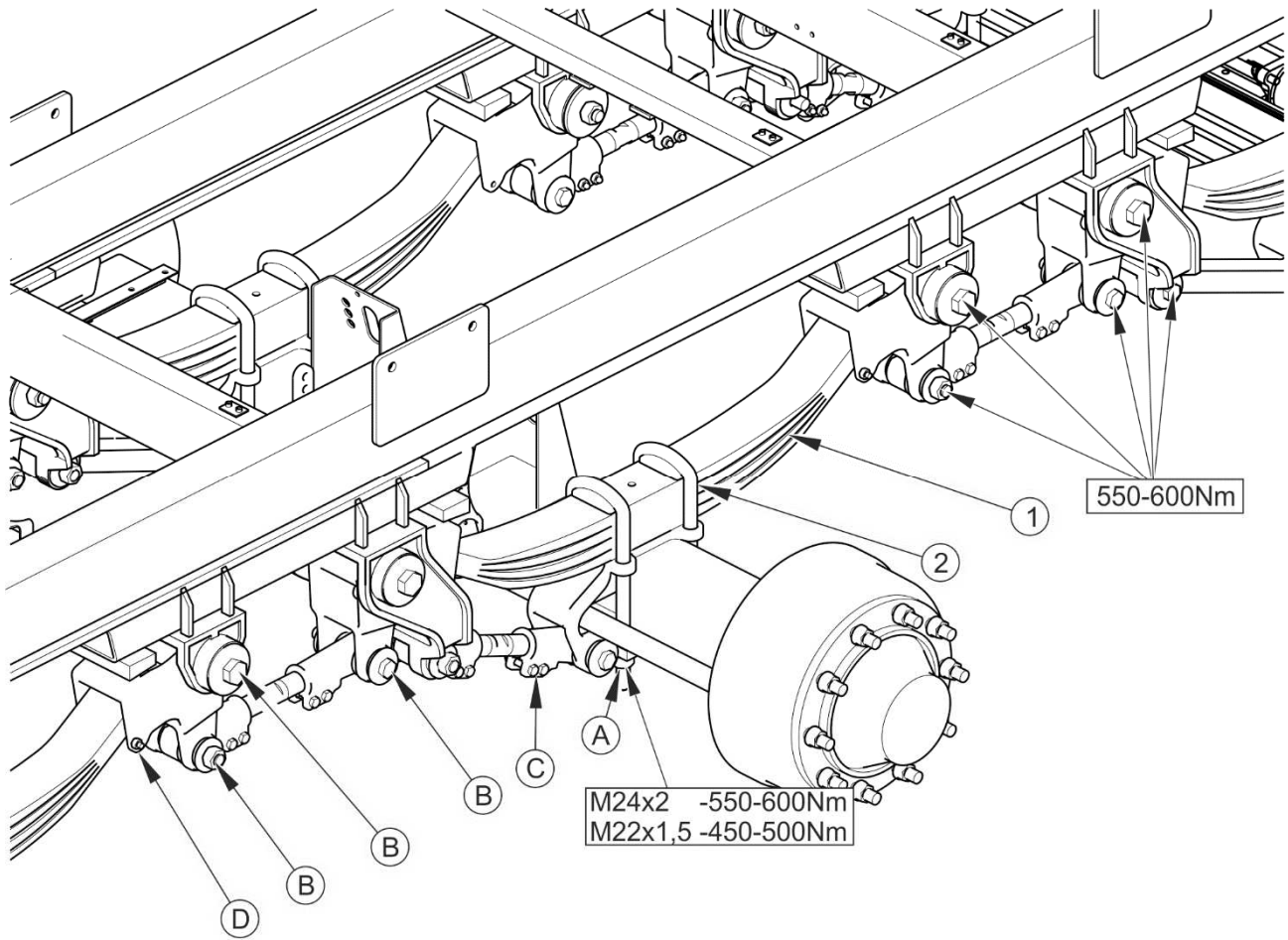
- every 4 years.



## 5.6 MAINTENANCE OF SUSPENSION SYSTEM


**TABLE 5.2 Mechanical suspension system maintenance schedule**

FREQUENCY	MAINTENANCE ACTIVITIES
<p>After the first travel with load. Before intensive use or once every 6 months.</p>	Tighten all U bolt nuts on the axle using recommended tightening torque - figure (5.10) item A. The nuts should be tightened diagonally.
	Tighten all bolt and nut connections of the suspension system, item B and D (suspension spring stirrups, brackets, rigid and adjustable lateral control rods, suspension springs) – figure (5.10).
	Tighten the fixing of adjustable lateral control rods – figure (5.10) item C. If the bolts are loose, the length of rods may be wrong. Confirm that the distance between the axles on the right side and the left side of the trailer is the same. Confirm that wheels are positioned in parallel to direction of travel.
	Tighten the fixing of flexible sleeves of rigid and adjustable lateral control rods. Pressure washers (item 1) should not touch the bracket (item 2). Otherwise, replace the rubber conical sleeves (item 3) - figure (5.11). Before installation, grease the rubber sleeves.
Once a year	Check the condition of the suspension springs (item 1): carefully clean and brush the sides of the suspension springs in order to confirm that there are no cracks.
	If there is a clearance between suspension springs and the axle, check the complete fixing system: U bolts, guiding and clamping plates of the suspension spring bolts.

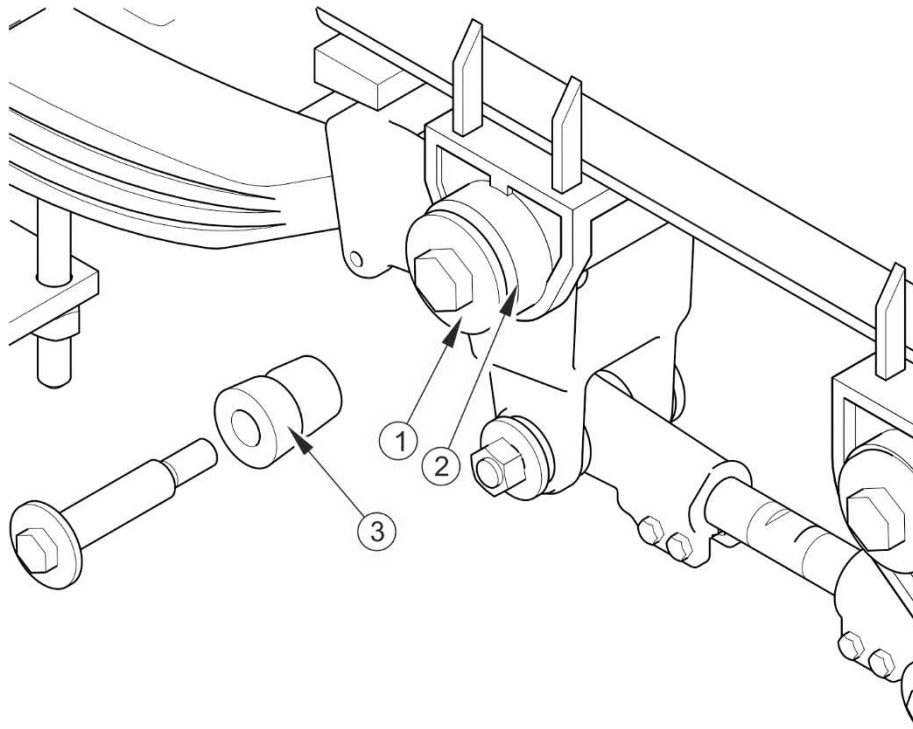


**FIGURE 5.10 Mechanical suspension system maintenance**

(1) suspension spring, (2) U bolt, (A) U bolt nuts, (B) bolt and nut connections of the suspension system, (C) mounting of lateral control rods, (D) suspension spring mounting



- If the trailer is operated in severe conditions or is operated intensively, the maintenance activities should be performed more frequently.



**FIGURE 5.11 Maintenance of rubber sleeves**

*(1) pressure washer, (2) bracket, (3) rubber sleeve*



### **ATTENTION**

**Bolt and nut connections of the trailer's suspension system should be tightened under load.**

Maintenance of hydraulic suspension system involves checking tightness of the system and regular tightening of all bolt and nut connections. In the event of confirmation of an oil leak on hydraulic conduit connections, tighten connections, and if this does not remedy faults then change conduit or connection elements. If oil leak occurs beyond connection, the leaking conduit of the system should be changed. Always exchange each mechanically damaged component. In the event of confirmation of damage of hydraulic ram cylinders they must be replaced or repaired.



### **ATTENTION**

**Before starting work on the hydraulic system, make certain that the hydraulic oil is not under pressure. Hydraulic conduits should be tightened using torque of 50 – 70 Nm.**

## 5.7 MAINTENANCE OF ELECTRICAL SYSTEM AND WARNING ELEMENTS

### 5.7.1 PRELIMINARY INFORMATION

Work connected with the repair, change or regeneration of electrical system components should be entrusted to specialist establishments, having the appropriate technology and qualifications for this type of work.

The responsibilities of the user are limited to:

- technical inspection of electrical system and reflectors,
- changing bulbs



#### ATTENTION

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

#### Required maintenance actions

- ➔ Connect trailer to tractor with appropriate connection lead.
  - ⇒ Check if the connection lead is reliable. Check connection sockets in tractor and trailer.
- ➔ Check completeness and technical condition of trailer lights.
- ➔ Check completeness of all reflectors.
- ➔ Check correct mounting of the slow-moving vehicle warning sign holder.
- ➔ Before driving on to public road, check that the tractor is equipped with a warning reflective triangle.



#### Checking technical condition of electrical system:

- each time while connecting the trailer.

**TIP**

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

## 5.7.2 REPLACEMENT OF BULBS

Compatible bulbs are shown in table (5.3). All light lenses are secured by screws and it is not necessary to dismantle whole lamp or trailer subassemblies.

**TABLE 5.3 List of bulbs**

LAMP	LAMP TYPE	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
Licence plate light	LT-120	C5W – 1 unit	2

## 5.8 TRAILER LUBRICATION

Trailer lubrication should be performed with the aid of a manually or foot operated grease gun, filled with recommended grease. Before commencing work insofar as is possible remove old grease and other contamination. Remove and wipe off excess oil or grease.

**TABLE 5.4 Trailer lubrication schedule**

ITEM	LUBRICATION POINT	NUMBER OF LUBRICATION POINTS	TYPE OF GREASE	FREQUENCY
1	Wheel hub bearings	6	A	24M

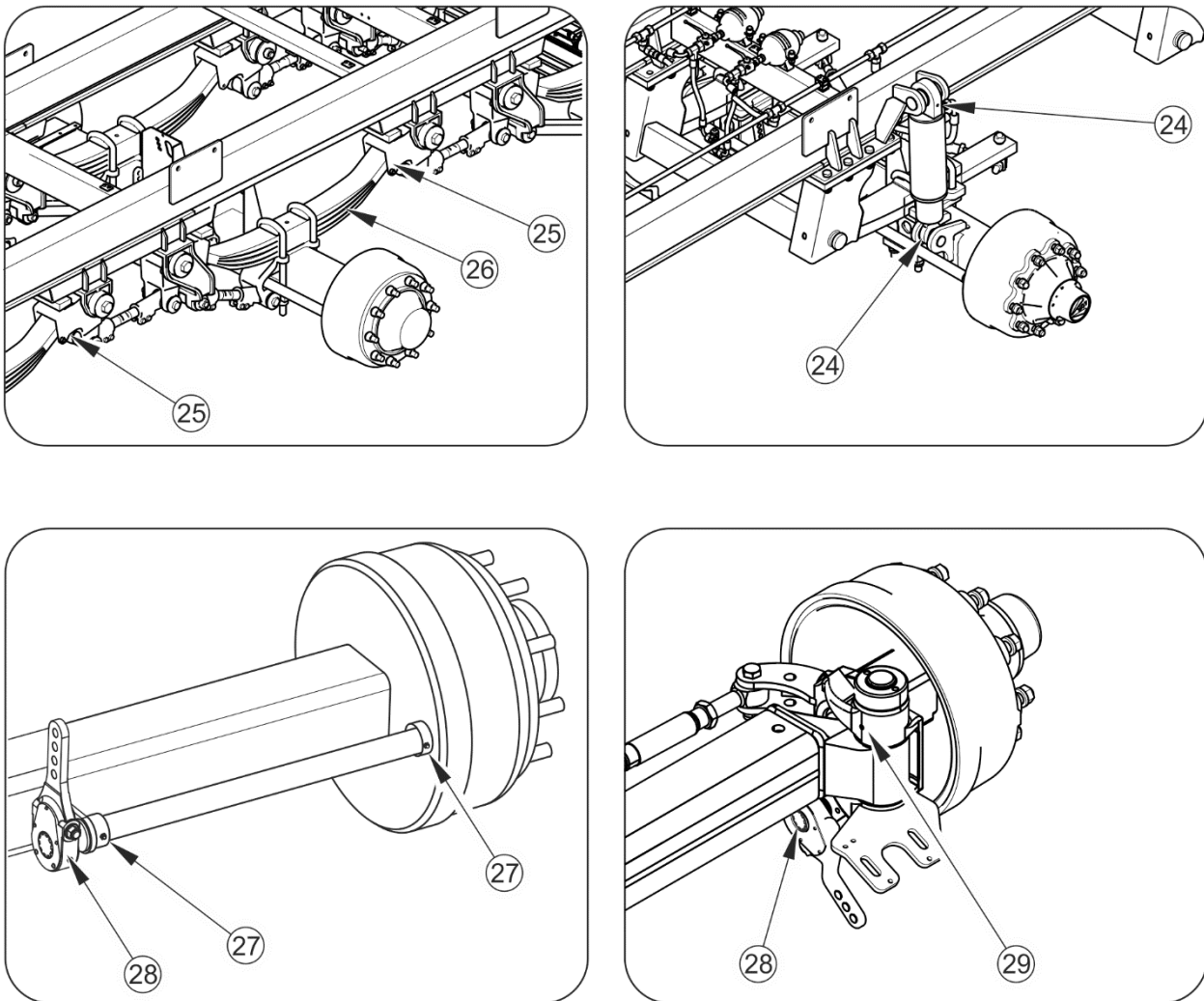
ITEM	LUBRICATION POINT	NUMBER OF LUBRICATION POINTS	TYPE OF GREASE	FREQUENCY
2	Drawbar hitching eye and steering system lever strings	3	B	14D
3	Pin of steering system lever	2	A	3M
4	Pin of steering system cylinder	2	A	3M
5	Pin of steering system string	2	A	3M
6	Hinges of the hinged wall	7	A	3M
7	Drawbar rocker arm sleeve	1	A	6M
8	Drawbar rocker arm pin	1	A	6M
9	Drawbar spring	1	C	6M
10	Pin of closing cylinder mounting	2	A	3M
11	Pin of hinged wall closing arm	1	A	3M
12	Closing string pin	2	A	3M
13	Pin of press down arm	1	A	3M
14	Pin of press down cylinder	1	A	3M
15	Tailgate cylinder bearings	4	A	3M
16	Pins of conduit arm	2	A	3M

ITEM	LUBRICATION POINT	NUMBER OF LUBRICATION POINTS	TYPE OF GREASE	FREQUENCY
17	Lever and string of chute	2	A	3M
18	Chute slide gate guides	2	D	3M
19	Telescopic support	2	A	3M
20	Bearings of wall sliding cylinder	6	A	3M
21	Bearings of wall lifting cylinder	4	A	3M
22	Guides of wall sliding cylinder eye	2	C	3M
23	Pins of sliding wall rollers	4	A	3M
24	Upper and lower fixing points of hydraulic suspension system cylinders	6	A	3M
25	Leaf spring sliding surface (mechanical suspension system)	12	A	3M
26	Leaf spring (mechanical suspension system)	6	C	3M
27	Expander shaft sleeve	12	A	3M
28	Brake expander arm	6	A	3M
29	Stub axle pin	8	A	3M

Lubrication periods – M months, D – days

**TABLE 5.5 Recommended lubricants**

MARKING ACCORDING TO TAB. (5.4)	DESCRIPTION
A	machine general-purpose grease (lithium, calcium grease),
B	permanent grease for heavily loaded elements with addition of $MOS_2$ or graphite
C	anticorrosion preparation in aerosol
D	ordinary machine oil, silicon grease in aerosol



**FIGURE 5.12 Lubrication points**



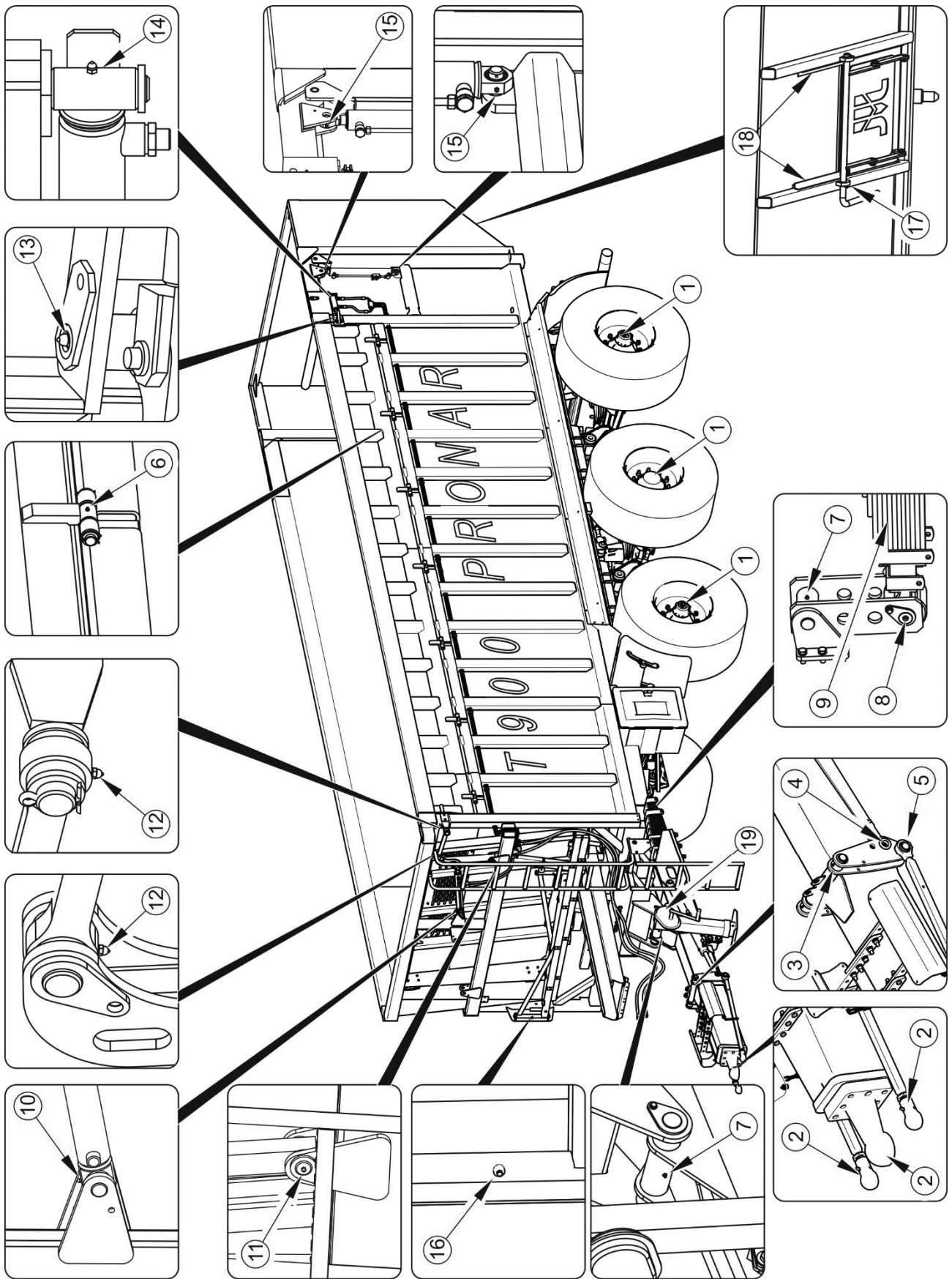


FIGURE 5.13 Lubrication points

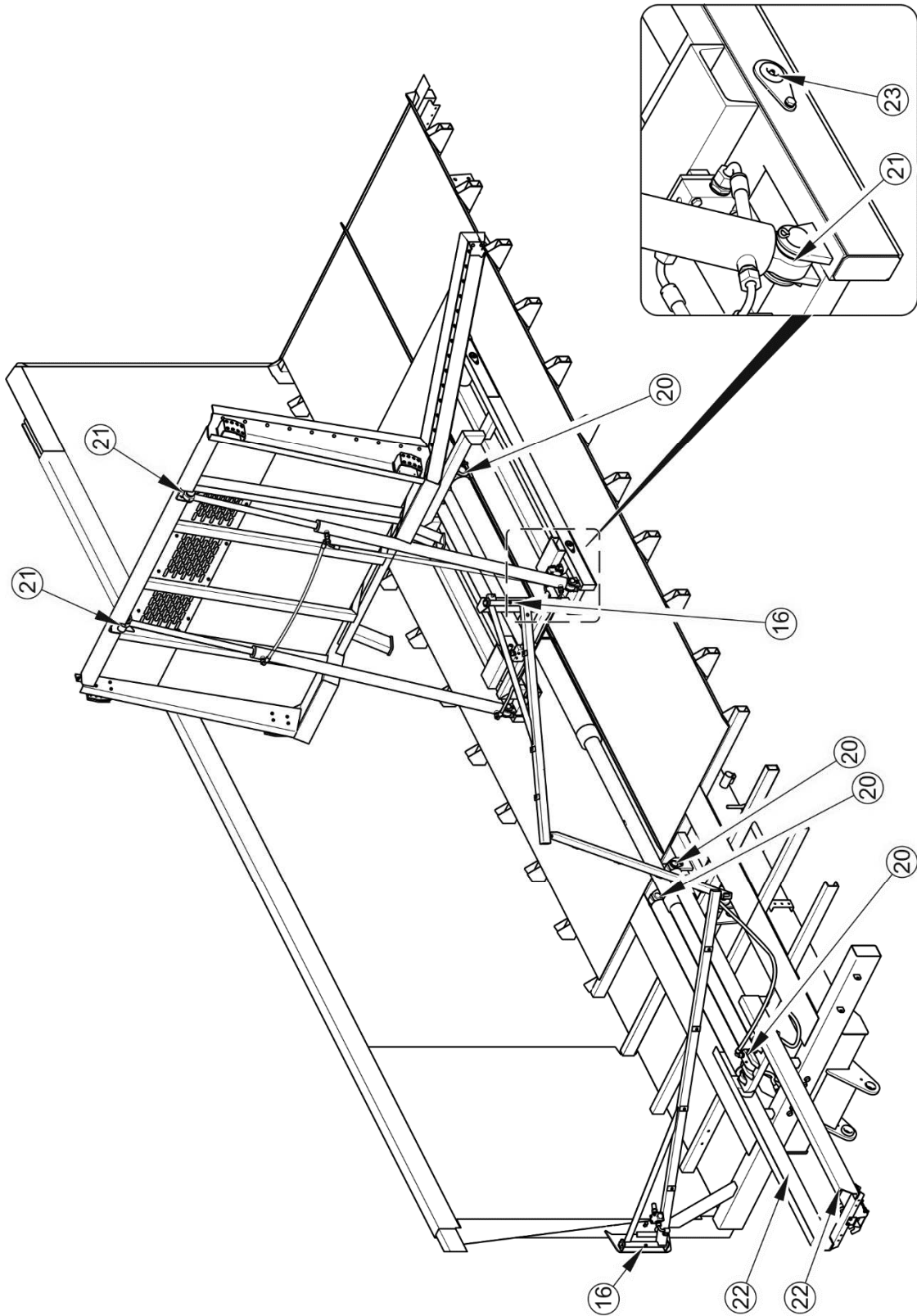


FIGURE 5.14 Lubrication points

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

Change of grease in hub bearings should be entrusted to specialised service points, equipped with the appropriate tools. According to the recommendations of the axle Manufacturer, dismantle the entire hub, remove the bearing 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 the event of intensive use, lubrication should be performed more frequently.

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



**During trailer operation, the user is obliged to observe lubrication instructions according to attached lubrication schedule.**

## 5.9 CONSUMABLES

### 5.9.1 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. In the event of application of different types of oil make certain that both hydraulic substances may be mixed together. Application of different oil types may cause damage to trailer or tractor. In a new machine, the hydraulic system is filled with L HL32 Lotos hydraulic oil.

If it is necessary to change hydraulic oil for another oil, check the recommendations of the oil Manufacturer very carefully. If it is recommended to flush the system with the appropriate preparation, then comply with these recommendations. Attention should be given, so that chemical substances used for this purpose do not damage the 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.

**TABLE 5.6 L-HL 32 Lotos hydraulic oil characteristics**

ITEM	NAME	UNIT	VALUE
1	ISO 3448VG viscosity classification	-	32
2	Kinematic viscosity at 40 <sup>0</sup> C	mm <sup>2</sup> /s	28.8 – 35.2
3	ISO 6743/99 quality classification	-	HL
4	DIN 51502 quality classification	-	HL
5	Flash-point	C	230

Because of its composition the oil applied is not classified as a dangerous substance, however long-term action on the skin or eyes may cause irritation. In the event of contact of oil with skin wash the place 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 in the event of the occurrence of irritation consult a doctor. Hydraulic oil in normal conditions is not harmful to the respiratory tract. A hazard only occurs when oil is strongly atomised (oil vapour), or in the case of fire during which toxic compounds may be released. Oil fires should be quenched with the use of carbon dioxide, foam or steam extinguishers. Do not use water to quench oil fires.

### 5.9.2 LUBRICANTS

For heavily loaded parts it is recommended to apply lithium greases with addition of molybdenum disulphide (MOS<sub>2</sub>) or graphite. In the case of less loaded sub-assemblies the application of general purpose machine greases is recommended, which contain anticorrosive additives and have significant resistance to being washed away by water. Aerosol preparations (silicon greases and anticorrosive-lubricating substances) should have similar characteristics.

Before using the grease, read its information leaflet. Particularly relevant are safety rules and handling procedures for a given lubricant as well as waste disposal procedure (used containers, contaminated rags etc.). Information leaflet (material safety data sheet) should be kept together with grease.

## 5.10 ADJUSTMENT OF LIMIT VALVES

In T900 trailer, the switching between the supply circuit of the wall sliding horizontal cylinders (3) and the telescopic cylinder (2) and the supply circuit of the wall rising vertical cylinders (4) is performed by the limit valve (6). The adjustment of this valve is performed by means of adjustment bolt (8) when the sliding wall is maximally extended. The conduit arm (1) should be positioned so that the polyurethane spring (5) is squeezed by at least 10 mm and the angle between individual arms does not exceed 160°. The valve lifter must be extended to a distance of 1.5 - 2 mm. After the adjustment, secure bolt (8) with conternut (9).

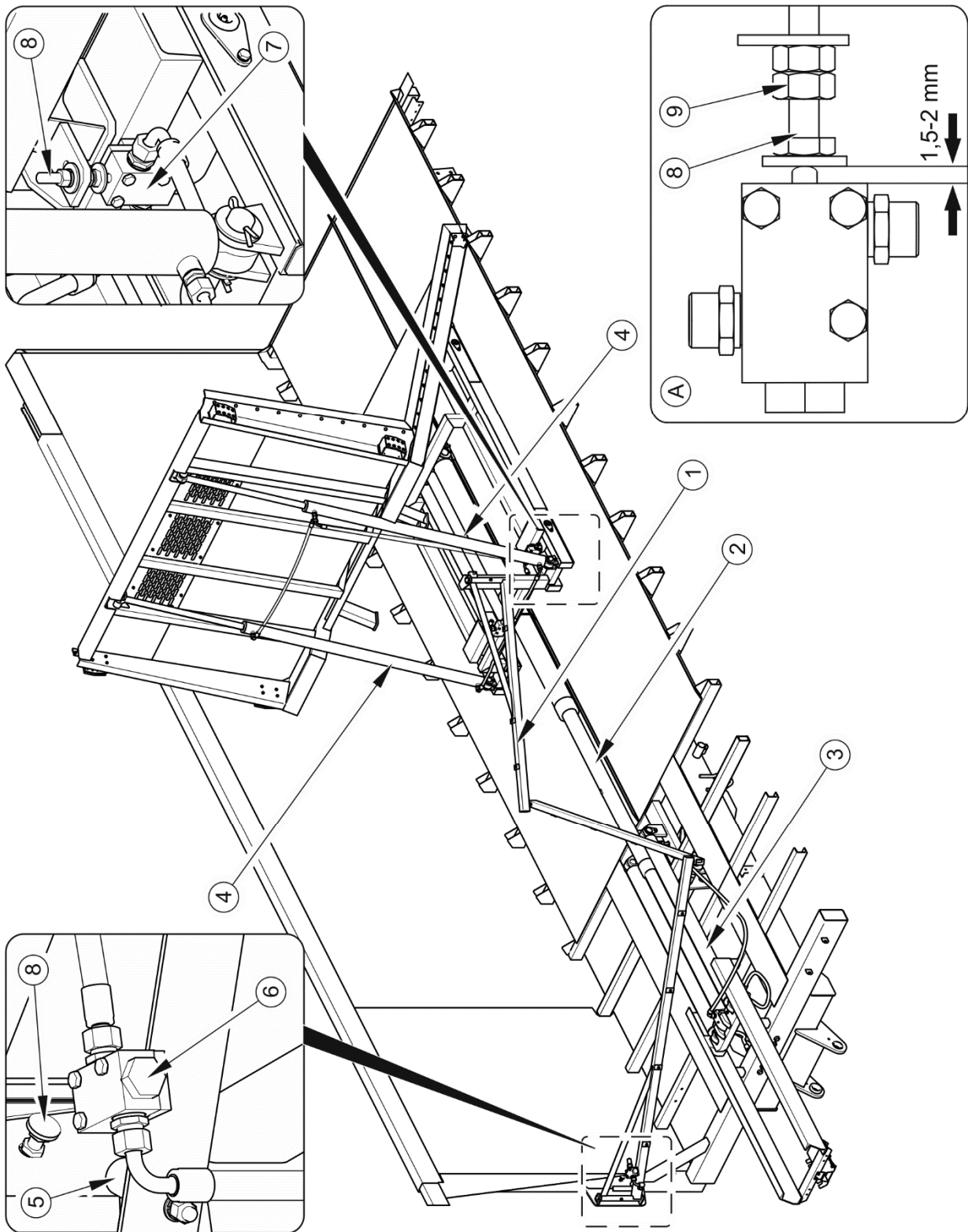
The adjustment of limit valve (7) is performed when the wall is maximally lowered. The limit valve lifter must be extended to a distance of 1.5 - 2 mm. After the adjustment, secure adjustment bolt (8) with conternuts (9).



### ATTENTION

**Work connected with setting, adjustment and replacement of limit valves should be entrusted to specialist establishments having the appropriate technology and qualifications for this type of work.**

**Make certain that the machine does not pose any threat after adjustment of the valves.**



**FIGURE 5.15** Setting of limit valves

(1) conduit arm, (2) telescopic cylinder, (3) wall sliding cylinder, (4) wall rising cylinder, (5) polyurethane spring, (6) limit valve I, (7) limit valve II, (8) adjustment bolt, (9) counternut, (A) valve setting diagram

## 5.11 CLEANING THE TRAILER

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

### Trailer cleaning guidelines

- Before cleaning the trailer open the tailgate. Carefully clean load remains from the load box (sweep out or blow out with compressed air), especially where tailgate and hinged wall join together.
- To clean the trailer, use only clean running water or water with a cleaning detergent additive with neutral pH.
- Using pressure washer increases washing effectiveness, but particular care must be taken during work. During washing, washer nozzle may not be closer than 50 cm from the surface being cleaned.
- Water temperature should not exceed 55 °C.
- Do not direct water stream directly at system and equipment elements of trailer i.e. control valve, braking force regulator, brake cylinders, hydraulic cylinders, pneumatic, electric and hydraulic plugs, lights, electrical connections, information and warning decals, identification plates, conduit connections, spring leaves and lubrication points etc. Great water jet pressure may cause mechanical damage to these elements.
- For cleaning and maintenance of plastic coated surfaces it is recommended to use clean water or special preparations designed for this purpose.
- Do not apply organic solvents, preparations of unknown origin or other substances, which may cause damage to lacquered, rubber or plastic surfaces. In the event of doubt it is recommended to make a test on an unseen surface area.
- Surfaces smeared 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 Manufacturer of cleaning agents.

**DANGER**

Carefully read the instructions for application of detergents and maintenance preparations.

While washing with detergents wear appropriate protective clothing and goggles protecting against splashing.

- Detergents should be kept in original containers, optionally in replacement containers, but very clearly marked. Preparations may not be stored in food and drink containers.
- Ensure cleanliness of elastic conduits and seals. The plastic from which these elements are made may be susceptible to organic substances and some detergents. As a result of long-term reaction of some substances, the ageing process may be accelerated and risk of damage increased. Rubber elements should be maintained with the aid of special preparations after previous thorough washing.
- After completed washing wait until the 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 and wash trailer in a place designed for this purpose.
- Cleaning and drying of the trailer must take place at temperatures above 0 °C.
- After washing and drying, trailer should be greased at all control points regardless of previous date of lubrication.

## 5.12 STORAGE

Trailer should be kept in closed or roofed building. If the machine will not be used for a long time, it is essential to protect it from adverse weather conditions (sunlight and rain), which cause corrosion and accelerate ageing of tyres. The protection should be made according to the below instructions.

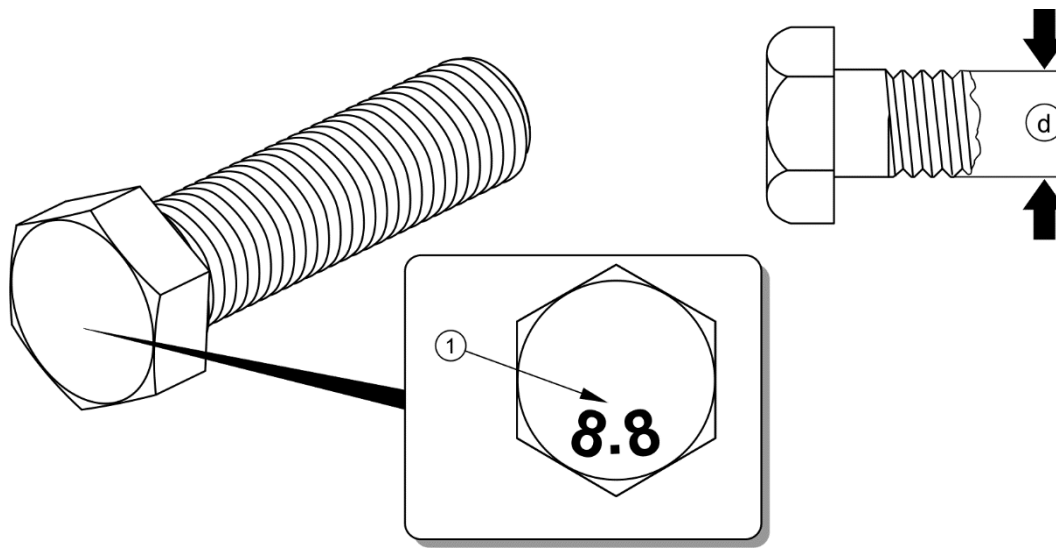
- The machine must be unloaded, placed on hard ground, on its wheels and secured against rolling away with wheel chocks.



- Carefully remove all remains of plant materials (grain, hay, straw, green fodder, etc.) because such materials can absorb moisture and stimulate corrosion.
- Trailer should be very carefully washed and dried.
- Corroded places should be cleaned of rust, degreased and protected using paint according to colour scheme.
- In the event of a prolonged work stoppage, it is essential to lubricate all components regardless of the date of the last lubrication.
- Wheel rims and tyres should be carefully washed and dried.
- Shield the tyres if they may be exposed to solar radiation.
- During longer storage of unused trailer it is recommended that every 2 to 3 weeks the machine may be moved a bit so that the place of contact of tyres with ground is changed. The tyres will not be deformed and maintain proper geometry. Also, air pressure in tyres should be inspected from time to time and, if necessary, pressure should be increased to appropriate value.

## **5.13 TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS**

Unless other tightening parameters are given, during maintenance-repair work apply appropriate torque to tighten nut and bolt connections. Recommended tightening torque for the most frequently used nut and bolt connections are given in table below. Given values apply to non-lubricated steel bolts.



**FIGURE 5.16 Bolt with metric thread**

(1) strength class, (d) thread diameter

**TABLE 5.7 Tightening torque for nut and bolt connections**

METRIC THREAD	5.8 <sup>(1)</sup>	8.8 <sup>(1)</sup>	10.9 <sup>(1)</sup>
	Md [Nm]		
M10	37	49	72
M12	64	85	125
M14	100	135	200
M16	160	210	310
M20	300	425	610
M24	530	730	1 050
M27	820	1 150	1 650
M30	1 050	1 450	2 100

<sup>(1)</sup> – strength class according to DIN ISO 898 standard

Hydraulic conduits should be tightened using torque of 50 – 70 Nm.

## 5.14 TROUBLESHOOTING

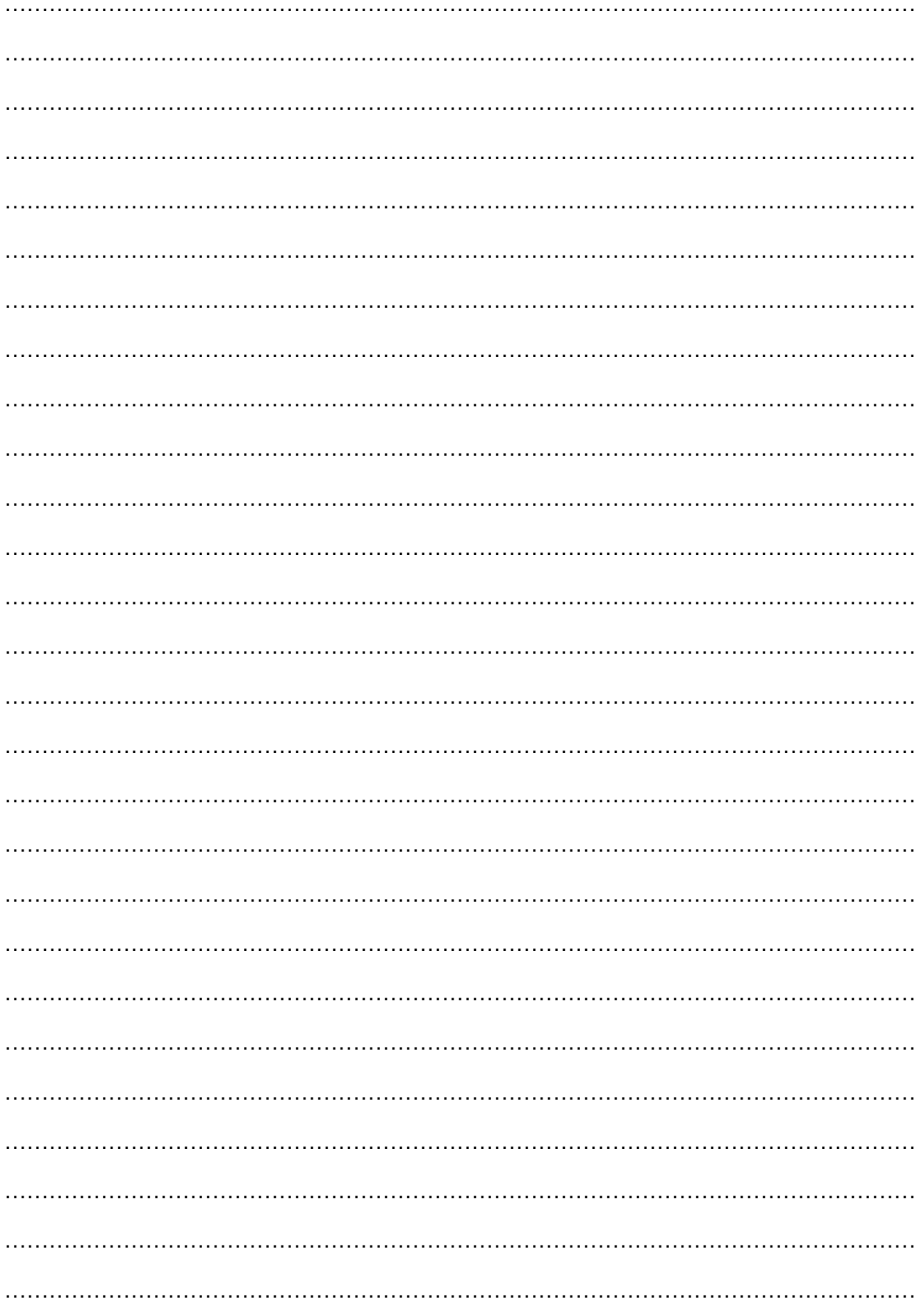
**TABLE 5.8 Troubleshooting**

<b>FAULT</b>	<b>CAUSE</b>	<b>REMEDY</b>
Problem with moving off	Brake system pneumatic conduit not connected	Connect brake conduits.
	Damaged pneumatic system connection conduits	Replace
	Leaking connections	Tighten, replace washers or seal set
	Parking brake applied	Release parking brake
	Damaged loosening-parking valve or main valve	Check the valves. Repair or replace any damaged components
Noise in axle hubs	Excessive bearing slackness	Check slackness and adjust if needed
	Damaged bearings	Change bearing together with sealing ring
Excessive heating of axle hubs	Incorrectly adjusted main brake	Regulate positions of expander arms
	Worn brake linings	Change brake shoes
The front wall can not be shifted or raised	Incorrectly connected hydraulic system conduits	Check and possibly correct
	Damaged quick couplers of hydraulic system conduits	Replace quick couplers
The front wall can not be shifted or raised	Damaged or non-adjusted limit valve of hydraulic system	Check, adjust or possibly replace
	Improper hydraulic oil viscosity	Check oil quality, make sure that the oil in both machines is of the same type. If necessary change oil in tractor or in trailer.

FAULT	CAUSE	REMEDY
	Insufficient tractor hydraulic pump output, tractor hydraulic pump is damaged	Check tractor hydraulic pump.
Jerking, uneven trailer braking.	Damaged ABS modulator	Repair or replace
	Incorrectly adjusted brakes	Adjust brakes
	Worn brake linings	Replace

# NOTES

A series of horizontal dotted lines for writing notes.



***ANNEX***

**A**

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**WALL EXTENSION  
INSTALLATION  
MANUAL**

## A.1 INSTALLATION SEQUENCE

Carefully read this manual before installing the wall extensions. The persons who install the wall extensions should have sufficient know-how, appropriate technology and qualifications for this type of work.

### ATTENTION



Exercise due caution while installing the wall extensions. Make certain that all safety conditions are adhered to.

During installation work, the tractor and the trailer must be protected against unintentional movement.

Installation and dismantling of wall extensions should be carried out with the use of appropriate platforms, ladders or when standing on a ramp. These tools must be in good condition to fully protect the persons working on them against falling. The installation work should be performed by at least two persons. Exercise due caution

### Installation sequence for the set of wall extensions (400) or (400+100):

1. check completeness according to figures and tables A1-A3,
2. mark the installation holes after fitting the wall extensions,
3. make the holes in the load box during installation,
4. install the left wall extension (item 2- figure A.1). Assume the dotted line as the base line. Make the first hole at the distance of 39mm (detail K- figure A.1),
5. install the side profile (item 8-figure A.1),
6. install the side wall extension, left +100 (item 29-figure A.1) – only (400+100),
7. install the front wall extension (item 1 - figure A.1),
8. install the front profile (item 12 - figure A.1),
9. install the front wall extension +100 (item 28 - figure A.2) – only (400+100),
10. install the left wall extension, rear (item 10 - figure A.1) or the left wall extension, rear + 100 (item 31 - figure A.1),
11. install the gate wall extension, left (item 4 - figure A.1),
12. install the gate profile, side (item 13 - figure A.1),



13. install the gate wall extension, left +100 (item 33- figure A.2) – only (400+100),
14. repeat the above installation operations for the wall extensions on the right side,
15. install the gate wall extension (item 6 - figure A.1),
16. install the gate profile (item 14 - figure A.1),
17. install the gate wall extension +100 (item 35 - figure A.1) – only (400+100),
18. dismount the top slides from the sliding wall,
19. install the right stake (item 4 - figure A.2), the left stake (item 3 - figure A.2) and slides (item 9 - figure A.1),
20. make Ø11 holes in the wall extension frame (item 2 - figure A.2) at the distance of 300 mm from the edge. Install blind rivet nuts and absorbers in this place (item 18 and 19 - figure A.2),
21. attach the wall extension leak stoppers (item 13 - figure A.2) to the stakes so that they press against the load box walls,
22. install the wall extension frame (item 2 - figure A.4) using hinges (item 1 - figure A.2)
23. install edge shields (item 27 - figure A1) on the internal edge of the gate wall extension, or (item 36 - figure A1) in the case of (400+100) wall extensions,

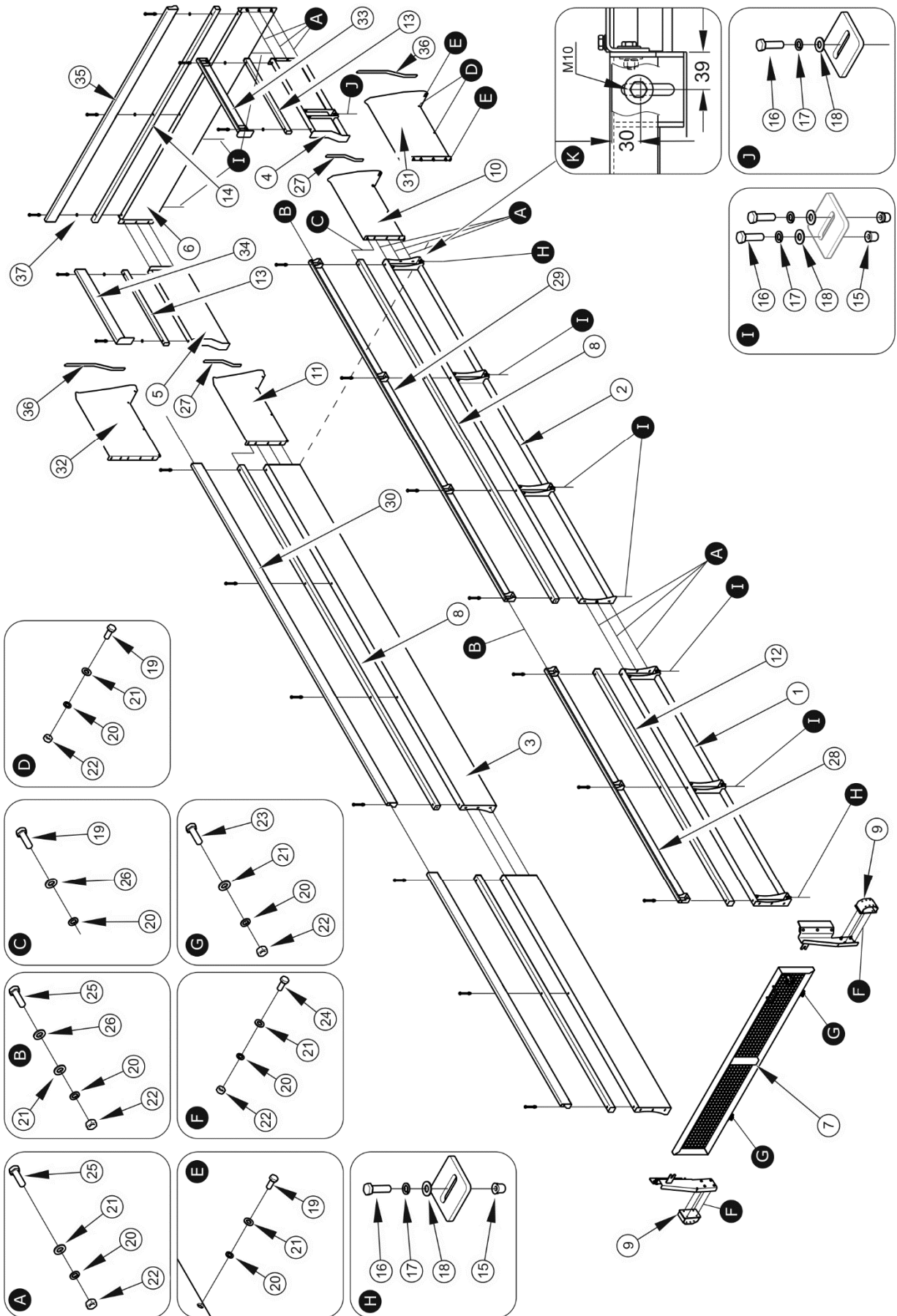
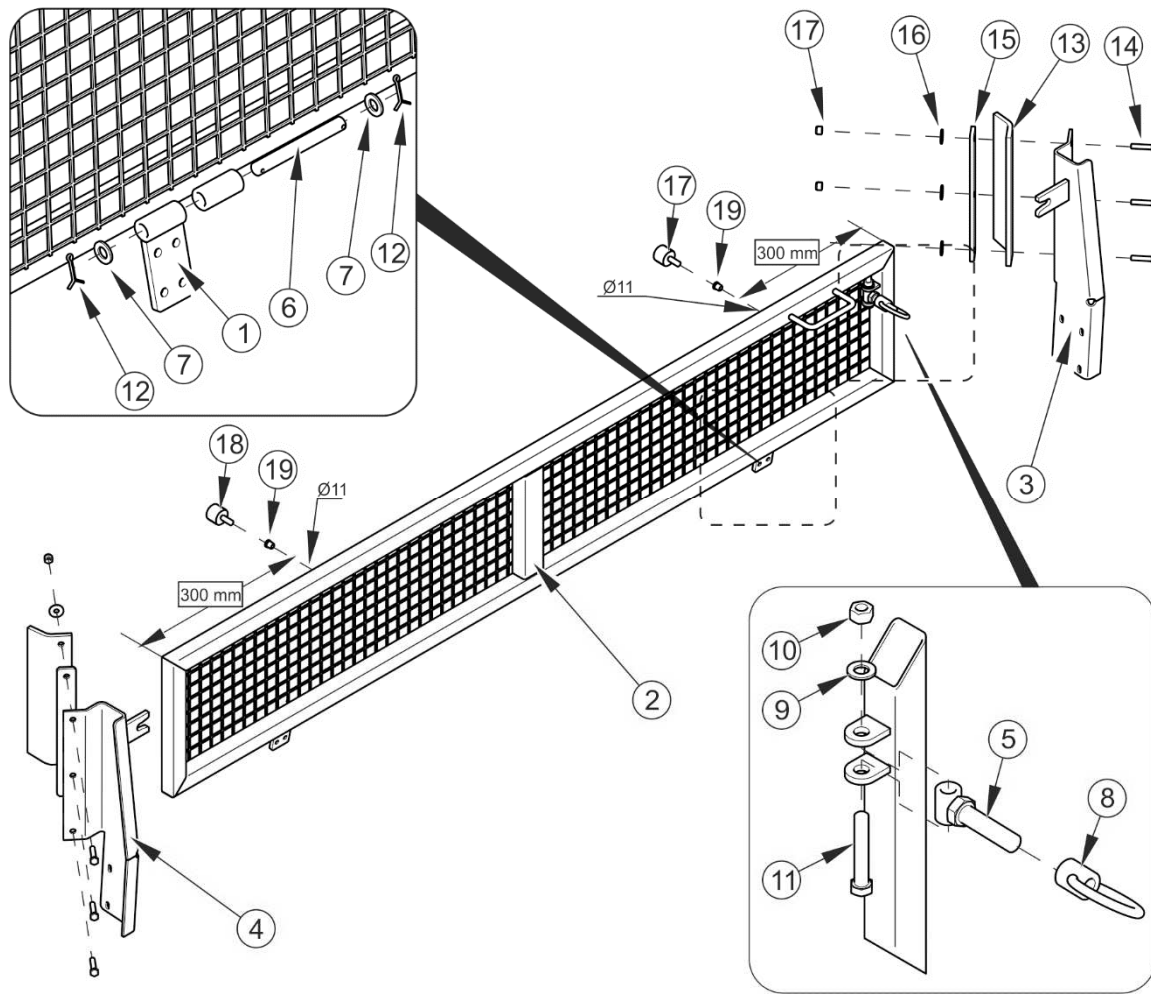


FIGURE A.1 Installation of wall extensions. Marking according to table A.1

**TABLE A.1 Part list: Load box wall extensions**

ITEM	PART NAME	TYPE	PART NUMBER (STANDARD NUMBER)	QUANTITY	
				A	B
1	WALL EXTENSION, FRONT		182N-30010000	2	2
2	WALL EXTENSION, LEFT		182N-30020000	1	1
3	WALL EXTENSION, RIGHT		182N-30030000	1	1
4	GATE WALL EXTENSION, LEFT		182N-30040000	1	1
5	GATE WALL EXTENSION, RIGHT		182N-30050000	1	1
6	GATE WALL EXTENSION		182N-30060000	1	1
7	WALL EXTENSION		182N-30070000	1	1
8	PROFILE, SIDE		182N-30080000	2	2
9	SLIDE, SET		182N-30090000	2	2
10	LEFT WALL EXTENSION, REAR		182N-30000100	1	-
11	RIGHT WALL EXTENSION, REAR		182N-30000200	1	-
12	PROFILE, FRONT		182N-30000300	2	2
13	GATE PROFILE, SIDE		182N-30000400	2	2
14	GATE PROFILE		182N-30000500	1	1
15	BLIND RIVET NUT	M10	SFM 10-65R	27	27
16	BOLT	M10x35-8.8-A2J	PN-EN ISO 4017	29	29
17	WASHER	Z10.2 Fe/Zn9	PN/M-82008	29	29
18	WASHER	10-100HV-A2J	PN-EN ISO 7093-2	29	29
19	BOLT	M8x20-8.8-A2J	PN-EN ISO 4017	10	10
20	WASHER	Z8.2 Fe/Zn9	PN/M-82008	44	48
21	WASHER	8-100HV-A4J	PN-EN ISO 7091	24	30
22	NUT	M8-8-A2J	PN-EN ISO 4032	38	42
23	BOLT	M8x30-8.8-A2J	PN-EN ISO 4017	8	8
24	BOLT	M8x35-8.8-A2J	PN-EN ISO 4017	8	8
25	BOLT	M8x25-8.8-A2J	PN-EN ISO 4017	18	22
26	WASHER	8-100HV-A2J	PN-EN ISO 7093-2	34	36
27	EDGE SHIELD	L=450	461 0031	2	-
28	WALL EXTENSION, FRONT	(+100)	182N-30000600	-	2
29	SIDE WALL EXTENSION, LEFT	(+100)	182N-30000700	-	1
30	SIDE WALL EXTENSION, RIGHT	(+100)	182N-30000800	-	1
31	REAR WALL EXTENSION, LEFT	(+100)	182N-30000900	-	1
32	REAR WALL EXTENSION, RIGHT	(+100)	182N-30001000	-	1
33	GATE WALL EXTENSION, LEFT	(+100)	182N-30001100	-	1
34	GATE WALL EXTENSION, RIGHT	(+100)	182N-30001200	-	1
35	GATE WALL EXTENSION	(+100)	182N-30001300	-	1
36	EDGE SHIELD	L=550	461 0031	-	2
37	WASHER	10-100HV-A4J	PN-EN ISO 7091	-	7

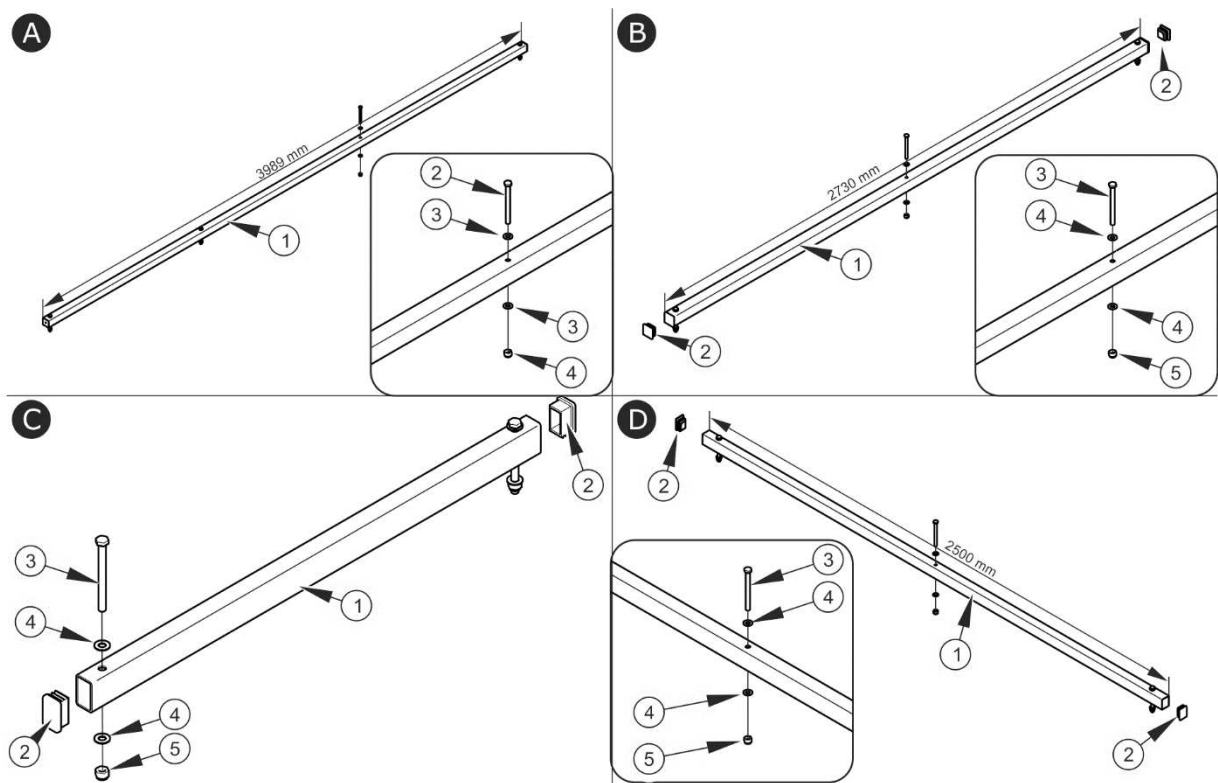
(A)- Wall extension 400, (B) - Wall extension 400+100



**FIGURE A.2** Installation of front wall extension. Marking according to table A.2

**TABLE A.2** Part list: Front wall

ITEM	PART NAME	TYPE	PART NUMBER (STANDARD NUMBER)	QUANTITY
1	HINGE		182N-30070100	2
2	WALL EXTENSION FRAME		193N-20020100	1
3	LEFT STAKE		193N-20020200	1
4	RIGHT STAKE		193N-20020300	1
5	LOCK		193N-20000100	1
6	HINGE PIN		29RPN-22.00.001	2
7	WASHER	14-160HV-A2J	PN-EN 28738	4
8	NUT		271N-02000200	1
9	WASHER	12-100HV A2J	PN-EN ISO 7091	1
10	NUT	M12-8 A2J	PN-EN ISO 7040	1
11	BOLT	M12x20-5,8 A2J	PN-EN ISO 4017	1
12	COTTER PIN	4x32-St A2J	PN-EN ISO 1234	4
13	WALL EXTENSION LEAK STOPPER		193N-20000002	2
14	BOLT	M10x45-8.8-A2J	PN-EN ISO 4017	6
15	LEAK STOPPER COVER PLATE		193N-20000003	2
16	WASHER	10-100HV	PN-EN ISO 7091	6
17	NUT	M10-8-A2J	PN-EN ISO 7040	6
18	METAL-RUBBER ABSORBER	Sh D Ø40x28 M8x23 90	10414	2
19	BLIND RIVET NUT	M8	SSM 08-45R	2



**FIGURE A.3** Installation of wall extension profiles. Marking according to table A.3

**TABLE A.3** Part list: Wall extension profiles

ITEM	PART NAME	TYPE	PART NUMBER (STANDARD NUMBER)	QUANTITY
<b>A</b>	PROFILE, SIDE		182N-30080000	
<b>1</b>	PROFILE		182N-30080100	1
<b>2</b>	BOLT	M10x110-8.8-A2J	PN-EN ISO 4014	4
<b>3</b>	WASHER	10-100HV-A2J	PN-EN ISO 7093-2	8
<b>4</b>	SELF LOCKING NUT	M10-8-A2J	PN-EN ISO 7042	4
<b>B</b>	PROFILE, FRONT		182N-30000300	
<b>1</b>	PROFILE		182N-30000301	1
<b>2</b>	SQUARE INSERT	SR1540	199274	2
<b>3</b>	BOLT	M10x110-8.8-A2J	PN-EN ISO 4014	3
<b>4</b>	WASHER	10-100HV-A2J	PN-EN ISO 7093-2	6
<b>5</b>	SELF LOCKING NUT	M10-8-A2J	PN-EN ISO 7042	3
<b>C</b>	GATE PROFILE, SIDE		182N-30000400	
<b>1</b>	PROFILE		182N-30000401	1
<b>2</b>	RECTANGULAR INSERT	50x30 SR1550	111366	2
<b>3</b>	BOLT	M10x110-8.8-A2J	PN-EN ISO 4014	2
<b>4</b>	WASHER	10-100HV-A2J	PN-EN ISO 7093-2	4
<b>5</b>	SELF LOCKING NUT	M10-8-A2J	PN-EN ISO 7042	2
<b>D</b>	GATE PROFILE		182N-30000500	
<b>1</b>	GATE PROFILE		182N-30000501	1
<b>2</b>	RECTANGULAR INSERT	50x40 SR1550	466546	2
<b>3</b>	BOLT	M10x110-8.8-A2J	PN-EN ISO 4014	3
<b>4</b>	WASHER	10-100HV-A2J	PN-EN ISO 7093-2	6
<b>5</b>	SELF LOCKING NUT	M10-8-A2J	PN-EN ISO 7042	3



# ANNEX B

Tyre dimensions

TRAILER VERSION	AXLE FRONT / REAR
<b>T900</b>	445 / 65-R22,5 170F TL <sup>(1)</sup>
	550 / 60-R22,5 171A8 <sup>(2)</sup>
	600 / 55-R22,5 16PR 169A8 <sup>(3)</sup>
	700 / 50-R26,5 16PR 174A8 <sup>(4)</sup>
	710 / 45-R26,5 169A8 <sup>(4)</sup>

<sup>(1)</sup> - wheel disc 14x22,5" ET=0

<sup>(2)</sup> - wheel disc 16x22,5" ET= 0

<sup>(3)</sup> - wheel disc 20x22,5" ET= -40

<sup>(4)</sup> - wheel disc 24x26,5" ET= -50

# ANNEX C

Reference list of oils for the hydraulic steering system.

TOTAL Equivis ZS 22
ELF Hydrelf 22
SHELL Tellus T22
TEXACO Rando HDZ 22
BP Energol SHF 22
ESSO Unavis N22
AGIP Arnica 22



