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

***Remember!!!***

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

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# 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 PRONAR T023 and PRONAR T023M agricultural trailers.

If the information stated 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:

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

## CONTACT TELEPHONES

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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:



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>T023</b>
Model:	<b>T023</b> <b>T023M</b>
Serial number:	
Commercial name:	<b>Trailer PRONAR T023</b> <b>Trailer PRONAR T023M</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 02 PAŹ. 2012

Place and date

Z-CIA DYREKTORA  
d/s technicznych  
członek zarządu

*Roman Melaniuk*

Full name of the empowered person  
position, signature

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*SECTION*

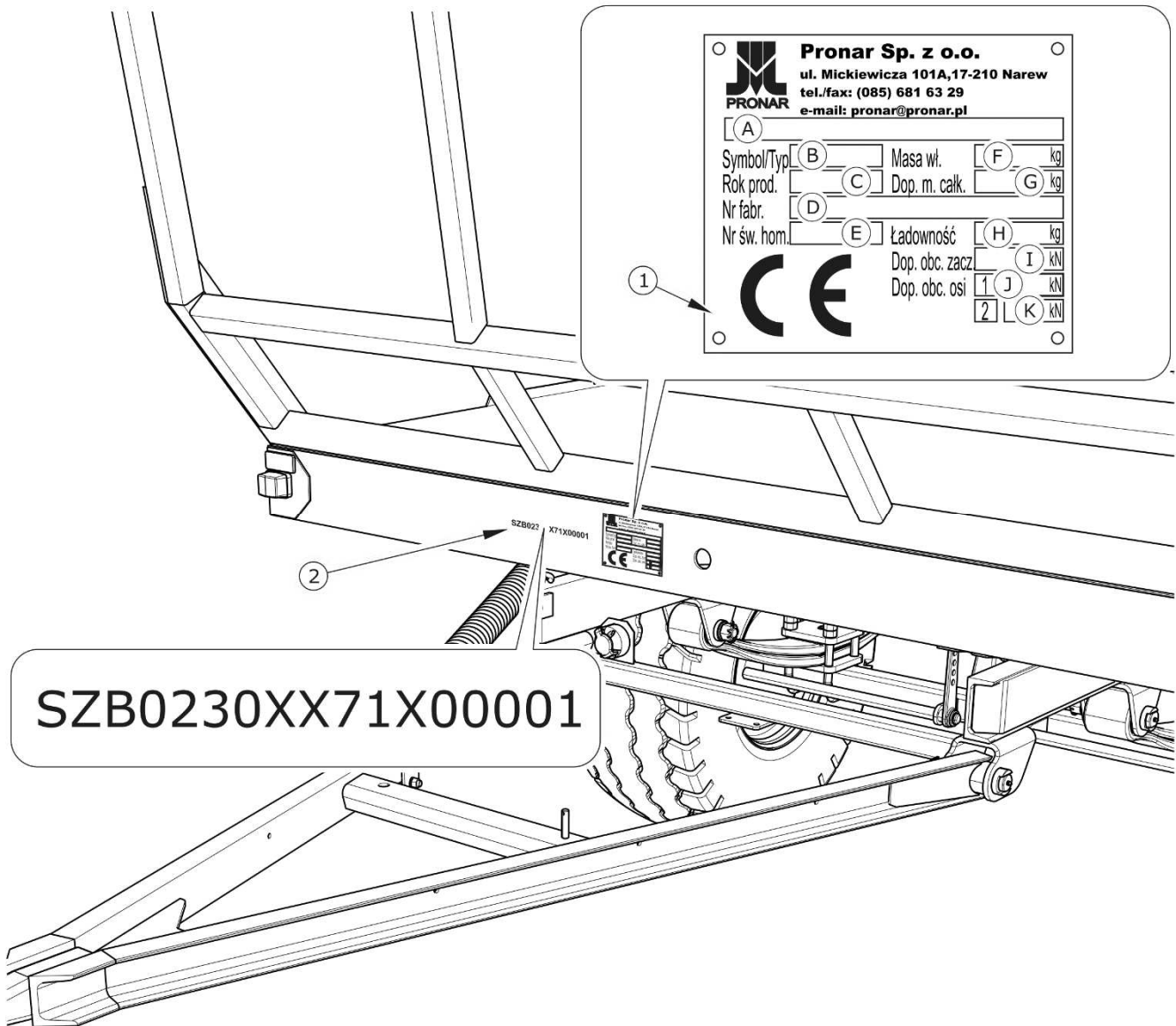
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**BASIC INFORMATION**

# 1.1 IDENTIFICATION

## 1.1.1 TRAILER IDENTIFICATION



**FIGURE 1.1** Location of the data plate and vehicle identification number (VIN)

(1) data plate, (2) example of vehicle identification number (VIN)

Pronar T023 and Pronar T023M agricultural trailers are marked with the data plate (1) and vehicle identification number (VIN) (2). The serial number and data plate are located in the central part of the frame front beam – figure (1.1). When buying the agricultural trailer check that the serial numbers on the machine agree with the number written in the *WARRANTY*

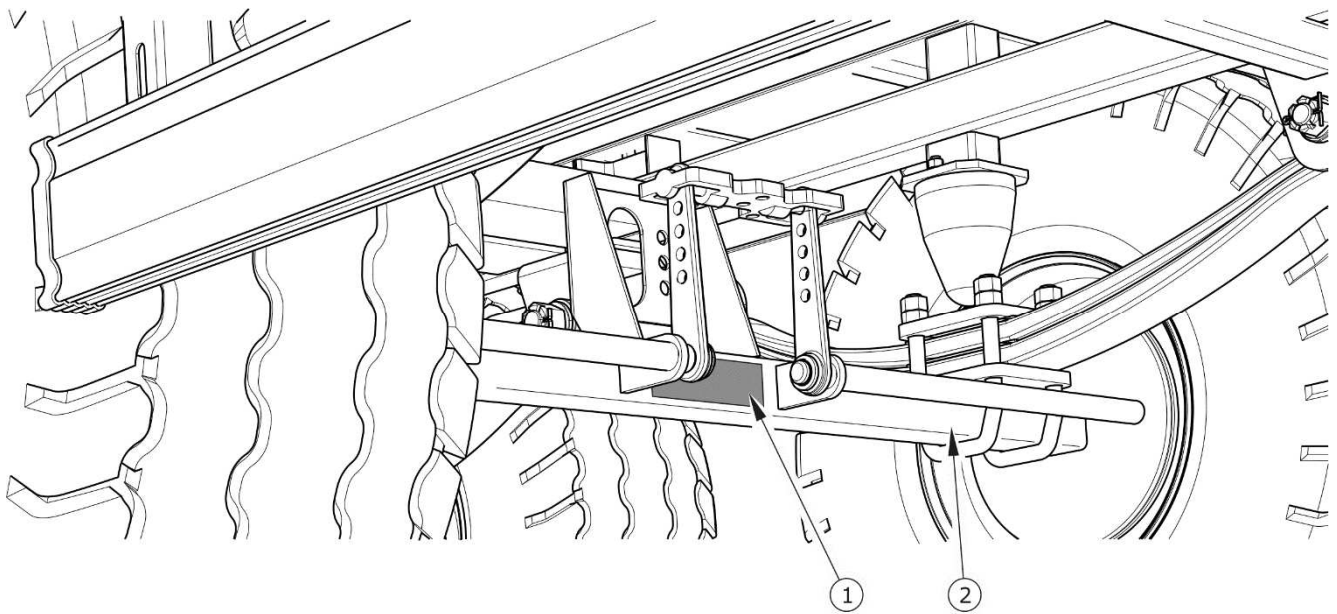
BOOK and in the sales documents. The meanings of the individual fields found on the data plate are presented in the table below:

**TABLE 1.1** *Markings on data plate*

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

### 1.1.2 AXLE IDENTIFICATION

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



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

(1) data plate, (2) wheel axle

**1.1.3 LIST OF SERIAL NUMBERS**

**TABLE 1.2** *List of serial numbers*

<b>VIN</b>														
<b>S</b>	<b>Z</b>	<b>B</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>0</b>		<b>X</b>			<b>X</b>			
<b>SERIAL NUMBER OF FRONT AXLE</b>														
<b>SERIAL NUMBER OF CENTRAL AXLE</b>														
<b>SERIAL NUMBER OF REAR AXLE</b>														

**TIP**

*In the event of ordering a replacement part or in the case of the appearance of problems it is often essential to give the serial number of the agricultural trailer or the serial number of the axles, therefore it is recommended that these numbers are inscribed in the table (1.2).*

## 1.2 PROPER USE

The trailer is designed for transport of harvested crops and agricultural products in the form of pressed bales or blocks, at the farm and on public roads. The machine is also designed for transporting harvested crops and agricultural products on EUR-pallets and in pallet boxes.

**TABLE 1.3** *Recommended types of pallets*

<b>PALLET NAME - TYPE</b>	<b>LENGTH [MM]</b>	<b>WIDTH [MM]</b>	<b>HEIGHT [MM]</b>
EUR-pallet – standard	1,200	800	144
EUR-pallet – 1/2	800	600	144
EUR-pallet – extended	1,200	1,200	144
ISO	1,200	1,000	144

The above-mentioned harvested crops and agricultural products may be transported provided that the recommendations included in this manual, especially the recommendations concerning protection of loads included in Section (4.3.2), are adhered to.

The trailer may only be hitched to the agricultural tractors which fulfil all the requirements specified in table (1.4).

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 is 30 km/h in Poland (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 of 40 km/h.

**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 hazardous loads or loads which are not properly secured against shifting or falling out,*
- *for transporting any materials other than those stipulated in the manual.*

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

- carefully read the *OPERATOR'S MANUAL* and *WARRANTY BOOK* and conform with the recommendations contained in these documents,
- understand the machine'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 machine 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 machine 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 safe operation,
- have the required authorisation to drive and are familiar with the road traffic regulations and transport regulations.



**TABLE 1.4** *Agricultural tractor's requirements*

CONTENTS	UNIT	REQUIREMENTS
<b>Brake system connection sockets</b>		
Single conduit pneumatic system	-	according to A DIN 74 294
Double conduit pneumatic system	-	according to ISO 1728
Hydraulic system	-	according to ISO 7421-1
<b>Pressure rating of the system</b>		
Single conduit pneumatic system	bar	5.8 – 6.5
Double conduit pneumatic system	bar	5.8
Hydraulic system	bar	150
<b>Electrical system</b>		
Electrical system voltage	V	12
Connection socket	-	7 polar compliant with ISO 1724
<b>Tractor hitches</b>		
Type of hitch	-	upper transport hitch
<b>Other requirements</b>		
Min. tractor power	hp / /kW	83.2 / 61

## 1.3 EQUIPMENT



### TIP

*Information concerning tyres is provided at the end of this manual in ANNEX A.*

**TABLE 1.5** *Equipment*

<b>EQUIPMENT</b>	<b>STANDARD</b>	<b>ADDITIONAL</b>	<b>OPTION</b>
OPERATOR'S MANUAL, WARRANTY BOOK	•		
Drawbar with hitching eye Ø40	•		
Double conduit pneumatic brake system	•		
Single conduit pneumatic brake system			•
Double conduit pneumatic brake system with ALB regulator			•
Hydraulic brake system			•
Toolbox		•	
Rear hitch		•	
Folding resistance ladders (for mounting with a linking chain) <sup>(1)</sup>	•		
Folding resistance ladders (for mounting with a linking cable) <sup>(2)</sup>	•		
Fixed resistance ladders (for mounting with a linking chain) <sup>(1)</sup>			•
Belt winders <sup>(1)</sup>		•	
Adjustable rear frame extending load area	•		
Spare wheel winch with spare wheel		•	
Mudguards (front and rear)		•	
Side under-run protection devices		•	
Linking chain <sup>(1)</sup>		•	
Rear hitch		•	
Slow-moving vehicle warning sign		•	
Warning reflective triangle		•	

<sup>(1)</sup> – the equipment only for T023M trailer, <sup>(2)</sup> – the equipment only for T023 trailer

## 1.4 TERMS & CONDITIONS OF WARRANTY

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*.



### 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.*

The warranty does not apply to 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,
- seals,
- bearings,
- bulbs and LED lamps,
- brake shoes.

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, caused by road accidents,
- inappropriate use, adjustment or maintenance, use of the machine for purposes other than those for which it is intended,
- use of damaged machine,
- repairs carried out by unauthorised persons, improperly carried out repairs,

- 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 machine.

Modification of the machine without the written consent of the Manufacturer is forbidden. 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 machine is prepared for sale completely assembled and does not require packing. Packing is only required for the machine's technical documentation and any extra fittings. The agricultural trailer is delivered to the user either transported on a vehicle or, after being attached to a tractor, independently (towing with a tractor).

### 1.5.1 TRANSPORT ON VEHICLE

Loading and unloading of the agricultural trailer from vehicle shall be conducted using loading ramp with the aid of agricultural tractor, overhead crane or hoisting crane. During work adhere to the general principles of Health and Safety at Work applicable to reloading work. Persons operating reloading equipment must have the qualifications required to operate these machines.



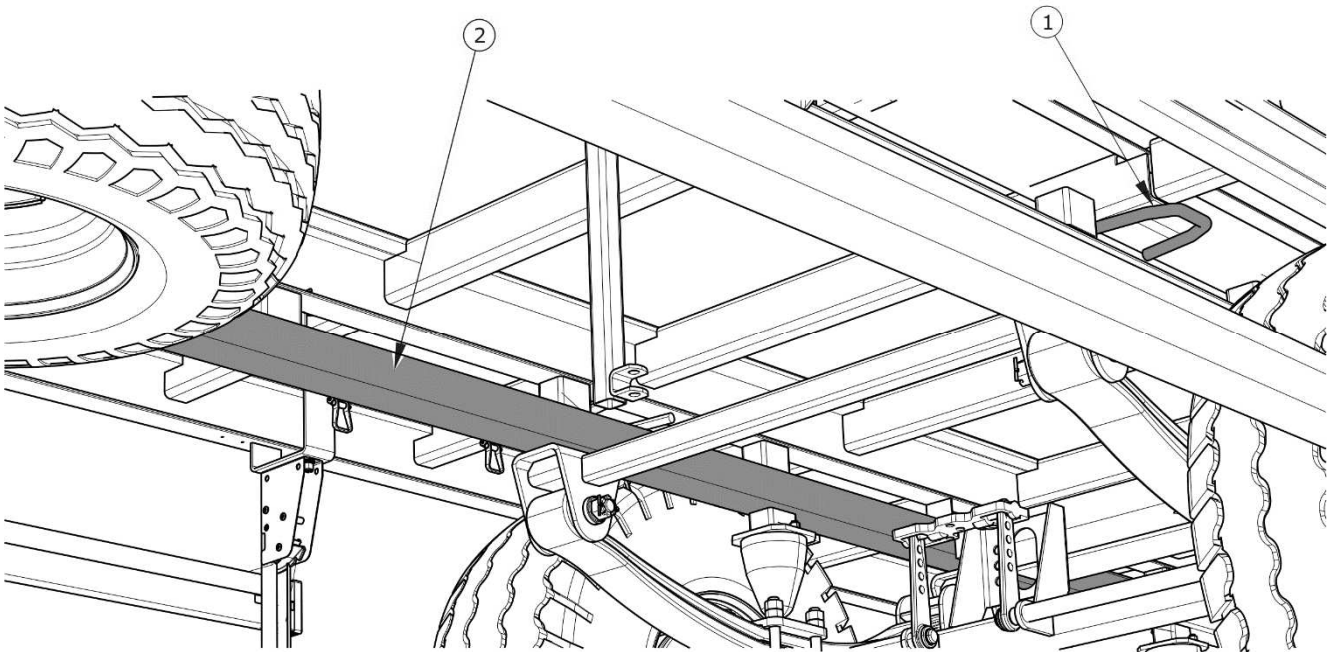
#### **IMPORTANT!**

*Do not attach or hitch the trailer by drawbar eye, under-run protection devices, mudguard brackets or other structural elements that are not sufficiently strong to withstand operations of this type.*

Lifting equipment used for transporting the machine must be attached only to the fixed structural elements of the machine. These elements are, first of all: frame, transport catches and axle.

The trailer should be attached firmly to the platform of the vehicle using straps or chains fitted with a tightening mechanism. In order to attach the machine in a proper manner, use

transport lugs (1) – figure (1.3) and fasten axles, lower longitudinal members of the frame and possibly structural elements of the rotating frame.



**FIGURE 1.3** *Transport lugs*

*(1) transport lug, (2) lower longitudinal member*

Chocks, wooden blocks or other objects without sharp edges should be placed under the wheels of the trailer to prevent it from rolling. Wheel blocks must be nailed to the vehicle load platform planks or secured in another manner preventing their movement.

Use certified and technically reliable securing measures. Worn straps, cracked securing catches, bent or corroded hooks as well as other damage may disqualify use of the given element from use. Carefully read the information stated in the Operator's Manual for the given securing measure. The number of securing elements (cables, straps, chains and stays etc.) and the force necessary for their tensioning depends on a number of things, including weight of the machine, the construction of vehicle carrying it, speed of travel and other conditions. For this reason it is impossible to define the securing plan precisely.

A correctly secured machine does not change its position with regard to the transporting 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 machine. If necessary, sharp edges of trailer should be protected at the same time protecting the securing straps from breaking during transport.

**DANGER**

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

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

**IMPORTANT!**

*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. Centre of gravity of the vehicle transporting the machine is shifted upwards, which poses a threat to stability of the vehicle and transported machine.*

*Use only certified and technically reliable securing measures. Carefully read the manufacturer's instructions for the securing measures.*

## 1.5.2 INDEPENDENT TRANSPORT BY THE USER

In the event of independent transport by the user, carefully read *THE OPERATOR'S MANUAL* and follow its recommendations. Independent transport involves towing the machine with own agricultural tractor to destination. During transport adjust travel speed to the prevailing road conditions, but do not exceed the maximum design speed.

**IMPORTANT!**

*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.



### 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.*

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.

Oil, which has been used up or is unsuitable for further use owing to a loss of its properties should be stored in its original packaging in the conditions described above. Waste oil should be taken to the appropriate facility dealing with the re-use of this type of waste. Waste code (L-HL 32 Lotos hydraulic oil): 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.*

**IMPORTANT!**

*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 machine from use, comply with the regulations in force in the given country concerning withdrawal from use and recycling of machines withdrawn from use. Before proceeding to dismantle equipment, oil shall be completely removed from hydraulic system.

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.

**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.*



**SECTION**

**2**

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**SAFETY  
ADVICE**

## 2.1 SAFETY INFORMATION

### 2.1.1 BASIC SAFETY RULES

- Before using the trailer, the user must carefully read this operator's manual. When operating the machine, the operator must comply with the recommendations. The trailer may only be used and operated by persons qualified to drive agricultural tractors and trained in the use of the machine.
- If the information stated in the Operator's Manual is difficult to understand, contact a seller who runs an authorised technical service on behalf of the Manufacturer, or contact the Manufacturer directly.
- Careless and improper use and operation of the trailer, and non-compliance with the recommendations given in this operator's manual is dangerous to your health.
- Be aware of the existence of a residual risk, and for this reason the fundamental basis for using this machine should be the application of safety rules and sensible behaviour.
- 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.
- The trailer must not be used for purposes other than those for which it is intended. Anyone who uses the machine other than the way intended takes full responsibility for himself for any consequences of this use. Use of the trailer for purposes other than those for which it is intended by the Manufacturer may invalidate the warranty.
- Any modification to the trailer frees PRONAR Narew from any responsibility for damage or detriment to health, which may arise as a result.
- The trailer can only be stood on when it is absolutely motionless and the tractor engine is switched off. Use safe and resistant platforms or ladders of proper height.

- In the event of failure of the braking system, do not use the trailer until the malfunction is corrected.
- The trailer unhitched from tractor must be immobilised with parking brake. If the machine is positioned on a slope or elevation it shall be additionally secured against moving by placing chocks or other objects without sharp edges under the trailer's wheels.
- Do not carry people or animals.
- The trailer and tractor must not be attached if the hydraulic oil in the two machines is of different types (applies to trailer version with hydraulic braking system).
- The machine must not be used when not in working order.
- 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 working or driving.
- Before each use of the trailer, check the technical condition of the trailer and tractor hitching system and connection elements of the braking system and electrical system.
- Exercise caution when connecting and disconnecting machine from the tractor.
- When hitching, there must be nobody between the trailer and the tractor.
- During hitching the trailer to the tractor only the upper transport hitch should be used. Check safety clips.
- If the trailer is equipped with the hitching system for coupling second trailer, the extendible frame should always be retracted before coupling second trailer.
- Load on the trailer must be uniformly distributed.
- Keep a safe distance during loading and unloading. Do not allow anyone to approach the place where works are carried out.
- Load should be protected against moving by means of belts, chains and tapes or other securing measures. The securing measures must be fitted with a tightening mechanism and have proper safety certificates.

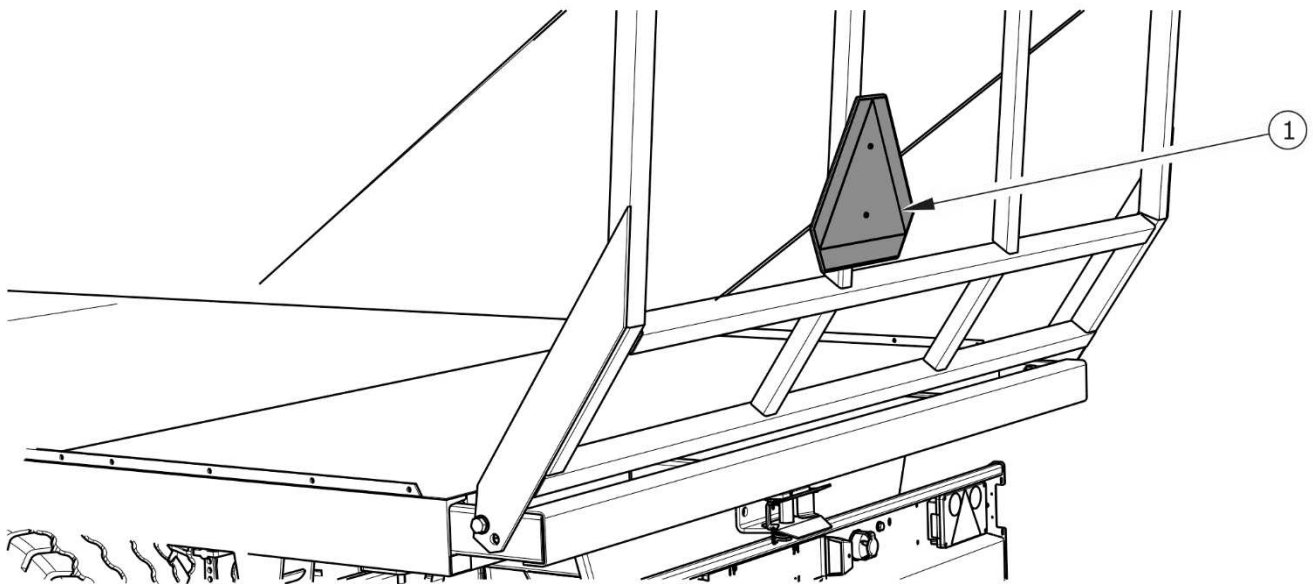
- When operating, the air tank and hydraulic brake system are under high pressure.
- Check the condition of braking system frequently. Oil leaks in the system are not allowed.
- Regularly check the technical condition of the connections and the pneumatic and hydraulic lines.
- When connecting the hydraulic lines to the tractor, make sure that the tractor and trailer hydraulic system are not under pressure.
- Before beginning repair or maintenance works on pneumatic or hydraulic systems reduce air or oil pressure.
- In the event of injuries being caused by pressurised hydraulic oil, contact a doctor immediately. Hydraulic oil may find its way under the skin and cause infections.
- Use the hydraulic oil recommended by the Manufacturer. Never mix two types of oil.
- After changing the hydraulic oil, the used oil should be properly disposed of.
- Do not make independent repairs of control valve, brake cylinders and braking force regulator. In the event of damage to these elements, repair should be entrusted to an authorised service point or elements should be replaced with new ones.
- 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.
- The paint coating should be cleaned off before beginning welding work. 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 and fusible elements (parts of the hydraulic, pneumatic and electric systems, plastic and rubber parts). If there is a risk that they will catch fire or be damaged, they should be removed before commencing welding work.
- 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 before the first use of trailer, after the first travel under load and then every 6 months of use or after 25,000 km, whichever occurs first. 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.
- Check the tyre pressure regularly.
- In the event of any fault or damage whatsoever, do not use the trailer until the fault has been fixed. The trailer must not be used when not in working order.
- When operating the machine wear protective gloves and close fitting clothing and use the appropriate tools.
- 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.
- Regularly check the condition of the bolt and nut connections.
- Before welding or electrical work, the trailer should be disconnected from the power supply.
- During the warranty period, any repairs may only be carried out by Warranty Service authorised by the manufacturer.
- Should it be necessary to change individual parts, use only original parts. 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 warranty.
- In the event of work requiring the trailer to be raised, use properly certified hydraulic or mechanical lifts for this purpose. After lifting the trailer, 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.
- Use appropriate tools, close-fitting protective clothing and gloves when operating, maintaining or cleaning the machine.

## 2.1.2 DRIVING ON PUBLIC ROADS

- Comply with the road traffic regulations.
- Exceeding the maximum load capacity of the trailer may damage it, and also threaten the safety of traffic.
- Do not exceed the maximum speed limit. Adjust driving speed to the road conditions.
- The trailer must NOT be left unsecured. Securing the trailer involves immobilising the trailer with the parking brake and, optionally, placing chocks under trailer wheels.
- While driving on public roads the trailer must be fitted with a certified or authorised reflective warning triangle.



**FIGURE 2.1** *Mounting place for the slow-moving vehicle warning sign*

(1) *slow-moving vehicle warning sign*

- Do not drive on public roads with extended frame.

- While driving on public roads the trailer shall be marked with a warning triangle distinguishing slow-moving vehicles. The warning triangle should be attached to the rear ladder.

### **2.1.3 DESCRIPTION OF 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 trailer for purposes other than those described in the Operator's Manual,
- being between the tractor and the trailer while the engine is running and when the machine is being attached,
- operation of the trailer by persons under the influence of alcohol or other intoxicating substances,
- operation of the trailer by unauthorised persons,
- being on the machine when it operates,
- careless cleaning, maintenance and technical checks of the trailer.


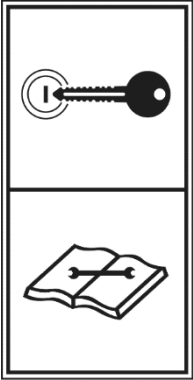
The residual risk may be kept to a minimum by following the recommendations below:

- prudent and unhurried operation of the machine,
- sensible application of the remarks and recommendations contained in the Operator's Manual,
- maintain safe distance from prohibited or dangerous places,
- do not climb on the machine when it is operating
- carrying out repair and maintenance work by persons trained to do so,
- using close fitting protective clothing,
- ensure unauthorised persons have no access to the machine, especially children.


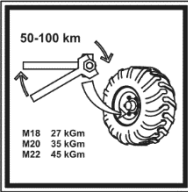

## 2.2 INFORMATION AND WARNING DECALS

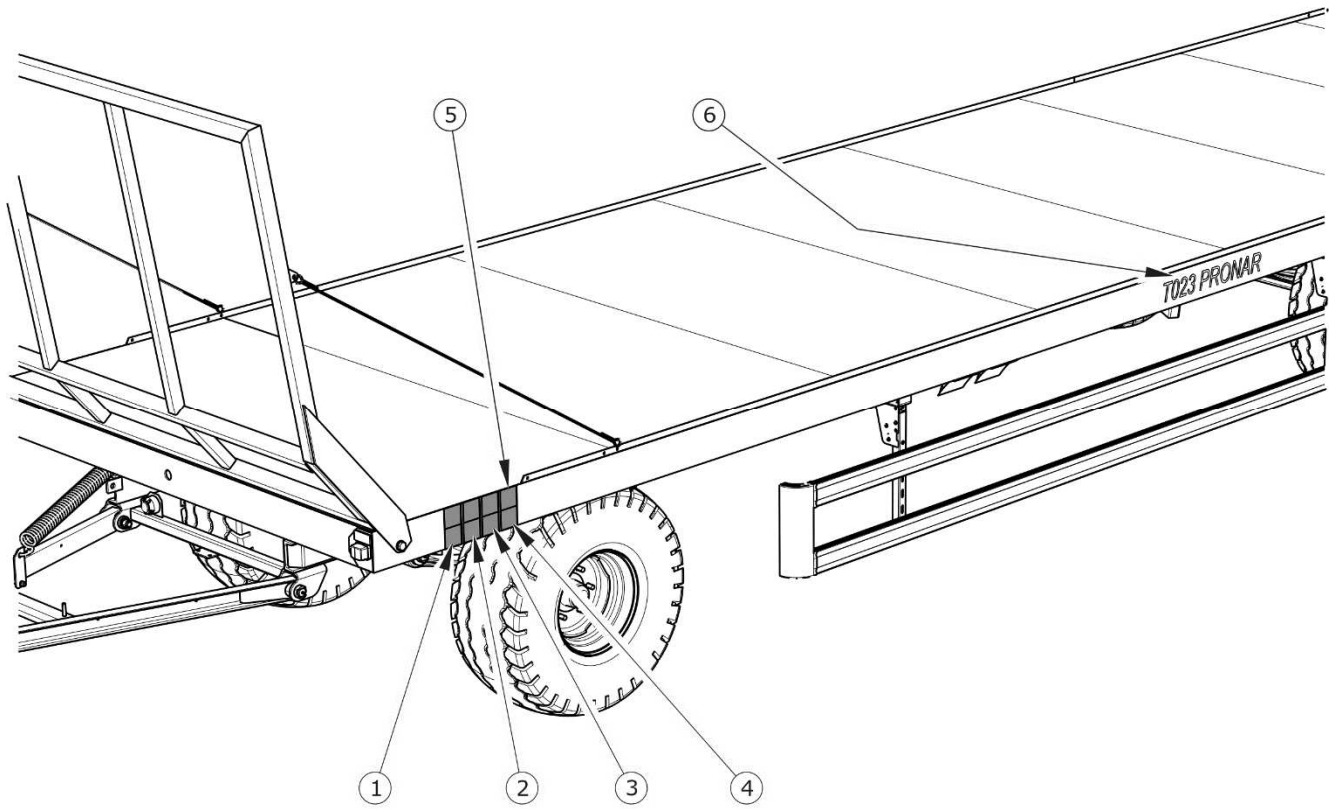
The trailer is labelled with the information and warning decals mentioned in table (2.1). Locations of pictograms on the machine are shown in figure (2.2). Throughout the time it is in use, the user of the machine is obliged to take care that notices and warning and information symbols located on the trailer are clear and legible. In the event of their destruction, they must be replaced with new ones. Information and warning decals may be purchased directly from the Manufacturer or your PRONAR dealer. Part numbers of information decals are given under pictogram description in table (2.1) and in *SPARE PARTS LIST*. New assemblies, changed during repair, must be labelled once again with the appropriate safety signs. During agricultural 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	SYMBOL	MEANING
1		<p>Caution!</p> <p>Before starting work, carefully read the <i>OPERATOR'S MANUAL</i>.</p> <p><b>70N-00000004</b></p>
2		<p>Before beginning maintenance or repairs, turn off engine and remove key from ignition</p> <p><b>70N-00000005</b></p>



ITEM	SYMBOL	MEANING
3		<p>Danger of crushing of the whole body.</p> <p>Keep a safe distance from ladders and drawbar.</p> <p><b>147N-0000002</b></p>
4		<p>Regularly check if the nuts and bolts fixing the wheels and other components are properly tightened.</p> <p><b>104N-0000006</b></p>
5		<p>Grease the machine according to the recommendations in the <i>OPERATOR'S MANUAL</i></p> <p><b>104N-0000004</b></p>
6	<p><b><i>T023 PRONAR</i></b></p>	<p>Machine type.</p> <p><b>65N-0000004</b></p>



**FIGURE 2.2** Locations of information and warning decals.

*SECTION*

**3**

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**DESIGN AND  
OPERATION**

## 3.1 TECHNICAL SPECIFICATION

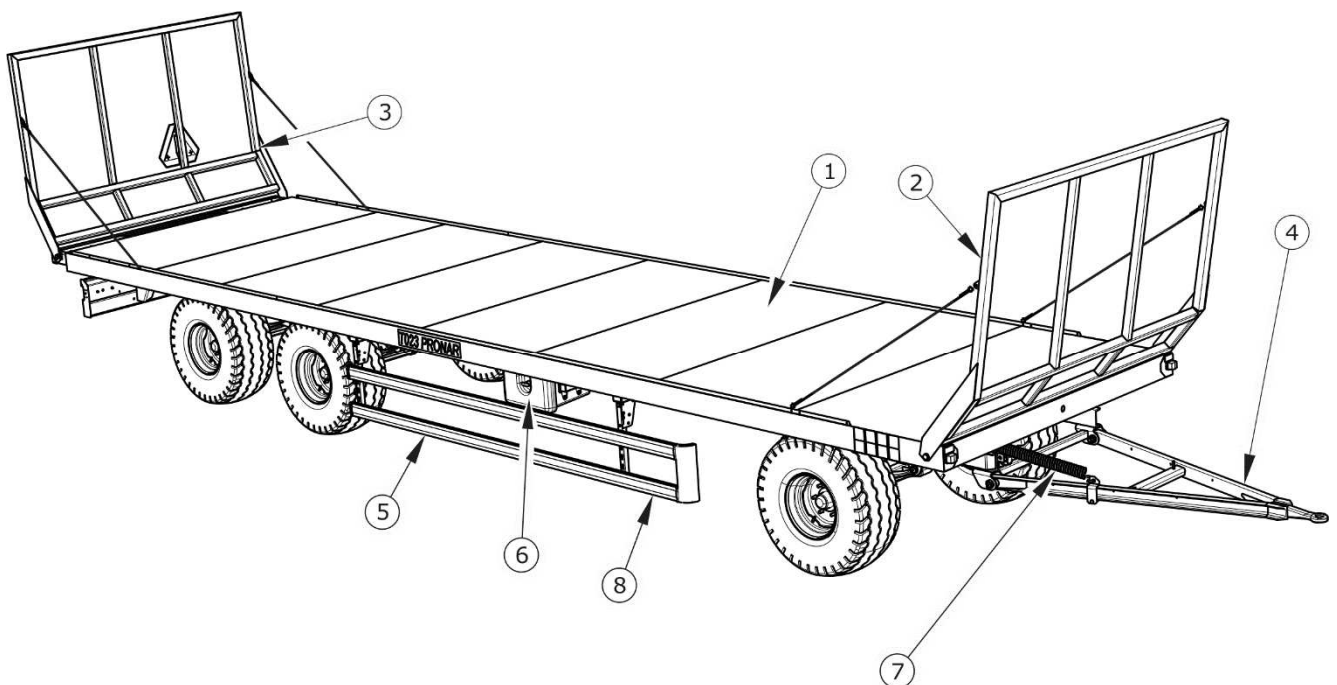
**TABLE 3.1** *Basic technical data of the standard machine version*

CONTENTS	UNIT	T023	T023M
<b>Dimensions</b>			
Length			
- with extended rear frame	mm	13,170	13,170
- with retracted rear frame	mm	11,995	11,995
Width	mm	2,500	2,550
Height	mm	2,780	2,830
<b>Load box dimensions</b>			
Length of load surface			
- with extended rear frame	mm	10,770	10,770
- with retracted rear frame	mm	9,880	9,880
Width	mm	2,435	2,517
<b>Technical specification</b>			
Carrying capacity	kg	11,300	11,300
Maximum gross weight	kg	15,000	15,000
Tare weight	kg	3,700	3,700
Height of platform from ground	mm	1,100	1,150
Load surface			
- with extended rear frame	m <sup>2</sup>	26.2	26.2
- with retracted rear frame	m <sup>2</sup>	24	24
<b>Other information</b>			
Electrical system voltage	V	12	12
Wheel track	mm	1,730	1,730
Maximum design speed	km/h	40	40
Tractor power demand	hp/kW	83.2 / 61	83.2 / 61

## 3.2 TRAILER CONSTRUCTION

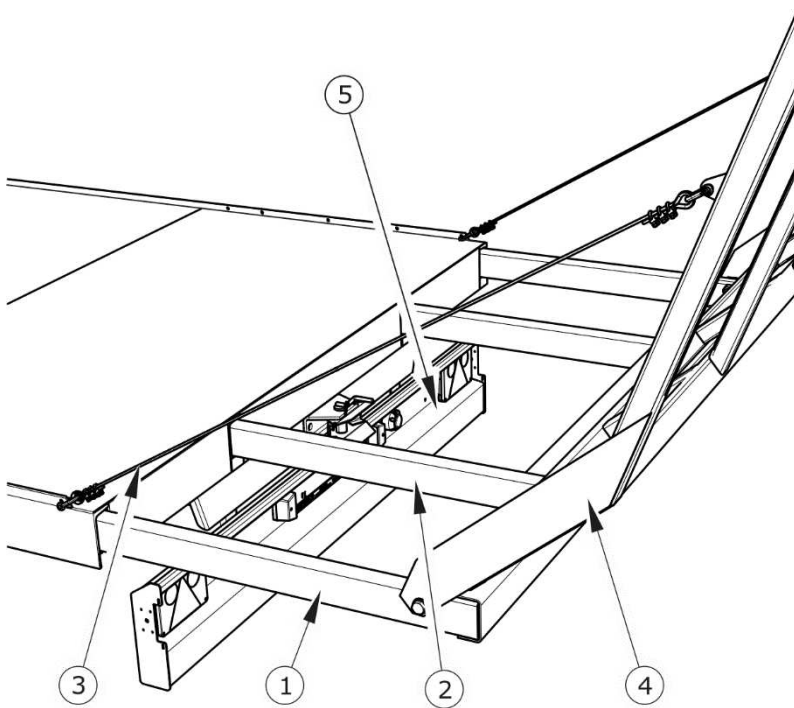
### 3.2.1 CHASSIS

Frame (1) – of the load box is a structure welded from steel sections. The main support elements are longitudinal members connected with crossbars. Depending on the trailer version, the floor sides can be ended with a welded flat bar (T023) or a profiled side strip (T023M). The load platform, in its front part and rear part, is limited by ladders (2) and (3). Depending on the trailer version, the ladders can be folding or fixed. Deflection angle of folding ladders is limited by means of steel cables or a tensioning chain.



**FIGURE 3.1** *Trailer construction*

(1) frame – load platform, (2) front ladder, (3) rear ladder, (4) drawbar, (5) under-run protection device, (6) toolbox, (7) spring

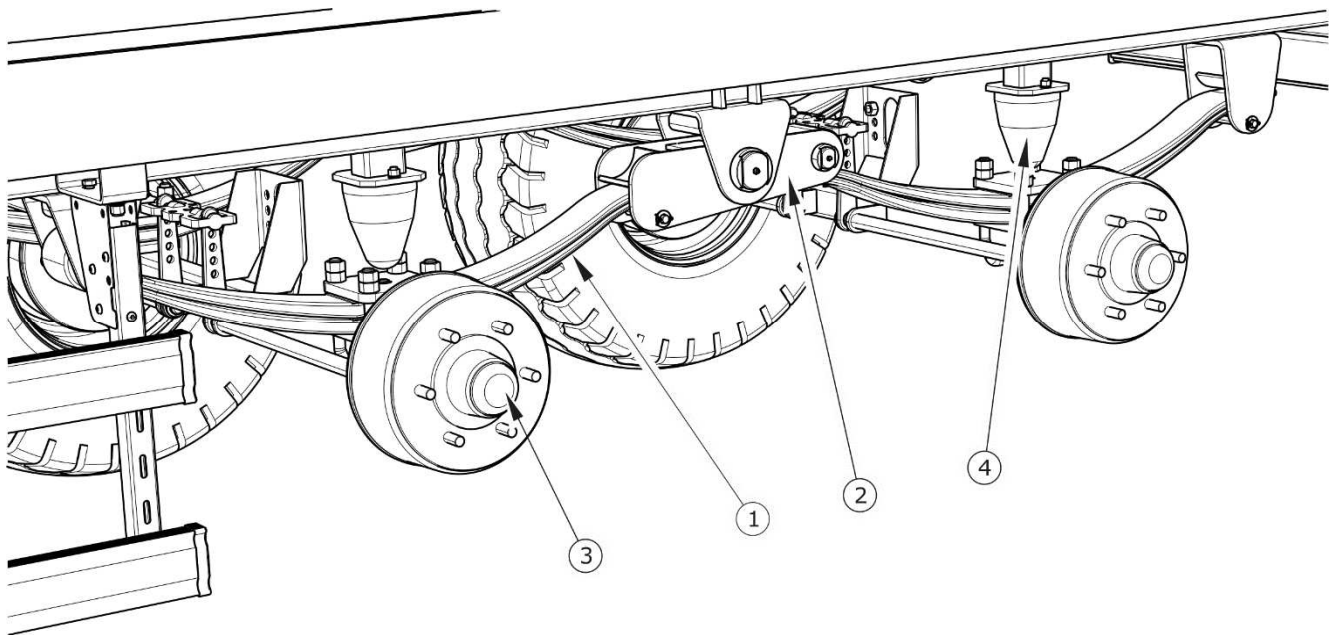


Extendible frame – figure (3.2) - consists of external frame (1) and internal frame (2). While driving on public roads, the extendible frame must be folded to transport position and secured by means of bolts located under the frame floor.

At the end of the trailer frame there is a lights support beam (5) which is designed for fixing electrical equipment, license plate and retroreflectors.

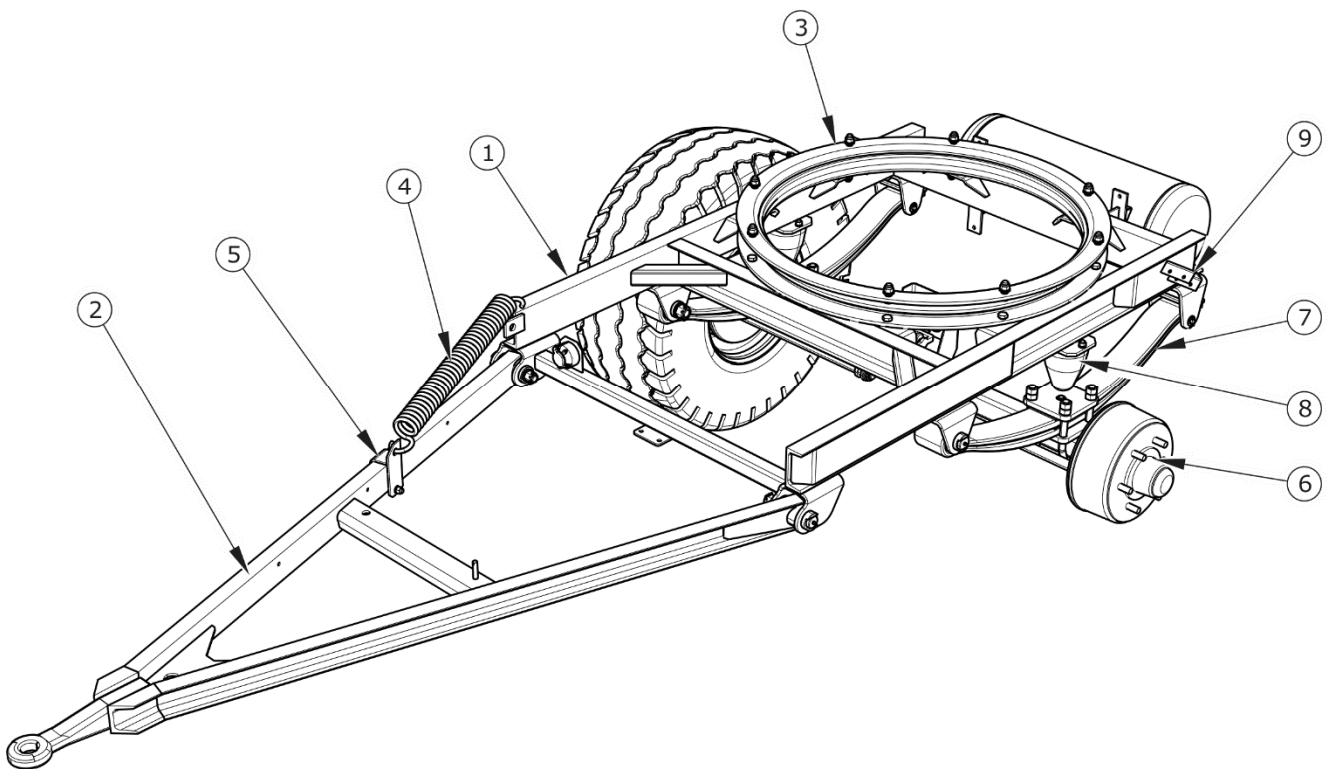
**FIGURE 3.2** *Extendible frame*

- (1) external extendible frame, (2) internal extendible frame,
- (3) tensioning cable, (4) rear ladder, (5) lights support beam



**FIGURE 3.3** *Rear suspension*

- (1) leaf spring, (2) rocker arm, (3) wheel axle, (4) rubber fender



**FIGURE 3.4** *Front suspension*

(1) turntable frame, (2) drawbar, (3) ball turntable, (4) spring, (5) spring catch, (6) wheel axle, (7) leaf spring, (8) rubber fender, (9) mudguard fixing socket

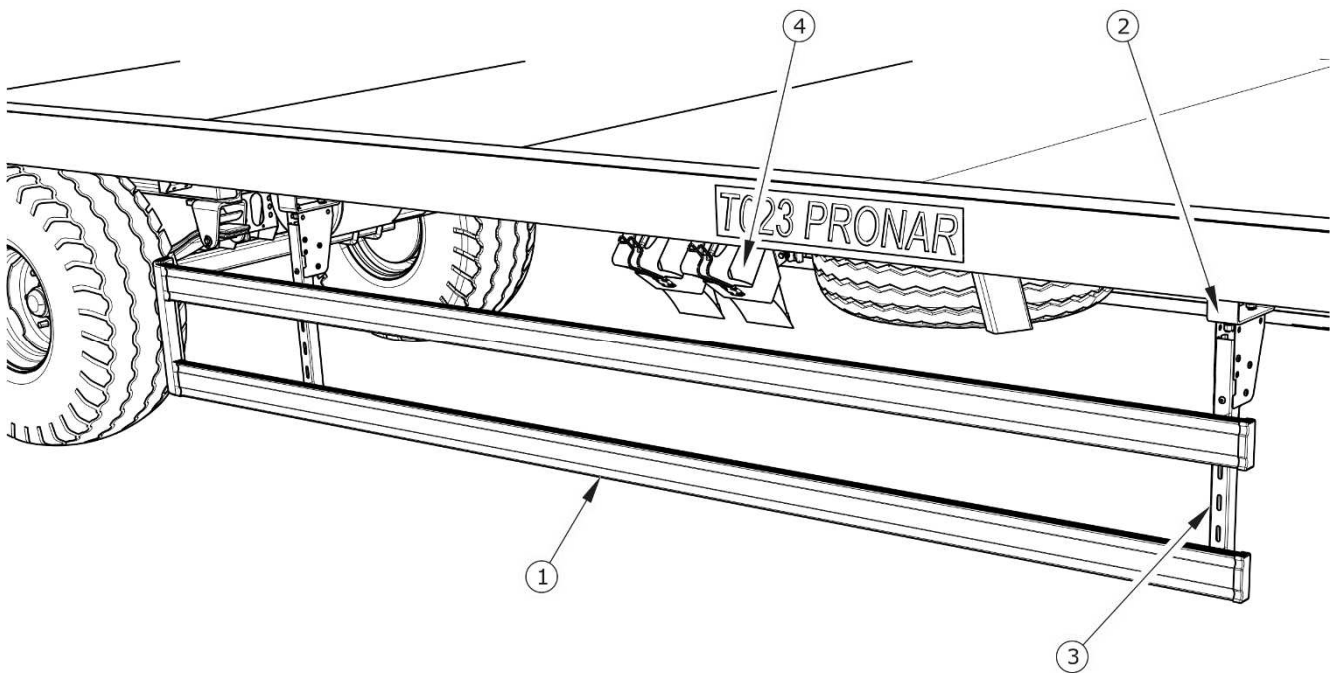
Drawbar (2) is fixed to the turntable frame (1) using pins. The height of drawbar hitching eye can be adjusted by moving the catch (5) fixing the spring to the drawbar.

Front axle and rear axles are made from rectangular rod terminated with pins, on which wheel hubs are mounted on cone bearings. The wheels are single and equipped with shoe brakes activated by mechanical cam expanders.

### **3.2.2 SIDE UNDER-RUN PROTECTION DEVICES**

Two side under-run protection devices can be installed in the central part of the chassis frame, on the left side and the right side of the trailer. The complete under-run protection devices are bolted to holder C-section (2) welded to the trailer frame.

The design of the side under-run protection devices enables their locking in the transport position and in the raised position.



**FIGURE 3.5** Side under-run protection devices

(1) strip of under-run protection device, (2) fixing C-section, (3) bracket, (4) wedges



### IMPORTANT!

*Side under-run protection devices must not be used as supporting elements while climbing on the trailer's platform.*

*Before driving off, make certain that side under-run protection devices are set in transport position.*

### 3.2.3 MAIN BRAKE

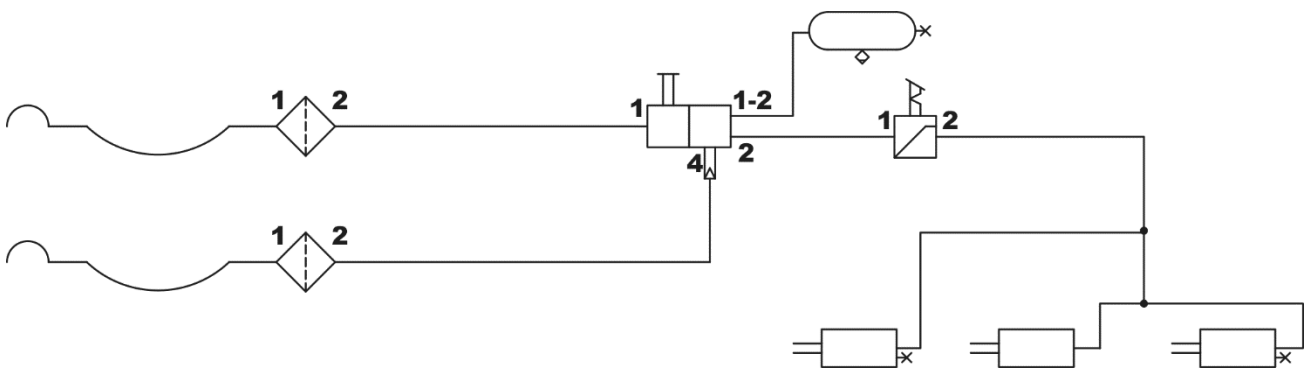
Depending on the version, the trailer is equipped with one of the four types of main brake:

- double conduit pneumatic system with three position regulator, figure (3.6) – standard equipment,
- double conduit pneumatic brake system with automatic regulator, figure (3.7) - optional equipment,
- single conduit pneumatic system with three position regulator, figure (3.8) - optional equipment,

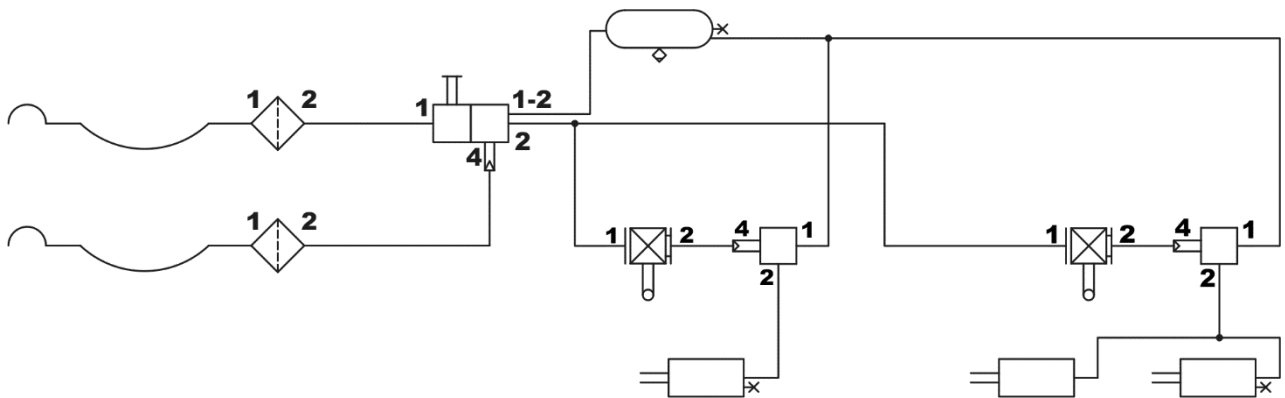


- hydraulic braking system – figure (3.9) - optional equipment,

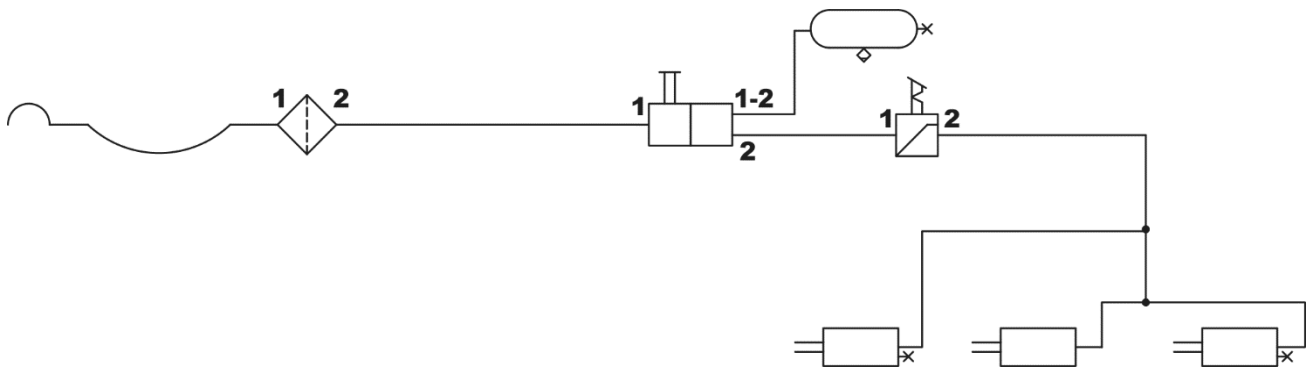
The main brake (pneumatic or hydraulic brake) is activated from the tractor driver's cab by depressing the brake pedal. The task of the control valve is to activate the trailer's brakes when the brake pedal is depressed in the tractor. Furthermore, in case of an inadvertent disconnection of the conduit between the trailer and the tractor, the control valve will automatically activate trailer's brakes - refers only to pneumatic systems.



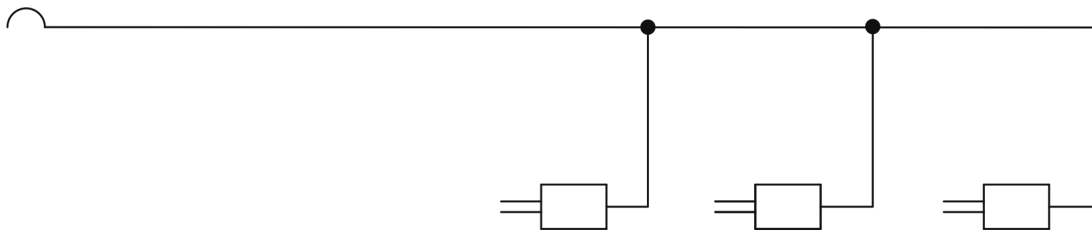
**FIGURE 3.6** *Diagram of double conduit pneumatic system with manual regulator*



**FIGURE 3.7** *Diagram of double conduit pneumatic system with automatic regulator*





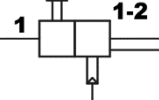
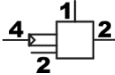


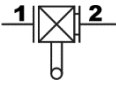
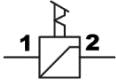


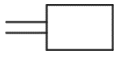

**FIGURE 3.8** Diagram of single conduit pneumatic system with manual regulator

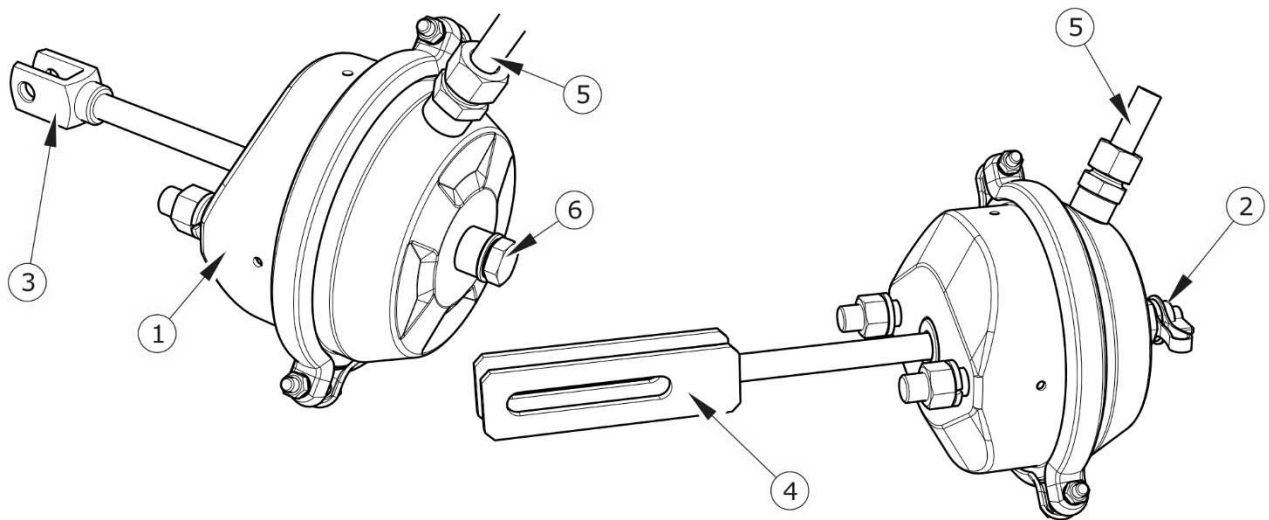


**FIGURE 3.9** Hydraulic system diagram

**TABLE 3.2** List of symbols used on the diagrams

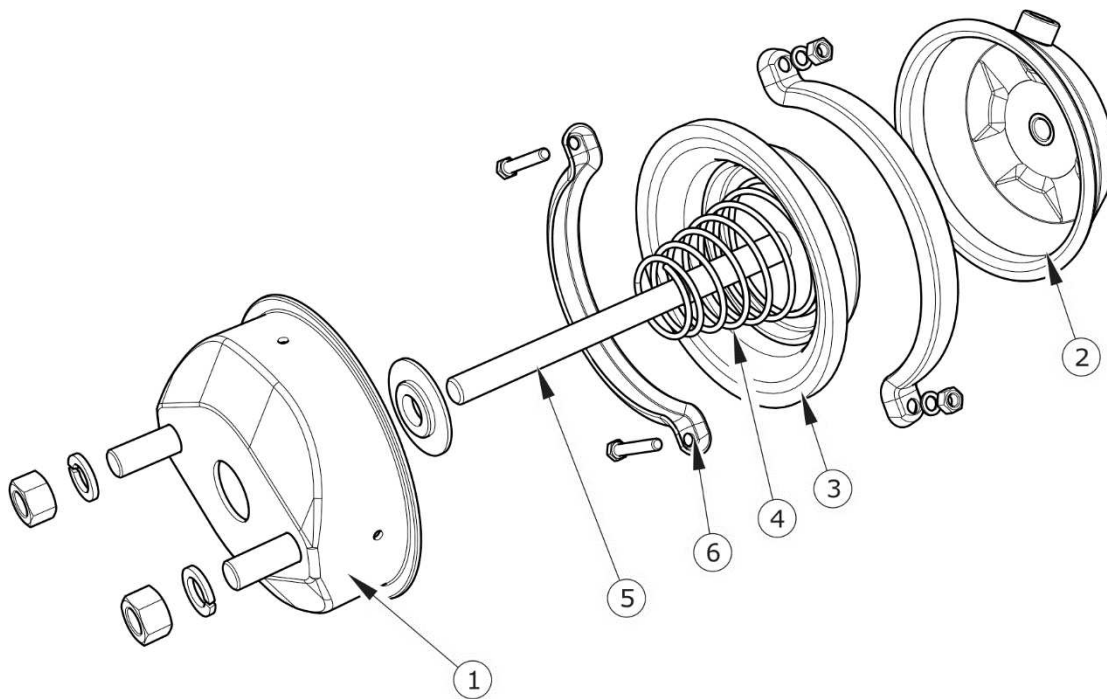
SYMBOL	MEANING
	Pneumatic connection (plug)
	Pneumatic connection with cut-off valve (socket)
	Air filter
	Drain valve
	Main control valve
	Relay valve

SYMBOL	MEANING
	Automatic regulator of braking force
	Three-position manual regulator of braking force
	Conduit connection (connector)
	Air tank
	Cylinder
	Valve - control connection



**FIGURE 3.10** *Pneumatic brake cylinders*

(1) membrane cylinder, (2) control connection, (3) short fork, (4) long fork, (5) pneumatic conduit, (6) plug



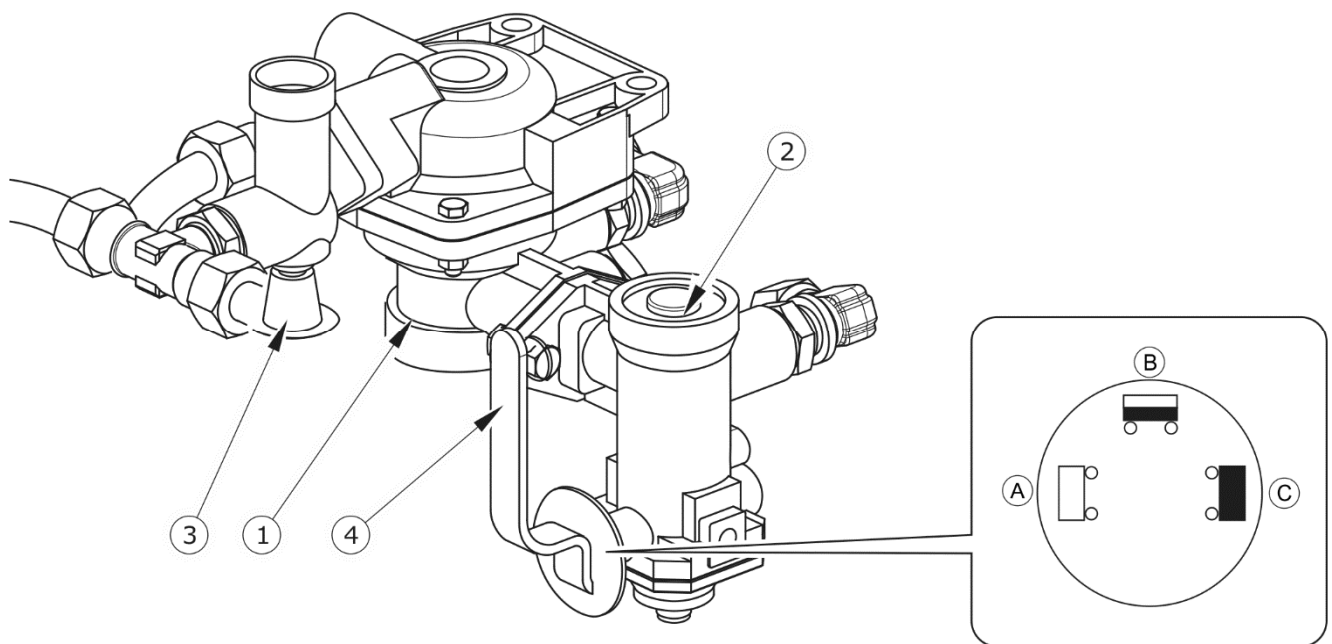
**FIGURE 3.11** *Design of pneumatic cylinder*

(1) front cover, (2) rear cover, (3) membrane, (4) spring, (5) cylinder rod, (6) clamping ring

Valve used in the system is equipped with a circuit causing the brakes to be applied when trailer is disconnected from the tractor - figure (3.12). When compressed air conduit is connected to the tractor, the device automatically applying the brakes now changes its position to allow normal brake operation.

Three-step braking force regulator (2)- figure (3.12) - adjusts braking force depending on setting. Switching to a suitable working mode is done manually by machine operator using the lever (4) prior to moving off. Three working positions are available: A - "no load", B - "half load" and C - "full load".

In double conduit systems with automatic regulator, braking force is adjusted automatically depending on the trailer load. The automatic regulator does not require maintenance during normal use of the trailer.



**FIGURE 3.12** Control valve and brake force regulator

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

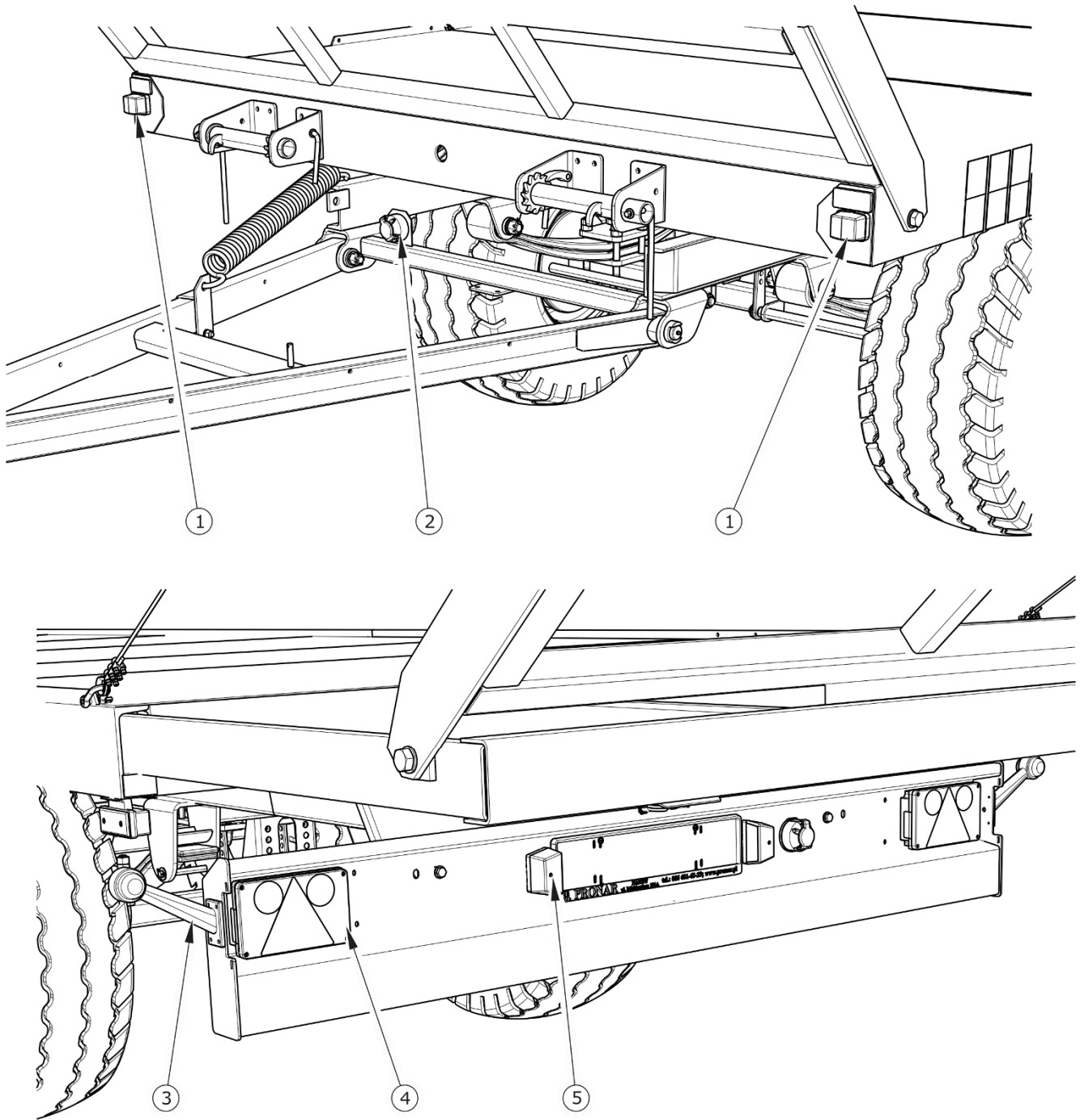
### 3.2.4 PARKING BRAKE

The parking brake is for immobilising trailer while standing motionless. The brake crank mechanism, located on the left side of the frame, is connected with the axle expander levers using a steel cable. Rotation of the crank increases tension of the steel cable. Expander arms exert pressure on brake shoes and cause the axle to brake. Prior to moving off, handbrake must be released - steel cable must hang loose.

### 3.2.5 ELECTRIC LIGHTING SYSTEM

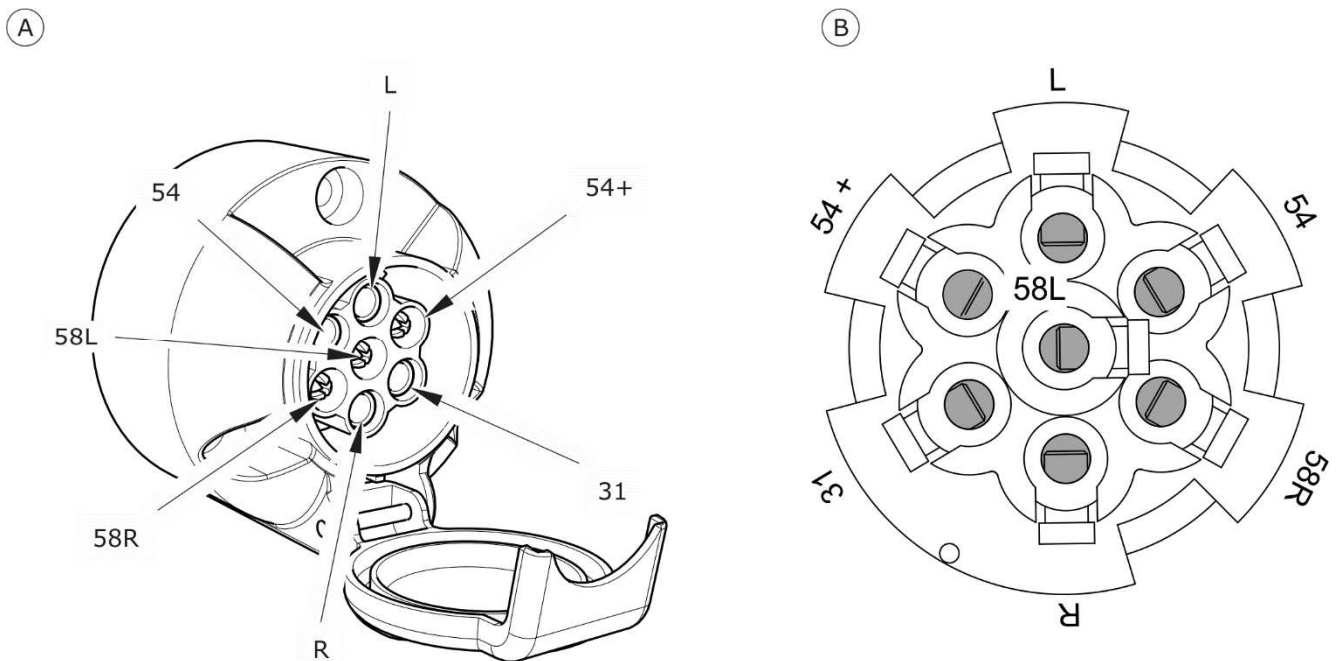
The trailer's electrical system is designed for supplying from direct current source of 12 V. Connection of the trailer's electrical system with the tractor should be made through an appropriate connection lead delivered as standard equipment of the machine.

Arrangement of electrical system components and connection diagram of the connection socket are shown in figures (3.13) and (3.14)



**FIGURE 3.13** Arrangement of electrical system components

(1) front parking light, white, (2) 7-pin connection socket, (3) rear clearance light, (4) rear lamp assembly, (5) license plate light



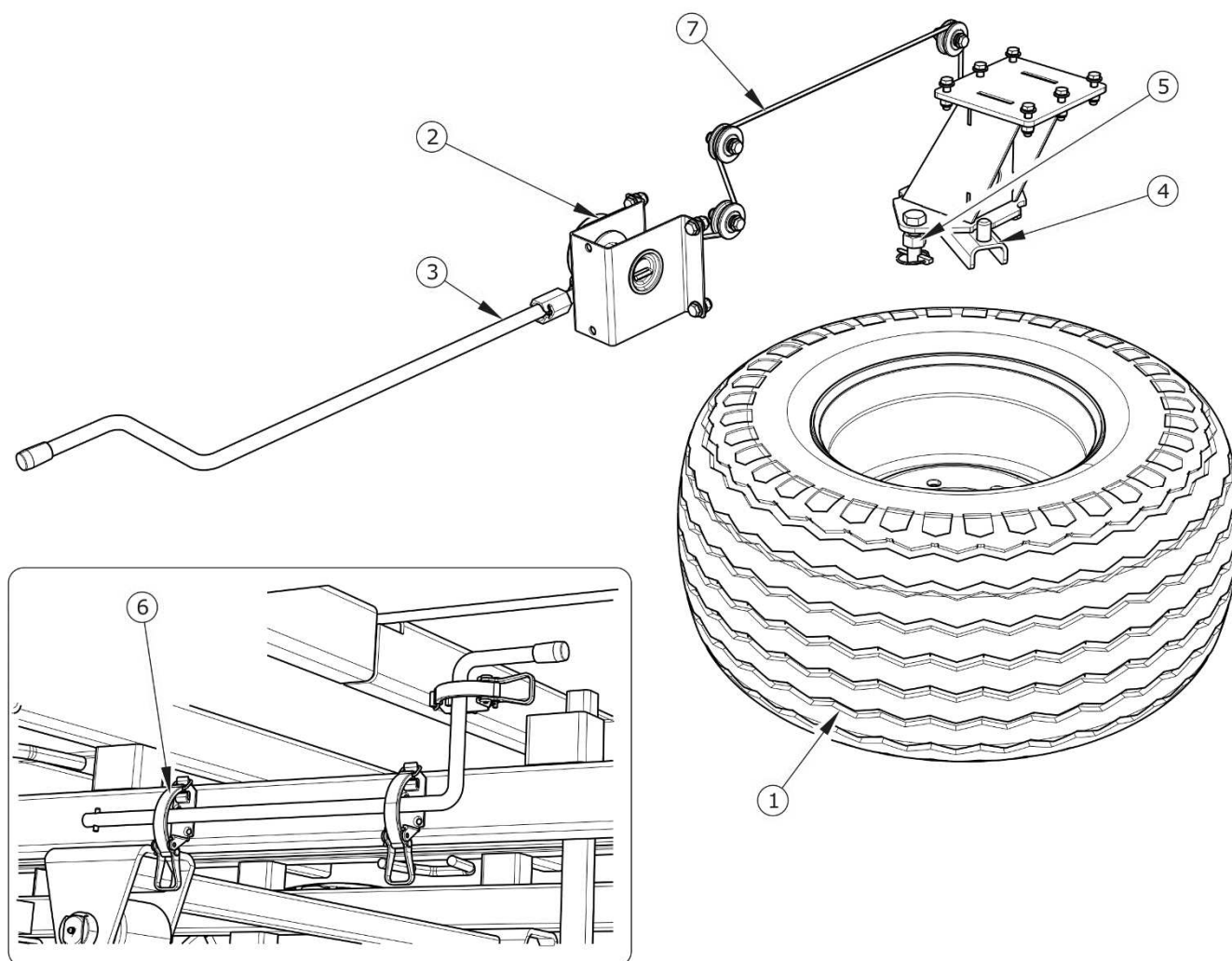
**FIGURE 3.14** Connection socket

(A) view of socket, (B) view of socket on the wiring harness fixing side

**TABLE 3.3** Marking of connection socket's connections

MARKING	FUNCTION
31	Weight
54+	Power supply +12V
L	Left indicator
54	STOP light
58L	Rear left parking light
58R	Rear right parking light
R	Right indicator

### 3.2.6 SPARE WHEEL WINCH



**FIGURE 3.15** *Design of spare wheel winch*

(1) spare wheel, (2) winch mechanism, (3) crank, (4) wheel fixing holder, (5) fixing bolt with securing cotter pin, (6) crank handle, (7) steel cable



*SECTION*

**4**

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**CORRECT USE**

## 4.1 PREPARING THE TRAILER FOR WORK

### 4.1.1 PRELIMINARY INFORMATION

The trailer is supplied to the user completely assembled and does not require additional mounting operations of machine sub-assemblies. The manufacturer guarantees that the machine is fully operational and has been checked according to quality control procedures and is ready for use. This does not release the user from an obligation to check the machine's condition prior to purchasing and before first use.

### 4.1.2 HAND-OVER AND INSPECTION OF THE MACHINE AFTER DELIVERY

After delivery of the machine to the buyer, the user is obliged to check technical condition of the trailer (one-time inspection). While buying the machine, the user must be informed by the seller about the method of use of the machine, risks resulting from the use for purposes other than intended, the method of the machine hitching and the principles of the machine construction and design. Detailed information concerning the machine hand-over are included in the *WARRANTY BOOK*.

#### Checking the trailer after delivery

- Check completeness of the machine according to order.
- Check technical condition of safety guards.
- Check condition of paint coating; check the machine for traces of corrosion.
- Check the machine for damage resulting from wrong transport of the machine to its destination (crushing, piercing, bending or breaking of minor elements etc.).
- Check air pressure in tyres and check correct tightening of wheel nuts.
- Check technical condition of drawbar eye and if correctly installed.

If non-conformities are found, do not hitch and start using the trailer. Discovered defects should be notified directly to the seller in order to remove them.

**IMPORTANT!**

*The seller is obliged to conduct the first start up of the trailer in the presence of the user.*

*The user trained by the seller is not released from the obligation to read this Operator's Manual carefully.*

### 4.1.3 PREPARING THE TRAILER FOR THE FIRST USE, TEST RUN OF THE TRAILER

**TIP**

*All maintenance activities concerning the trailer are described in detail in further sections of the Operator's Manual.*

#### Preparing for the test run

- The user must read this *OPERATOR'S MANUAL* and observe all the recommendations contained in it.
- Adapt the height of the trailer drawbar to the tractor hitch.
- Visually inspect the trailer according to the guidelines presented in section *PREPARING THE TRAILER FOR NORMAL USE*.
- Hitch machine to tractor. Immobilise tractor with parking brake.

#### Test start

- 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 are properly tightened.
- Drain air tank of the braking system.
- Ensure that hydraulic, pneumatic and electric connections in agricultural tractor are according to the requirements. Otherwise, the trailer should not be hitched to the tractor.
- Hitch trailer to tractor.

- Switch on individual lights, check correct operation of electrical system.
- Release tractor's parking brake. Perform test drive. Check the trailer's braking efficiency during driving.
- Stop tractor and turn off the engine, immobilise the tractor and trailer with parking brake.

If during test run worrying symptoms occur such as:

- excessive noise and abnormal sounds originating from the rubbing of moving elements,
- leaky brake system, hydraulic oil leaks,
- incorrect operation of brake cylinders,
- other faults,

stop operating the trailer and do not operate it until the malfunction is corrected. If a fault cannot be rectified or the repair could void the warranty, please contact retailer for additional clarifications or to perform the repair.

#### **4.1.4 PREPARING THE TRAILER FOR NORMAL USE**

##### **Scope of inspection activities**

- Visually inspect if the tyres are properly inflated. In case of doubt, carefully check tyre pressure.
- Check technical condition of drawbar eye.
- Check correctness of electrical system operation.
- Check technical condition and completeness of safety guards.
- Install the slow-moving vehicle warning sign - if the trailer is used on public roads.
- Fold the extendible frame before driving on public roads.

**DANGER**

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

*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 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.*

## 4.2 HITCHING AND UNHITCHING THE TRAILER

Ensure that hydraulic, pneumatic and electric connections and the hitch of agricultural tractor are according to the Manufacturer's requirements, if not the trailer should not be hitched to the tractor. In order to hitch the trailer to the tractor perform the actions below in the sequence presented.

### Hitching to tractor

- ➔ Position agricultural tractor directly in front of the trailer's drawbar eye.
- ➔ Reverse tractor, hitch trailer to appropriate hitch on tractor, check hitch lock protecting machine against accidental unhitching.
- ➔ If the agricultural tractor is equipped with an automatic coupler, ensure that the hitching operation is completed and that drawbar eye is secured.
- ➔ Turn off tractor engine. Ensure that unauthorised persons do not have access to the tractor cab.
- ➔ Connect the braking system conduits.
  - ⇒ If the trailer is equipped with a double conduit pneumatic system, first connect the yellow pneumatic conduit to the yellow socket in the tractor and then connect the red conduit to the red socket in the tractor.
  - ⇒ If the trailer is equipped with a single conduit pneumatic system, connect the black pneumatic conduit to the black socket in the tractor.

- ⇒ If the trailer is equipped with a hydraulic braking system, connect the braking system conduit to proper hydraulic socket in the tractor.
- ➔ Connect the electrical system lead.
  - ➔ Check and, if necessary, protect leads against abrasion or other mechanical damage.
  - ➔ Just before driving off, remove chocks from under the trailer's wheels and release parking brake.

**IMPORTANT!**

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

When turning, connecting conduits must hang loosely and not become tangled with moving elements of machine and tractor.

**DANGER**

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

*When connecting the hydraulic or pneumatic conduits to the tractor, make sure that the hydraulic and pneumatic systems of the tractor and the trailer are not under pressure.*

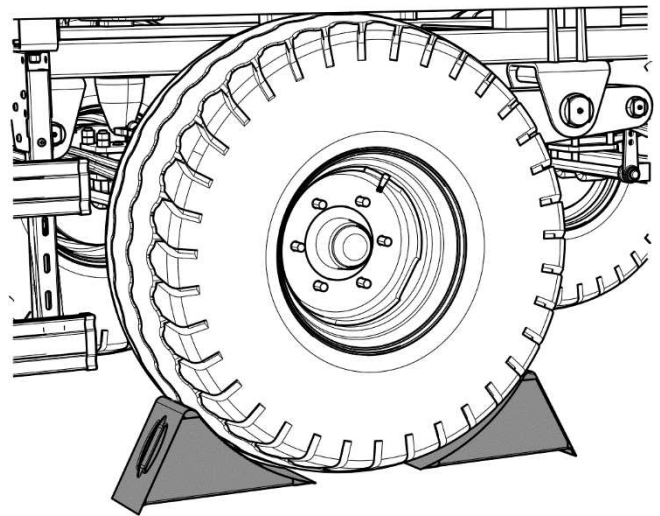
*Ensure sufficient visibility during hitching.*

*After completion of hitching check the security of the hitching pin.*

## Unhitching

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

- ➔ Immobilise tractor with parking brake, turn off tractor engine
- ➔ Ensure that unauthorised persons do not have access to the tractor cab.
- ➔ Place chocks under the trailer's wheels in order to prevent the machine from rolling.
- ➔ Disconnect electric lead.



**FIGURE 4.1** Proper position of chocks

## DANGER



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

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

*The trailer must not be disconnected when loaded.*

- ➔ Disconnect braking system conduits.
  - ⇒ If the trailer is equipped with a double conduit pneumatic system, first disconnect the red conduit and then disconnect the yellow conduit.
  - ⇒ If the trailer is equipped with a single conduit pneumatic system, disconnect the black conduit.
  - ⇒ Disconnect proper conduit of the hydraulic braking system from the tractor's socket.
- ➔ Protect conduit ends with covers.
- ➔ Release tractor hitch, drive tractor away from the trailer.

## 4.3 LOADING AND SECURING LOAD

### 4.3.1 GENERAL INFORMATION ABOUT LOADING

The trailer is designed for transport of harvested crops and agricultural products in the form of pressed bales or blocks, at the farm and on public roads. The machine is also designed for transport of harvested crops and agricultural products transported on pallets.

The trailer must be positioned to travel forwards and be hitched to the tractor. Loading should only take place, when trailer is placed on flat level surface and hitched to tractor. Before loading, check the technical condition of linking cables or chains and correctness of their attaching to the ladders and trailer frame. Do not load or drive the trailer with damaged linking cables or chains. It is recommended to unload the trailer using a loader, conveyor or forklift truck. Keep a safe distance during loading and unloading. Do not allow anyone to approach the place where works are carried out.

Load should be uniformly distributed along the length and width of the platform in order to ensure proper distribution of axle loads and proper stability of the trailer. Load must not extend beyond the outline of the load platform. Number of load layers depends on size of pressed bales or blocks, their arrangement on the load platform and their weight. However, the permissible loading height defined by the road traffic regulations and permissible design load of the trailer must not be exceeded. When loading goods on pallets pay special attention to load distribution on the platform. Pallets must be secured against the displacement on the platform. Pallets must not be stacked in layers.

#### **IMPORTANT!**



*Do NOT exceed the trailer's maximum carrying capacity.*

*Load placed on the platform must be uniformly distributed and properly secured.*

*While driving on public roads the extendible frame must be retracted.*

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



Loading should be carried out by a person having appropriate authorisation for operating the equipment (if required).

## **DANGER**



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

*Uneven arrangement of the load may cause overloading of the trailer's axle.*

*Do not carry people or animals.*

*During work, keep a safe distance from overhead electric power lines.*

*When loading or unloading the trailer, bystanders must exercise caution and keep a safe distance from danger zones.*

### **4.3.2 SECURING LOAD**

Load (rectangular or round bales, pallets or pallet boxes) should be adequately protected against moving by means of belts with a tightening mechanism. The belts may be attached to the following structural elements:

- left and right longitudinal member of the platform,
- front beam,
- rear beam of the extendible frame,
- transport lugs welded to the longitudinal members,
- oblong structural holes in the side part of profiled floor,
- tensioners bolted to front beam,
- grips welded to front ladder and rear ladder.

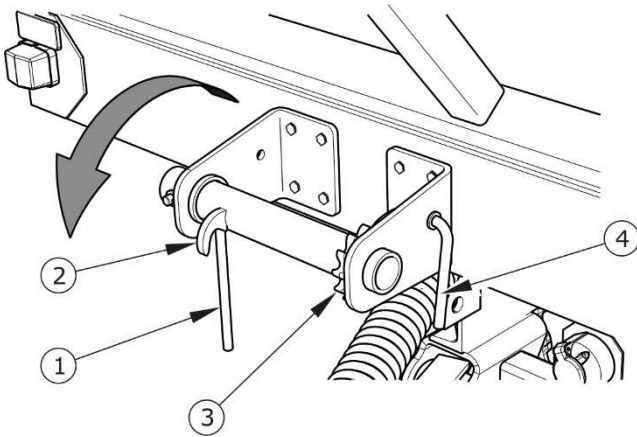
The extent of protection depends on loading method, type of load and size of load. If load is to be transported on slopes and/or in strong gusty winds conditions, limit the load height according to existing conditions.

Regardless of the type of load carried, the user is obliged to secure it in such a manner that the load is unable to spread and cause contamination of the road.

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.

### 4.3.3 TENSIONER OPERATION



**FIGURE 4.2** *Right tensioner*

(1) tensioner lever, (2) fixing hook, (3) pawl, (4) release lever

#### Required actions

Load can be attached using two tensioners bolted to the frame front beam (the tensioner is available only in T023M trailer as optional equipment).

Attach fixing belts or ropes to a fixed element of the trailer structure on one side, e.g. to fixing grips on the rear ladder and to a fixing hook in the tensioner on the other side. Rotate the lever in the direction indicated by arrow in order to tighten the belt.

In order to dismount belts or ropes, turn lever (1) until lever (4) can be released. Release lever (4) and remove belts.

## 4.4 TRANSPORTING LOADS

When driving on public 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. Take care that the driver has sufficient visibility.
- Make sure that the trailer is correctly attached to the tractor and tractor's hitch is properly secured.
- 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 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.
- While driving on public roads the extendible frame must be retracted.

**IMPORTANT!**

*Travel with a high-volume load by ruts, ditches, roadside slopes etc. constitutes a great risk of overturning the trailer. Exercise particular caution.*

- 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.
- Prolonged driving across steep ground may lead to loss of braking efficiency.
- When driving with the trailer without load, the front ladder and the rear ladder should be folded.

## 4.5 UNLOADING

The trailer must be positioned to travel forwards and be hitched to the tractor. Unloading should only take place when the trailer is placed on flat level surface and hitched to tractor.

**DANGER**

*Ensure that during unloading nobody is in the vicinity of the load handled.  
During work, keep a safe distance from overhead electric power lines.*

It is recommended to unload the trailer using a loader, conveyor or forklift truck. During work, ensure good visibility and exercise particular caution. Immobilise tractor and trailer with parking brake and switch off tractor engine. Place wheel chocks under trailer wheel. Just before unloading, remove all securing elements (belts, ropes, etc.). Unloading the trailer should be carried out in accordance with the general principles of workplace health and safety.

## 4.6 PROPER USE AND MAINTENANCE OF TYRES

When working with tyres, the trailer should be secured against rolling by placing chocks under the wheels. 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 before the first use of trailer, after the first travel under load and then every 6 months of use or after 25,000 km, whichever occurs first. 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 pressure in tyres according to Operator's Manual (especially if trailer is not used for a longer period).
- Pressure and 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 the appropriate 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.
- Adhere to 30 minutes rest for cooling tyres after driving 75 km or after 150 minutes 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 and the performance of maintenance procedures are essential, 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.



### **IMPORTANT!**

*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 warranty.

## 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,

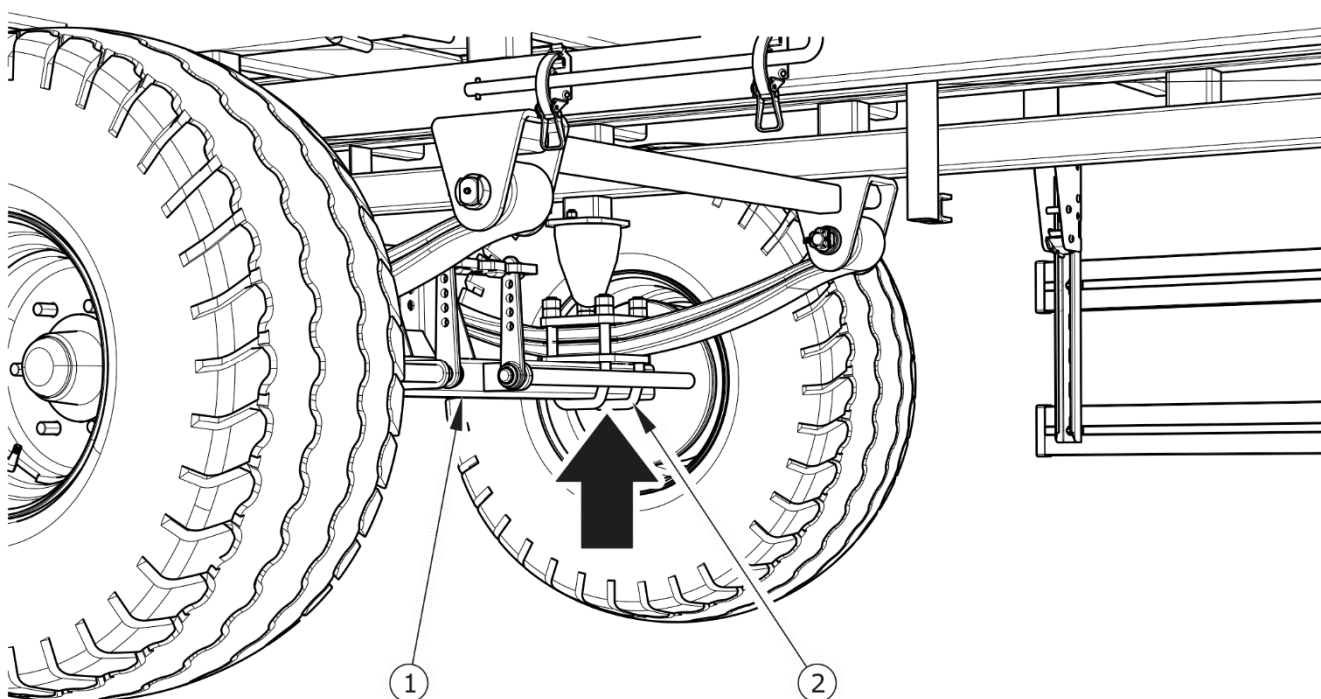
Procedures connected with:



- 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 SLACKNESS OF WHEEL AXLE BEARINGS



**FIGURE 5.1** *Lifting jack support point*

(1) wheel axle, (2) U bolt

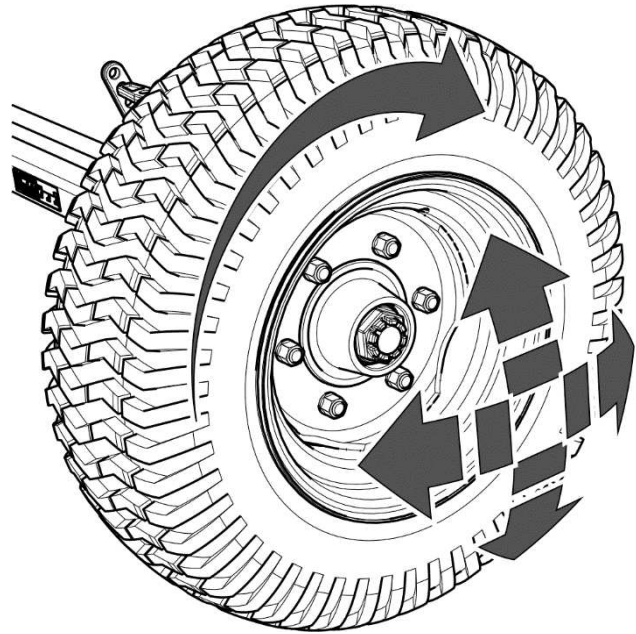
### Preparation procedures

- ➔ Hitch trailer to tractor, immobilize tractor with parking brake.
- ➔ Park the 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).

- ⇒ Lifting jack should be positioned in the place indicated by the arrow in figure (5.1). Lifting jack must be suitable for the weight of the trailer.

### Checking slackness of wheel axle bearings

- ➔ 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.
- ➔ Holding the wheel above and below, try to feel any slackness.
  - ⇒ You may use a lever placed under the wheel supporting the other end on the floor.
- ➔ Lower the lifting jack, relocate the chocks to the other wheel and repeat the inspection procedure for the other wheels.



**FIGURE 5.2** *Checking bearings for slackness*

#### TIP



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

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

If slackness is felt, adjust bearing. Unusual sounds coming from bearing may be symptoms of excess wear, dirt or damage. In such a case, the bearing and sealing ring should be replaced with new parts (if they are not suitable for further operation) or cleaned and greased again.

**INSPECTION**

- *After travelling the first 1,000 km.*
- *Every six months of use or every 25,000 km.*

Check condition of hub cover, if necessary replace with new cover. Inspection of bearing slackness may only be conducted when the trailer is hitched to tractor. The machine may not be loaded.

**DANGER**

*Before commencing work the user must read the instructions for lifting 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.*

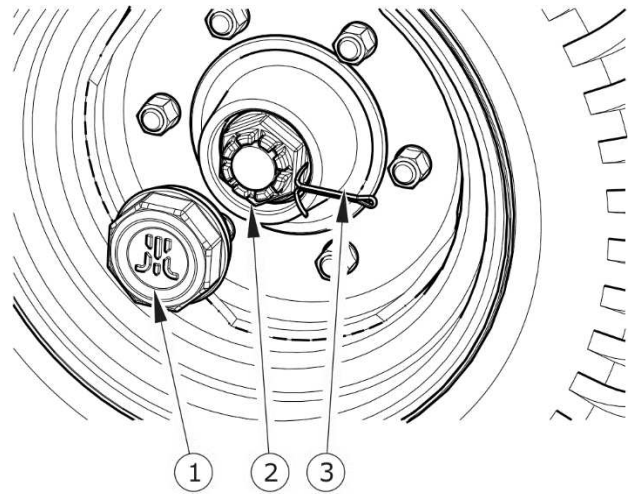
**5.2.3 ADJUSTMENT OF SLACKNESS OF WHEEL AXLE BEARINGS**

The wheel should turn smoothly without stiffness or 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.

- ➔ Take off hub cover (1), figure (5.3).
- ➔ Take out cotter pin (3) securing castellated nut (2).

- ➔ Tighten castellated nut in order to eliminate slackness.
- ➔ Wheel should rotate with insignificant resistance.
- ➔ Unscrew 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 hub cap.
- ➔ Delicately tap hub cap with rubber or wooden hammer.

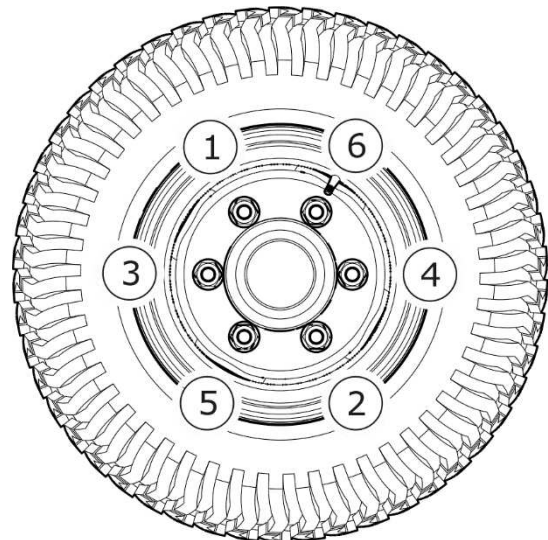


**FIGURE 5.3** Adjustment of slackness  
(1) hub cover, (2) castellated nut, (3) cotter pin

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

#### Wheel removal

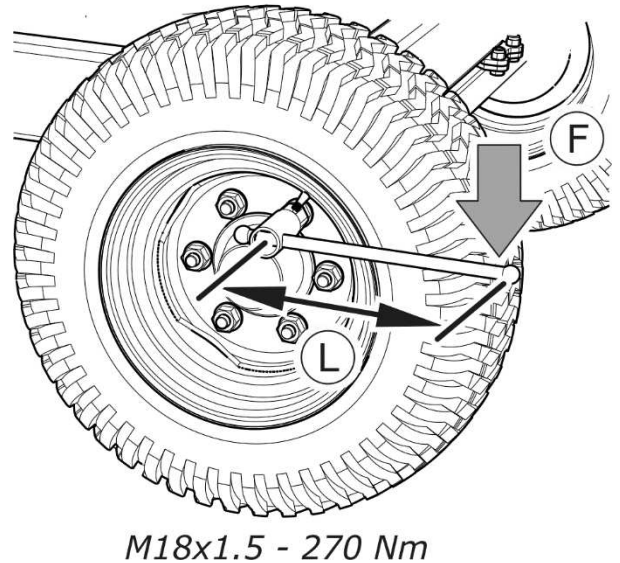
- ➔ Place chocks under wheel that will not be dismantled.
- ➔ Ensure that trailer shall not move during wheel dismantling.
- ➔ Loosen wheel nuts according to the sequence shown in figure (5.4).
- ➔ Place lifting jack and lift trailer.
- ➔ Dismount wheel.



**FIGURE 5.4** Sequence of undoing and tightening nuts

### Wheel installation

- ➔ Clean axle pins and nuts of dirt contamination.
- ⇒ Do not grease thread of nuts and pins.
- ➔ Check condition of pins and nuts, if necessary replace.
- ➔ Place wheel on hub, tighten nuts so that wheel rim tightly fits the hub.
- ➔ Lower trailer, tighten nuts according to recommended torque and given sequence.



**FIGURE 5.5** Tightening method

(F) – weight of the person tightening the nut,  
(L) - length of spanner arm

### 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 (5.5) 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. Tightening of nuts should be checked with the frequency given in the below table. The activities should be repeated after each removal of a wheel from the wheel axle.

### INSPECTION



- After the first use of the trailer.
- After the first travel with load.
- Every 6 months of use or every 25 000 km, whichever occurs first.
- In the event of intensive work, check the nut tightening at least every 10,000 km.

### TIP



Wheel nuts should be tightened using the torque of 270 Nm - M18x1.5 nuts.

**TABLE 5.1** Selection of spanner arm length

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

**IMPORTANT!**



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

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

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



**TIP**

*Tyre pressure values are specified in information decal, placed on wheel or on the frame above machine wheel.*

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



**DANGER**

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

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. 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.



### INSPECTION

- *Every month of use.*
- *Every week during intensive work.*

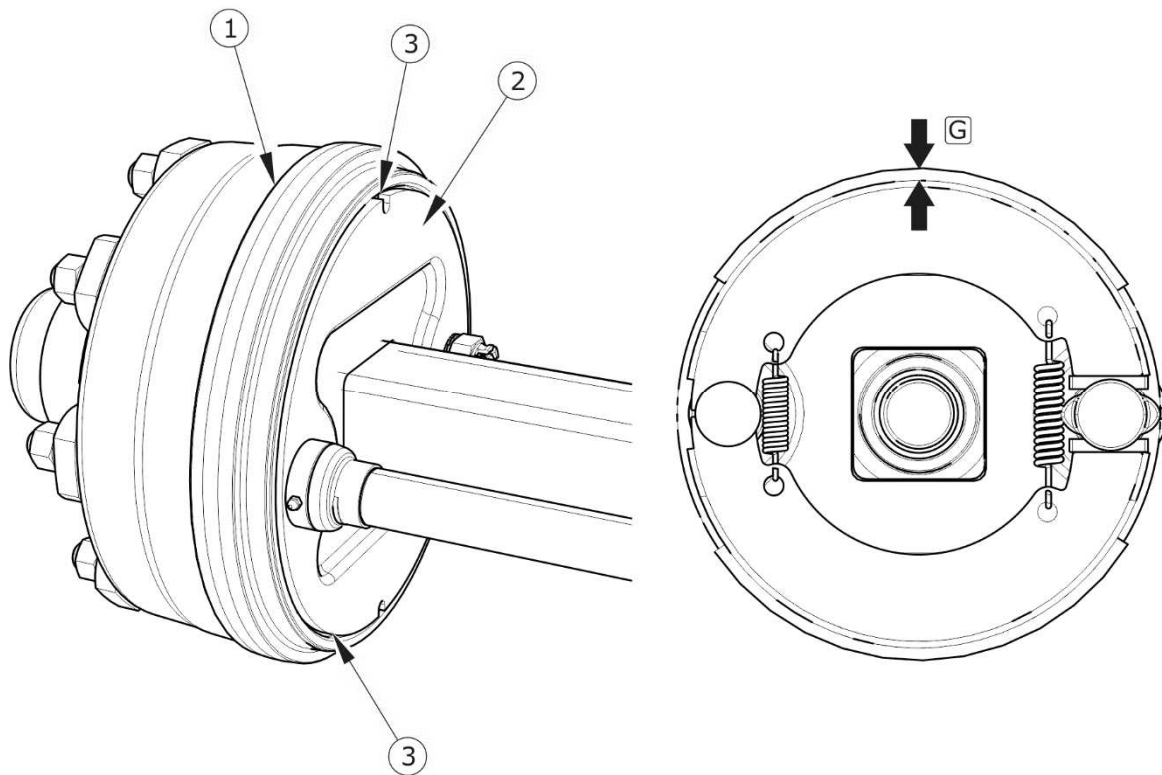
## 5.2.6 CHECKING THICKNESS OF BRAKE SHOE LININGS

During the trailer operation, drum brake linings are subjected 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 (5.6).



### TIP

*Minimum thickness of brake shoe linings is 2 mm.*



**FIGURE 5.6** *Checking brake shoe linings*

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



**INSPECTION**

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

**5.2.7 MECHANICAL BRAKES ADJUSTMENT**

**Preliminary information**

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



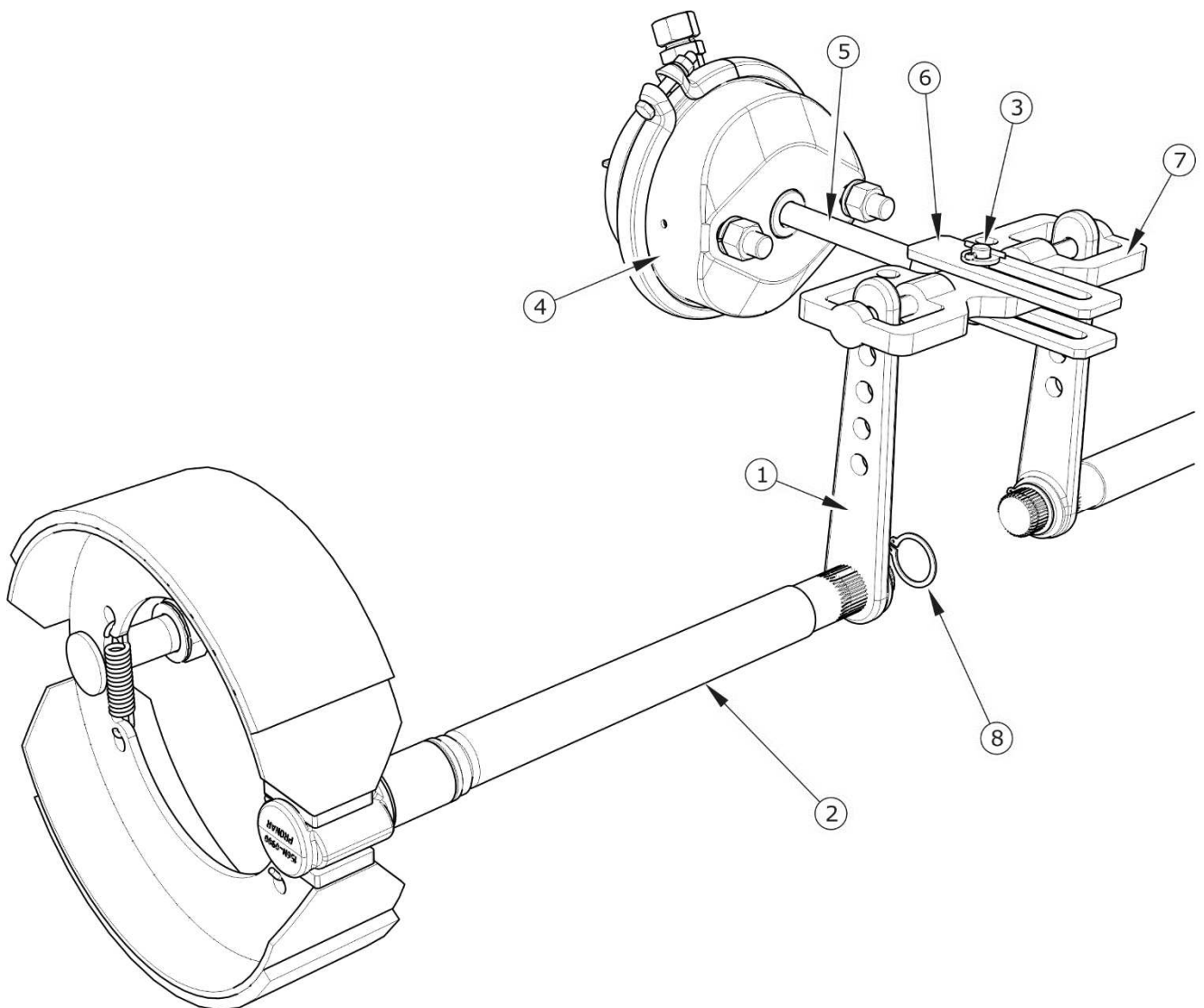
**TIP**

*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 and expander arm should be about  $90^\circ$  – compare figure (5.8).

Braking force decreases also when the operating angle of the brake cylinder piston (5), in relation to the expander arm (1), is wrong – figure (5.7). 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  $90^\circ$ .



**FIGURE 5.7** *Design of wheel axle brake*

(1) expander arm , (2) expander shaft, (3) fork pin, (4) brake cylinder, (5) brake cylinder piston, (6) cylinder fork, (7) equalising bar, (8) expansion ring



**IMPORTANT!**

*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.*

**TABLE 5.2** *Operating data of pneumatic cylinder*

NOMINAL CYLINDER STROKE L [MM]	MINIMUM CYLINDER STROKE L <sub>MIN</sub> [MM]	MAXIMUM CYLINDER STROKE L <sub>MAX</sub> [MM]
75	25	45



**INSPECTION**

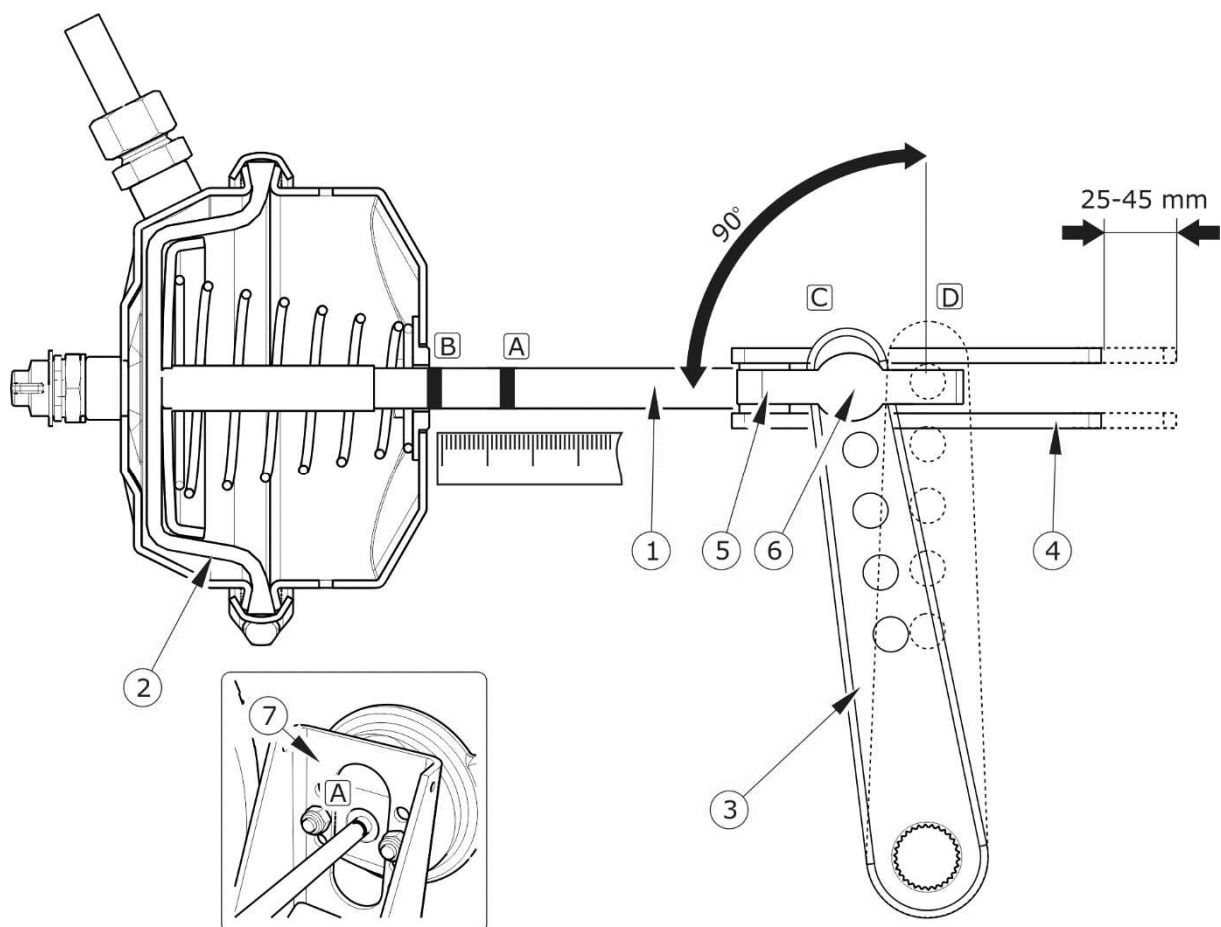
- *Check technical condition of brake every 6 months.*

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

**Required maintenance actions**

- ➔ Hitch trailer to tractor.
- ➔ Turn off tractor engine and remove key from ignition.
- ➔ Immobilise tractor with parking brake.
- ➔ Make sure that the trailer's brakes are not engaged.
- ➔ Secure the trailer with 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 – figure (5.8). Mark the maximum withdrawal position of the brake cylinder piston on the adjacent cylinder.

- ➔ Press the tractor brake pedal and mark the position of the maximum extension of the brake cylinder piston with a line (B). Mark the maximum extension position of the brake cylinder piston on the adjacent cylinder.
- ➔ Measure the distance between lines (A) and (B). If the brake cylinder piston stroke is outside the proper operating range, adjust the expander arm.
- ➔ Remember or mark the original position of equalising bar in openings of expander arms.
- ➔ Dismantle brake cylinder fork pin, dismantle equalising bar.



**FIGURE 5.8** *Principle of brake system adjustment*

(1) brake cylinder piston, (2) brake cylinder membrane, (3) expander arm, (4) brake cylinder fork, (5) equalising bar, (6) position of equalising bar, (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

- ➔ Check if the brake cylinder pistons move freely and within the whole nominal range.
- ➔ Confirm that vent holes of brake cylinders are not blocked with impurities and that there is no water or ice inside the brake cylinders. Check if the brake cylinders are correctly installed.
- ➔ Clean the brake cylinders. If necessary, defrost the brake cylinders and drain water through the unblocked vent holes. Replace damaged brake cylinders with new ones. When installing the brake cylinder, maintain its original position with regard to bracket (7).
- ➔ Dismantle the expansion ring securing the expander arm.
- ➔ Shift the expander arm to align the marked expander arm opening with the equalising bar fixing hole.
  - ⇒ During adjustment, membrane (2) must rest on the rear wall of the brake cylinder – compare figure (5.8).
- ➔ Repeat all the above-mentioned activities for the second cylinder.
- ➔ After completed adjustment, expander arms of both cylinders must be positioned in parallel with regard to each other.
- ➔ Install the equalising bar, brake cylinder fork pin and washers and secure the pin with cotter pins.
- ➔ Engage the brake.
- ➔ Remove previous marks and measure the brake cylinder piston stroke again (on both cylinders).
- ➔ If the brake cylinder piston stroke is outside the proper operating range, repeat the adjustment.



### INSPECTION

- *Every 6 months.*
- *After repair of braking system.*
- *In case of uneven trailer wheels braking.*

**IMPORTANT!**

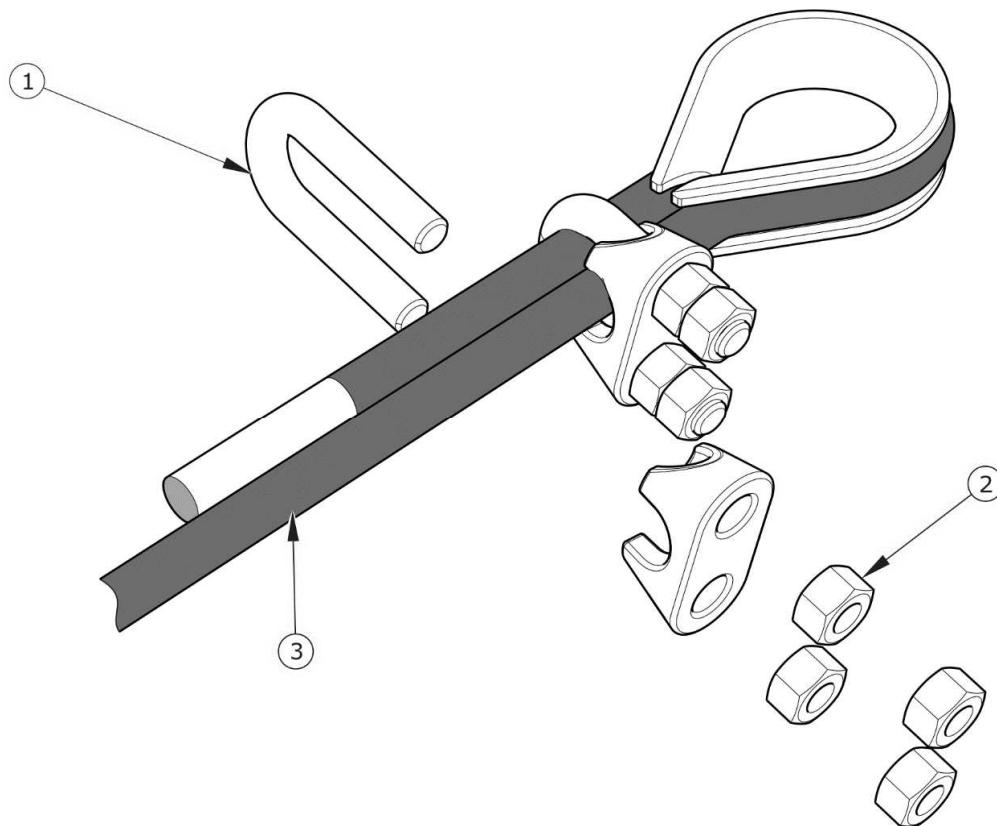
The positions for fixing the brake cylinder in the bracket openings and the brake cylinder pin in the expander arm are determined by the Manufacturer and must not be changed.

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

### 5.2.8 CHANGE OF PARKING BRAKE CABLE AND ADJUSTMENT OF CABLE TENSION.

Proper operation of the parking brake is dependent on the effectiveness of the axle brake and the correct brake cable tension.

#### Replacing the parking brake cable



**FIGURE 5.9** *Installing the parking brake cable*

(1) U-bolt clamp, (2) nuts of clamps, (3) handbrake cable

- ➔ Hitch trailer to tractor. Park machine and tractor on level surface.
- ➔ Prevent the trailer from rolling by placing chocks under the wheels. Immobilise tractor with parking brake.
- ➔ Loosen nuts (2) of cable clamps and dismantle the cable.
- ➔ Grease the bolt mechanism of the parking brake and pins of cable guide rollers – see section *LUBRICATION*.
- ➔ Install new cable, adjust cable tension.

### Adjustment of parking brake cable tension

- ➔ Hitch trailer to tractor. Park machine and tractor on level surface.
- ➔ Prevent the trailer from rolling by placing chocks under the wheels. Immobilise tractor with parking brake.
- ➔ Fully unscrew the bolt of the handbrake mechanism.
- ➔ Loosen all nuts (2) – figure (5.9) of handbrake cable clamps on the brake mechanism side.
- ➔ Tighten cable and tighten clamps.

Length of parking brake cable should be so selected that at total release of working and parking brake the cable would be loose and hanging by 1 - 2 cm.



### IMPORTANT!

*Parking brake cable clamps must be installed as shown in figure (5.9), i.e. clamp bracket (2) must be installed on the side of the shorter brake cable section. Tighten nuts using tightening torque given in table TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS*

Adjustment of parking brake cable tension should be conducted in the event of:

- stretching of cable,
- loosening of parking brake cable clamps
- after adjustment of axle brakes,
- after repairs to axle brake system,

- after repairs in parking brake system.

Before commencing adjustment make certain that the main break is correctly regulated and is functioning properly.



### INSPECTION

- *Every 12 months.*

## 5.3 PNEUMATIC SYSTEM MAINTENANCE

### 5.3.1 PRELIMINARY INFORMATION

Work connected with repair, replacement or regeneration of system components (brake cylinders, conduits, 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 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,



### DANGER

*Do NOT use the trailer when brake system is unreliable.*

### 5.3.2 CHECKING TIGHTNESS

#### Checking air tightness of pneumatic system

- ➔ Hitch trailer to tractor. Park machine and tractor on level surface.

- ➔ Prevent the trailer from rolling by placing chocks under the wheels. Immobilise tractor and trailer with parking brake.
- ➔ Start the tractor in order to supplement air in the trailer braking system tank.
  - ⇒ In single line systems air pressure should amount to approx. 5.8 to 6.5 bar.
  - ⇒ In double conduit systems air pressure should amount to approx. 5.8 bar.
- ➔ Turn off tractor engine.
- ➔ Check system components after releasing brake pedal in tractor.
  - ⇒ Give particular attention to conduit connections and brake cylinders.
- ➔ Repeat 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 also detected by covering checked elements with washing fluid or other foaming preparations, which will not react aggressively with system components. It is recommended to supply preparations commercially available designed to facilitate detecting air leaks. 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.



### INSPECTION

- *After travelling the first 1,000 km.*
- *Each time after making repairs or changing system components,*
- *Every 12 months.*



### 5.3.3 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.

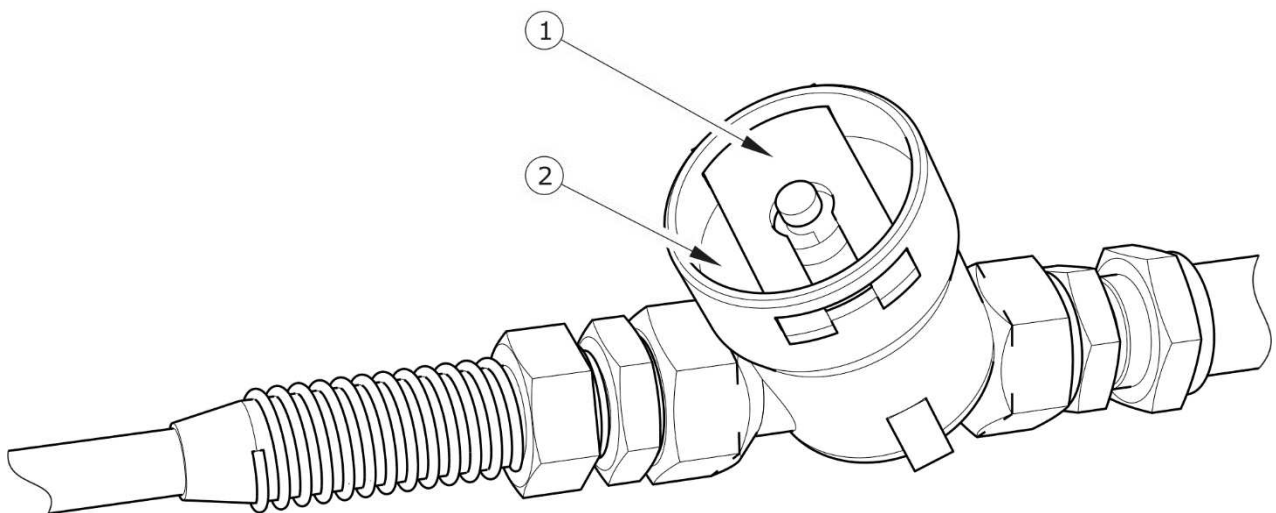


#### INSPECTION

- *Each time during tightness inspection.*

## 5.4 CLEANING THE AIR FILTERS

Depending on trailer working conditions, but not less than once in three months, take out and clean air filter inserts, which are located in pneumatic system connection conduits. Inserts are used many times and are not subject to changing unless they are mechanically damaged.



**FIGURE 5.10** *Air filter*

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

**DANGER**

*Before proceeding to dismantle filter, reduce pressure in supply conduit. While disengaging filter slide gate, hold cover with the other hand. Stand away from filter cover vertical direction.*

**Required maintenance actions**

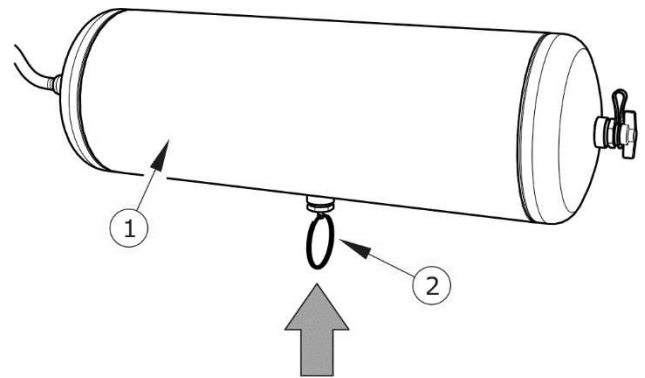
- ➔ Reduce pressure in supply conduit.
  - ⇒ Pressure in conduit can be reduced by pressing the head of the pneumatic connection until resistance is felt.
- ➔ Remove securing slide (1).
- ➔ Hold the filter cover (2) with the other hand. After removing slide lock, the cover is pushed off by the spring, in the filter housing.
- ➔ The insert and the filter body should be carefully washed out and blown through with compressed air. Assembly should be done in reverse order.

**INSPECTION**

- *Every 3 months.*

**5.4.1 DRAINING WATER FROM AIR TANK****Required maintenance actions**

- ➔ Tilt drain valve stem (2) located in the lower part of tank (1).
- ➔ 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 *CLEANING DRAIN VALVE*.



**FIGURE 5.11** *Draining water from the tank*

(1) air tank, (2) drain valve

## 5.4.2 CLEANING DRAIN VALVE



### **DANGER**

*Release air from tank before dismantling drain valve.*

### **Required maintenance actions**

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

**INSPECTION**

- *Every 12 months (before winter).*

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

**DANGER**

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

Connection with damaged body should be replaced. In 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 cover or placed in their designated socket. Before the winter period it is recommended to preserve the seal with special preparations (e.g. silicon grease for rubber elements).

Each time before connection of the machine inspect technical condition and cleanness of contacts and sockets in tractor. If necessary clean or repair tractor socket.

**INSPECTION**

- *Each time before hitching trailer to tractor.*

## 5.5 HYDRAULIC SYSTEM MAINTENANCE

### 5.5.1 PRELIMINARY INFORMATION

Work connected with the repair, replacement or regeneration of hydraulic system components should be entrusted to specialist establishments which have the appropriate technology and qualifications for this type of work.



#### TIP

*Bleeding of the hydraulic system is not required during normal operation of the trailer.*

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

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

### 5.5.2 CHECKING HYDRAULIC SYSTEM TIGHTNESS

#### Required maintenance actions

- ➔ Hitch trailer to tractor.
- ➔ Connect conduits of hydraulic braking system according to the recommendations in the Operator's Manual.
- ➔ Clean connectors and hydraulic cylinders.
- ➔ Start the tractor's engine and depress brake pedal several times. Leave the cylinders in the maximally extended position.
- ➔ Switch off tractor engine and check hydraulic cylinders.

If oil leak is detected on hydraulic cylinder body, ascertain origin of leak. Inspect seals when hydraulic cylinder is completely extended. Minimum leaks are permissible with symptoms of "sweating". However, if leaks in the form of "droplets" are noticed, stop using the trailer. If leaks appear at connections then tighten the connections. If the leak at connections is not removed, replace conduit, connector and seals (depending on place of leakage).

**INSPECTION**

- *After the first week of use.*
- *Every 12 months.*

### 5.5.3 CHECKING TECHNICAL CONDITION OF HYDRAULIC CONNECTIONS AND SOCKETS.

Hydraulic connections must be technically reliable and kept in a clean condition. Each time before connecting, check if sockets in tractor are maintained in good working condition. Hydraulic systems of the tractor and trailer are sensitive to the presence of permanent contamination, which may cause damage to precision system components.

**INSPECTION**

- *Each time before hitching trailer to tractor.*

### 5.5.4 REPLACEMENT OF HYDRAULIC CONDUITS

**INSPECTION**

- *Every 4 years.*

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

## 5.6 LUBRICATION

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

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.

**TABLE 5.3** *Lubrication schedule*

ITEM	LUBRICATION POINT	NUMBER OF LUBRICATION POINTS	TYPE OF GREASE	FREQUENCY
1	Hub bearing	12	A	24M
2	Drawbar eye	1	B	14D
3	Handbrake mechanism	1	A	6M
4	Handbrake cable guide wheel axle	2	A	6M
5	Expander shaft slide sleeve	6	A	3M
6	Drawbar pin	2	B	3M
7	Leaf spring absorbers	6	C	3M
8	Leaf spring absorber sliding surfaces	6	B	1M
9	Leaf spring pin	6	B	1M
10	Rocker arm pin	6	B	1M
11	Turntable	2	B	3M

*Lubrication periods – M months, D – days*

*(1) – grease every 3 months or each time before intensive work*

**TABLE 5.4** *Recommended lubricants*

<b>MARKING ACC. TO TAB. (5.3)</b>	<b>DESCRIPTION</b>
A	Machine general-purpose grease (lithium, lime).
B	Grease for heavily loaded elements with addition of MoS <sub>2</sub> or graphite.
C	Anti-corrosion and penetrating preparation in aerosol.

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



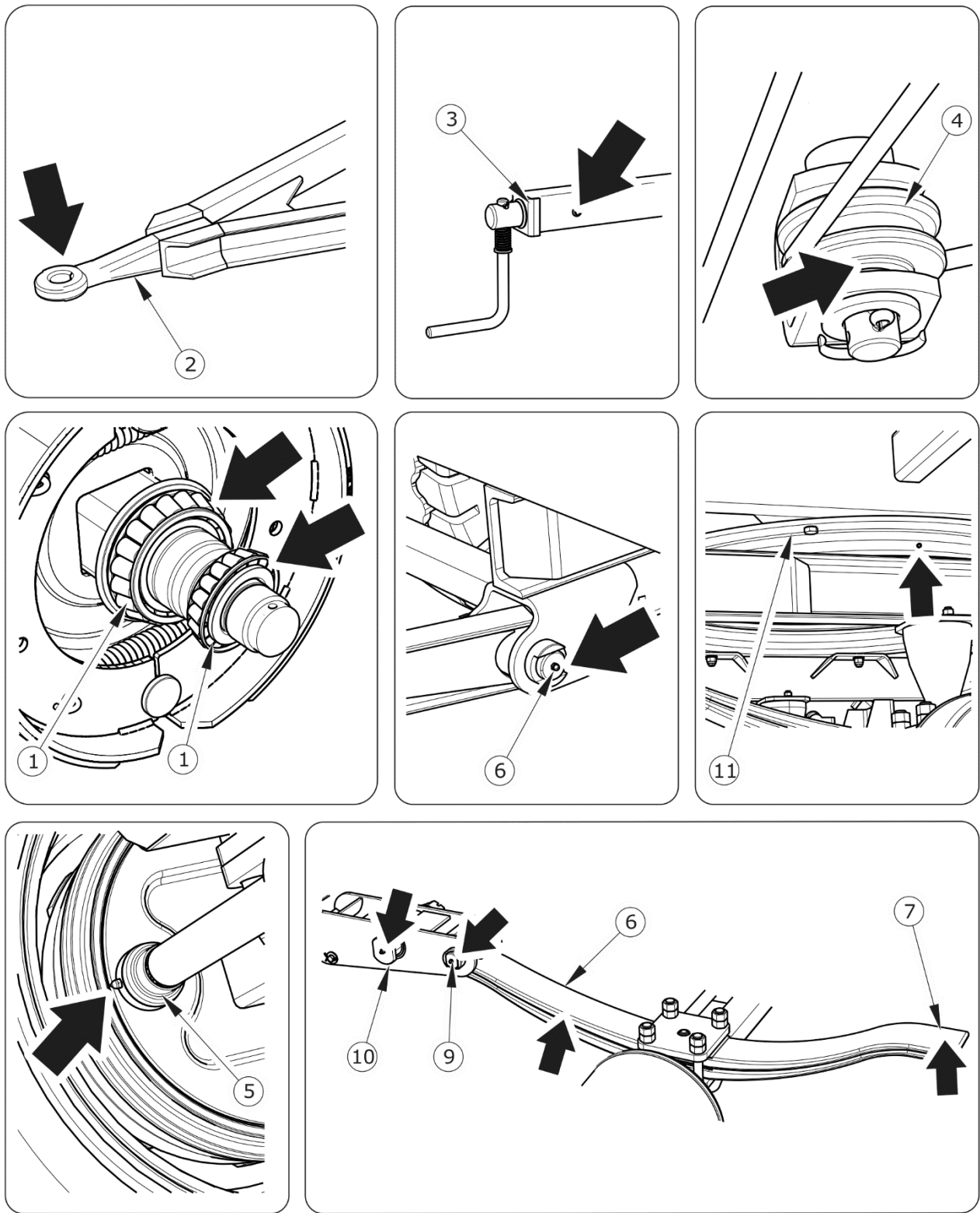


FIGURE 5.12 Trailer's lubrication points



**TIP**

*Number of lubrication points and subassemblies requiring lubrication specified in table (5.3) LUBRICATION SCHEDULE depend on the trailer version.*

*Locations of grease nipples and areas requiring lubrication are indicated by black arrows in figure (5.12).*

**5.6.1 CONSUMABLES**

**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.

In the event of necessity of changing 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 5.5** *L-HL 32 Lotos hydraulic oil characteristics*

ITEM	NAME	UNIT	VALUE
1	ISO 3448VG viscosity classification	-	32
2	Kinematic viscosity at 40°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.



### **DANGER**

*Oil fires should be quenched with the use of carbon dioxide, foam or extinguisher steam. Do not use water to quench oil fires.*

### **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 anticorrosion additives and have significant resistance to being washed away by water. Similar characteristics should typify aerosol preparations (Silicon greases and anticorrosive lubricant substances).

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

## **5.7 TRAILER CLEANING**

- The trailer should be cleaned as needed. Before using pressure washer the user is obliged to acquaint himself with the operating principles and recommendations concerning safe use of this equipment.
- The trailer only be cleaned with clean running water. Cleaning detergents with neutral pH may be used, which do not react aggressively with the trailer's structural elements.

- 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 shall not exceed 55°C.
- Do not direct water jets at system elements and equipment of the 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 plate, conduit connections, lubrication points, leaf springs and drawbar shock absorber, etc. High pressure water jets may get inside the machine and cause mechanical damage or corrosion.
- 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.
- Washing detergent should be kept in original containers, optionally in replacement containers, but very clearly marked. Preparations may not be stored in food and drink containers.
- Unsure 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.

**DANGER**

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

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

- Observe environmental protection principles and wash trailer in a place designed for this purpose.
- Washing and drying the trailer must take place at temperatures above 0°C.
- Leaf springs should be cleaned using a hard brush. The space between spring leaves should be blown using compressed air.

## 5.8 STORAGE

- Trailer should be kept in a 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, especially those which initiate corrosion of steel, have aggressive impact on anticorrosion coating and accelerate tyre ageing. During this time the machine must be unloaded. Trailer should be very carefully washed and dried.
- Corroded places should be cleaned of rust, degreased and protected using undercoat paint and then painted with surface paint according to colour scheme.
- In the event of prolonged work stoppage, it is essential to lubricate all elements regardless of the period of the last lubrication process.
- Wheel rims and tyres should be carefully washed and dried. During a longer storage of unused trailer it is recommended that the machine should be moved a bit once every 2 - 3 weeks in order to change the place of contact of tyres with the ground. The tyres will not be deformed and maintain proper geometry. Also, tyre pressure should be inspected from time to time, and if necessary pressure should be increased to the appropriate value.

## 5.9 INSPECTION OF TIGHTENING TORQUE OF NUT AND BOLT CONNECTIONS

### 5.9.1 TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS

**TABLE 5.6** *Tightening torque for nut and bolt connections*

THREAD METRIC	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

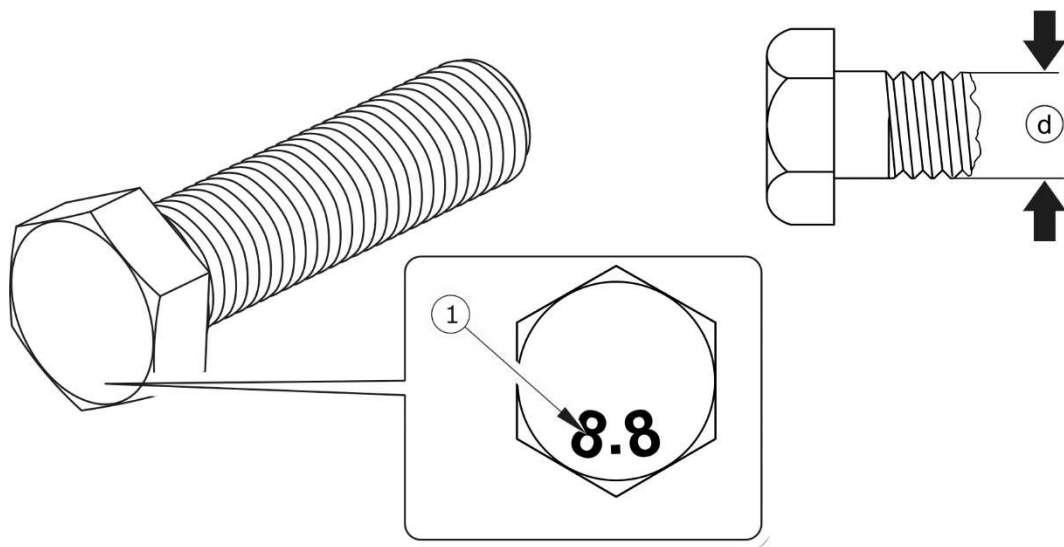
(1) – resistance class according to DIN ISO 898 standard

Unless other tightening parameters are given, during maintenance repair work apply appropriate torque to tightening nut and bolt connections. Recommended tightening torque values for the most frequently used bolt and nut connections are given in table (5.6). Given values apply to non-lubricated steel bolts.



#### TIP

*Hydraulic conduits should be tightened with a torque of 50 – 70 Nm.*



**FIGURE 5.13** Bolt with metric thread

(1) resistance class, (d) thread diameter



### INSPECTION

- Once, after purchasing the trailer, before first use.
- Every 12 months.
- Every 3 months during intensive work.

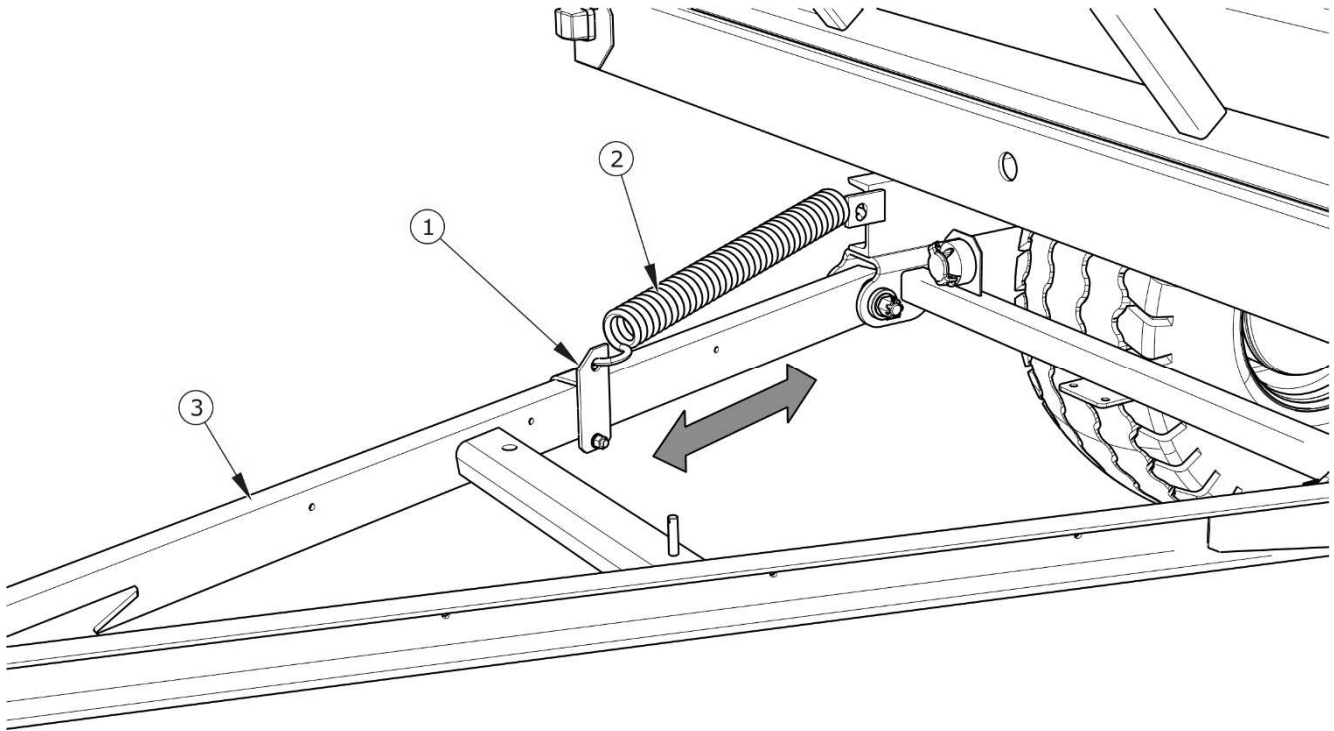
## 5.10 ADJUSTMENT OF DRAWBAR POSITION

Location of the drawbar should be selected individually depending on the height of the hitch on the tractor that will pull the trailer. If possible, adjust the tractor hitch in such a manner that the trailer drawbar is set in horizontal position.

### Scope of adjustment activities

- ➔ Immobilise trailer with parking brake.
- ➔ Prevent the trailer from rolling by placing chocks under the wheels.
- ➔ Drive the tractor to the trailer drawbar hitching eye.
- ➔ Undo clamp nut (1) and move the clamp in a selected direction.

- ➔ Tighten the nut and check position of drawbar with regard to tractor hitch.



**FIGURE 5.14** *Adjustment of drawbar position*

(1) adjusting clamp, (2) spring, (3) drawbar

## 5.11 TROUBLESHOOTING

### 5.11.1 TROUBLESHOOTING

FAULT	CAUSE	REMEDY
Problem with moving off	Brake system conduits not connected	Connect brake conduits (applies to pneumatic systems)
	Applied parking brake	Release parking brake.
	Damaged pneumatic system connection conduits	Replace.
	Leaking connections	Tighten, replace washers or seal sets, replace conduits.
	Control valve or braking force regulator damaged	Check valve, repair or replace.



FAULT	CAUSE	REMEDY
Noise in axle hubs	Excessive bearing slackness	Check slackness and adjust if needed
	Damaged bearing	Replace bearing
	Damaged hub parts	Replace
Poor reliability of braking system	Insufficient pressure in system	<p>Check pressure on tractor pressure gauge, wait till compressor fills tank to required pressure.</p> <p>Damaged air compressor in tractor Repair or replace.</p> <p>Damaged brake valve in tractor. Repair or replace.</p> <p>Leaking system conduits or connections. Check system for tightness.</p>
Excessive heating of axle hubs	Incorrect main or parking brake adjustment	Regulate setting of expander arms
	Worn brake linings	Change brake shoes
Incorrect hydraulic system operation	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.
	Insufficient tractor hydraulic pump output, damaged tractor hydraulic pump.	Check tractor hydraulic pump.
	Damaged or contaminated cylinder	Check cylinder ram piston (bending, corrosion), check ram cylinder for tightness (piston seal), in case of need repair or replace ram cylinder.
	Excessive cylinder ram loading	Check and reduce cylinder loading if necessary
	Damaged hydraulic conduits	Check and ascertain that hydraulic conduits are tight, not fractured and properly tightened. If necessary. replace or tighten.

FAULT	CAUSE	REMEDY
Excessive wear of left and right tyre shoulders on both sides.	<p>Too low air pressure in tyres.</p> <p>Excessive speed of travel of loaded trailer on turns.</p> <p>Too fast loss of air due to damaged wheel, valve, puncture, etc.</p>	<p>Check air pressure. Regularly check correctness of air pressure in tyres.</p> <p>Excessive loading of the trailer. Do not exceed the permissible gross weight of the trailer.</p> <p>Reduce speed of travel while driving on turns on hardened surface.</p> <p>Check wheel and valve. Replace damaged parts.</p>
Excessive wear of central part of tyre.	Excessive air pressure in tyres.	Check air pressure. Regularly check correctness of air pressure in tyres.
Excessive wear of left or right tyre shoulder, on one side	<p>Incorrect toe-in.</p> <p>Incorrectly positioned wheel axles.</p>	<p>Damaged leaf spring on one side of the suspension system.</p> <p>Replace leaf springs.</p>
Worn tyre tread.	<p>Damaged suspension system, broken leaf spring.</p> <p>Damaged brake system, blocking of brakes, incorrectly adjusted brake system. Too frequent and violent braking.</p>	<p>Check suspension system for looseness, check leaf springs. Replace damaged or worn elements.</p> <p>Check brake system for malfunctions. Adjust expander lever.</p>
Side crack.	<p>Prolonged use of tyre with low air pressure.</p> <p>Excessive loading of the trailer.</p>	<p>Regularly check air pressure in tyres.</p> <p>Check weight of load while loading.</p>
Abrasions on external side edge of tyre.	Too frequent driving over sharp or high obstacles (e.g. curbs).	Control driving technique.
Damaged rim (hardening and cracking near rim), brittleness of tyre.	<p>Incorrect braking technique.</p> <p>Too frequent violent braking.</p> <p>Damaged brake system.</p>	<p>Check brake system.</p> <p>Control braking technique.</p> <p>Damage occurs due to excessive heating of hub which leads to heating of wheel.</p>

# NOTES

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# ANNEX A

TYRE	WHEEL DISC
400/60 - 15.5 145A8	13.00x15.5 ET=-15
360/65-16 148A8	11x16" ET=-20