

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 malfunction free work of the machine. The machine is designed to meet obligatory standards, documents and legal regulations currently in force.

The manual describes the basic safety rules and operation of Pronar T314, Pronar T315 and Pronar T316 slurry spreaders.

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

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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 SERVICE ACTIONS

Service actions described in the manual are marked: ➡

Result of service/adjustment actions or comments concerning the performance of actions are marked: ⇨



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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:	Slurry spreader		
Type:	T314	T315	T316
Model:	–	–	–
Serial number:			
Commercial name:	Slurry spreader PRONAR T314 Slurry spreader PRONAR T315 Slurry spreader PRONAR T316		

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 _____

2013-02-04

Place and date

Z-CIA DYREKTORA
d/s technicznych
czynności zarządu
Roman Melianiuk

Full name of the empowered person
position, signature

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ANNEX A

ANNEX B - CLEAN WATER ACCESSORIES

SECTION

1

BASIC INFORMATION

1.1 IDENTIFICATION

1.1.1 IDENTIFICATION OF SLURRY TANKER

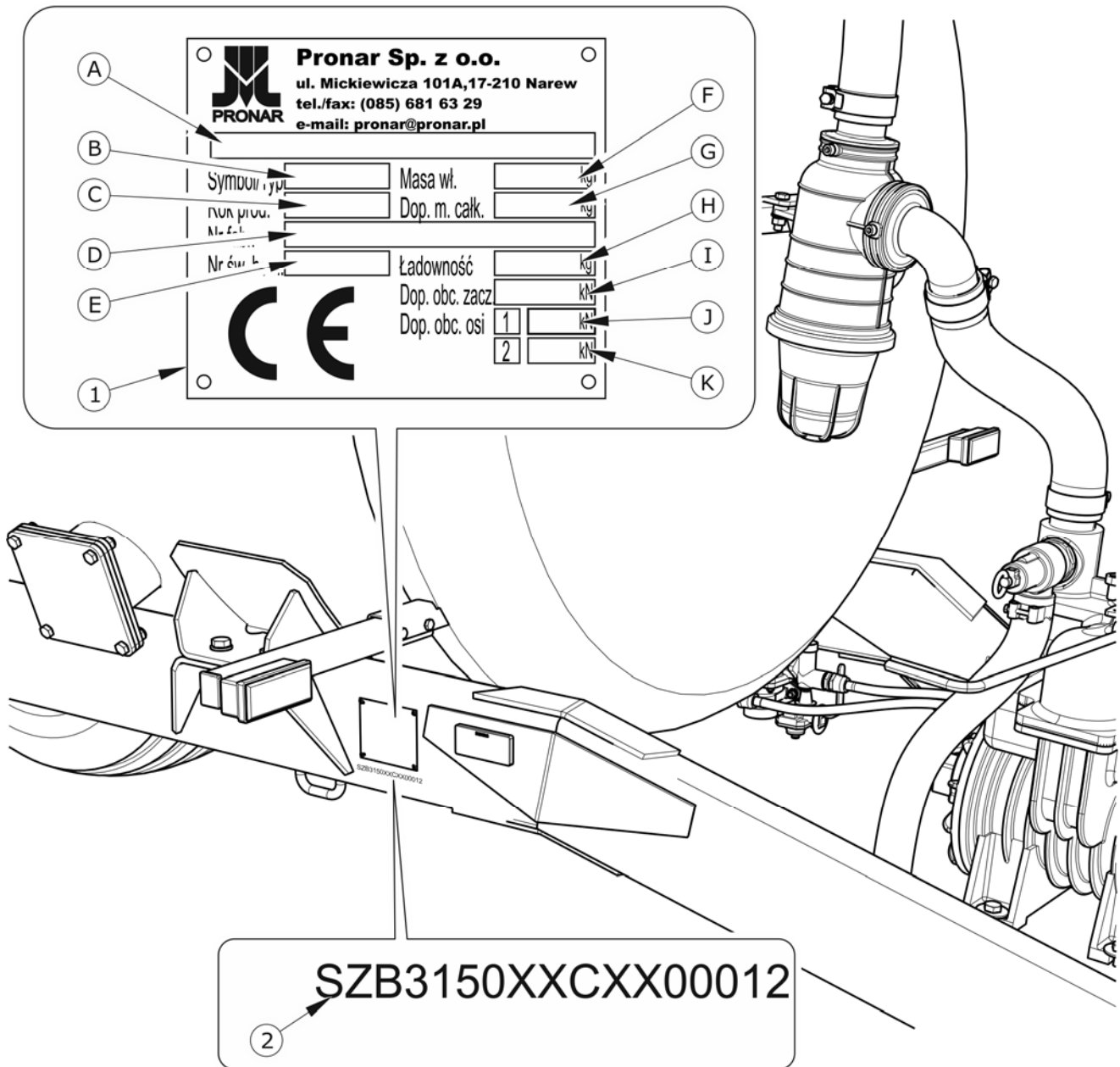


FIG. 1.1 Location of the data plate and vehicle identification number (VIN)

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

Slurry tankers are marked with the data plate (1) and vehicle identification number (VIN) (2). The serial number and data plate are located on the right side of the frame on the main

longitudinal member – figure (1.1). When buying the machine 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:

TAB. 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).

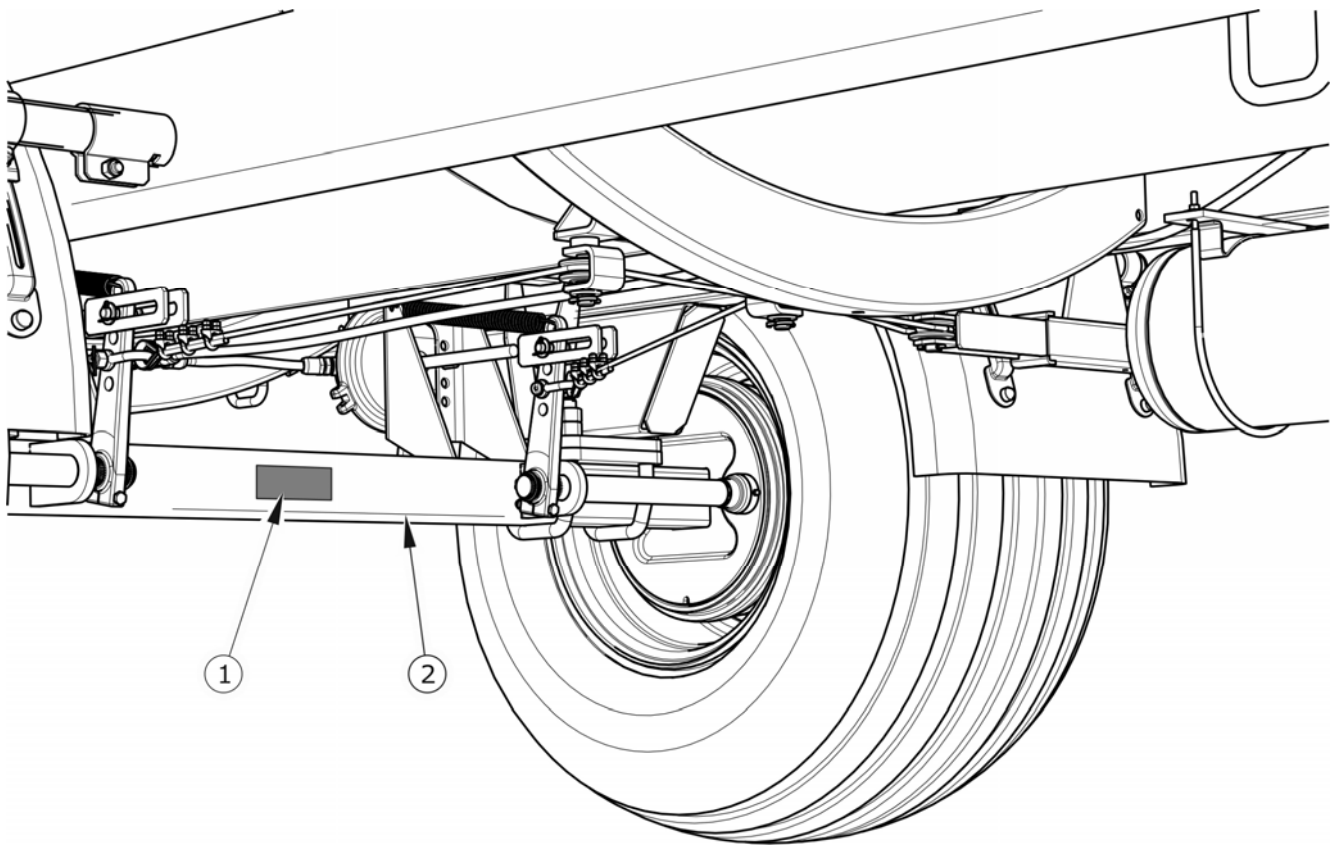


FIG. 1.2 *Location of the axle data plate*

(1) data plate, (2) wheel axle,

1.1.3 LIST OF SERIAL NUMBERS

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 slurry tanker or the serial number of the axle, therefore it is recommended that these numbers are inscribed in the table (1.2).

TAB. 1.2 List of serial numbers

VIN															
S	Z	B	3	1		0	X	X			X				
AXLE SERIAL NUMBER															
SERIAL NUMBER OF ROTARY VANE VACUUM PUMP															

1.2 PROPER USE

Slurry tankers Pronar T314, Pronar T315 and Pronar T316 are designed for transporting, pumping over and spreading liquid substances such as liquid manure, water (not for food processing), municipal wastewater. The machines can be used in fieldwork and on the farm. The slurry tankers are not designed for handling highly acidic and highly saline liquids.

The machine is constructed according to current safety requirements and engineering standards. The brake system and the light and indicator system meet the requirements of road traffic regulations. The maximum speed of the slurry tanker on public roads is 30 km/h in Poland (pursuant to Road Traffic *ACT OF JUNE 20TH 1997, ART. 20*). In the countries where the machine is used, the limits stipulated by the road traffic legislation in force in a given country must be observed. The slurry tanker speed must not, however, be greater than the maximum design speed of 40 km/h.

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* of the slurry tanker, drive shaft, vacuum pump and the *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 slurry tanker to an agricultural tractor, which fulfils all the requirements made by the slurry tanker'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 slurry tanker service and safe operation,
- have the required authorisation to drive and are familiar with the road traffic regulations and transport regulations.

TAB. 1.3 *Agricultural tractor's requirements*

CONTENTS	UNIT	REQUIREMENTS
Brake system connection sockets		
Pneumatic system 1 line	-	according to A DIN 74 294
Pneumatic system 2 line	-	according to ISO 1728
Pressure rating of the system		
Single conduit pneumatic system	bar	5.8 – 6.5
Double conduit pneumatic system	bar	5.8
Electrical system		
Electrical system voltage	V	12
Connection socket	-	7 polar compliant with ISO 1724
Tractor hitches		
Type of hitch	-	lower transport hitch
Minimum static vertical load capacity	kg	T314 – 1 000
	kg	T315 - 1 300
	kg	T316 – 1 400

CONTENTS	UNIT	REQUIREMENTS
Other requirements		
Min. Tractor power (T314)		45 / 33
Min. Tractor power (T315)		54 / 40
Min. Tractor power (T316)	hp / /kW	65 / 48
Hydraulic system		
Hydraulic oil	-	L HL 32 Lotos
Pressure rating of the system	MPa	16
Oil demand:	l	5
PTO		
PTO speed	RPM	540

1.3 EQUIPMENT

TAB. 1.4 *Equipment*

EQUIPMENT	STANDARD	ADDITIONAL	OPTION
<i>OPERATOR'S MANUAL, WARRANTY BOOK</i>	•		
Rotating drawbar eye Ø50	•		
Double conduit pneumatic brake system	•		
Single conduit pneumatic brake system			•
PTO shaft 6x6 7143076CE007007		•	
PTO shaft 21x6, 7143076CE008007		•	
Wide angle PTO shaft 6x6, 71R4066CEWR7007		•	
Wide angle PTO shaft 21x6, 71R4066CEWR8007		•	
Slow-moving vehicle warning sign		•	
Warning reflective triangle		•	

EQUIPMENT	STANDARD	ADDITIONAL	OPTION
Operator's Manual of the pump	•		



TIP

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

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*.

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,
- vacuum pump vanes.

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,

- by inappropriate use, adjustment or maintenance, use of the slurry tanker 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.



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 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 slurry tanker is delivered to the user either transported on a vehicle or, after being attached to a tractor, independently (slurry tanker towed with a tractor).

1.5.1 TRANSPORT ON VEHICLE

Loading and unloading of slurry tanker 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.

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, drawbar and axle.



IMPORTANT!

Do not secure or attach the slurry tanker by drawbar eye, tank equipment, tank, vacuum pump and other structural elements that are not sufficiently strong to withstand operations of this type.

The slurry tanker 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, frame longitudinal members and possibly drawbar.

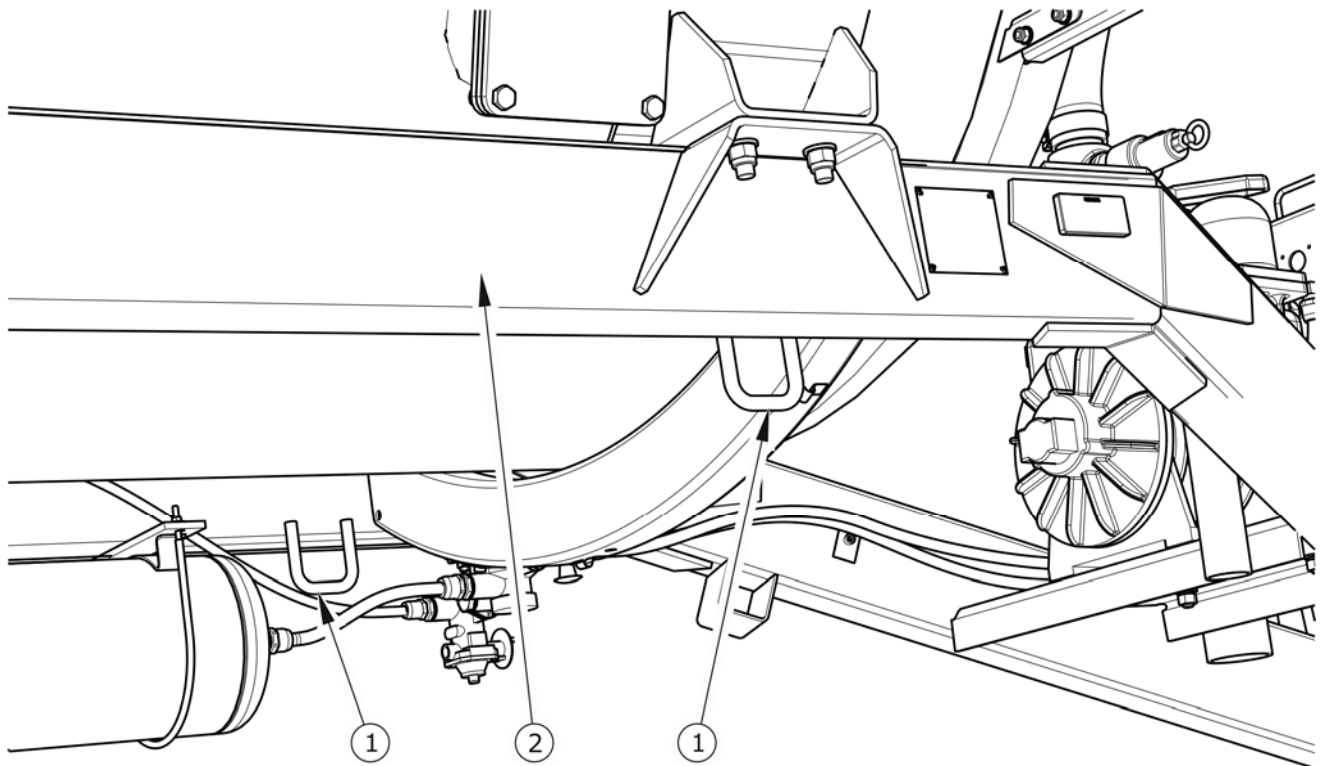


FIG. 1.3 *Transport lugs*

(1) transport lug, (2) lower longitudinal frame

Additionally, support the drawbar with a wooden block of such a height that the slurry tanker frame is positioned parallel to the load platform. Chocks, wooden blocks or other objects without sharp edges should be placed under the wheels of the slurry tanker to prevent it from rolling. Wheel blocks must be nailed to the load platform planks of the vehicle 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 transport in 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 slurry tanker 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 lacquer coating. The tare weight of the slurry tanker is given in table (3.1).

**IMPORTANT!**

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

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

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

1.5.2 INDEPENDENT TRANSPORT BY THE USER



IMPORTANT!

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

In the event of independent transport by the user, carefully read the *OPERATORS 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.

1.6 ENVIRONMENTAL HAZARDS

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

While carrying out maintenance and repair work, which involves the risk of an oil leak, this work should take place on an oil resistant floor or surface. In the event of oil leaking into the environment, first of all contain the source of the leak, and then collect the leaked oil using available means. Remaining oil should be collected using sorbents, or by mixing the oil with sand, sawdust or other absorbent materials. The oil pollution, once gathered up, should be kept in a sealed, marked, hydrocarbon resistant container. The container should be kept away from heat sources, flammable materials and food.



DANGER

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

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 slurry tanker is filled with L-HL 32 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 slurry tanker 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.), using 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

SAFETY ADVICE

2.1 SAFETY INFORMATION

2.1.1 BASIC SAFETY RULES

- Before using the machine, the user should carefully read this Operator's Manual, the Operator's Manual of PTO shaft and the Operator's Manual of rotary vane vacuum pump. During use all the recommendations laid down in this Operator's Manual should be observed. Do NOT start the slurry tanker without knowledge of its function.
- The user is obliged to acquaint himself with the construction, action and the principles of safe usage of the machine.
- Before using the slurry tanker always check the machine, whether it is properly prepared for work, especially in terms of safety.
- 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 slurry tanker and also non-observance of the recommendations contained in this Operator's Manual, endanger health and life third persons and/or machine operator.
- Be aware of the existence of a minimal risk, and for this reason the fundamental basis for using this machine should be the application of safety rules and sensible behaviour.
- The machine must never be used by persons who are not authorised to drive the agricultural tractors and not trained in the safety principles and use of the machine, including children and people under the influence of alcohol.
- Do NOT use the slurry tanker for other than intended purpose. Anyone who uses the machine other than the way intended takes full responsibility for himself for any consequences of this use. Use of the machine for purposes other than those for which it is intended by the Manufacturer may invalidate the warranty.
- Use close fitting protective clothing.

- Any modification to the slurry tanker frees the manufacturer from any responsibility for damage or detriment to health which may arise as a result.
- Before using the machine always check its technical condition, and in particular: technical condition of the drawbar, systems, safety guards and air pressure in tyres.
- Hitching and unhitching the slurry tanker may only take place when the machine is immobilised by use of the parking brake and it is not loaded.
- Before using the slurry tanker, always ensure that all the safety guards are in good condition and in place. Damaged or incomplete sub-assemblies must be exchanged for original new ones.
- The user is obliged to acquaint himself with the principles of safe operation, adjustment methods and inspection points of the machine and with the risks resulting from operation and maintenance of the machine.
- People or objects must not be carried on the machine.
- Do NOT enter the tank without proper preparation.
- The slurry tanker may be operated only by one person at a time.

2.1.2 HITCHING AND UNHITCHING FROM TRACTOR

- Be especially careful when hitching and unhitching the machine.
- While hitching the slurry tanker to the tractor, use the appropriate hitch. After completing the hitching of the machines check the safety of the hitch Carefully read the tractor Operator's Manual. If the tractor is equipped with an automatic hitch, make certain that the coupling operation is completed.
- When hitching, there must be nobody between the slurry tanker and the tractor.
- Do NOT hitch the slurry tanker to tractor, if the tractor does not fulfil the requirements made by the Manufacturer (minimum tractor power demand, wrong hitch etc.) – compare table (1.3) *AGRICULTURAL TRACTOR REQUIREMENTS*. Before hitching the machine, make certain that oil in the external hydraulic system of tractor may be mixed with the hydraulic oil in the machine's hydraulic system.

- When connecting the hydraulic conduits to the tractor, make sure that the hydraulic systems of the tractor and slurry tanker are not under pressure. If necessary reduce residual pressure in the system.
- Before hitching slurry tanker to tractor check that both machines are in good technical condition.
- The machine unhitched from tractor must be immobilised with parking brake. If the machine is positioned on a slope, it should be additionally secured against moving by placing chocks under the machine's wheels. Terminals of hydraulic, electrical and pneumatic conduits should be protected against contamination.

2.1.3 HYDRAULIC AND PNEUMATIC SYSTEM

- When operating, the hydraulic and pneumatic systems are under high pressure.
- Regularly check the technical condition of the connections and the hydraulic conduits. There must not be any leaks of hydraulic oil.
- Before proceeding to maintenance-repair work, make certain that the hydraulic system is not under pressure.
- Rubber hydraulic conduits must be replaced every 4 years regardless of their technical condition.
- Use the hydraulic oil recommended by the Manufacturer.
- After changing the hydraulic oil, the used oil should be properly disposed of. Used oil or oil, which has lost its properties, should be stored in original containers or replacement containers resistant to action of hydrocarbons. Replacement containers must be clearly marked and appropriately stored.
- Do not store hydraulic oil in packaging designed for storing food or foodstuffs.

2.1.4 LOADING AND UNLOADING

- Gases, which may be flammable and harmful to health, are produced during fermentation of liquid manure or sediments in the tank.
- Do not approach the tank with an open flame, do NOT smoke cigarettes etc. near the tank. Danger of gas explosion.

- Safety valves must be efficient and adjusted according to the Manufacturer's recommendations. Unauthorised changing of valve setting is forbidden.
- Entering the tank is allowed only after earlier preparation of the tank and when using a proper breathing apparatus.
- When loading and draining the tank, there is a risk of poisoning by fumes and risk of gas explosion.
- Loaded tank should be emptied within several hours from loading because fermentation process causes a considerable increase of pressure inside the tank, which may lead to loss of tightness or permanent damage to tank structure.

2.1.5 CLEANING, MAINTENANCE AND ADJUSTMENT

- Maintenance and repair works on the tank may be performed only when the tank is empty and not under pressure.
- Maintenance and repair works may be performed after hitching the slurry tanker to the tractor. In such a case, switch off the tractor engine, remove the key from the ignition and immobilise the tractor with parking brake. Ensure that unauthorised persons do not have access to the tractor cab. Protect the machine against rolling by placing blocking chocks under the wheels. When performing works that do not require hitching to tractor, position the slurry tanker on level and hard surface, support it using a parking stand, immobilise the machine with parking brake and protect it against rolling by placing chocks under the wheels. Place of work should be dry, clean and well-lighted.
- Regularly check the condition of the bolt and nut connections.
- During the warranty period, any repairs may only be carried out by Warranty Service authorised by the manufacturer. After the expiry of the warranty period it is recommended that possible repairs to the machine be performed by specialised workshops.
- During work use the proper, close-fitting protective clothing, gloves, protective goggles and appropriate tools.
- In the event of any fault or damage whatsoever, do not use the machine until the fault has been corrected.

- 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.
- Service inspections should be carried out according to the frequency specified in this Operator's Manual.
- Welding works may be performed only by persons having appropriate authorisations for this type of works. There is a high risk of explosion during welding works.
- Before welding or electrical work, the slurry tanker should be disconnected from the power supply, if the machine is connected to the tractor (disconnect the tractor negative battery cable (-) or disconnect connection lead). The paint coating should be cleaned. Burning paint fumes are poisonous for people and animals. Welding work should be carried out in a well lit and well ventilated space.
- In order to reduce the danger of fire or explosion, remove sediments accurately from the slurry tanker and clean and vent the tank before welding works. Be especially careful when welding and pay attention to flammable or fusible elements (hydraulic system conduits, electrical system leads and other structural elements made of plastics). If there is a risk that they will catch fire or be damaged, they should be removed or covered with non-flammable material before commencing welding work. Before beginning work prepare a CO₂ or foam extinguisher.
- Check condition of machine hydraulic system regularly, oil leaks are not allowed.
- Before beginning repair works on hydraulic or pneumatic systems reduce oil or air pressure.
- In the event of work requiring the slurry tanker to be raised, use properly certified hydraulic or mechanical lift jacks for this purpose. After lifting the machine, stable and durable supports must also be used. Do NOT carry out work under a machine, which has only been raised with the lift jack.
- The machine must not be supported using fragile elements (bricks or concrete blocks).

- After completing work associated with lubrication, remove excess oil or grease. The machine should be kept clean and tidy.
- The user must not repair by himself the hydraulic and pneumatic cylinders. In the event of damage to these elements, repair should be entrusted to authorised service point or replace elements with new parts.
- Do NOT make repairs to drawbar (straightening, repairing or welding). A damaged drawbar must be replaced.
- Do NOT install additional appliances or fittings not according to the specifications defined by the Manufacturer.
- The slurry tanker may only be towed when axles and brake system are reliable.
- Regularly check technical condition and mounting of all guards and protective elements.
- Should it be necessary to change individual parts, use only original parts or those indicated by the Manufacturer. Non-adherence to these requirements may put the user and other people's health and life at risk, and also damage the machine.
- 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. 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. In the event of contact of oil with skin wash the area of contact with water and soap. Do NOT apply organic solvents (petrol, kerosene).
- The machine can only be stood on when it is absolutely motionless and the tractor engine is switched off.
- The slurry tanker should be kept clean and tidy.

2.1.6 SAFE DRIVING

- When driving on public roads, comply with the road traffic regulations.
- During transport adjust travel speed to the prevailing road conditions. If possible avoid travelling on uneven terrain and unexpected corners.

- Do NOT exceed permissible travel speed. Excessive speed may cause loss of control over the tractor-slurry tanker combination and damage to slurry tanker and/or tractor and may limit braking efficiency of the tractor-slurry tanker combination.
- Before moving check that the slurry tanker is correctly hitched to the tractor (in particular check security of hitching pin).
- Vertical load borne by the slurry tanker drawbar eye affects the steering of the agricultural tractor.
- Place the slow-moving vehicle warning sign on the rear wall – figure (2.1).

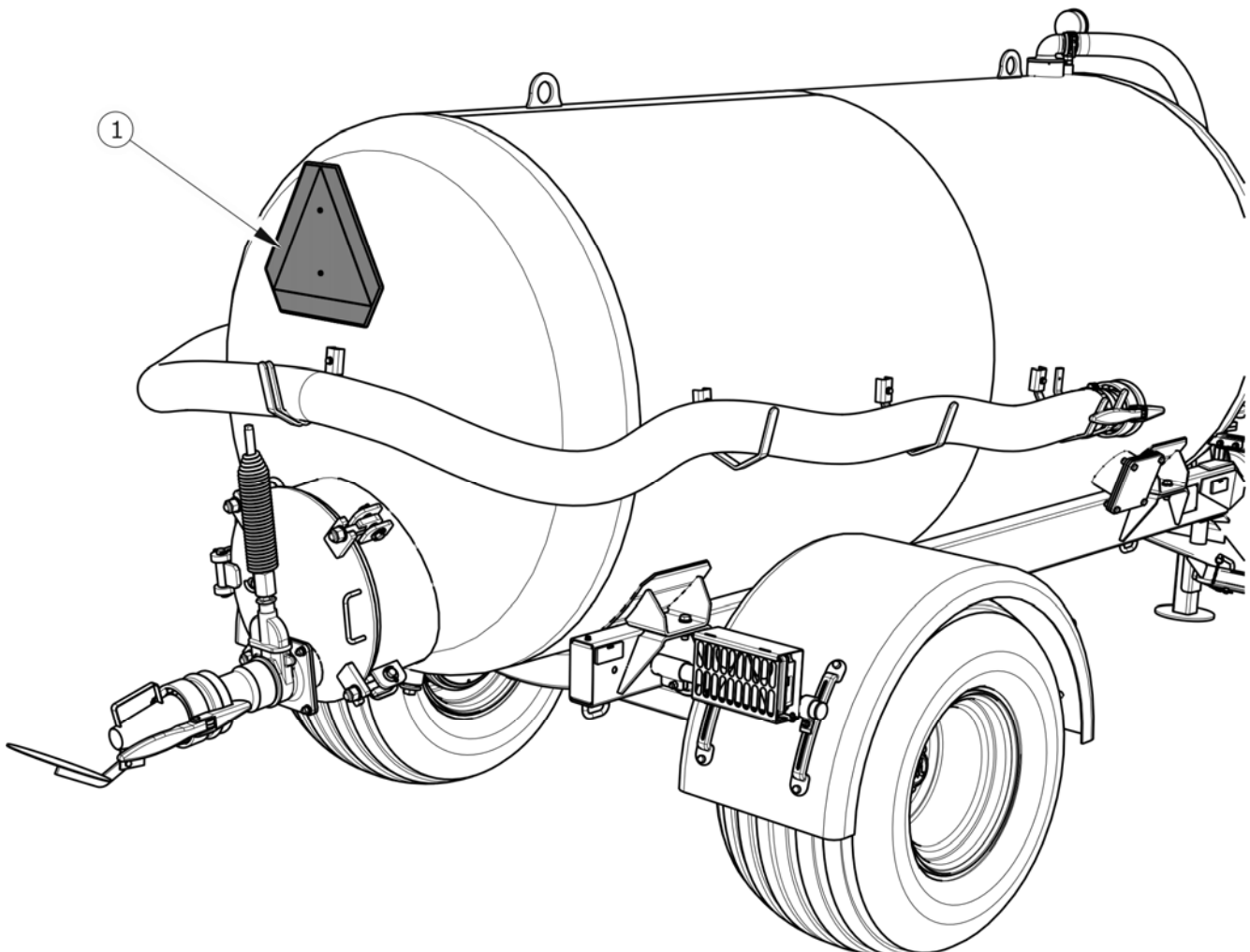


FIG. 2.1 *Mounting place for the slow-moving vehicle warning sign*

(1) slow-moving vehicle warning sign

- Do NOT attempt to board slurry tanker while travelling.
- Do NOT park slurry tanker on slope.
- Before driving off check that the parking brake is released, the braking force regulator is positioned in the proper position (applies to pneumatic systems with a manual three position regulator).
- During reversing one should use the assistance of another person. During manoeuvring the person helping must stay at a safe distance from the danger zone and be visible all the time to the tractor driver.
- While driving on public roads the slurry tanker must be fitted with a certified or authorised reflective warning triangle.

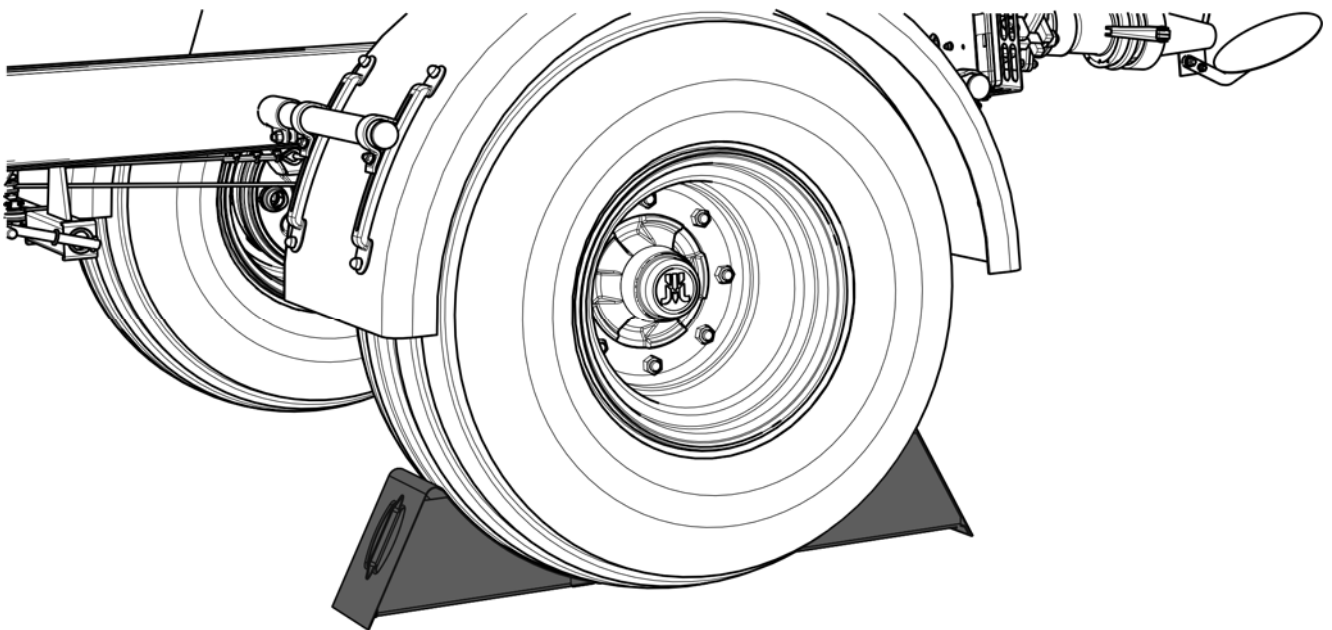


FIG. 2.2 *Method of placing chocks*

- The machine must NOT be left unsecured. The slurry tanker unhitched from the tractor must be secured against rolling away by means of parking brake and wheel chocks placed under the wheel - figure (2.2). Chocks should be placed only under one wheel (one in front of the wheel, the second behind the wheel).
- Periodically drain water from the air tanks in pneumatic system. During frosts, freezing water may cause damage to pneumatic system components.
- Reckless driving and excessive speed may cause accidents.

2.1.7 TYRES

- When working with tyres, the slurry tanker should be secured against rolling by placing chocks under the wheels. Wheels can be taken off the machine axle only when the machine 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 wheel nuts after the first use of the slurry tanker, after the first day of work under load, after travelling 1000 km and then every 6 months of use or every 25,000 km. The inspection should be repeated individually if a wheel has been removed from the wheel axle.
- Avoid potholes, sudden manoeuvres or high speeds when turning.
- Check the tyre pressure regularly. Pressure and tyres should be also checked after the whole day of intensive work. Please note that higher temperatures could raise tyre pressure by as much as 1 bar. At high temperatures and pressure, reduce load or speed. Do not release air from warm tyres to adjust the pressure or the tyres will be underinflated when temperatures return to normal.
- Protect tyre valves using suitable caps to avoid soiling.

2.1.8 OPERATING PTO SHAFT.

- The user should thoroughly acquaint himself with the PTO shaft Operator's Manual and adhere to the recommendations contained in it.
- The machine may only be connected to the tractor by appropriately selected PTO shaft. Use PTO shaft recommended by the slurry tanker Manufacturer.
- The drive shaft must be equipped with guards. Do NOT use the shaft with damaged or missing guards. Before activating the machine, always ensure that all the safety guards are in good condition and in place. Damaged or incomplete sub-assemblies must be exchanged for original new ones.
- After connecting shaft ensure that it is correctly and safely connected to the tractor and to the machine.

- Do NOT use the securing chains to support the shaft while slurry tanker is parked or when transporting the slurry tanker. Use shaft bracket for this purpose (1) – figure (2.3).

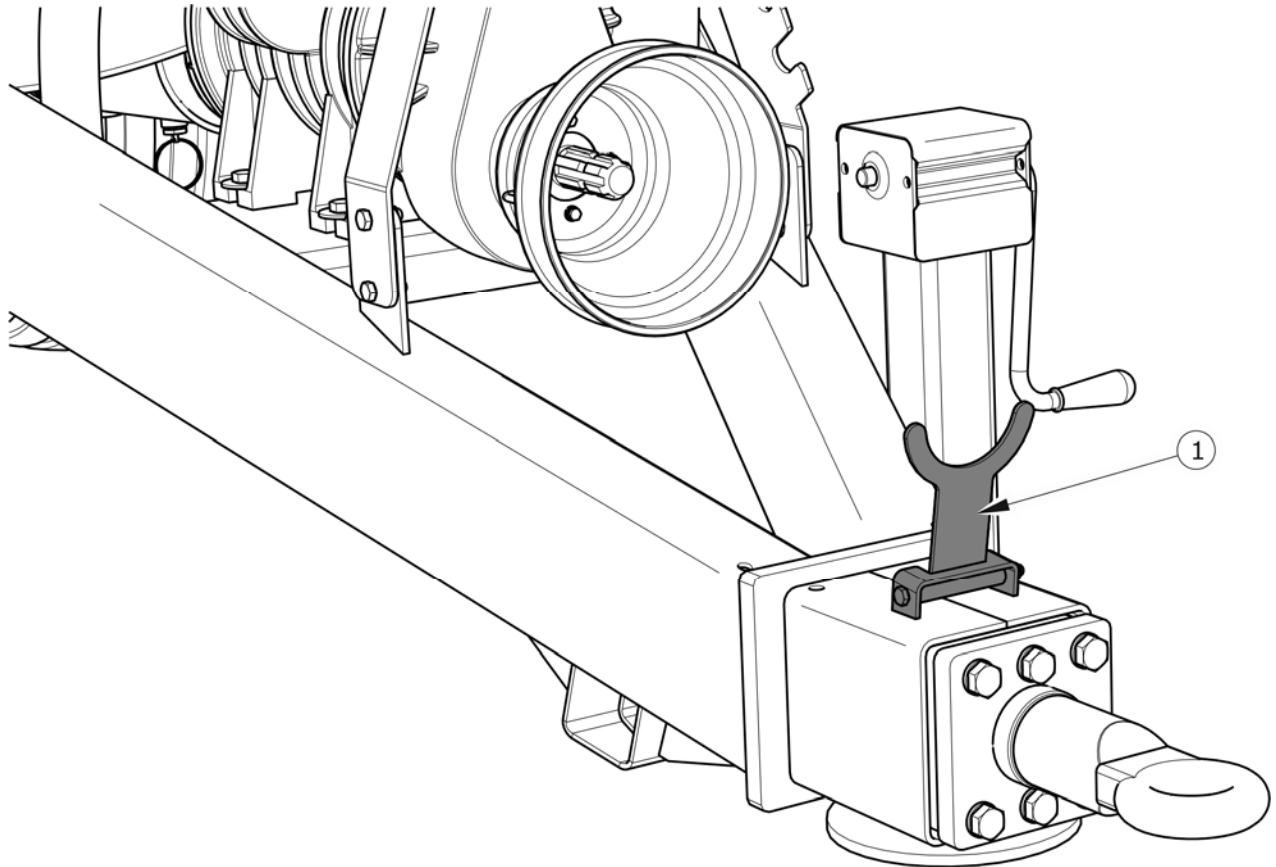


FIG. 2.3 *Shaft bracket*

(1) PTO shaft bracket

- Do NOT wear loose clothing, straps or whatever that may become wrapped round the rotating drive shaft. Contact with rotating PTO shaft may cause severe injuries.
- Before connecting or disconnecting the shaft, turn off the tractor engine and remove the key from the ignition. Immobilise tractor with parking brake.
- When working in limited visibility conditions, use the tractor's forward working lights to illuminate the articulated shaft and its vicinity.
- During transport the shaft must be stored in the horizontal position to avoid damage to safety guards or other protection elements.

- During shaft operation telescopic pipes must overlap by at least one third of their length.
- When using the slurry tanker and PTO shaft, do not use PTO rotation speed greater than 540 rpm. Do NOT overload shaft and machine and also engage the clutch suddenly. Before starting PTO shaft make certain that the PTO rotation direction is correct.
- The chains preventing the shaft cover from turning while the shaft is working, shall be secured to a fixed element of machine structure.
- Do NOT go over and under the shaft or stand on it equally during work as also when the machine is parked.
- The PTO shaft has markings on the casing, indicating, which end of the shaft shall be connected to the tractor.
- Never use a damaged PTO shaft, it may cause an accident. A damaged shaft must be repaired or replaced.
- Disconnect the drive shaft each time when it is not necessary to drive the machine, or when the tractor and slurry tanker are at an unsuitable angle to each other.

2.1.9 DESCRIPTION OF MINIMAL RISK

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

- using the machine for purposes other than those for which it is intended,
- being between the tractor and the machine while the engine is running and when the machine is being hitched,
- operating the slurry tanker with the safety guards removed or faulty,
- not maintaining safe distance while the slurry tanker is in operation,
- operation of the slurry tanker by persons under the influence of alcohol
- cleaning, maintenance and technical checks,

- work of machine on unstable and sloping surface,
- entering the tank without proper preparation,
- approaching the tank with an open flame.


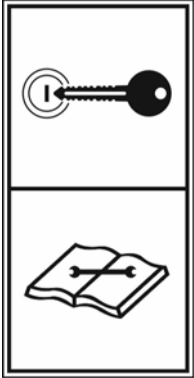



The minimal risk may be kept to a minimum by following the recommendations below:







- prudent and unhurried operation of the machine,
- adherence to the remarks and recommendations stated in the Operator's Manual,
- maintaining safe distance from the danger zone,
- a ban on being on the machine when it is operating, except the places specially designed for this purpose,
- carrying out repair and maintenance work in line with operating safety rules,
- using close fitting protective clothing,
- ensuring unauthorised persons have no access to the machine, especially children.



2.2 INFORMATION AND WARNING DECALS

The slurry tanker is marked with information and warning decals referred to in table (2.1). Locations of pictograms on the machine are shown in figure (2.4). Throughout the time in use, the user of the machine is obliged to take care that notices and warning and information symbols located on the slurry tanker 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 slurry tanker cleaning do not use solvents which may damage the coating of information label stickers and do not subject them to strong water jets.

TAB. 2.1 Information and warning decals

ITEM	SAFETY SYMBOL	DESCRIPTION						
1		<p>Caution!</p> <p>Before starting work, carefully read the <i>OPERATOR'S MANUAL</i></p> <p>70N-00000004</p>						
2		<p>Before beginning servicing or repairs, switch off engine and remove key from ignition</p> <p>70N-00000005</p>						
3	 <table border="1" data-bbox="448 1406 528 1451"> <tr> <td>M18</td> <td>27 kGm</td> </tr> <tr> <td>M20</td> <td>35 kGm</td> </tr> <tr> <td>M22</td> <td>45 kGm</td> </tr> </table>	M18	27 kGm	M20	35 kGm	M22	45 kGm	<p>Regularly check if the nuts and bolts fixing the wheels and other components are properly tightened.</p> <p>104N-00000006</p>
M18	27 kGm							
M20	35 kGm							
M22	45 kGm							
4	 <p>Smarować ! Grease ! Schmieren !</p>	<p>Grease the machine according to the recommendations in the <i>OPERATOR'S MANUAL</i></p> <p>104N-00000004</p>						
5		<p>Tank capacity: 4 000 litres</p> <p>239N-00000002</p>						

ITEM	SAFETY SYMBOL	DESCRIPTION
5		<p>Tank capacity: 5 000 litres</p> <p>219N-00000013</p>
5		<p>Tank capacity: 6 000 litres</p> <p>303N-00000002</p>
6		<p>The slurry tanker should be hitched only to a hitch designed for single axle trailers (lower transport hitch).</p> <p>37N-00000002</p>
7		<p>Maximum PTO speed.</p> <p>75N-00000004</p>
8		<p>Caution!</p> <p>Danger of poisoning by gas fumes.</p> <p>219N-00000010</p>
9		<p>Danger of explosion.</p> <p>Do not approach the slurry tanker with an open flame.</p> <p>219N-00000011</p>

ITEM	SAFETY SYMBOL	DESCRIPTION
10		<p>Danger of crushing to limbs. Do not put hands near the open gate.</p> <p>219N-0000009</p>
11	<p><i>T314 PRONAR</i></p>	<p>Machine type.</p> <p>239N-0000001</p>
11	<p><i>T315 PRONAR</i></p>	<p>Machine type.</p> <p>219N-0000012</p>
11	<p><i>T316 PRONAR</i></p>	<p>Machine type.</p> <p>303N-0000001</p>
12		<p>Controlling the distributor of the vacuum pump manifold.</p> <p>219N-0800003</p>

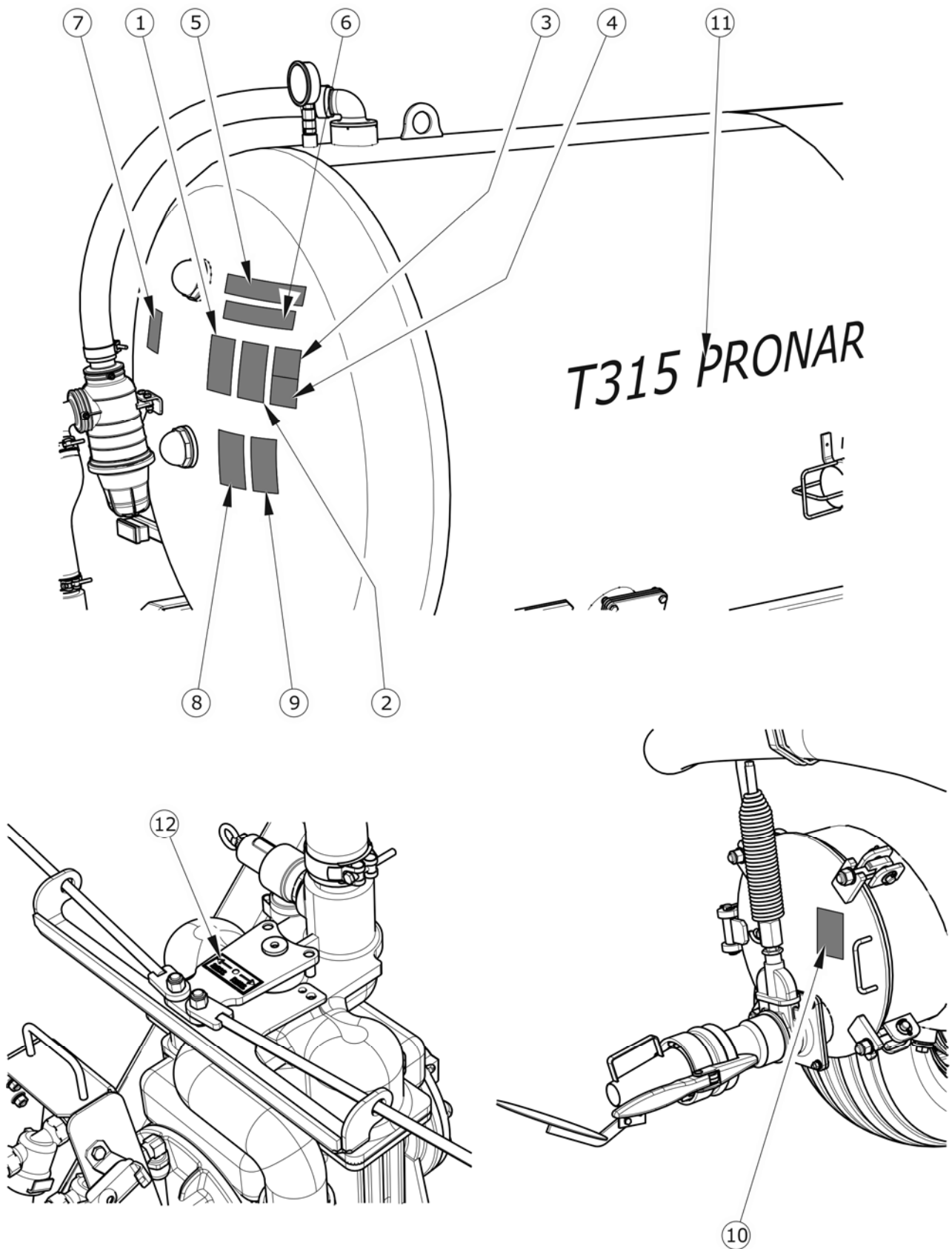


FIG. 2.4 Locations of information and warning decals.

SECTION

3

**DESIGN AND
OPERATION**

3.1 TECHNICAL SPECIFICATION

TAB. 3.1 *Basic technical data of standard fittings*

CONTENTS	UNIT	T314	T315	T316
Dimensions				
Length	mm	5 350	5 965	6 708
Width	mm	2 050	2 300	2 400
Height	mm	2 380	2 430	2 610
Tank parameters				
Length	mm	2 840	3 460	4 120
Diameter	mm	1 400	1 400	1 400
Wall thickness	mm	5	5	5
Capacity	l	4 000	5 000	6 000
Maximum working pressure	bar	0.45	0.45	0.45
Maximum negative working pressure	bar	0.7	0.7	0.7
Weight and carrying capacity				
Maximum gross weight	kg	5 800	7 200	8 650
Carrying capacity	kg	4 400	5 500	6 600
Tare weight	kg	1 400	1 700	2 050
Other information				
Axle track	mm	1,650	1 770	1 860
Drawbar attachment point load	kg	1 000	1 300	1 400
Nominal voltage of electrical system	V	12	12	12
Maximum design speed	km/h	40	40	40
Maximum PTO rotation speed	RPM	540	540	540
Safety valve opening pressure	bar	0.5	0.5	0.5

3.2 DESIGN OF THE SLURRY TANKER

3.2.1 CHASSIS

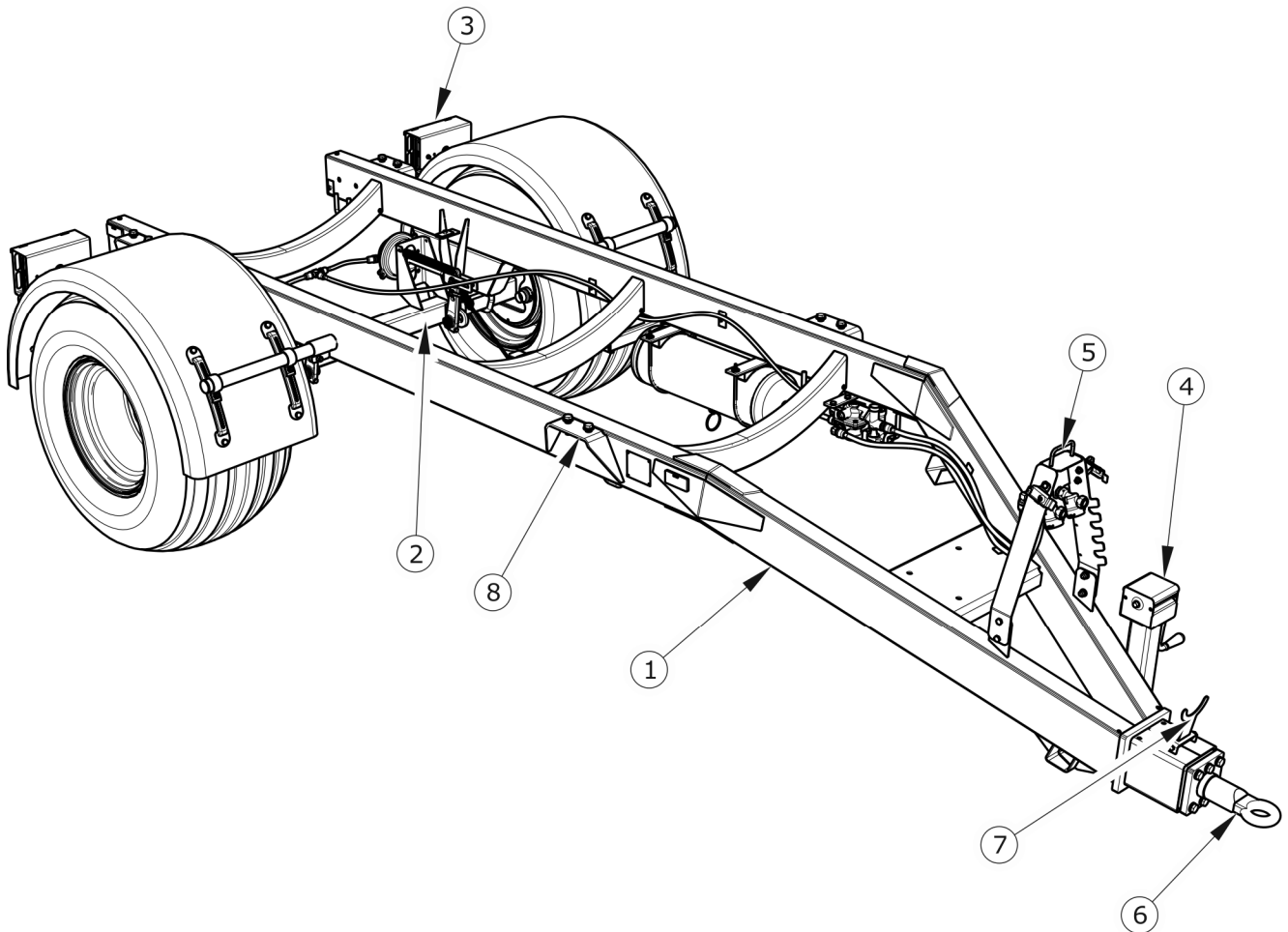


FIG. 3.1 Chassis

(1) lower frame, (2) wheel axle, (3) light bracket, (4) support, (5) conduit bracket, (6) rotating drawbar eye, (7) PTO shaft bracket, (8) tank fixing bracket

Slurry tanker chassis consists of subassemblies indicated on figure 3.1. Lower frame (1) is a structure welded from steel sections. The main support elements are two longitudinal members connected with profiled crossbars. Brackets (8) for tank mounting are welded to the frame longitudinal members. Rear light brackets (3) are located in the rear part of the lower frame.

The slurry tanker suspension consists of the axle (2) that are mounted to a lower frame by means of U bolts. Axles are made from square bars terminated with a pin, where wheel hubs

are mounted on cone bearings. The wheels are single, equipped with brake shoes activated through mechanical expander cams.

Conduit bracket (5), slurry tanker support (4) and drawbar with rotating drawbar eye (6) are located in the front part of the lower frame.

3.2.2 TANK WITH EQUIPMENT

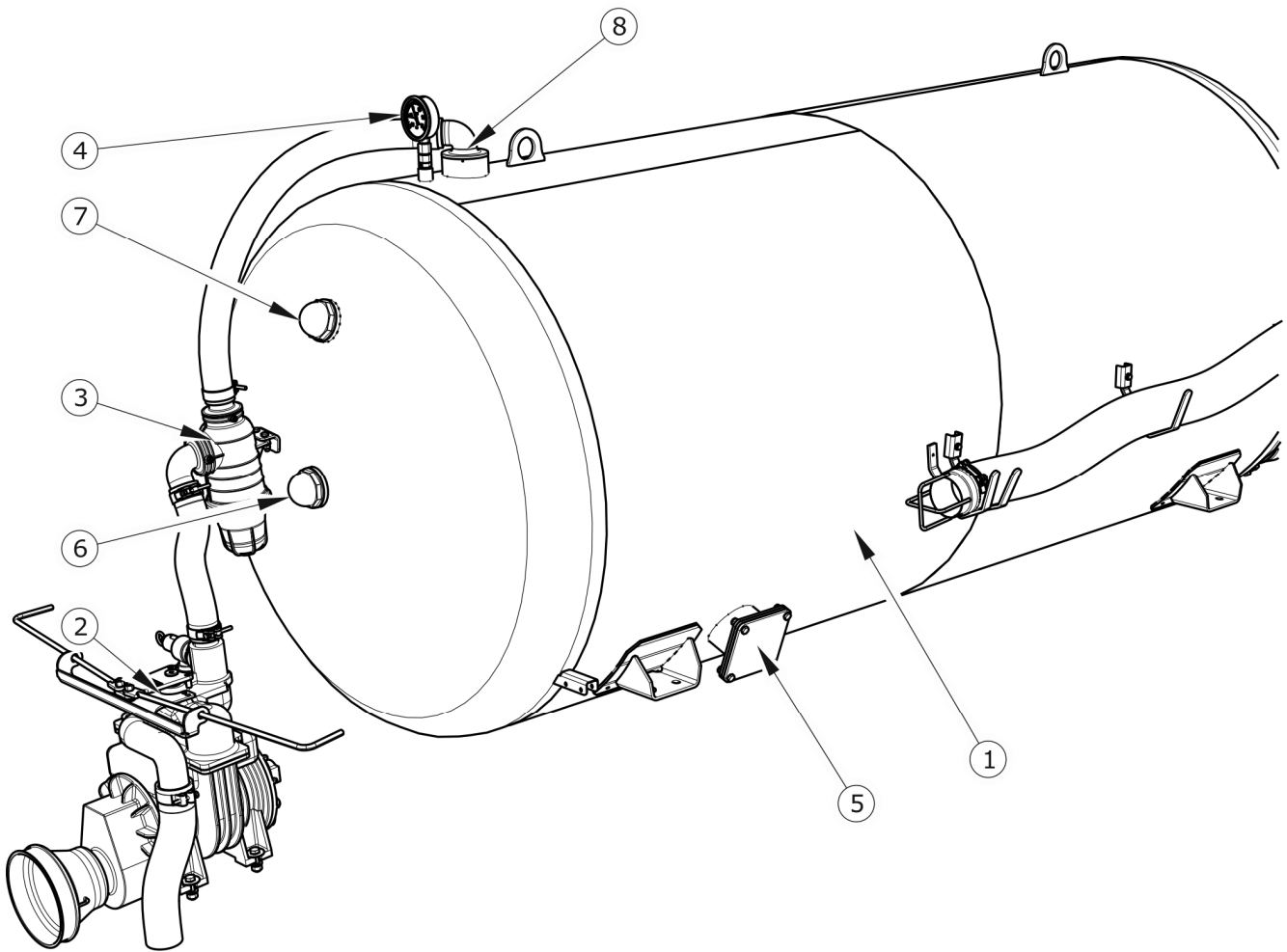


FIG. 3.2 Tank – front view

(1) tank, (2) rotary vane vacuum pump, (3) siphon valve, (4) manovacuumeter, (5) connection, (6) lower sight-glass, (7) upper sight-glass, (8) relief valve

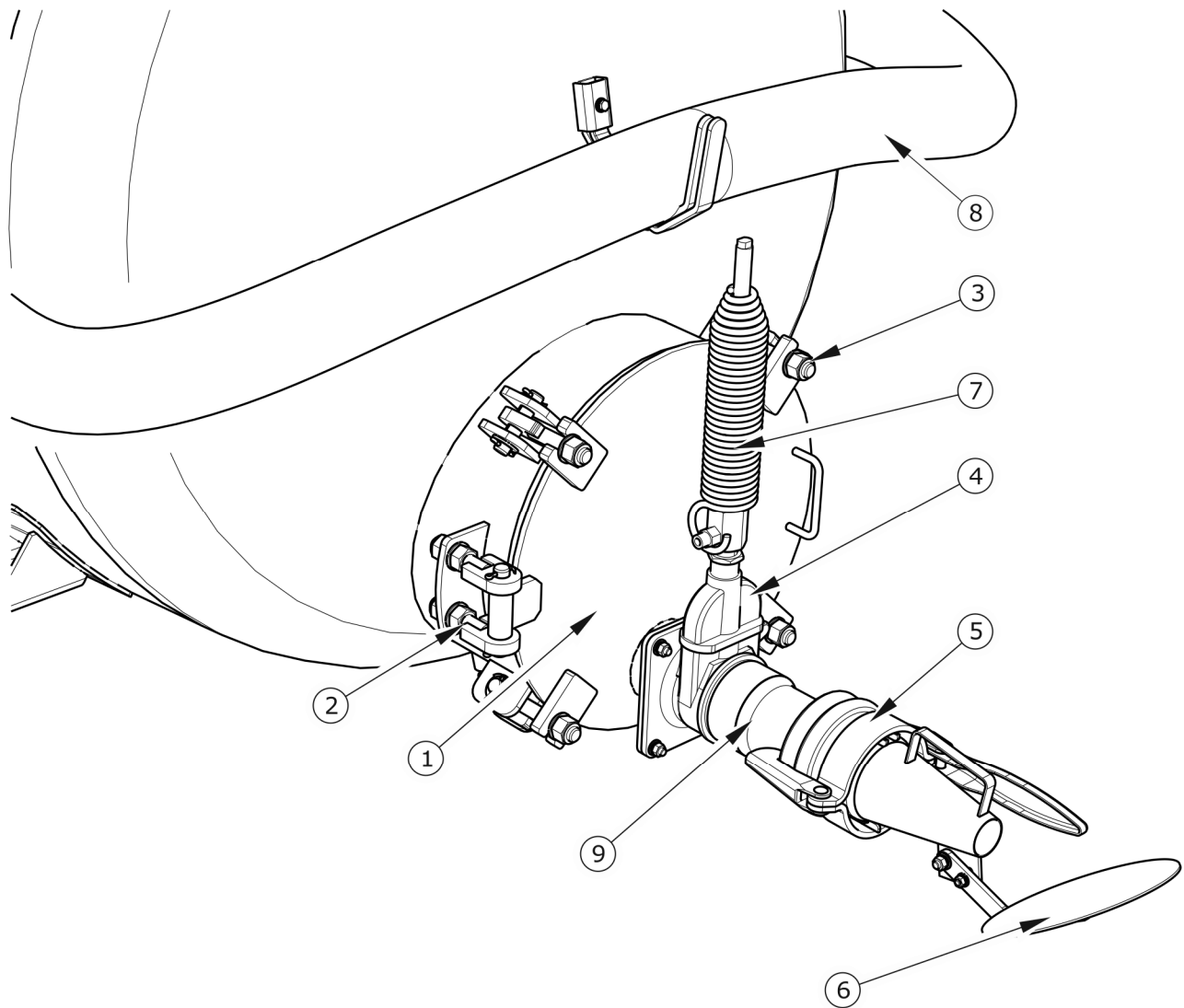


FIG. 3.3 Tank – rear view

(1) rear gate, (2) gate hinge (adjustable), (3) gate fixing bolts, (4) damper, (5) spout, (6) spout spoon, (7) hydraulic cylinder, (8) suction hose, (9) connector pipe

The tank and its equipment are shown in figures (3.2) and (3.3). The tank is a welded structure terminated with profiled bottoms at its both ends. Siphon valve and sight-glasses (6) and (7) for checking level of liquid are installed on the bottom located at the front of the slurry tanker. On the lower frame of the slurry tanker there is a rotary vane vacuum pump (2), whose purpose is to create negative pressure when filling the tank or overpressure when emptying the tank. The vacuum pump is protected against flooding (hydraulic impact) by relief valve (8) and siphon valve (3).

In the rear part of the tank there is gate (1) – figure (3.3) to which damper (4) is bolted. The damper is controlled by means of the tractor's external hydraulic system. Connector pipe (9) is attached to the damper's outlet opening. Depending on requirements, spout (5) with spoon (6) or suction hose (8) is attached to the connector pipe.

**TIP**

The slurry tanker can be equipped with accessories for emptying and filling the tank with clean water. For detailed information, please refer to Annex B and the pump manual enclosed with this publication.

3.2.3 MAIN BRAKE

The slurry tanker is equipped with double conduit pneumatic brake system - figure (3.4), or single conduit pneumatic brake system – figure (3.5) – optional equipment. The machine brakes are activated from the tractor driver's cab by pressing on the brake pedal.

The function of the control valve (1), Figure (3.6), is to activate the slurry tanker's brakes simultaneously when tractor's brakes are applied. Furthermore, in case of an inadvertent disconnection of the line between the slurry tanker and the tractor, the control valve will automatically activate slurry tanker's brakes. Valve used in the system is equipped with a circuit causing the brakes to be applied when machine is disconnected from the tractor. When compressed air line is connected to the tractor, the device automatically applying the brakes now changes its position to allow normal brake operation.

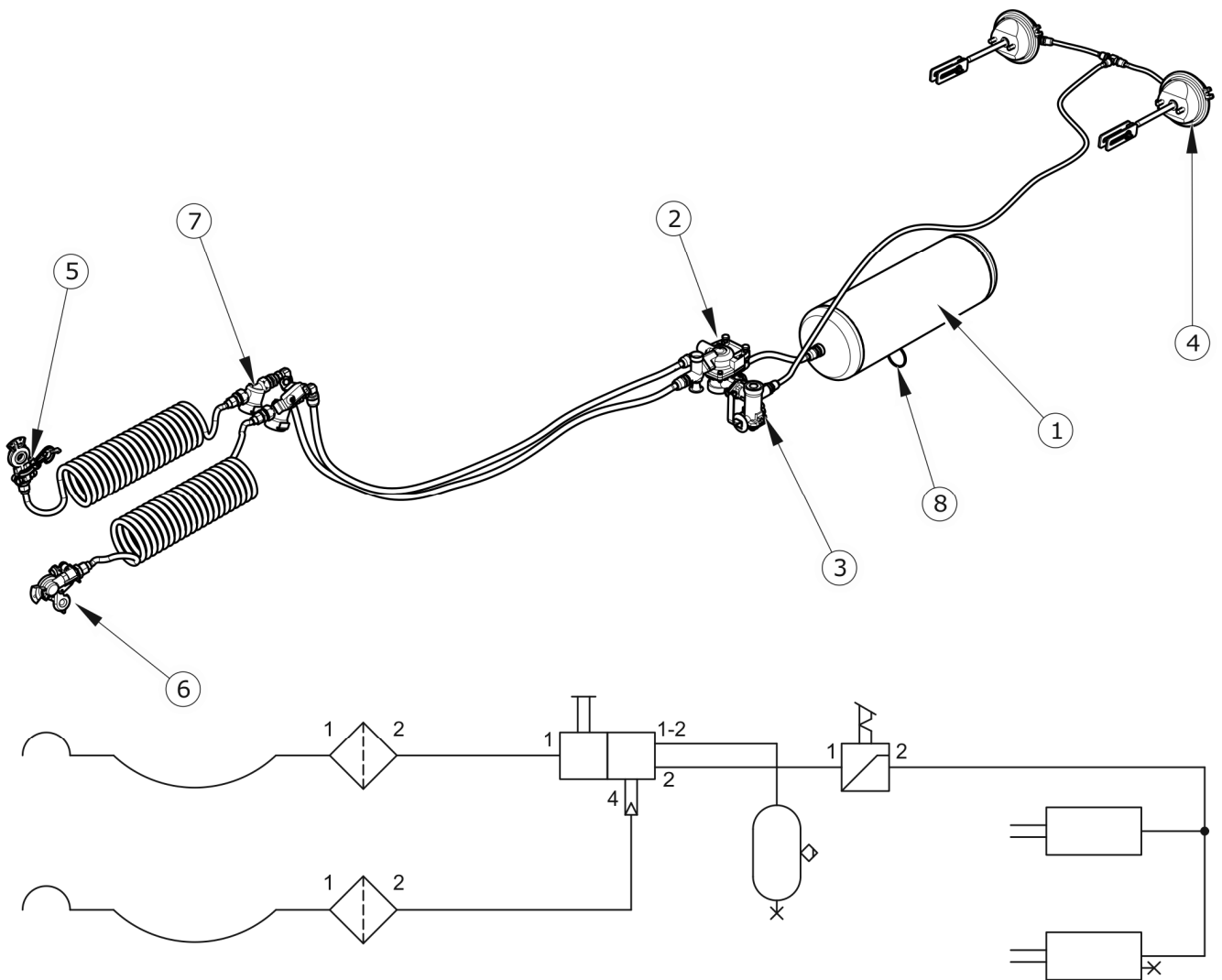


FIG. 3.4 Design and diagram of the double conduit pneumatic brake system.

(1) air tank, (2) control valve, (3) brake force regulator, (4) pneumatic cylinder, (5) lead connector (red), (6) lead connector (yellow), (7) air filter, (8) drain valve

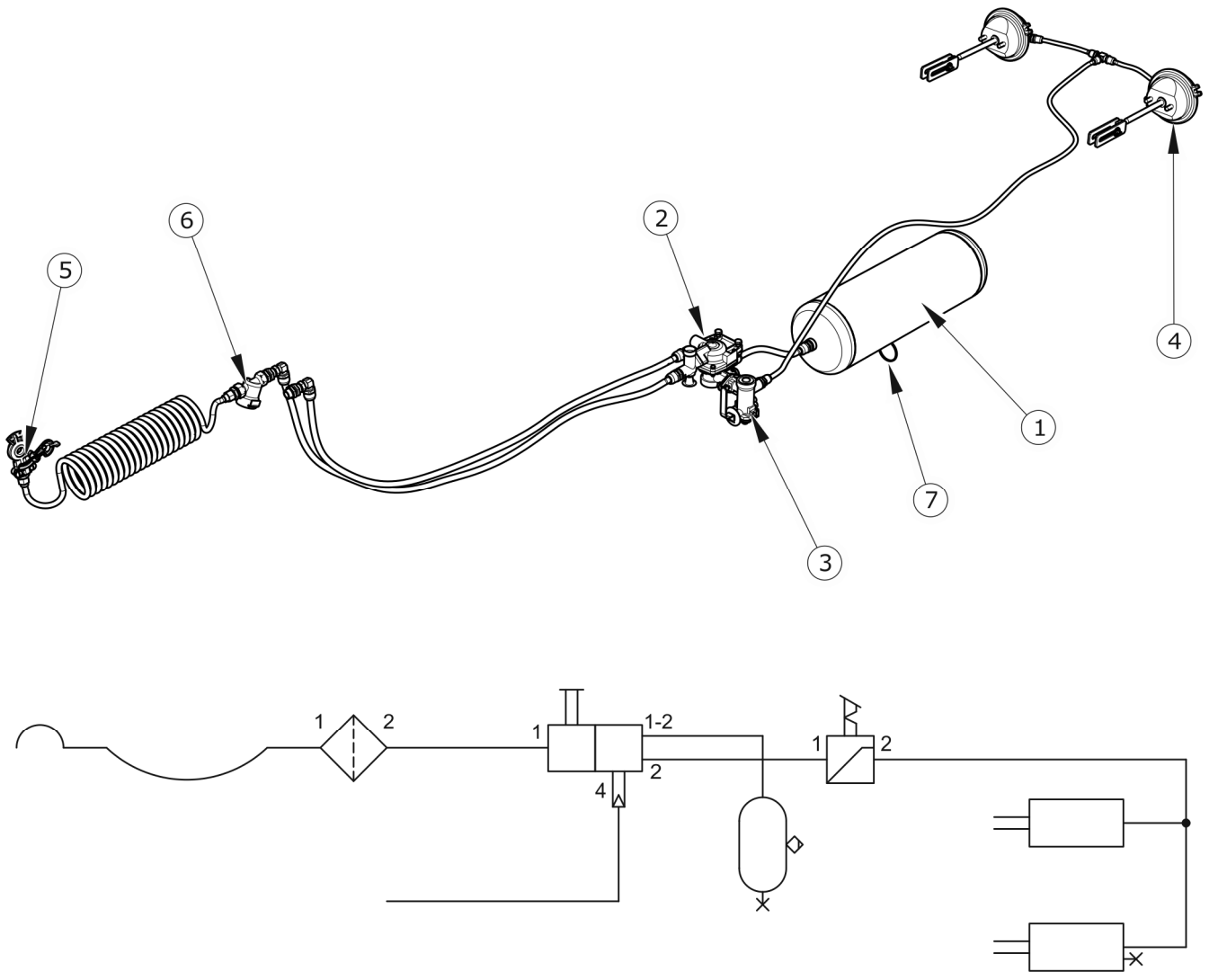


FIG. 3.5 Design and diagram of the single conduit pneumatic brake system

(1) air tank, (2) control valve, (3) brake force regulator, (4) pneumatic cylinder, (5) lead connectors, (6) air filter, (7) drain valve

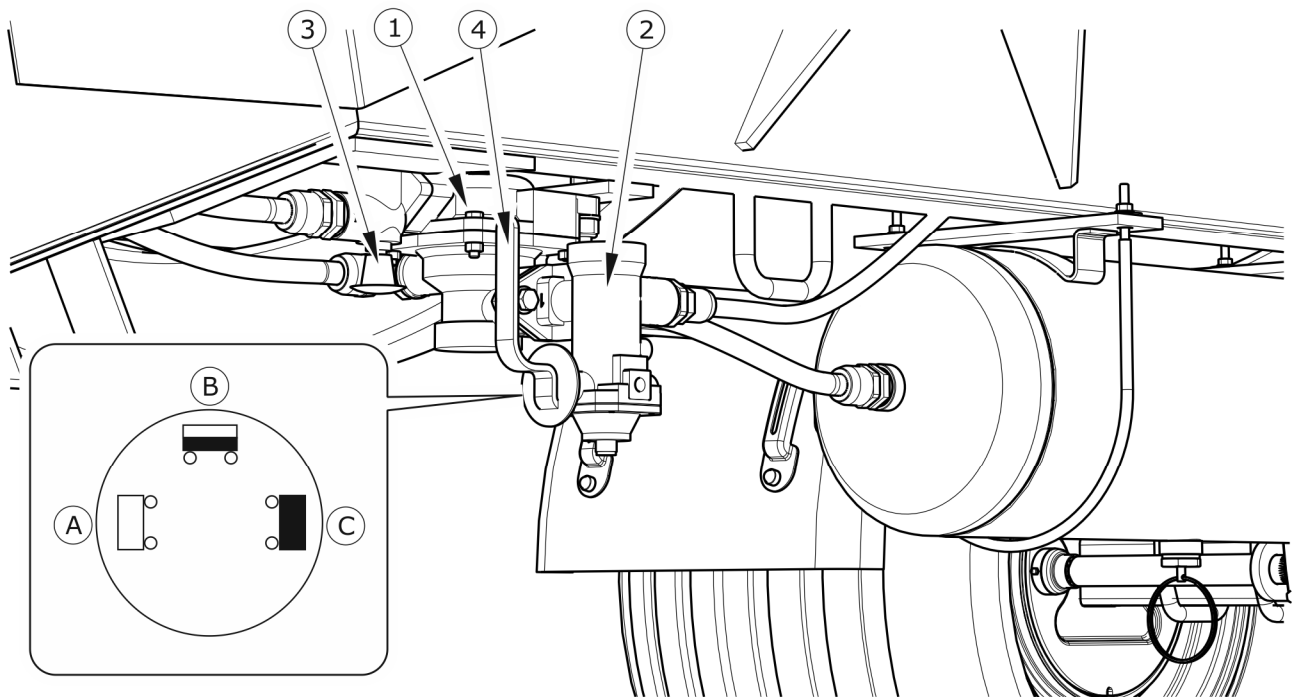


FIG. 3.6 Control valve and brake force regulator

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

Three-step brake force regulator (2), 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".

3.2.4 PARKING BRAKE

The parking brake is for immobilising slurry tanker while standing motionless. Brake crank mechanism body (1) is welded to the left longitudinal member of the lower frame. Steel cable (3), routed through two guide rollers (4), is connected with expanded levers of axle (2) by crank mechanism. Tightening the cable (turning the crank clockwise) causes tilting of the expander lever, which parts the jaws of the brake shoes immobilising the slurry tanker.

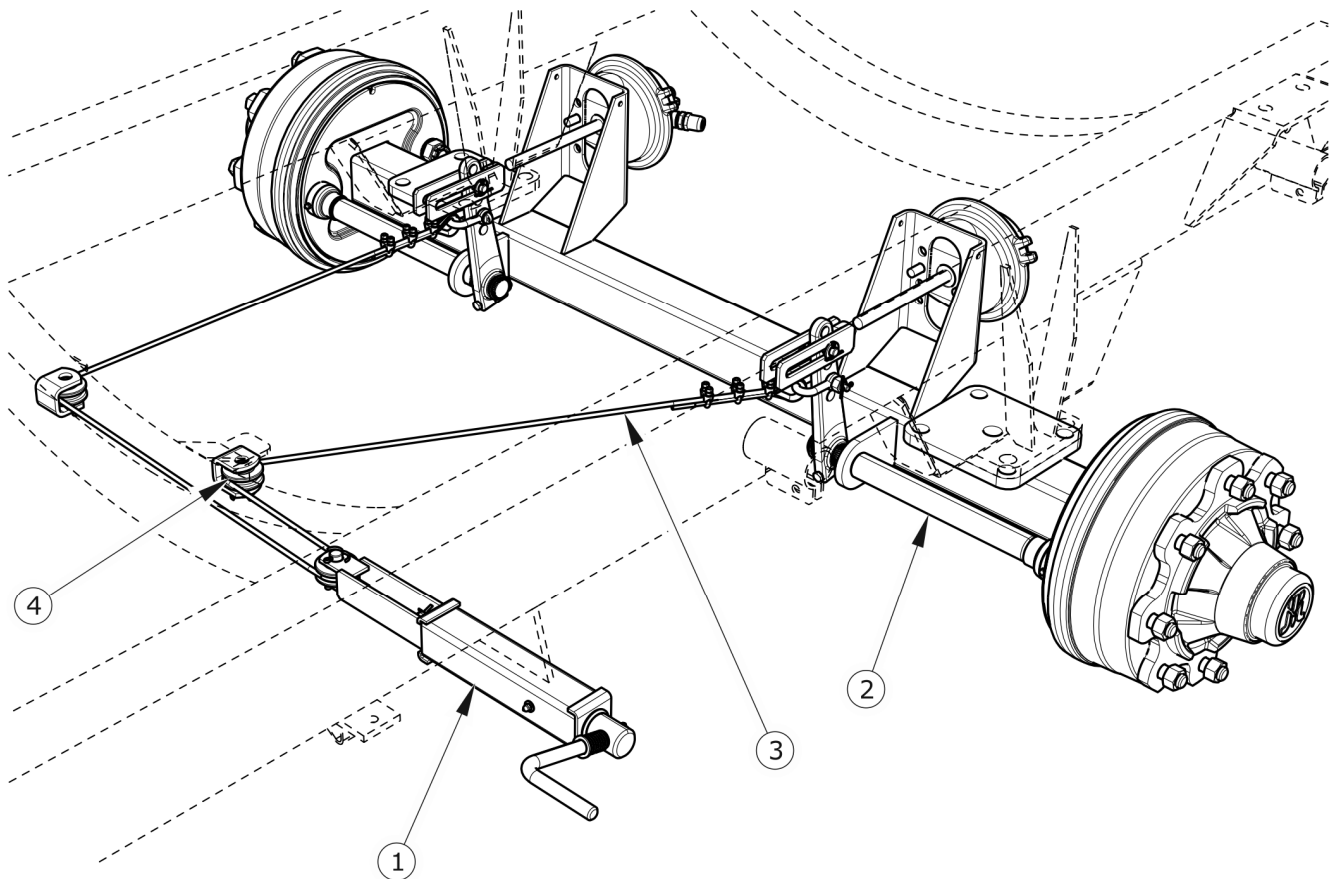


FIG. 3.7 *Parking brake housing with crank mechanism*

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

3.2.5 LIGHTING SYSTEM

The slurry tanker's electrical system is designed for supplying from direct current source of 12 V. Connection of the slurry tanker'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 (3.8) and (3.9)

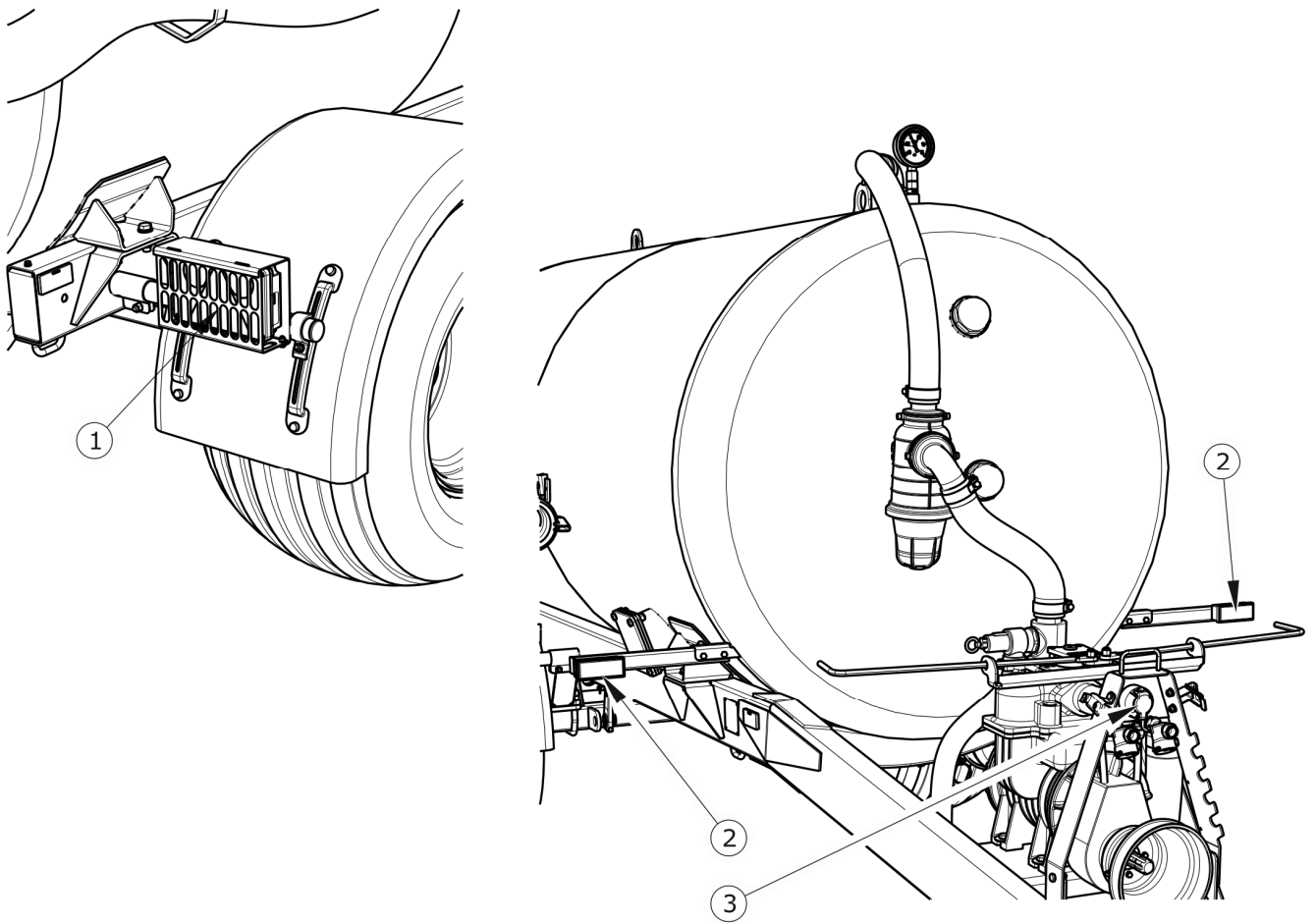


FIG. 3.8 *Arrangement of electrical system components*

(1) rear lamp assembly, (2) front parking light, (3) connection socket

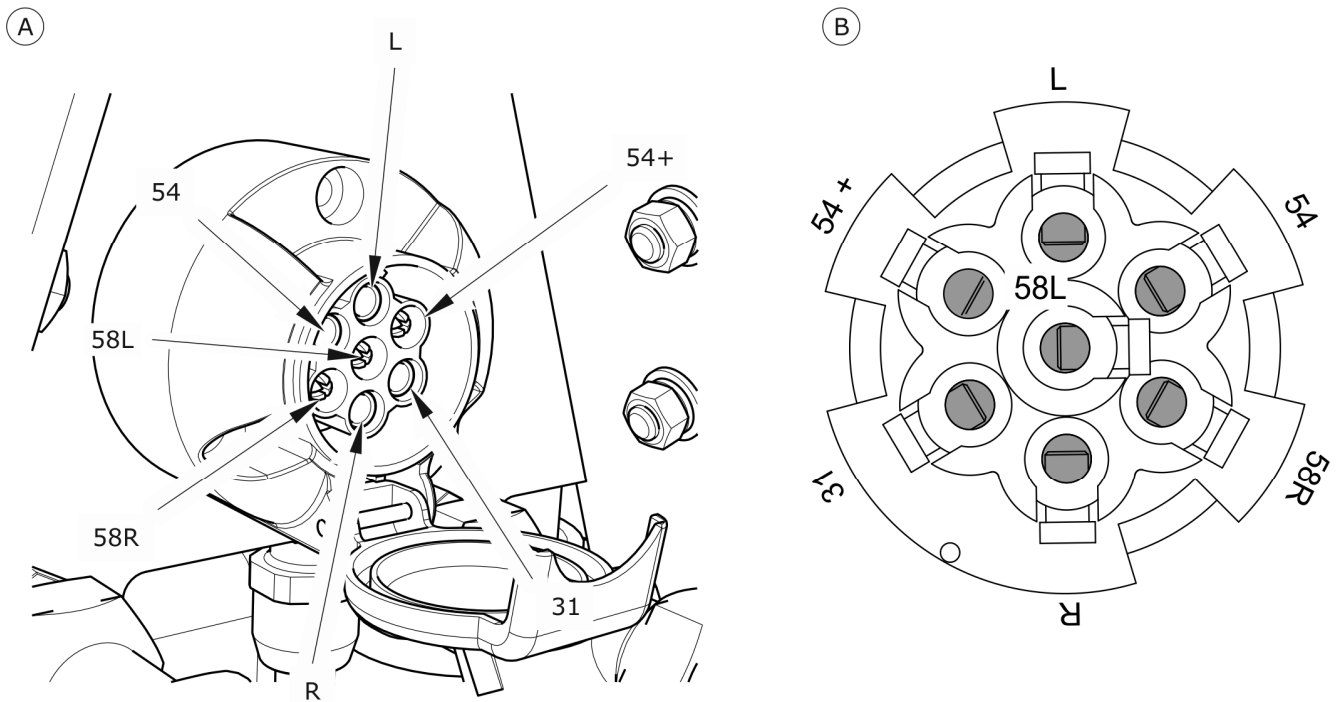


FIG. 3.9 Connection socket

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

TAB. 3.2 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

SECTION

4

CORRECT USE

4.1 PREPARING SLURRY TANKER FOR WORK

4.1.1 PRELIMINARY INFORMATION

The slurry tanker is supplied to the user completely assembled and does not require additional assembling 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 slurry tanker (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 slurry tanker 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.
- Check oil level in the rotary vane vacuum pump.

If non-conformities are found, do not attach and start the slurry tanker. 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 slurry tanker in the presence of the user.

The user trained by the seller is not released from the obligation to carefully read this operator's manual, the Operator's Manual of PTO shaft and the Operator's Manual of rotary vane vacuum pump.

4.1.3 PREPARING THE SLURRY TANKER FOR THE FIRST USE, TEST RUN OF THE SLURRY TANKER

**TIP**

All slurry tanker service activities are described in detail in further parts of the Operator's Manual.

Preparing for the test run

**TIP**

The instructions included in the additional Operator's Manuals describe PTO shaft mounting method, principle of its adjusting to tractor and machine, preparation and operation of the rotary vane vacuum pump, checks before start-up and information concerning safe operation.

- The user must carefully read this *OPERATOR'S MANUAL*, the Operator's Manual of PTO shaft and the Operator's Manual of rotary vane vacuum pump and observe the instructions contained in the manuals.
- Visually inspect the slurry tanker according to guidelines presented in section *PREPARING THE SLURRY TANKER FOR NORMAL USE*.
- Hitch machine to tractor. Immobilise tractor with parking brake.

Test start

- Check all lubrication points of the slurry tanker, PTO shaft and rotary vane vacuum pump. Lubricate the machine as needed according to recommendations

provided in section 5. Check lubricating oil level in the vacuum pump transmission and level of oil lubricating the pump vanes (read the operator's manual).

- Drain air tank of the brake system.
- Make sure that the pneumatic brake system of the slurry tanker is compatible with the tractor's brake system. In case of incompatibility, adapt the slurry tanker's pneumatic brake system according to the guidelines presented in section 5.4.4.
- Ensure that hydraulic and electric connections in agricultural tractor are according to the requirements, if not the slurry tanker should not be hitched to the tractor.
- Switch on individual lights, check correct operation of electrical system.
- Release tractor's parking brake. Perform test drive. Check the slurry tanker's braking efficiency during driving.
- Stop tractor (do not switch off the engine), immobilise tractor with parking brake.
- Set vacuum pump to filling mode. Start PTO with a speed of not more than 350 rpm.
- Check and, if necessary, adjust dosing of lubricating oil of the vacuum pump.
- Disengage PTO drive after one minute of operation.
- Check increase of pressure in the tank by means of the manovacuometer. Equalize pressure in the tank.
- Set vacuum pump to emptying mode. Start PTO with a speed of not more than 350 rpm.
- Disengage PTO drive after one minute of operation.
- Check drop of pressure in the tank by means of the manovacuometer. Equalize pressure in the tank.
- Open and close hydraulic damper.

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 suspected faults,

stop operating the slurry tanker 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.

When generating negative pressure or overpressure in the tank, check the manovacuometer's indications regularly. Pressure should change smoothly and should be maintained at the same level for a longer period of time after stopping the vacuum pump. Check tightness of the tank if there are sudden pressure jumps or if pressure changes too quickly – chapter 5. If a leak is caused by the tank damage (e.g. during transport), notify the sale point in order to perform repair.

4.1.4 PREPARING THE SLURRY TANKER 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 slow-moving vehicle warning triangle plate - whenever the slurry tanker moves on public roads.
- Check lubricating oil level in the transmission of the rotary vane vacuum pump and level of oil lubricating the pump vanes.



DANGER

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

DANGER

The slurry tanker 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 SLURRY TANKER

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

Connection

- ➔ Position agricultural tractor directly in front of the slurry tanker drawbar eye.
- ➔ Position drawbar eye at the correct height.
 - ⇒ Turn the crank clockwise to raise the drawbar hitching eye (the support foot slides out).
 - ⇒ Turn the crank counterclockwise to lower the drawbar hitching eye (the support foot slides in).
- ➔ Reverse tractor, hitch slurry tanker 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 ignition. Ensure that unauthorised persons do not have access to the tractor cab.
- ➔ Connect pneumatic system conduits (if the slurry tanker is equipped with double conduit pneumatic system).

- ⇒ Connect pneumatic conduit marked yellow with yellow socket in tractor.
- ⇒ Connect pneumatic conduit marked red with red socket in tractor.

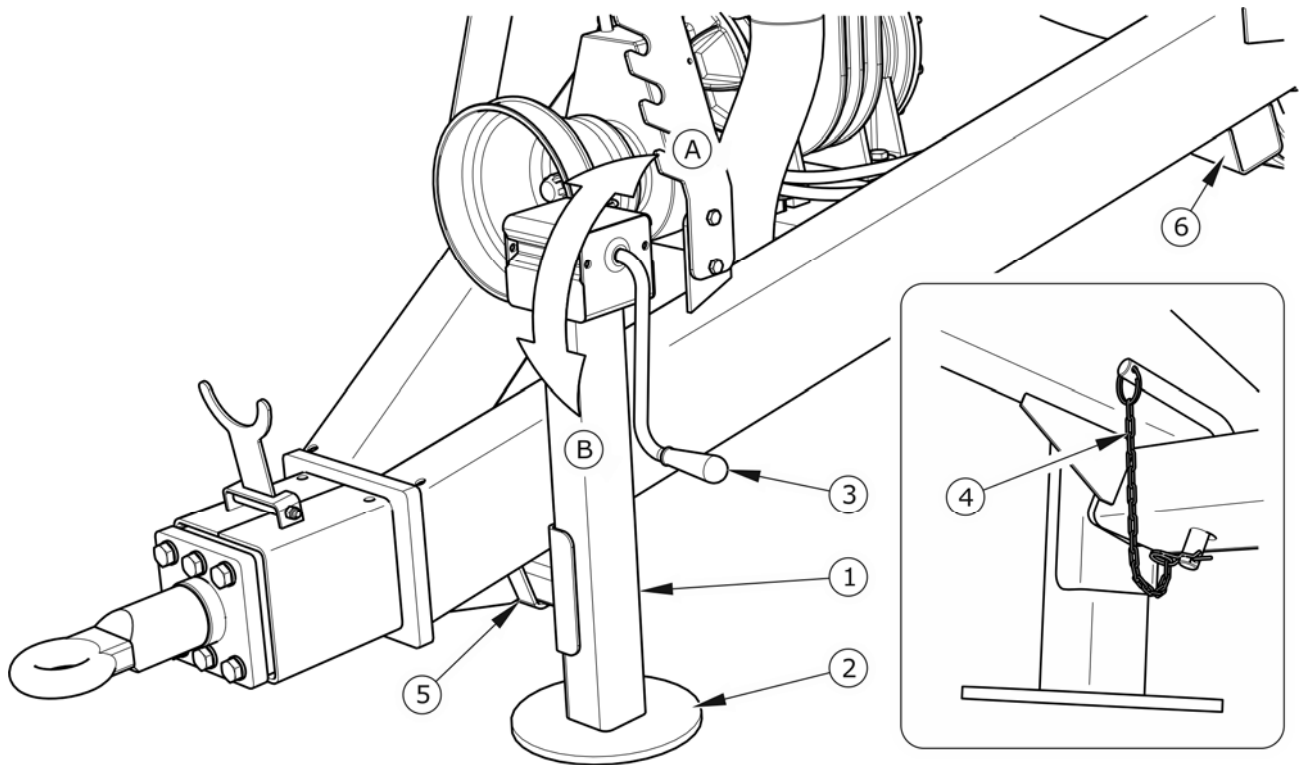


FIG. 4.1 Support operation

(1) support, (2) foot, (3) crank, (A) sliding the foot out / raising the drawbar hitching eye, (B) sliding the foot in / lowering the drawbar hitching eye, (4) pin with cotter pin, (5) fixing profile I, (6) fixing profile II

- ➔ Connect pneumatic system conduit (if the slurry tanker is equipped with single conduit pneumatic system).
 - ⇒ Connect pneumatic conduit marked black with black socket in tractor.
- ➔ Connect connection lead for the electrical system
- ➔ Connect hydraulic system line.
- ➔ Raise the support to extreme upper position, unlock and take out pin (4) – figure (4.1), move the support to profile II (transport position). Insert pin and secure it with cotter pin
- ➔ Connect PTO shaft to tractor and slurry tanker.

- ➔ Check and, if necessary, protect conduits against rubbing or other mechanical damage.
- ➔ Just before driving off, remove chocks from under the slurry tanker's wheels and release parking brake.

**IMPORTANT!**

Do NOT use out of order slurry tanker.

When turning, line connection tubes must hang loosely and not become tangled with moving elements of slurry tanker and tractor.

If the agricultural tractor is equipped with an automatic coupler, ensure that the hitching operation is completed and that drawbar eye is secured.

**DANGER**

When hitching, there must be nobody between the slurry tanker and the tractor. When hitching the machine, tractor driver must exercise 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 slurry tanker are not under pressure.

Ensure sufficient visibility during hitching.

Exercise particular caution during support operation - danger of severing limbs.

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

Unhitching

In order to unhitch the slurry tanker from the tractor carry out the following actions in the following sequence.

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

- ➔ Set the drawbar eye at such a height that one may safely unlock and unhitch the slurry tanker's drawbar eye.
- ➔ Disconnect PTO shaft from tractor and place it in the bracket.
- ➔ Disconnect electric lead.
- ➔ Disconnect pneumatic system conduits (applies to double conduit systems):
 - ⇒ Disconnect pneumatic conduit marked red.
 - ⇒ Disconnect pneumatic conduit marked yellow.
- ➔ Disconnect pneumatic system conduit (applies to single conduit system).
 - ⇒ Disconnect pneumatic conduit marked black.
- ➔ Disconnect hydraulic system conduit.
- ➔ Protect terminal ends with covers,
- ➔ Place connection conduits of the systems on special hangers.
- ➔ Release tractor hitch, drive tractor away from the slurry tanker.

DANGER



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

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

Do NOT unhitch the slurry tanker if its tank is filled with material.

4.3 FILLING THE TANK

Description of actions

- ➔ Hitch the slurry tanker to tractor. Park the slurry tanker near the tank to be emptied.
- ➔ Park the slurry tanker on flat level ground.
- ➔ Immobilise tractor and slurry tanker with parking brake.
- ➔ Close the tank damper.

- ➔ Disconnect liquid manure spout with spoon (1) – figure (4.2).
- ➔ Connect suction hose (3) and immerse its other end in the tank to be emptied.
- ➔ Set the rotary vane vacuum pump's lever to tank filling position (negative pressure) – figure (4.3), lever (1) to position (B).
- ➔ Start PTO drive with a speed of not more than 400 - 450 rpm.
- ➔ Open the tank damper.
 - ⇒ Created negative pressure will cause filling the tank.
- ➔ Observe level of liquid in the tank through sight-glasses installed on the front bottom.

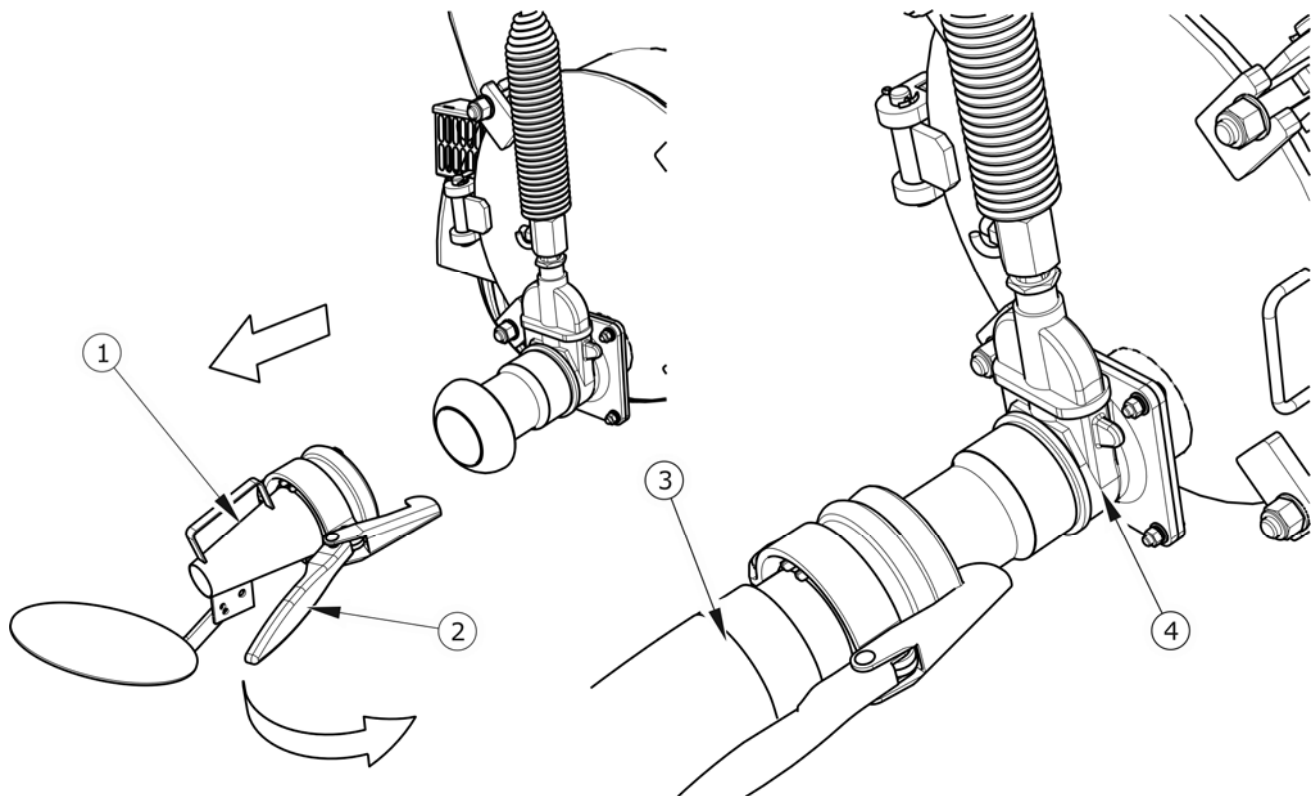


FIG. 4.2 *Connecting the suction hose*

(1) liquid spreading spout, (2) lever, (3) suction hose, (4) damper

- ➔ When the liquid starts to reach the level of the upper sight-glass, close the damper immediately.
- ➔ Disengage PTO drive and set the rotary vane vacuum pump's lever to the middle position.

- ➔ Disconnect suction hose, wait until remaining liquid flows into the tank and place the suction hose on brackets.
- ➔ Check that there are no material leaks.
 - ⇒ First of all, check if the damper is correctly closed and if the gate and side connections are properly tightened. No leaks of liquid are allowed during slurry tanker travel.

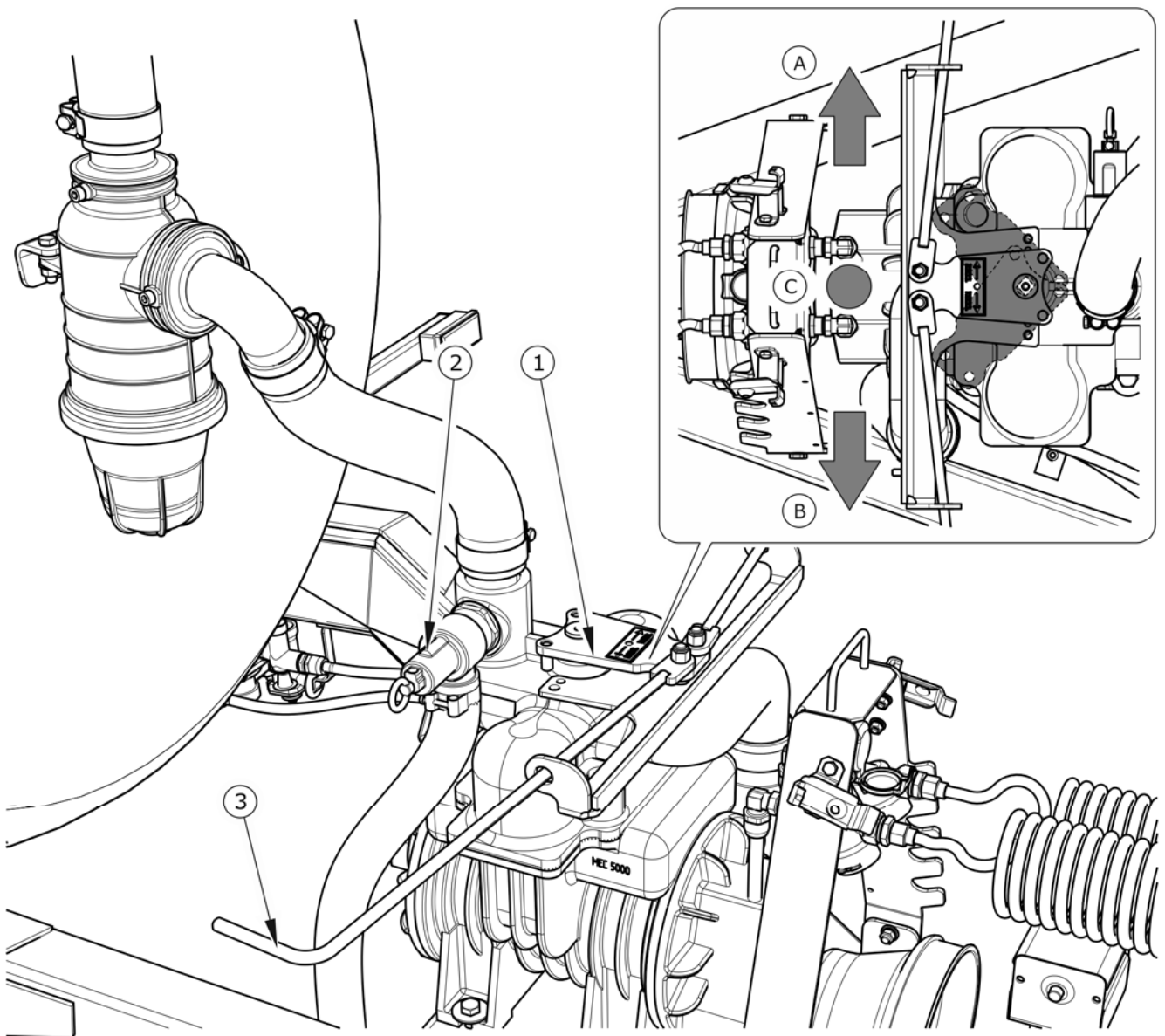


FIG. 4.3 *Controlling the rotary vane vacuum pump operation.*

(1) lever, (2) safety valve, (3) information decal, (A) emptying the tank (overpressure), (B) filling the tank (negative pressure), (C) neutral position

**IMPORTANT!**

Before starting the rotary vane vacuum pump, always check oil level and after starting the system, check dose of oil lubricating the pump vanes. If necessary, correct the setting.

**TIP**

If it is difficult to reach the required negative pressure, check tank tightness. Similar symptoms may also occur if the vacuum pump's vanes are worn out.

Formation of foam on the liquid surface is normal and is more intensive if negative pressure is lower.

Tank filling time depends on many factors (value of negative pressure, density of liquid, depth of liquid suction). That is why the filling process must be constantly controlled. In case of tank overflow, relief valve installed on the tank should automatically cut off the load space from the suction side of the compressor. (small leaks of liquid to siphon valve are allowed). If tank overflow occurs when the relief valve is out of order, there is a high risk of damage to the compressor (hydraulic impact).

**IMPORTANT!**

Stop filling the tank when the liquid starts to reach the level of the upper sight-glass.

Do NOT load and transport liquids that may overload the pump system and react aggressively with the machine's structural elements.

Do NOT exceed the slurry tanker's maximum carrying capacity.

When filling the tank, check the manovacuumeter's indications continuously.

4.4 UNLOADING

Description of actions

- Set lever (1) – figure (4.3), to pumping position (overpressure).
- Install liquid spreading spout on connector pipe or hose.
- Start PTO drive and create negative pressure in the tank.

- ➔ Start driving in the field, open the tank damper.
- ➔ Reduce drive shaft speed, control PTO speed in order to maintain constant pressure in the tank.
 - ⇒ When pressure of 0.5 bar is exceeded, safety valve (2) – figure (4.3), located on the rotary vane vacuum pump will be opened.
- ➔ After emptying the tank, disengage PTO drive and close the damper after levelling the pressure.

**DANGER**

Keep a safe distance from liquid spreading spout when spreading the liquid.

**ATTENTION!**

Unauthorised repairs and changes to settings of the safety valve are forbidden and regarded as use of the machine contrary to its intended purpose. Repairs and adjustments of the safety valve should be entrusted to specialist workshops.

Failure of safety valve or unauthorised and incorrect adjustment of safety valve's settings may cause excessive increase of pressure in the tank, as a result of which the tank or elements of the slurry tanker's equipment may get damaged. In such a situation, immediately stop PTO drive and continue unloading. When pressure of about 0.2 bar is reached, restart the drive in order to reach the maximum overpressure. Repeat the process until the tank is completely empty. Inefficient safety valve should be repaired or adjusted.

4.5 TRANSPORTING THE MACHINE

When driving slurry tanker on public or private roads, respect the road traffic regulations, exercise caution and prudence. Listed below are the key guidelines for driving the tractor and machine combination.

- Before moving off make sure that there are no bystanders, especially children, near the slurry tanker or the tractor. Take care that the driver has sufficient visibility.

- Ensure that slurry tanker is properly hitched to the tractor and that the tractor hitch has been properly secured.
- Please note that liquid load behaves differently than solid loads during transport. That is why liquid load should be transported as gently as possible.
- Avoid sudden acceleration, turning and braking.
- Do NOT overload the slurry tanker. The slurry tanker's maximum carrying capacity must not be exceeded as this can damage the slurry tanker 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. Speed of travel should be adjusted to prevailing road conditions, load carried and other conditions.
- When not hitched to the tractor, the slurry tanker must be immobilised using parking brake and with chocks placed under the wheels. Do NOT leave unsecured machine.
- In the event of slurry tanker 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 slurry tanker must be marked with a slow-moving vehicle warning sign attached to the rear wall of the tank. The tractor driver shall be equipped with a certified or approved 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 slurry tanker or the tractor to suddenly tilt. This is of special importance because loaded machine's centre of gravity is higher, which reduces safety. Particular attention should be paid when driving the slurry tanker that is not fully loaded. Driving near ditches or channels is dangerous as there is a risk of the wheels sliding down the slope or the slope collapsing.

- Speed must be sufficiently reduced before making a turn or driving on an uneven road or a slope.
- When driving, avoid sharp turns especially on slopes.
- Please note that the braking distance of the tractor and slurry tanker combination is substantially increased at higher speeds and loads.
- Monitor slurry tanker's behaviour when travelling on an uneven terrain, and adjust driving speed to road conditions, slow down early enough when turning.
- Keep the slurry tanker clean. Prevent soiling of lights, reflective lights and information and warning decals. Before driving off, make sure that suction hose is correctly mounted in brackets and that it is correctly cleaned of liquid and sediment.

4.6 PROPER USE AND MAINTENANCE OF TYRES

- • When performing maintenance and servicing of tyres, the slurry tanker must be immobilized with parking brake and 2 chocks placed under the wheels.
- Repair or replacement of tyres should be carried out by persons trained and entitled to do so.
- Repair work on tyres should be carried out using appropriate tools.
- Inspect tightness of wheel nuts after the first use of the machine, after the first day of work under load, after travelling 1000 km and then every 6 months of use or every 25,000 km. The inspection should be repeated individually if a slurry tanker wheel has been removed from the wheel axle.
- Regularly check and maintain correct pressure in tyres.
- Protect valves using suitable caps to avoid soiling.
- Do not exceed the maximum design speed of the slurry tanker.
- When machine is operated all day, check temperature of tyres.
- Avoid potholes, sudden manoeuvres or high speeds when turning.

SECTION

5

MAINTENANCE

5.1 PRELIMINARY INFORMATION

When using the slurry tanker, 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 slurry tanker is obliged to perform all the maintenance and adjustment procedures defined by the Manufacturer.

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

Detailed procedures and extents of functions are described in this section, which the user may perform with his own resources. In the event of unauthorised repairs, changes to factory settings and other actions, which are not regarded as possible for the slurry tanker operator to perform, the user shall invalidate the warranty.

5.2 SERVICING 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 loose play of axle bearings,
- mounting and dismounting wheel, inspection of wheel tightening,
- checking air pressure, evaluating technical condition of wheels and tyres.
- mechanical brakes adjustment,
- change of parking brake cable and adjustment of cable tension.

Procedures connected with:

- changing grease in axle bearings,
- changing bearings, hub seals,
- repairing wheel axle,

may be performed by specialist workshops.

5.2.2 CHECK WHEEL AXLE BEARINGS FOR LOOSENESS

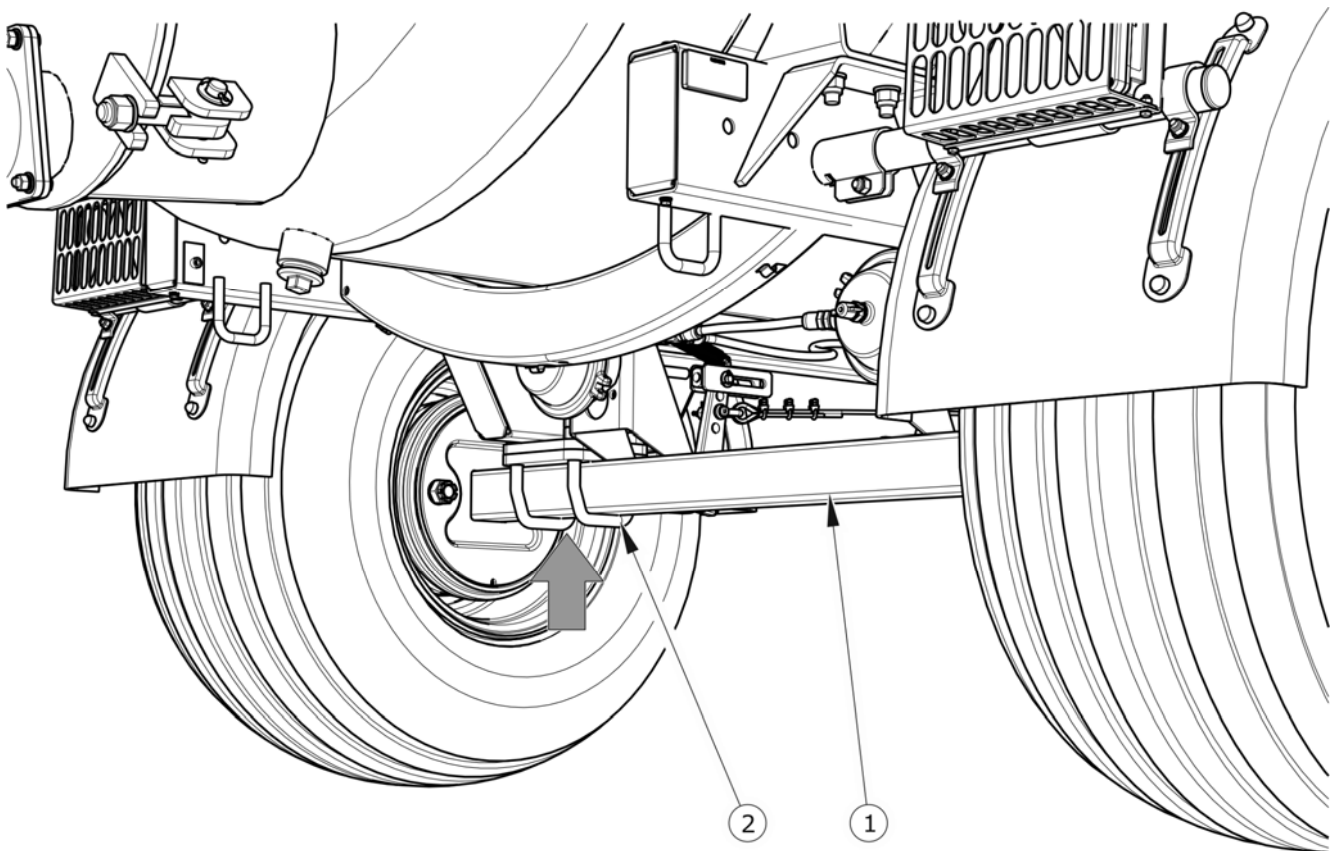


FIG. 5.1 *Lifting jack support point*

(1) wheel axle, (2) U bolt

Preparation procedures

- ➔ Hitch the slurry tanker to tractor, immobilize tractor with parking brake.
- ➔ Park the slurry tanker on hard and level ground.
 - ⇒ Tractor must be placed to drive forward.
- ➔ Place chocks under the slurry tanker's wheel that will not be raised. Ensure that machine shall 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 suited to weight of slurry tanker.

Check wheel axle bearings looseness

- ➔ 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 looseness.
 - ⇒ 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 wheel.
- ➔ Turning the wheel slowly in both directions check that movement is smooth and that the wheel rotates without excessive resistance.

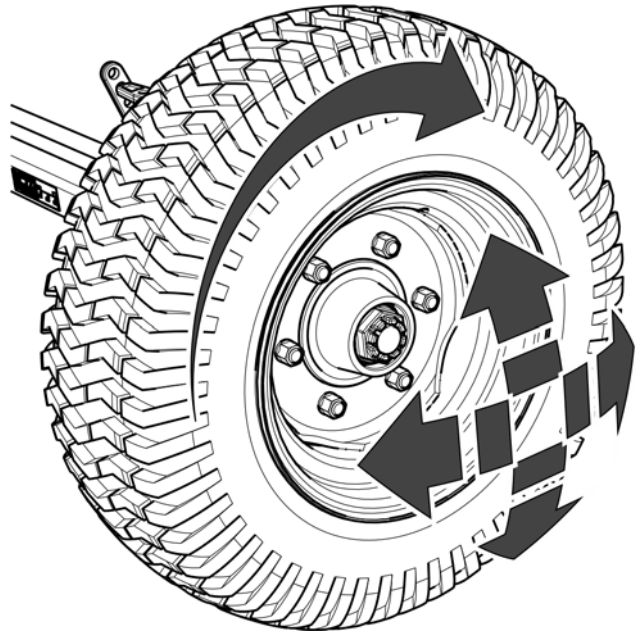


FIG. 5.2 *Checking bearings for play*



TIP

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

**TIP**

Bearing life is dependent on working conditions of slurry tanker, loading, speed of travel and lubrication conditions.

If play 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.



Check wheel axle bearings for play:

- *after the first month of use,*
- *every 6 months of use.*

Check condition of hub cover, if necessary replace with new cover. Inspection of bearing play may only be conducted, when the slurry tanker is hitched to a 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 slurry tanker shall not move during inspection of bearing play of axles.

5.2.3 ADJUSTMENT OF PLAY OF WHEEL AXLE BEARINGS

The wheel should turn smoothly without stiffness or detectable resistance. Adjustment of bearing play may only be conducted, when the slurry tanker is not loaded and is hitched to a tractor.

- Take off hub cover (1), figure (5.3).
- Take out split cotter pin (3) securing castellated nut (2).
- Tighten castellated nut in order to eliminate looseness.
- Wheel should rotate with insignificant resistance.
- Unscrew nut (not less than 1/3 rotation) to cover the nearest thread groove with alignment to opening in wheel stub axle. Wheel should rotate without excessive resistance.
- Nut may not be excessively tightened. Do not apply excessive pressure with regard for deterioration of bearing working conditions.
- Secure castellated nut with cotter pin and mount hub cap.
- Delicately tap hub cap with rubber or wooden hammer.

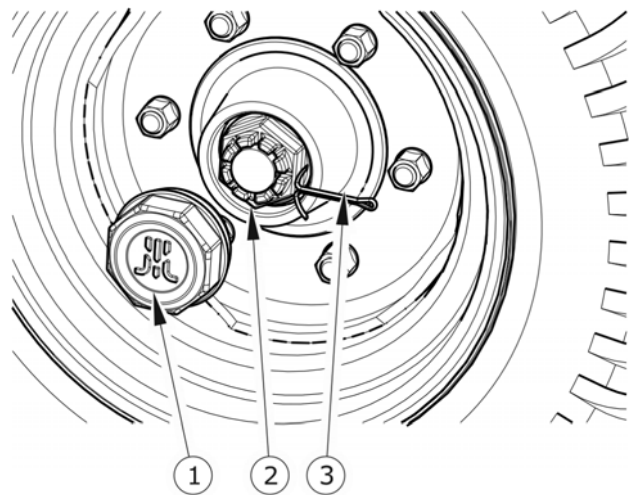


FIG. 5.3 Adjustment of play

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

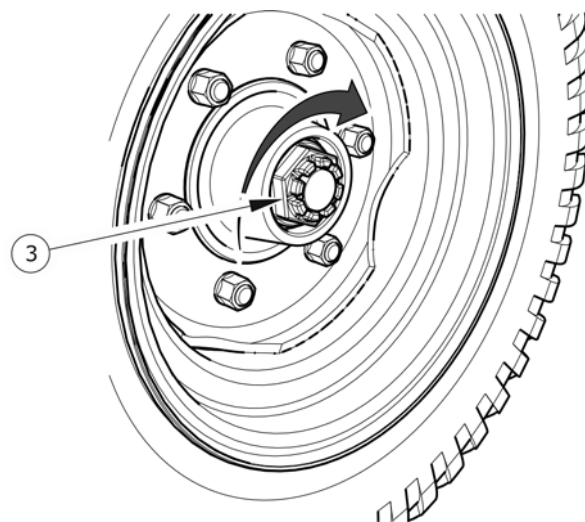


FIG. 5.4 Tightening castellated nut

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

Dismounting wheel

- ➔ Place chocks under wheel that will not be dismantled.
- ➔ Ensure that the slurry tanker is properly secured and shall not move during wheel dismantling.
- ➔ Loosen wheel nuts. Example of nut undoing method is shown for T315 slurry tanker in figure (5.5) – 8 nuts.
- ➔ Place lifting jack and lift slurry tanker.
- ➔ Dismount wheel.

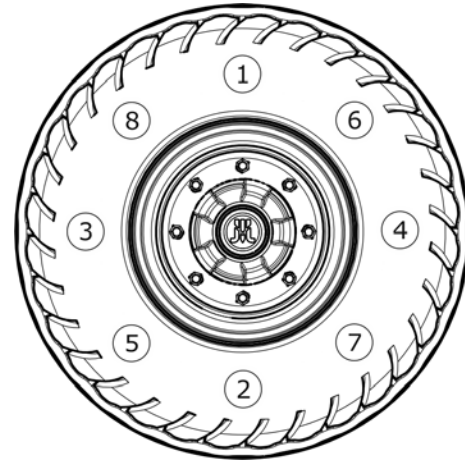


FIG. 5.5 *Sequence of undoing and tightening nuts*

Wheel mounting

- ➔ 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 adjoins hub exactly.
- ➔ Lower slurry tanker, tighten nuts according to recommended torque and given sequence.

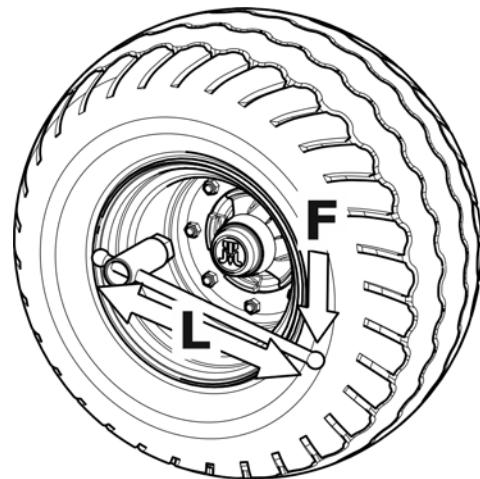


FIG. 5.6 *Tightening nuts*

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

Tightening nuts

TAB. 5.1 *Connections of wheels with axle*

SLURRY TANKER	PIN THREAD	ITEMS
T314	M18x1.5	6
T315	M18x1.5	8
T316	M22x1.5	10

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 (5.6) 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.

TIP



Nuts with M18x1.5 thread should be tightened using the maximum torque of 270 Nm.

Nuts with M22x1.5 thread should be tightened using the maximum torque of 510 Nm.

Checking wheel tightening:



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

The above actions should be repeated individually if a wheel has been removed from the wheel axle.

TAB. 5.2 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
510	85	0.6
	73	0.7
	64	0.8
	60	0.85

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

5.2.5 CHECK AIR PRESSURE, EVALUATE TECHNICAL CONDITION OF WHEELS AND TYRES

**TIP**

Tyre pressure values are specified in information decal, placed on wheel or on 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 it is recommended to check air pressure more

frequently. During this time the slurry tanker 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. Technical condition and appropriate maintenance significantly extends the life of these components and ensures appropriate level of safety to slurry tanker users.

**Checking tyre pressure and steel rims:**

- every 1 month of use,
- every week during intensive work,
- if needed.

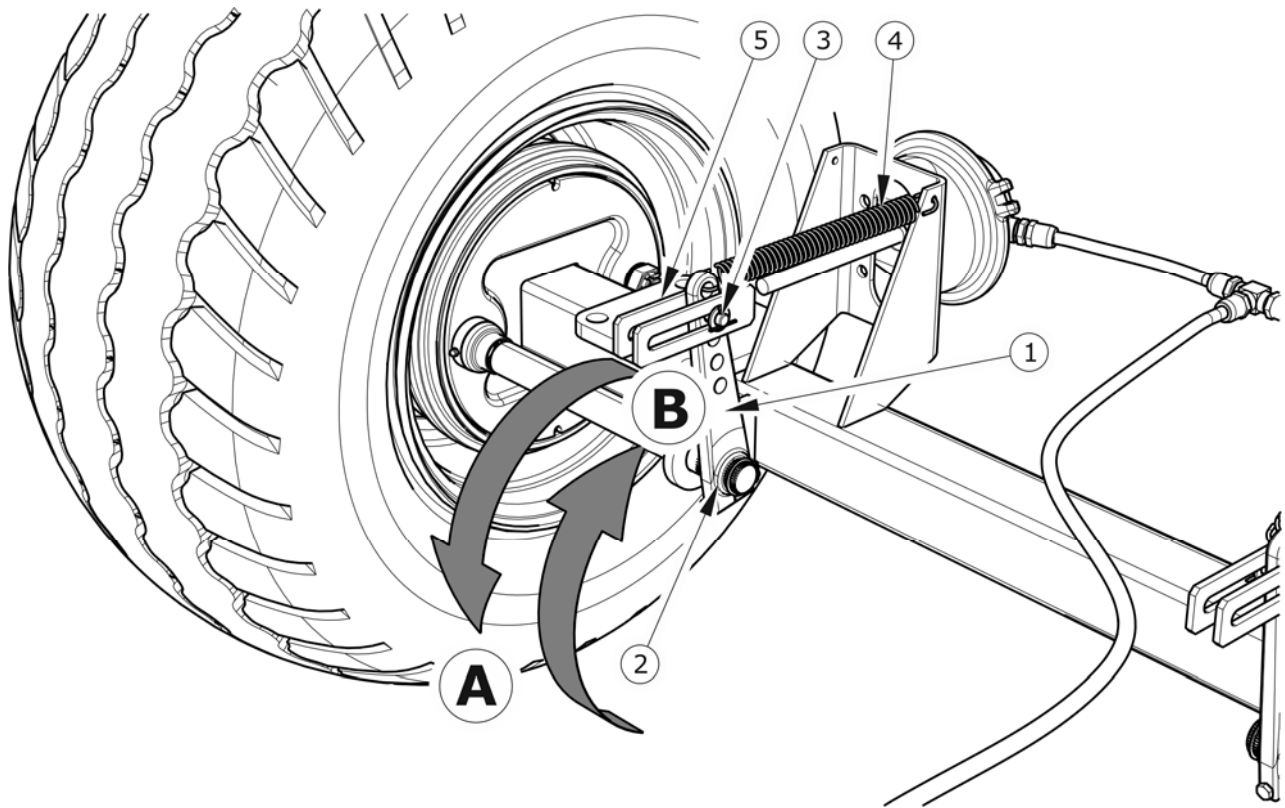
5.2.6 MECHANICAL BRAKES ADJUSTMENT

During use of slurry tanker abrasive friction covering of brake drums is subject to wear. Piston stroke extends, and exceeding braking force limiting value declines.

Adjustment must be made when:

- piston stroke amounts to 2/3 of the maximum stroke at full braking,
- repairs are made to braking system.

The slurry tanker's wheels must brake simultaneously. Brakes adjustment involves changing the position of the expander arm (1), Figure (5.7), in relation to expander shaft (2).

Required service actions**FIG. 5.7** *Adjustment of axle mechanical brakes*

(1) expander arm, (2) expander ring, (3) pin, (4) spring, (5) cylinder fork

- ➔ Dismantle pin (3) – figure (5.7) fixing the cylinder fork to expander lever (1).
- ➔ Mark position of expander arm (1) with regard to the shaft (2).
- ➔ Dismantle expander ring (2) and expander arm (1)
- ➔ Set the arm to proper position.
 - ⇒ in direction (A), if braking is too early,
 - ⇒ in direction (B), if braking is too late.
- ➔ Install expander ring and pin.
- ➔ Adjust brake of the other wheel.

Adjustment should be conducted separately for each wheel. Expander arm (1) should be moved by one notch in chosen direction. If the extent of cylinder action is still incorrect, move the lever again. After proper brake adjustment, at full braking, the expander arms should

create the angle of 90° with the cylinder piston, and the stroke should amount to approximately half the length of the total stroke of the piston. After brake release expander arms may not be supported on any structural elements, because too little withdrawal of a piston ram may cause abrasion of brake shoes in drum and result in overheating slurry tanker brakes. Expander arms must be positioned in parallel with regard to each other at full braking. If this is not so, adjust the position of the lever, which has the longer stroke.

If it is necessary to dismantle the pin, remember or mark its original position in the expander lever. The mounting position is selected by the Manufacturer and may not be changed.

5.2.7 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

- ➔ Hitch slurry tanker to tractor. Park machine and tractor on level surface.
- ➔ Protect the slurry tanker against 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 *LUBRICATING THE SLURRY TANKER*.
- ➔ Install new cable, adjust cable tension.

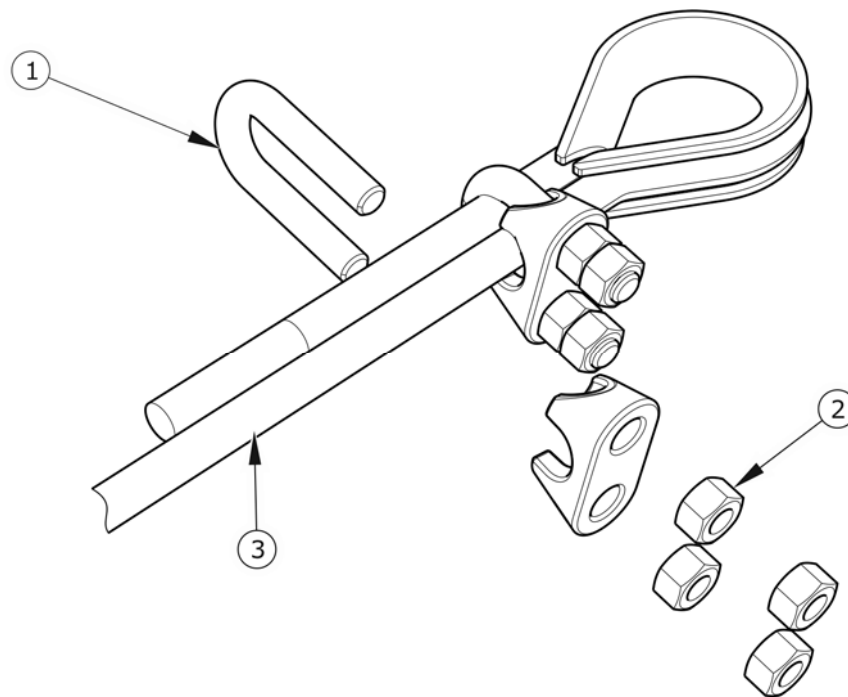


FIG. 5.8 *Installing the parking brake cable*

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

Adjustment of parking brake cable tension

- ➔ Hitch slurry tanker to tractor. Park machine and tractor on level surface.
- ➔ Protect the slurry tanker against 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 (5.8) 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 (5.8), 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.



Checking and parking brake adjustment:

- every 12 months,
- if needed.

5.3 PNEUMATIC SYSTEM MAINTENANCE

5.3.1 PRELIMINARY INFORMATION

Work connected with the repair, change or regeneration of system components (brake cylinders, lines, 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:

- inspecting and checking air tightness of system.
- cleaning the air filter (filters),
- draining water from air tank,
- cleaning drain valve,
- cleaning and maintaining pneumatic line connections,
- changing double conduit system into single conduit system and vice versa.



DANGER

Do NOT use the slurry tanker when brake system is unreliable.

5.3.2 INSPECTING AND CHECKING AIR TIGHTNESS OF PNEUMATIC SYSTEM.

Checking hydraulic system tightness

- ➔ Hitch slurry tanker to tractor. Park machine and tractor on level surface.
- ➔ Protect the slurry tanker against rolling by placing chocks under the wheels. Immobilise tractor and slurry tanker with parking brake.
- ➔ Start tractor in order to supplement air in slurry tanker brake system tank.
 - ⇒ In single line systems air pressure should amount to approx. 5.8 to 6.5 bar.
 - ⇒ In double line systems air pressure should amount to approx. 5.8 bar.
- ➔ Turn off tractor ignition.
- ➔ Check system components by releasing brake pedal in tractor.
 - ⇒ Give particular attention to line 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 reach places of damage on the exterior, with a characteristic hiss. Lack of system tightness may be exposed 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 discovering 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 component or seal.



Check system tightness

- *after travelling the first 1,000 km,*
- *each time after making repairs or changing system components,*
- *annually.*

5.3.3 VISUAL ASSESSMENT OF SYSTEM

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



Visual assessment of system

- *after travelling the first 1,000 km,*
- *each time after making repairs or changing system components,*
- *annually.*

5.4 CLEANING THE AIR FILTERS

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

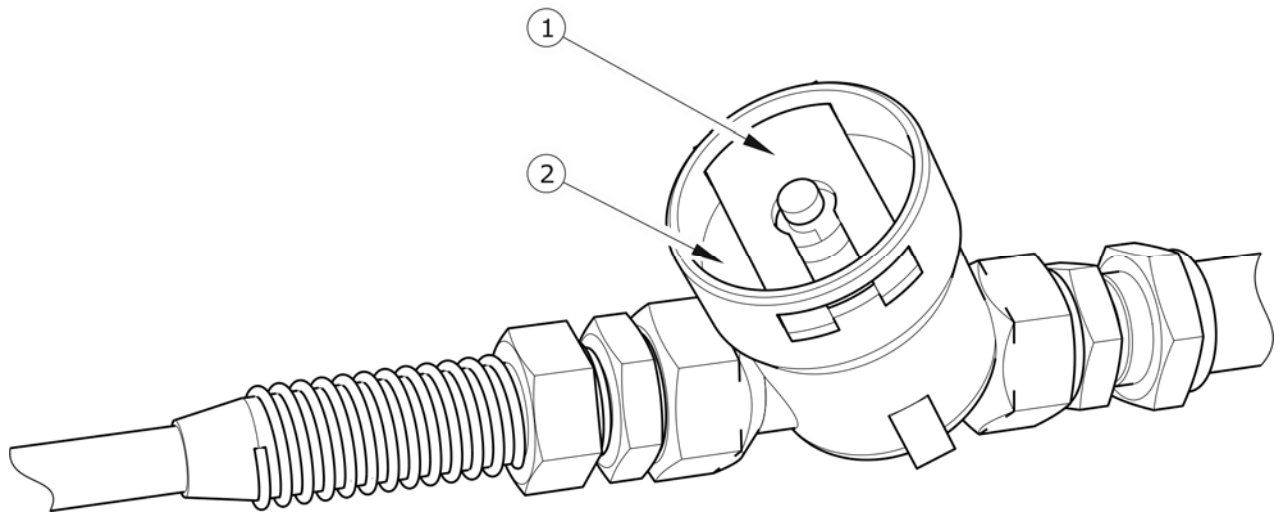


FIG. 5.9 Air filter

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



DANGER

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

Required service actions

- ➔ Reduce pressure in supply line.
 - ⇒ Reduction of pressuring line may be achieved by pressing the head of the pneumatic connection to resistance point.
- ➔ 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.



Cleaning the air filter (filters):

- every 3 months of use,

5.4.1 DRAINING WATER FROM AIR TANK

Required service actions

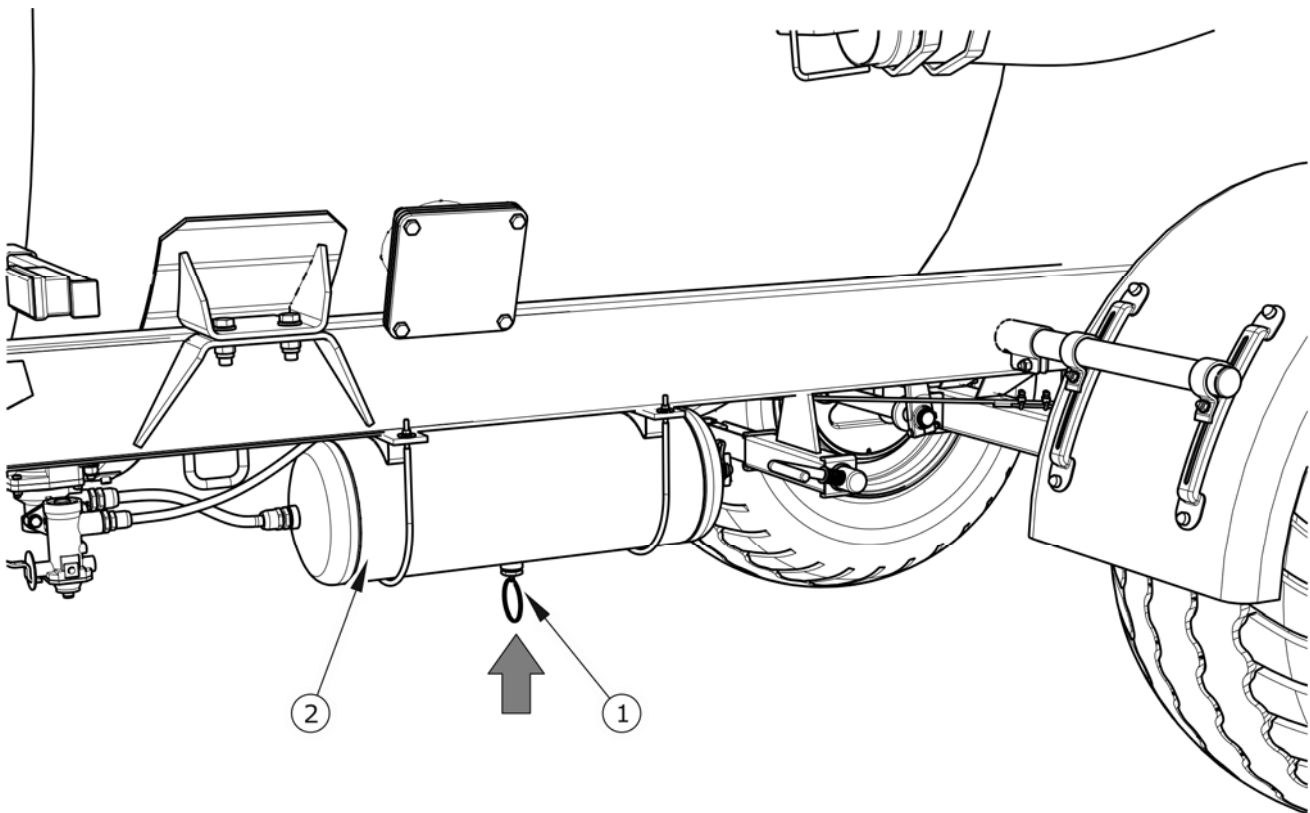


FIG. 5.10 *Draining water from air tank*

(1) drain valve, (2) air tank

- ➔ Open out drain valve (1) placed in lower part of tank (2) – the tank is placed under left longitudinal frame of lower frame.
- ➔ The compressed air in the tank causes the removal of water to the exterior.
- ➔ After release valve stem should automatically close and stop airflow from 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*.



Draining water from air tank:

- *every seven days of use.*

5.4.2 CLEANING DRAIN VALVE



DANGER

Before dismantling drain valve release air from tank.

Required service actions

- ➔ Reduce pressure in air tank.
 - ⇒ Reduction of pressure in tank is achieved by tilting the drain valve mandrel.
- ➔ Unscrew valve.
- ➔ Clean valve, purge with compressed air.
- ➔ Change copper seal.
- ➔ Screw in valve, fill air tank, and check tank tightness.



Cleaning valve:

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

5.4.3 CLEANING AND MAINTAINING PNEUMATIC LINE CONNECTIONS AND PNEUMATIC SOCKETS



DANGER

Unreliable and dirty slurry tanker 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 slurry tanker 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.



Checking technical condition of connections:

- *each time before hitching to tractor.*

5.5 HYDRAULIC SYSTEM OPERATION

5.5.1 PRELIMINARY INFORMATION

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



TIP

Bleeding air from the slurry tanker's hydraulic system is not required during normal operation.

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

- inspecting and checking air tightness of system.
- Checking technical condition of hydraulic connections.

5.5.2 CHECKING HYDRAULIC SYSTEM TIGHTNESS

Required service actions

- ➔ Hitch slurry tanker to tractor.
- ➔ Connect all hydraulic system lines according to service instructions.
- ➔ Clean connectors and ram cylinders.
- ➔ Start tractor and actuate damper cylinder several times.
- ➔ Check tightness of hydraulic system, inspect cylinders and hydraulic conduits.

In the event of confirmation of oil on hydraulic cylinder bodies ascertain origin of leak. Inspect hydraulic seals when hydraulic cylinder is completely extended. Minimum leaks are permissible with symptoms of "sweating", however in the event of noticing leaks in the form of "droplets" stop using the slurry tanker. If leaks appear at connections then tighten the connections.



Checking tightness:

- *After a week of use*
- *every 12 months of use.*

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 slurry tanker are sensitive to the presence of permanent contamination, which may cause damage to precision system components.



Inspection of hydraulic connections and sockets:

- *each time before connecting slurry tanker to tractor.*

5.5.4 CHANGING HYDRAULIC CONDUITS



Changing hydraulic conduits:

- *every 4 years,*

Hydraulic conduits must be changed every 4 years regardless of their technical condition. This should be entrusted to specialised workshops.

5.6 LUBRICATING THE SLURRY TANKER

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

TAB. 5.3 *Lubrication schedule*

ITEM	LUBRICATION POINT	NUMBER OF LUBRICATION POINTS	TYPE OF GREASE	FREQUENCY
1	Hub bearing	4	A	24M
2	Drawbar eye	1	B	14D
3	Handbrake mechanism	1	A	6M
4	Handbrake cable guide wheel axle	2	A	6M

ITEM	LUBRICATION POINT	NUMBER OF LUBRICATION POINTS	TYPE OF GREASE	FREQUENCY
5	Driving shaft	1	B	1M
6	Support screw	1	A	3M
7	Expander shaft slide sleeve	2	A	3M

Lubrication periods – M months, D – days

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.

TAB. 5.4 *Recommended lubricants*

LISTED ON TAB. (5.2)	DESCRIPTION
A	machine general-purpose grease (lithium, alkaline),
B	permanent grease for heavily loaded elements with addition of MOS ₂ or graphite

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

Number of lubrication points and subassemblies requiring lubrication depend on equipment of the slurry tanker.

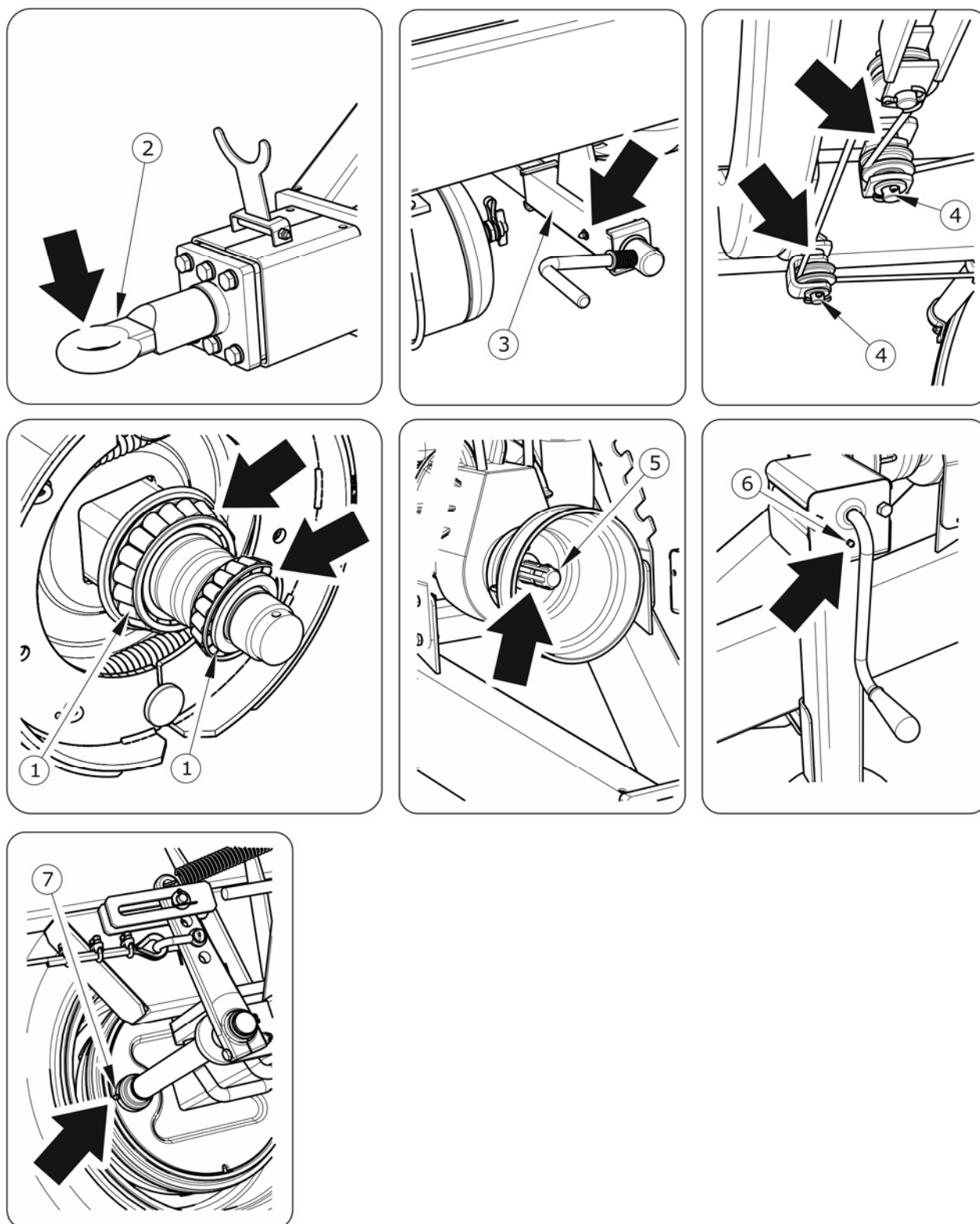


FIG. 5.11 *Lubrication points of the slurry tanker*



When using the slurry tanker, the user is obliged to observe lubrication instructions according to lubrication schedule.



IMPORTANT!

Rotary vane vacuum pump and PTO shaft should be lubricated according to guidelines contained in the Operator's Manuals delivered together with the slurry tanker.

5.6.1 CONSUMABLES

Hydraulic oil

Always adhere to the principle that the oil in the slurry tanker 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 slurry tanker or tractor. In a new machine, the hydraulic system is filled with L HL32 Lotos hydraulic oil.

TAB. 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 ² /s	28.8 – 35.2
3	ISO 6743/99 quality classification	-	HL
4	DIN 51502 quality classification	-	HL
5	Flash-point	C	230

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 slurry tanker use change of hydraulic oil is not necessary, but if required, this operation should be entrusted to a specialist service point.

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 parts under great load it is recommended to apply lithium grease with molybdenum disulphide (MOS_2) or graphite additive. In the case of less loaded sub-assemblies the application of general purpose machine greases is recommended, which contain anticorrosion additive and have significant resistance to being washed away by water. Similar characteristics should typify aerosol preparations (Silicon greases and anticorrosive lubricant substances).

Before starting to use greases acquaint oneself with the content of 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.

Transmission of rotary vane vacuum pump and rotor vanes should be lubricated using lubricants recommended by the manufacturer.

5.7 CLEANING THE SLURRY TANKER

- The slurry tanker 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.
- Before cleaning the slurry tanker, open the rear gate and unscrew drain plug located in the lower part of the tank.
- The slurry tanker may only be cleaned with clean running water. Cleaning detergents with neutral pH may be used, which do not react aggressively with the machine'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 jet at system and equipment elements of the slurry tanker i.e. control valve, braking force regulator, brake cylinders, hydraulic cylinders, pneumatic, electric and hydraulic plugs, lights, electrical connections, information and warning decals, identification plates, conduit connections, lubrication points, rotary vane vacuum pump etc. Great water jet pressure may damage these elements.
- For cleaning and maintenance of plastic coated surfaces it is recommended to use clean water or special preparations designed for this purpose.
- Do not apply organic solvents, preparations of unknown origin or other substances, which may cause damage to lacquered, rubber or plastic surfaces. In the event of doubt it is recommended to make a test on an unseen surface area.
- Surfaces smeared with oil or grease should be cleaned by application of benzene or other degreasing agents and then washed with clean water with added detergent. Comply with recommendations of the Manufacturer.
- 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.

**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.

- Care for the cleanness of elastic lines 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.
- Observe environmental protection principles and wash slurry tanker in a place designed for this purpose.
- Washing and drying slurry tanker must take place at temperatures above 0°C.

5.8 STORAGE

- Slurry tanker should be stored in a completely enclosed 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. The slurry tanker, especially its tank, should be very carefully washed and dried. Drain plug must be unscrewed because water vapour may condensate on the tank walls.
- 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 longer storage of unused slurry tanker, it is recommended that every 2 to 3 weeks the machine may be moved a bit so that the place of contact of tyres with ground is changed. The tyres will not be deformed and maintain proper geometry. Also tyre pressure should be inspected from time to time, and if necessary pressure should be increased to appropriate value.
- For a longer storage period of the slurry tanker, preserve the chamber of the rotary vane vacuum pump according to the guidelines contained in the Operator's Manual of the pump.

5.9 TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS

Unless other tightening parameters are given, during maintenance repair work apply appropriate torque to tightening nut and bolt connections. Recommended tightening torque of most frequently applied nut and bolt connections are given in table (5.5). Given values apply to non-lubricated steel bolts.

TAB. 5.6 *Tightening torque for nut and bolt connections*

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

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

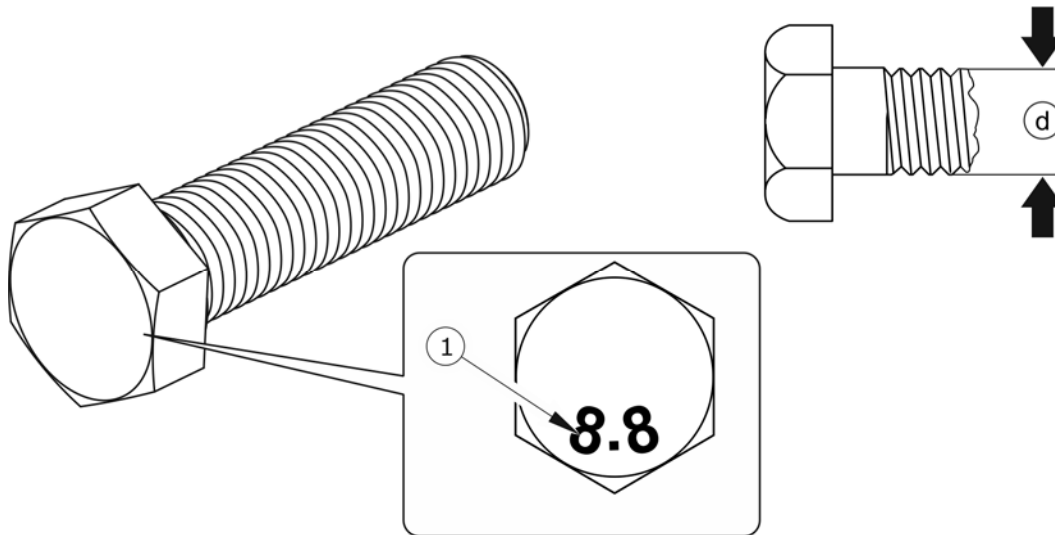


FIG. 5.12 Bolt with metric thread

(1) resistance class, (d) thread diameter

5.10 PREPARATION PROCEDURE BEFORE ENTERING THE TANK

! DANGER
Entering the tank is highly risky for health or life.
Do NOT enter the tank without preparation and without proper equipment facilitating breathing.

Tank preparation procedure

- ➔ Turn off the tractor engine, immobilise the slurry tanker with parking brake. Disconnect PTO shaft from tractor.
- ➔ Equalize air pressure in the tank.

- ➔ Unscrew bolts (1) – figure (5.14) fixing the rear gate. Open the gate.
- ➔ Unscrew two stoppers (4) of side connections (on the left and right side of the tank).
- ➔ Unscrew drain plug of the tank.
- ➔ Clean the tank interior with strong water jet through the side openings and rear manhole.
 - ⇒ Clean the tank until all sediment accumulated on the bottom and adhering to the tank walls is rinsed out. Cleaning may be stopped when clean water flows out through the drain opening.

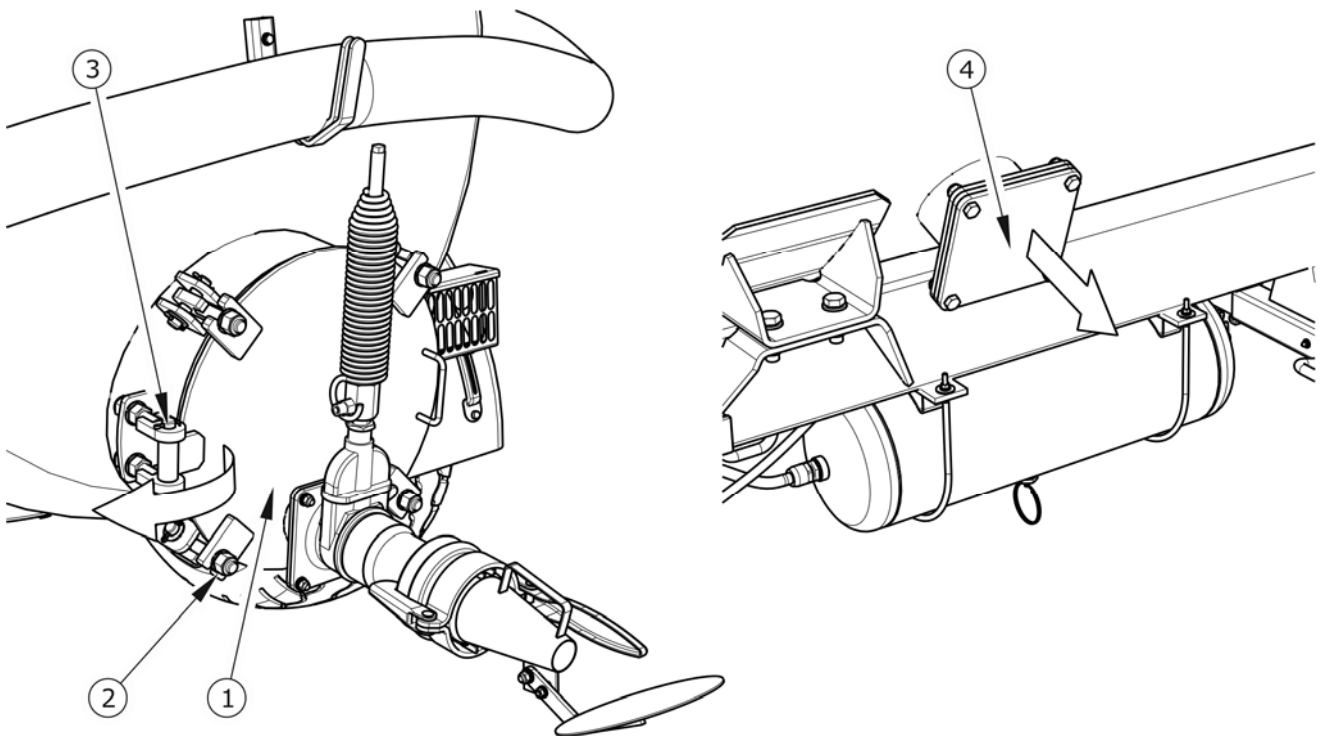


FIG. 5.13 *Rear gate and side connection stopper*

(1) rear gate, (2) fixing bolt, (3) hinge, (4) connection stopper

- ➔ Leave the tank open for as long as possible – minimum 12 hours.
- ➔ Before entering the tank, prepare breathing apparatus that enables breathing in air from air cylinder.

- ➔ Person entering the tank must be secured using a lifeline. The person assisting in entering the tank must stay outside the tank and control the behaviour of the person inside the tank.
- ➔ After completing work, install side stoppers, close rear gate and tighten nuts. Tighten the nuts of rear gate diagonally in order to achieve proper tank tightness.

DANGER

Do NOT use an open flame while preparing the tank and while working inside the tank.

Always remember to carefully clean and vent the tank.

Entering the tank is allowed only with the help of an assisting person and using an apparatus that facilitates breathing.

5.11 CLEANING THE TANK INTERIOR

Required service actions

Due to character of transported load, there is a risk that heavy sediments, stones and other solids will be sucked into the tank and remain unloaded inside the tank. Because of this, accumulated foreign bodies must be periodically removed from the tank. The below-described procedure does not require entering the tank.

Required service actions

- ➔ Turn off the tractor engine, immobilise the slurry tanker with parking brake. Disconnect PTO shaft from tractor.
- ➔ Equalize air pressure in the tank.
- ➔ Unscrew bolts (1) – figure (5.14) fixing the rear gate. Open the gate.
- ➔ Unscrew two stoppers (4) of side connections (on the left and right side of the tank).
- ➔ Unscrew drain plug of the tank.

- ➔ Clean the tank interior with strong water jet through the side openings and rear manhole.
 - ⇒ Clean the tank until all sediment accumulated on the bottom and adhering to the tank walls is rinsed out. Cleaning may be stopped when clean water flows out through the drain opening.
- ➔ Vent the tank for several hours.
- ➔ Remove stones and other contaminations from the tank by scraping them to the manhole edge (entering the tank is not required).
- ➔ After completing work, install side stoppers, close rear gate and tighten nuts. Tighten the nuts of rear gate diagonally in order to achieve proper tank tightness.

**DANGER**

Do NOT use an open flame while preparing the tank and while working.

5.12 CHECKING THE SLURRY TANKER'S TECHNICAL CONDITION

**IMPORTANT!**

Do NOT use the slurry tanker with damaged tank.

Required service actions

- ➔ Hitch slurry tanker to tractor.
- ➔ Fill the tank with water.
- ➔ Create negative pressure in the tank – approximately 0.5 bar.
- ➔ Check welds on the tank for tightness.

- ⇒ Water drops appear in the area of defective weld. The upper welds (relief valve fixing flange, front jacket connection, rear jacket connection etc.), in the area of air cushion, should be checked using a foaming agent.
- ➔ If a damage is detected, mark the place of leakage. Repair the slurry tanker in a specialist workshop.



TIP

If the tank is filled with cold water on a warm day, water vapour will appear on the tank's external walls. Wipe the tested areas in order to check the welds.



Welds should be checked once a year.

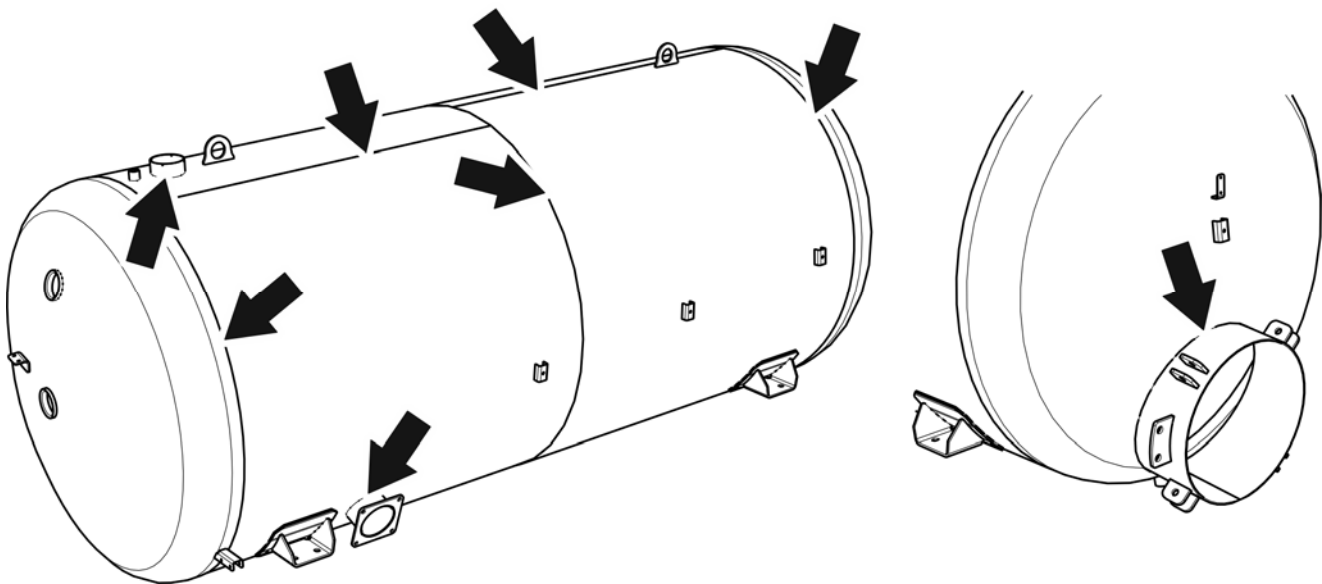


FIG. 5.14 *Inspection points of the tank*

5.13 TROUBLESHOOTING

5.13.1 TROUBLESHOOTING

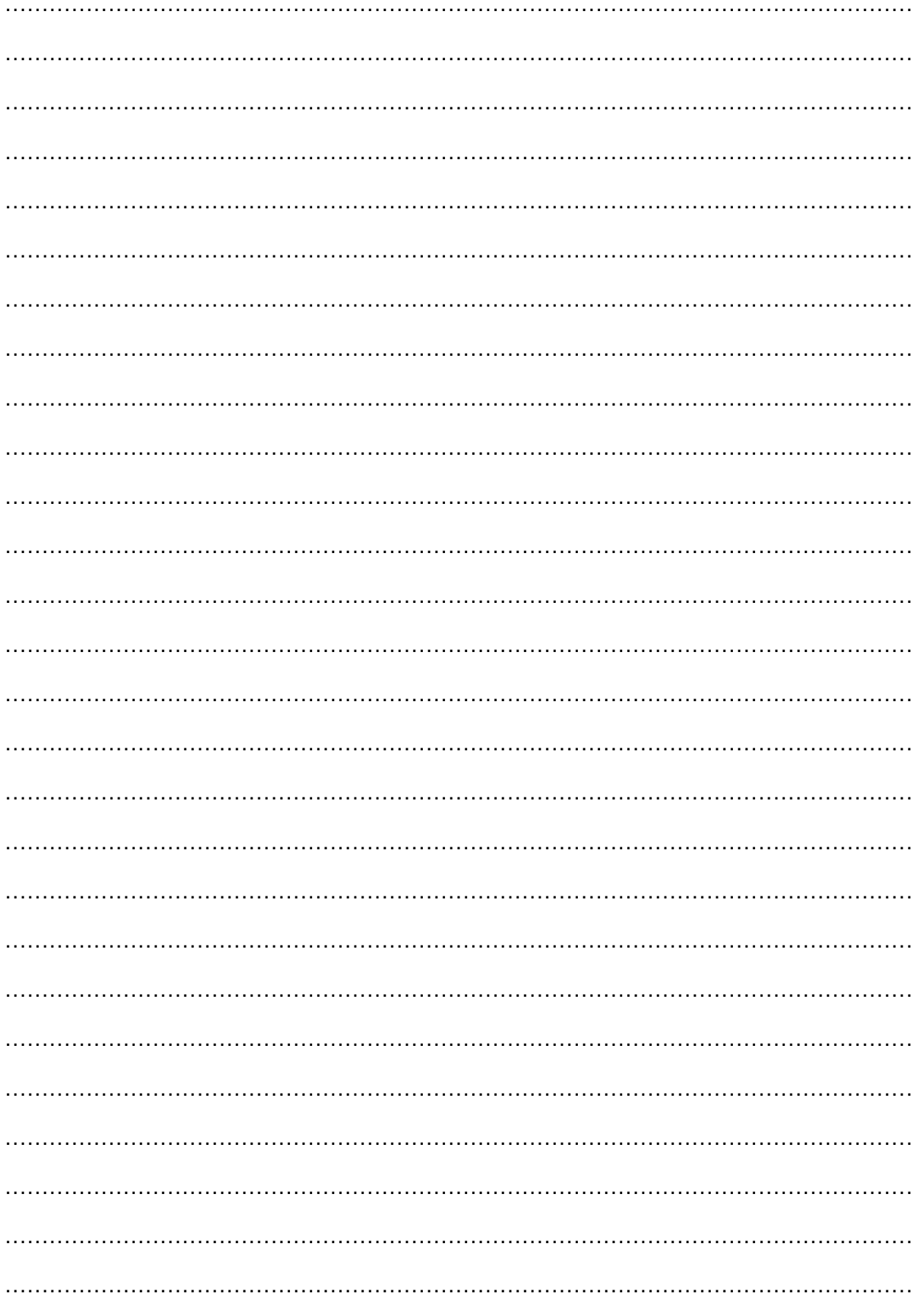
FAULT	CAUSE	REMEDY
Problem with moving off	Brake system pneumatic conduits not connected	Connect brake conduits (applies to pneumatic systems)
	Applied parking brake	Release parking brake.
	Damaged pneumatic system connection conduits	Replace.
	Leaking connections	Tighten, replace washers or seal set, replace conduits.
	Damage control valve or brake force regulator	Check valve, repair or replace.
Noise in axle hubs	Excessive play in bearings	Check play and regulate 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 slurry tanker

FAULT	CAUSE	REMEDY
	Insufficient tractor hydraulic pump output, tractor hydraulic pump is damaged.	Check tractor hydraulic pump.
	Damaged or contaminated ram 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.
Problem with achieving proper overpressure or negative pressure.	Damaged rotary vane vacuum pump	Check and follow the instructions included in the Operator's Manual of the rotary vane vacuum pump.
	Leaking tank	Broken welds, pierced tank coating – have the slurry tanker repaired.
	Leaking connections	Check connections of damper, stoppers, relief valve and sight-glasses. Tighten connection or replace seals.
	Leaking conduits	Check tightness of conduits and method of their attaching. Replace or repair.
	Damaged relief valve, siphon valve or safety valve	Repair or replace.

FAULT	CAUSE	REMEDY
	Incorrectly closed damper.	Repair or replace. Confirm that damper is not blocked. Check operation of the hydraulic system.
Defects and wrong operation of pump	See the Operator's Manual of rotary vane vacuum pump.	

NOTES

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ANNEX A

SLURRY TANKER	TYRES	WHEEL RIM
T314	400/60-15.5 TL 14PR	13.00x15.5
T315	500/50-17 14PR	16.00x17 ET=-35
T316	500/60-22.5 16PR 159A8	16.00x22.5H2 ET=-30

ANNEX B

B.1 INTENDED USE

Clean water accessories are an optional equipment of the tanker and they are intended for operations related to the transport of clean sanitary water.

Sanitary water is not intended for drinking.

B.2 TECHNICAL SPECIFICATION

TABLE 1.1 *Basic technical data of the T316 tanker with clean water accessories*

CONTENTS	UNIT	T316
Dimensions		
Length	mm	6,000
Width	mm	2,400
Height	mm	2,610
Other information		
Maximum pump capacity	l/min	620
Maximum time to empty	min	10
Minimum tractor power demand	hp/kW	33.6 / 24.7

B.3 DESIGN AND OPERATION

Installed clean water accessories are shown in figure (B.1). Use filling hose (2) to fill the tank. The connection nozzle is located at a height of 1,100 mm on the left side of the tanker. The hose has been terminated with a 3" Camlock connection. Use an external source such as a hydrant to fill the tank. The clean water motor pump (1) is installed in the front part on the lower frame. The motor pump sucks water from the tank using a suction hose (4) and pumps it through a hose (5) terminated with a 2" Camlock connection (7). There is hatch in the rear to clean the inside of the tank, e.g. with a pressure washer. The ball valve (6) located before the suction hose (4) is designed to protect against water leakage in the event of damage to the suction hose and cuts off the water supply to the pump when it is not in use.

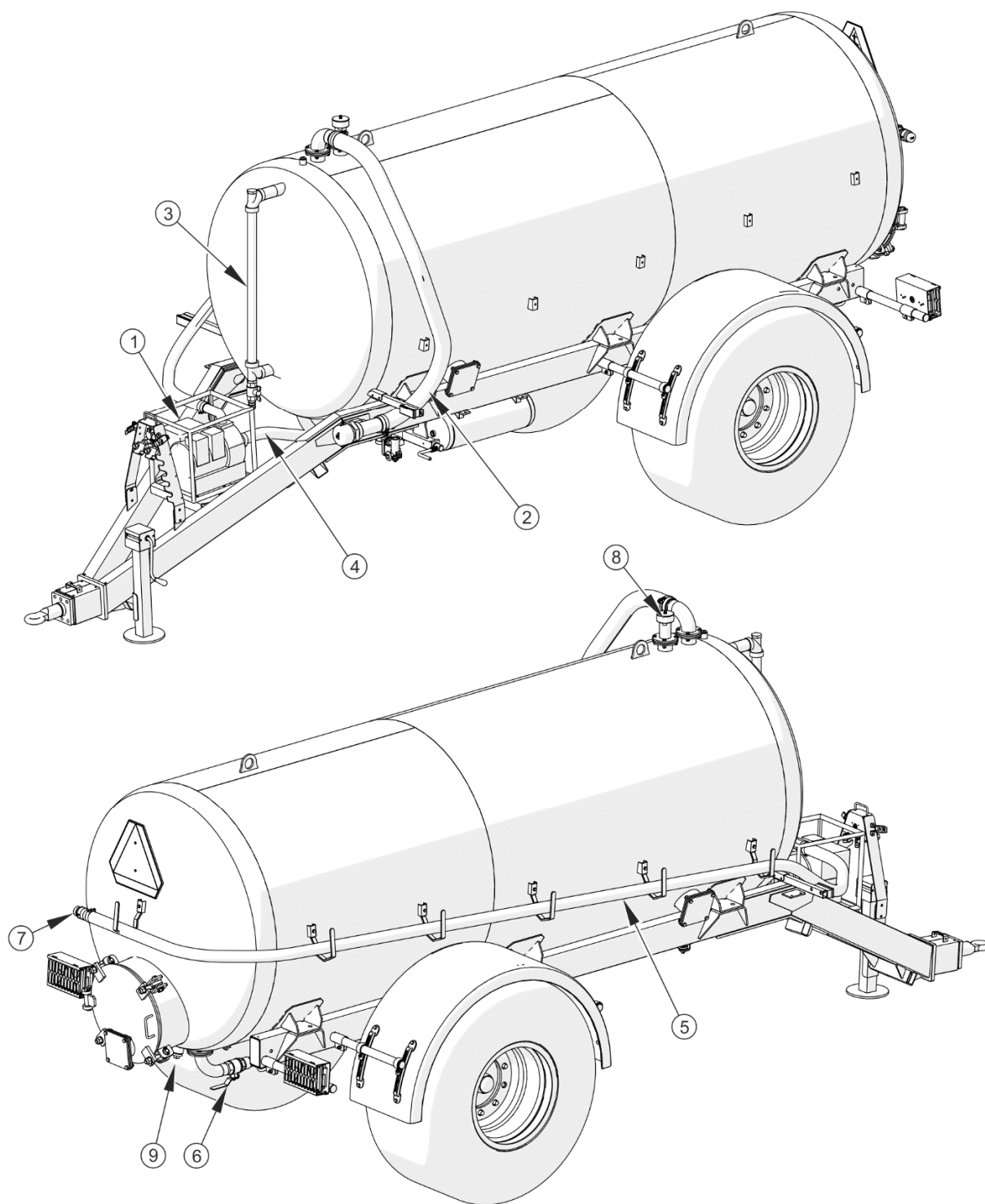


FIGURE B.1 *Installed clean water accessories*

(1) pump, (2) filling hose, (3) water level indicator, (4) pump suction hose, (5) pump discharge hose, (6) ball valve, (7) connection, (8) air vent, (9) drain plug

B.4 OPERATION

B.4.1 FILLING THE TANK



DANGER

When filling the tank, the tanker must be hitched to the tractor and rest on a stable, level surface.

- Position the tanker to drive forward.
- Turn off tractor engine.
- Immobilise tractor and slurry tanker with parking brake.
- Connect the water hose (external power supply) to the filling connection.
- Make sure the bottom valve on the pump suction hose is closed.
- Start filling the tank.
- Monitor the fill level in the liquid level gauge.



TIP

When filling the tank, it will be automatically vented through the vent, which also acts as an overflow device.

- Stop filling the tank when the liquid level reaches the upper edge of the liquid level gauge.

B.4.2 EMPTY THE TANK

- Carefully read the pump operator's manual and follow its recommendations.
- Get the motor pump ready for operation.
- Connect the hose to the discharge connector to drain the water outside (a hose is not included with the machine).
- Open the valve on the suction hose under the tank.
- Start the motor pump.

- Pump out the contents of the tank.
- Stop the motor pump.
- Disconnect the hose from the discharge connector.
- Close the valve on the suction hose.

B.5 MAINTENANCE

In winter, undo the plug in the bottom part of the tank and drain it.

Motor pump maintenance instructions are included in the enclosed operating instructions.