Read the following prior to start-up!

ZUNHAMMER
GÜLLE-TECHNIK

Operating manual

Slurry tanker

Type: pump tanker

K6,5PU
K8PU
K10PU
K11PU
K12,5PU
K14PU
K15,5PU

MK11PU
MK12PU
MK14PU
MK15,5PU

SK15,5PU
SK17PU
SK18,5PU

English
Translation of the original

Dear Customer,

Continuing a decades-long tradition,

ZUNHAMMER GmbH

develops and manufactures special agricultural trailers. As a result of advanced vehicle designs, outstanding mechanical engineering solutions down to the last detail and optimal equipment variants, ZUNHAMMER slurry tankers deliver excellent performance especially in professional use. The slurry tankers manufactured by ZUNHAMMER GmbH withstand even the most rigorous requirements, for example in large-scale agricultural operations and service supply agencies. They comply with all aspects of the applicable regulations. Before start-up, please read carefully and observe the following operating and safety information.

Best regards

Sebastian Zunhammer

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IBS Ingenieurbüro Schneider

www.konstruktion-ibs.de

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Table of content

I. General safety information

Prior to commissioning, all operating manuals for the pump tanker must be present!

All other users and operating persons must also have access to all of the operating manuals!

Both the manufacturer and the dealer are obligated to hand over all operating manuals to the customer upon sale and transfer of the product.

If the pump tanker is used on public roads, all local regulations must be complied with.

Prior to the initial commissioning, the operating personnel must participate in training on the pump tanker (see chapter 6.1 beginning on page 31). In this connection, the operating person must be familiar with all controls and devices as well as their function.

The pump tanker must only be operated by persons who have a valid driver's license for the towing equipment and the rig.

To operate the vehicle, the operating person must have undergone sufficient agricultural training and must be in a state of sufficient physical and mental capacity at the time of use.

The relevant accident prevention regulations and other generally recognized technical safety, occupational medicine and road traffic regulations must be complied with.

Unauthorised persons must be kept away as a general rule during commissioning, operation, maintenance and service! Repairs may only be performed by qualified persons.

German Equipment and Product Safety Act (GPSG)

The transfer of the operating manual is regulated in Article 4 (4) 1. and 2.
Please note that also in the event of leasing, rental or loan of the vehicle, the owner or possessor must inform the user of the dangers of the product and that the operating person must have read and understood the operating manual (preferably by signing a statement to this effect)!

Attention

If you do not understand any part of this operating manual, please contact your dealer or ZUNHAMMER GmbH.

Save money!

Comply with all operating and maintenance regulations! This is a fundamental requirement for the economical and trouble-free operation and use of the of the pump tanker over a period of many years. This will save you money in the long-term!

Check the pump tanker to ensure it is safe for operation prior to each commissioning. The operation of unsafe pump tanker is prohibited.

Safety devices must be inspected regularly and replaced, if damaged. They must never be modified or rendered ineffective.

Attention

The safety equipment includes warning signs and labels!

It is prohibited to remove, transport or spread other substances than water, slurry and liquid faeces (liquid manure) with the pump tanker, unless written permission has first been obtained from ZUNHAMMER GmbH.

Permissible transported goods

Chemical properties of the transported good can cause

- A pressure increase in the tank (danger of explosion)
- Dangerous gases due to chemical reactions (danger of explosion, asphyxiation)
- And physical properties of the transported good can cause
- A weight increase to to a higher specific weight (altered handling, inadequate braking, etc.)
- Damage to the vehicle (pump system, tank, etc.).

Safe operation is only guaranteed with the intended substances in combination with the specification in this operating manual!

When working with slurry, be aware that the gases (fermentation gases) arising from the slurry are highly toxic and, in combination with oxygen, are explosive. Open flames, light probes, spark discharges and smoking are therefore prohibited when working with slurry.

Electromagnetic radiation can have a negative effect on the functionality of operating and control elements.

Wear close-fitting clothing during all work with the pump tanker.

A signaller is required for reverse travel.

Riding on the pump tanker is prohibited.

All safety information provided in this operating manual for transport, operation, maintenance, care and servicing applies analogously.

II. Safety information specific to the equipment

Observe the attached affixed warning and notice signs. They provide important information for safe operation and are provided for your safety!

Note!

An overview of all warning and notice signs is provided in chapter 4 beginning on page 25.

Attention

Check the near vicinity (look out for children, in particular)!

Prior to commissioning, the operating person must ensure that no one is in the danger area of the pump tanker or its moving work equipment (e.g. all pivoting ranges).

All control devices must be actuated at least 550 mm from the drive shaft as a basic principle.

Climbing and work aids

Possible climbing and work aids: a ladder, scaffold or building component (e.g. a passageway). This climbing aid or working aid must comply with the local work safety and accident prevention regulations at all times.

At no time is it permitted to use the climbing aid for working on the pump tanker! If it is necessary to access parts of the pump tanker that cannot be reached from the floor, whether for operation, maintenance or care, a separate, stable aid for ascending must be used.

Due to the smooth surface of the tank there is a danger of slipping – do not climb onto the tank!

It is prohibited to step on the hose attachment or the mudguards.

In case of any malfunction of the pump tanker, immediately shut down the power take-off and the hydraulic system, turn off the motor of the tractor and secure it against inadvertent start-up (pull out the key!).

For the three-point hitch, the attachment categories of the flexible link and the attached implement must match! The maximum permissible tongue load must never be exceeded. The attachment equipment must not exceed a weight that would resulted in a negative supported load when the the attachment equipment is raised.

When parking and working on and with the pump tanker, always make sure it is on a level, flat and stable surface.

When working on the pump tanker, a second person must be present. For further information, see chapter “8.1. General safety information for maintenance and care” on page 40.

III. Formatting and icons

In order to prevent personal injury and damage to the pump tanker or other objects, we use the warning notice to the right in this operating manual.

Attention

This information block should notify you of dangers.
Red text should notify you of special dangers.

Information in this form indicates that there is additional, important information. This could be references to statutory requirements or similar information.

Important information

This indicates important additional information and explanations.

The block shown to the right appears wherever we would like to provide you with additional tips and information.

Tip or information

This is the appearance of tips and information in this operating manual.

Specific parts are frequently identified by numbers in circles (1). The representation to the right provides an overview of which numbers correspond to which parts.

Information for figures

(1) Display (4-line)
(2) Display (4-line)

The figures in this manual are labelled accordingly. The figure numbers consist of the chapter number and a consecutive number.

▲ Figure 7.1
At this point, a figure would be provided above this notice (the first figure in chapter 7).

IV. Terminology

Attachment equipment Refers to machinery and partially completed machinery that can be attached to agricultural and / or forestry carrier vehicles by means of special devices (e.g. three-point linkage).

Operating person, operating personnel The person or persons responsible for installation, operation, setup, maintenance, cleaning, repair or transport of machinery.

User The proprietor or owner of the pump tanker.

Intended use Use of the pump tanker according to the specifications in the operating manual.

D-value The fatigue strength against forces exerted due to the driving operation between the tractor and trailer on the trailer coupling design is identified as the D-value[1].

Experts Group including all persons having qualified expertise. This includes women and men who

- have appropriate technical skills in a specific area,
- are intimately familiar with their technical field.

Danger A potential source of injury or harm to the health.

Danger area All areas that cause danger due to moving parts or areas that represent a danger due to other influences (e.g. dangerous gases and liquids).

Commissioning Is the term in this operating manual for the use of the pump tanker. It refers to both the initial use by the operating person and normal use. The term applies to use of the pump tanker.

Joystick Cable-connected device that enables the user to operate the machine from a flexible operating location. The only limitation on the location is the cable length.

Machine The pump tanker in this operating manual.

Risk The combination of the probability and the severity of an injury or harm to the health that can occur in a hazardous situation.

Qualified person This included master craftsmen, operating engineers and technicians. Based on their training and experience, they are capable of assessing the operationally safe status of equipment. These persons must be familiar with the regulations, standard engineering practices, etc.

Definition of "User" in standards

EN ISO 12100-2:2010 para. 6.5.1 b) also uses the term user in the sense of "owner of the machine" or "employer" without definition. EN 60204-1:2006 "Electrical equipment for machines" provides a definition for proprietor in para. 3.57: "legal person that uses the machine and its electrical equipment".

[1] Wikipedia: http://de.wikipedia.org/w/index.php?title=Anh%C3%A4ngerkupplung&oldid=122391761

Safety equipment This includes all devices and equipment provided for the purpose of safety of man and machine. This is primarily covers over moving parts, but also includes all safety labels and signs.

Supported load The force that acts on the attachment device of the tractor without adequate axle spacing (e.g. passenger vehicle trailer with only one axle or axle spacing of less than 1 metre; semi-trailer, centre-axle trailer).[2]

Transport The term transport is differentiated between whether the pump tanker is moved on a transport vehicle intended for this purpose (low-load semi-trailer, etc.), the machine is moved to its intended location or the machine is moved by means of lifting gear (crane, forklift, etc.).

Unauthorised person A person who is not authorised, not empowered, not entitled, not competent, not responsible, not permitted, not capable, prohibited.[3]

[2] Wikipedia: http://de.wikipedia.org/w/index.php?title=St%C3%BCtzlast&oldid=109420909
[3] http://www.openthesaurus.de/synonyme/unbefugt

V. Operating manual

1. Scope of delivery

The Operating manual comprises several parts, depending on the equipment. The following matrix is provided as an aid to check the completeness of the necessary operating and maintenance instructions for your equipment.

How to use the matrix:

Check which options are available for your pump tanker based on your order. An operating or maintenance manual is available depending on the background colour of the lines (see the colour key). Only commission the pump tanker if all operating manuals are available!

Colour key

Document type	Colour
Operating manual ZUNHAMMER	
Operating manual Supplier	
Maintenance manual	

Legend

Meaning	Symbol
Possible equipment	•
Theoretically possible equipment	o
Standard equipment	S
Not possible	–
Zunhammer	Z

Your equipment	Option	Manufacturer	K6.5PU	K8PU	K10PU	K11PU	K12.5PU	K14PU	K15.5PU	MK11PU	MK12PU	MK14PU	MK15.5PU	SK15.5PU	SK17PU	SK18.5PU
	PETRA axle	Z	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Lifting axle		–	–	–	–	–	–	–	•	•	•	•	•	•	•
	Hydraulic suspension		–	–	–	–	–	–	–	o	o	o	o	•	•	•
	Air suspension	BPW	–	–	–	–	–	–	–	–	–	o	•	•	•	•
	Three-point		–	–	–	–	–	–	–	o	o	•	•	•	•	•
	Farmlandfix	Z	–	–	–	–	o	o	o	•	•	•	•	•	•	•
	Drag hose	Z	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Drag hose	Vogelsang	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Dual nozzle spreader	Z	–	–	–	–	o	o	o	•	•	•	•	•	•	•
	SwingMax	Vogelsang	–	–	–	–	–	–	–	–	–	–	–	–	•	•
	Handy suction arm	Z	–	o	•	•	•	•	•	•	•	•	•	•	•	•
	Telescopic handy suction arm	Z	–	o	•	•	•	•	•	•	•	•	•	•	•	•
	Guny suction arm	Z	–	–	o	o	•	•	•	•	•	•	•	•	•	•
	GunySwing suction arm	Z	–	–	o	o	•	•	•	•	•	•	•	•	•	•
	Dino suction arm	Z	–	–	–	–	o	•	•	•	•	•	•	•	•	•
	Tornado suction arm	Z	–	–	–	–	o	•	•	•	•	•	•	•	•	•
	Schneidwerk stone trap	Vogelsang	–	–	o	o	o	•	•	•	•	•	•	•	•	•
	Pump	Vogelsang	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	Pump	Börger	o	o	•	•	•	•	•	•	•	•	•	•	•	•
	Pump	Wangen	o	o	•	•	•	•	•	•	•	•	•	•	•	•
	Joystick	Z	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	MagicBox	Z	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Isobus	Z	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Gülle 2000	Z	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	LH 500	Z	•	•	•	•	•	•	•	•	•	•	•	•	•	•

2. Performance specification

2.1. Intended use

The pump tanker described here are only approved for agricultural and forestry and must only be towed by tractors for agriculture and forestry.

The pump tanker can be used for receiving, transporting and spreading water, slurry and faeces in liquid form. Other pumpable substances may be transported only after obtaining the written approval ZUNHAMMER GmbH.

The intended use also includes following instructions

- for safety,
- for operation and control,
- for service and maintenance,

that are described in this operating manual.

Any differing use or use exceeding this applies as unintended.

ZUNHAMMER GmbH is not liable for the resulting damages.

Attention

It is prohibited to modify the pump tanker for any other use. Unauthorised modifications and conversions of the pump tanker will void the manufacturer's liability for resulting damage (as well as the warranty!). The manufacturer's liability for safety-related equipment will also be voided. The manufacturer will not be liable for damages resulting from use of the pump tanker other than for the intended use.

2.2. Qualifications

2.2.1. Operation, cleaning

Operation refers to the commissioning, transport and normal operation. The The pump tanker must only be used and cleaned by persons who have necessary the driving license for the combination of tractor and pump tanker and have the physical and mental capacity to drive the combination. In addition, they must also be familiar with and instructed on the dangers involved with operation of the vehicle combination.

Instruction

Documentation of operating personnel instruction with signed reports is recommended as proof of the familiarity and awareness of dangers involved with the pump tanker. Since all operating persons must have read the operating manual before using the pump tanker, this should also be confirmed with a signature.

2.2.2. Maintenance and care

The same requirements as those specified under 2.2.1 apply for maintenance and care.

2.2.3. Repair, service

Training as an agricultural machinery mechanic or an equivalent education is prerequisite for all repair work. Work on components or assemblies that pertain to driving safety (e.g. work on the brake system, etc.), in particular, must be carried out by qualified technicians.

3. Description of equipment

3.1. Description

Pump tanker with rotary piston pump are independent and can be used anywhere immediately. With the suction line, the tank is fully emptied in just a few minutes – even the slurry recess. The lightweight plastic tank is pressureless. The special shape in combination with the stirring line prevents depositing of solid particles in the tank almost entirely.

The quiet and vibration-free pump empties the tank at a constant pressure and a consistently metered quantity. Various different exact spreaders can also be installed instead of the standard baffle head spreader.

Various docking systems ensure quick and hygienic, clean extraction.

Towing is made easier and the operating speed is increased, whereas fuels costs and wear are reduced thanks to the low empty weight.

3.2. Technical data

Type	Tank [litres]	Length [1] [mm]	Width [mm]	Height [2][3] [mm]	Track [5] [mm]	Empty weight [4] [kg]
K6.5PU	6500	5900	2150	2200	1800	1850
K8PU	8000	5900	2300	2450	1900	2250
K10PU	10000	6700	2550	2550	2000	2950
K11PU	11000	6700	2550	2650	2000	3050
K12.5PU	12500	6700	2550	2800	2000	3100
K14PU	14000	6700	2550	2950	2000	3200
K15.5PU	15500	6700	2550	3100	2100	3300
MK11PU	11000	7200	2850	3390	2150	5000
MK12PU	12000	7200	2850	3540	2150	5065
MK14PU	14000	7200	2850	3690	2150	5095
MK15.5PU	15500	7200	2850	3840	2150	5115
SK15.5PU	15500	8200	2850	3000	2150	5400
SK17PU	17000	8200	2850	3200	2150	5600
SK18.5PU	18500	8200	2850	3350	2150	5700

Information for the technical data table

1) Length with baffle head spreader + 400 mm
2) Height with ventilation
3) Height with spray edge guard + 300 mm
4) Empty weight with basic equipment
5) Minimum required track width in the basic tyre equipment. We adapt the track width accordingly for different tyres.

3.3. Standard configuration

Type / tank size	Standard tyres[1]	Brake system[1]	Axle[1]
K6.5PU	13.0/75-16 10 PR with hose	Overrun brakes Automatic reversing	Pendulum axle 40 km/h
K8PU	15.0/70-18 10 PR with hose	Pneumatic, 2-line with ALB regulator	Pendulum axle

Information for the standard configuration table

1) There may be deviations from the specifications above depending on your equipment

Type / tank size	Standard tyres[1)]	Brake system[1)]	Axle[1)]
K10PU	550/60-22.5 Alliance Profile 404	Pneumatic, 2-line with ALB regulator	PETRA pendulum steering axle
K11PU			
K12.5PU			
K14PU			
K15.5PU			
MK11PU	28 L 26 16 PR Alliance Block		
MK12PU			
MK14PU			
MK15.5PU			
SK15.5PU			
SK17PU			
SK18.5PU			

3.4. Basic construction

The following assemblies and attached components are basic requirements for the different equipment versions of the pump tanker of ZUNHAMMER GmbH.

The individual positions of the components and attachments described below are shown in the illustrations at the end of this chapter.

◀ Figure 3.1
Pump tanker with tandem axle

Attention

The following applies for the brake system:
The tractor brakes the tractor and the trailer brakes the trailer!

3.4.1. Wheels, brake system and chassis

We carefully selected all specified tyres. Additional information on tyres is available in the Technical Manual under “D. Tyre pressure table” on page 9. Some intermediate values were interpolated. Other tyres are available on request.

An automatic reversal overrun brake system is used as a brake system for a permissible gross weight of 8 t and a permissible maximum speed of 40 km/h. Legislators normally stipulate a 2-line pneumatic brake system for weights and speeds exceeding this. For this purpose, please observe the specific applicable regulations in each state for the use of public roads.

Note

The data in the Technical Manual under “D. Tyre pressure table” on page 9 was provided to us by the manufacturers; we assume no liability for errors.

Of course, you can add our optional 2-line pneumatic brake to your system at any time.

An automatic load-dependent brake (ALB) can also be installed. This option is recommended especially for use with a 2-line pneumatic brake. An ALB regulator is installed as standard equipment for tanks with a capacity of 8000 l and up.

The vehicle frame is hot-dip galvanised. PETRA steering axles (pendulum axles) are used for vehicle types with a capacity for 10,000 litres and up. We use pendulum tandem axles as standard equipment for vehicles of the type K6.5PU and K8PU. They can be designed as steering axles if desired.

A supporting wheel is included in the standard equipment. Also observe the information in chapter 7.2 on page 35 and chapter 7.6 on page 39. On request, the supporting wheel can be replaced with a supporting winch or a hydraulic supporting foot.

Important when changing the tractor

When changing the tractor, check whether it has the necessary support and attachment characteristics.

The attachment device of the of the pump tanker is also adapted to your tractor. Modifications and special designs are available for a surcharge. A table of towing devices is provides in the Appendix B auf S. 56.

3.4.2. Electrical system

The electrical system of the trailer (standard operating voltage is 12 V) is designed in accordance with the local regulations for road traffic! Consult us if your vehicle has differs (pole number or higher operating voltage).

To operate the system the electric plug must be connected to electric socket on the towing vehicle. Before starting work, always check to ensure that the system is functioning properly.

Make sure to use only the fuses specified by the manufacturer of the towing vehicle! Stronger fuses can cause damage to the electrical system in the event of current or voltage peaks.

Depending on the equipment options you may have additional electrical or electronic systems / components (for example ISOBUS controller, MAGIC-BOX, light support). Refer to the respective operating manual for these systems.

3.4.3. Tank

The tank can be refilled yourself or by a third party.

The tank is made of glass-fibre reinforced plastic and is designed for use with liquid, pumpable faeces and bio-substrate up to a temperature of 40 °C.

The tank is equipped with several drain openings in connection with the pipe system of the pump as well as a service door for removal of stones and other foreign objects (see chapter 8.2 on page 41).

3.4.3.1. Filling opening

It is used for third-party filling of the tank. The opening has mechanical devices to prevent “falling into the tank”.

3.4.3.1.1. Flap cover equipment

The filling opening is provided with a hinged mechanism that can be opened and closed manually as standard equipment.

However, depending on the equipment of your pump tanker, may only be actuated by a hydraulic system. For this purpose, you must choose between a simple-action hydraulic cylinder and a double-action hydraulic cylinder for the actuation. The cover opens automatically in the event of a line break of the simple-action hydraulic cylinder. If there is a loss of hydraulic pressure should occur with a double-action hydraulic cylinder, the cover remains in its current position.

3.4.3.1.2. Sliding cover equipment

The filling opening works with a sliding cover. This optional equipment operated via a double-action hydraulic cylinder. In the process, the sliding cover pivots back to open the closure. If there is a loss of hydraulic pressure, the cover remains in its current position. The pump tanker becomes higher with the sliding cover version.

3.4.4. Baffle plates

Tanks with a capacity of 6000 l or more must be equipped with baffle plates. The baffle plates are installed transversely to the machine’s direction of travel and serve to reduce the sloshing movement of the liquid in the tank. This increases driving stability of the pump tanker.

3.4.5. Fill level indicator and overflow

The fill level indicator is located on the front side of the fuel tank. A float uses a float rod, a tightly mounted shaft and the fill level indicator to determine the level of the liquid (observe the indicator position on the fill level marking). This makes it possible to monitor the fill level of the tank.

Ventilation with overflow is necessary to prevent the generation of vacuum or pressure in the tank during filling and emptying. When filling the tank, the displaced air escapes through the bleeder hose, while the tank re-fills with air during spreading of the contents.

The overflow hose must be flushed with water to remove deposits and foreign objects.

3.4.6. Climbing aid

The galvanised climbing aid is an elevated stand for inspection purposes and is not provided for climbing on the pump tanker or tank.

Attention

Observing the filling process by climbing onto the tank is prohibited.

Auxiliary equipment providing stable footing (e.g. scaffolding) must be used for work on components that cannot be reached from the ground, e.g. the upper side of the tank. Observe the safety information in the various chapters of this operating manual.

3.4.7. Pump system

Our pump tanker are equipped with powerful rotary pumps as standard equipment. They are designed for quiet operation, a constant discharge rate and high pressure build-up with low power consumption. One of the major advantages is that they virtually eliminate the risk of winding fibrous material. However, you can also have other pump systems installed for your pump tanker. We primarily use eccentric screw and centrifugal pumps. To ensure a long pump service life, refer also to the information in chapter 8.11 on page 48.

Basically, your pump tanker has a suction connection position at the front left with a standard quick-coupling system. Additional suction lines are optional.

The pipe system of the pump is equipped with several drain openings and flushing connections.

3.4.8. Spreading and incorporation mechanism

The exact baffle head spreader is provided as the standard spreading device. It is used for wide spreading of slurry.

After the slurry slide gate opens, the slurry is forced out via the pump. The liquid flows against a metal plate is distributed to the side.

Five different baffles are available for the spreading process:

Cross-section	Diameter	Working width at 2500 l/min approx. [1)]
3 cm²	20 mm	18 m
7 cm²	30 mm	15 m
20 cm²	40 mm	14 m
27 cm²	55 mm	12 m
43 cm²	70 mm	10 m

[1)] The application width depends on the pump output and the slurry consistency.

A smaller nozzle provides a somewhat greater working width, but with a smaller application quantity.

Whe spreading device can be removed and replaced or opened for any necessary emptying at any time thanks to the upstream slurry slide gate. The slurry slide gate acts as a barrier against unintended release of the slurry.

Of course, you can order and install various exact spreaders (e.g. drag hose systems, cultivators) for your pump tanker. All pivoting attachments are hydraulically actuated. Pivoting movements must only be actuated while the vehicle is at a standstill.

Observe the safety instructions in this operating manual and the applicable operating instructions when using attachments and devices.

Attention

Bear also in mind that environmental influences, particularly wind, can have a major influence on the working range of the spreader. Therefore, taken into account the resulting dangers for people and property!

The following figures show a potential configuration of a pump tanker. Due to the variety of equipment options, your trailer can differ from the figures below in the type of equipment and / or positioning on the vehicle.

3.5. Ventilation

3.5.1. Function

The ventilation supplies the necessary air to the line when filling and emptying. Damage due to excessive pressure and negative pressure in the tank is avoided as a result. The device is also provided as an overflow for heavily foaming slurry. Safety valves were installed for this purpose, in order to prevent the tank from being independently sucked dry by the ventilation hose. No. (2) can be reversed for maintenance tasks on the ventilation.

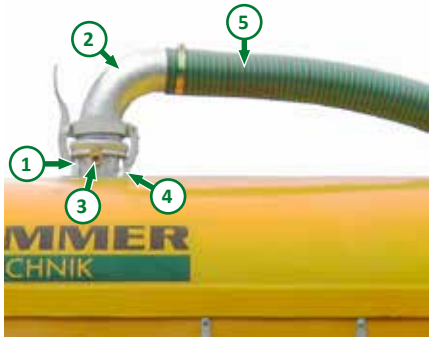
3.5.2. Configuration

Until 2011 the ventilation is largely identical up to no. (3) and the fastening on the tank. The ventilation until 2011 was designed as a Perrot hose coupling. The safety valve was located in the tank opening (see until 2011). Due to deficient maintenance of the ventilation in the past, the manufacturer was compelled to install a second safety valve (see starting from 2011, no. (3)).

3.5.3. Maintenance interval

In order to function correctly and well, the ventilation must be maintained correctly. Please observe the maintenance intervals; otherwise, the tank can be damaged (carrying out maintenance and cleaning, see chapter 8.5, page 42).

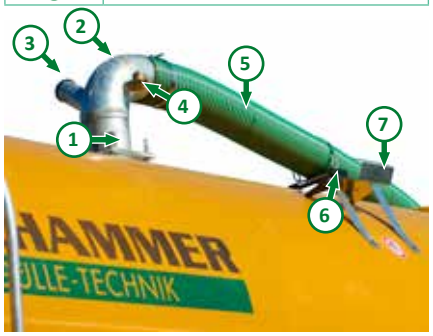
- Prior to extended downtime
  - ➥ Clean the ventilation prior to every downtime of the tanker. This is especially important before winter storage.
- Prior to every start-up
  - ➥ Check the safety valve for ease of movement and the ventilation for contamination prior to every start-up.



▲ Ventilation configuration until 2011

Configuration until 2011 legend

Position	Description
1	Tank opening with Perrot M-piece
2	Elbow NW150 / Perrot V-piece
3	Safety valve
4	Ventilation rack
5	Hose NW 150



▲ Ventilation configuration starting from 2011

Configuration starting from 2011 legend

Position	Description
1	Tank opening
2	Ventilation elbow NW150
3	Rubber valve
4	Safety valve
5	Hose NW 150
6	Support
7	Ladder holder

3.6. Hoses, filling hopper and filling arm

These accessories are optionally available.

Inspect the mounts of the houses before use (see also chapter 7.1 on page 34).

Stepping on the mud guard and / or the hose attachment is not permitted.

Observe the specific operating instructions for the filling hopper and filling arm.

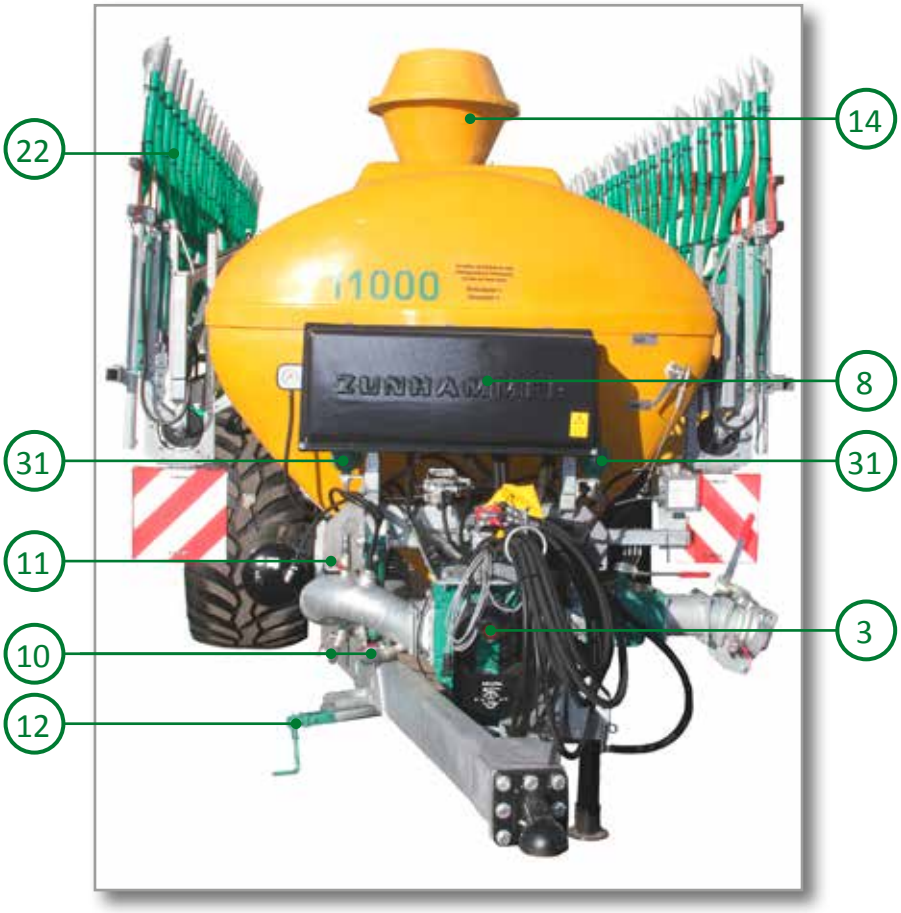
The actual equipment height must be observed with use of a filling hopper or a filling arm.

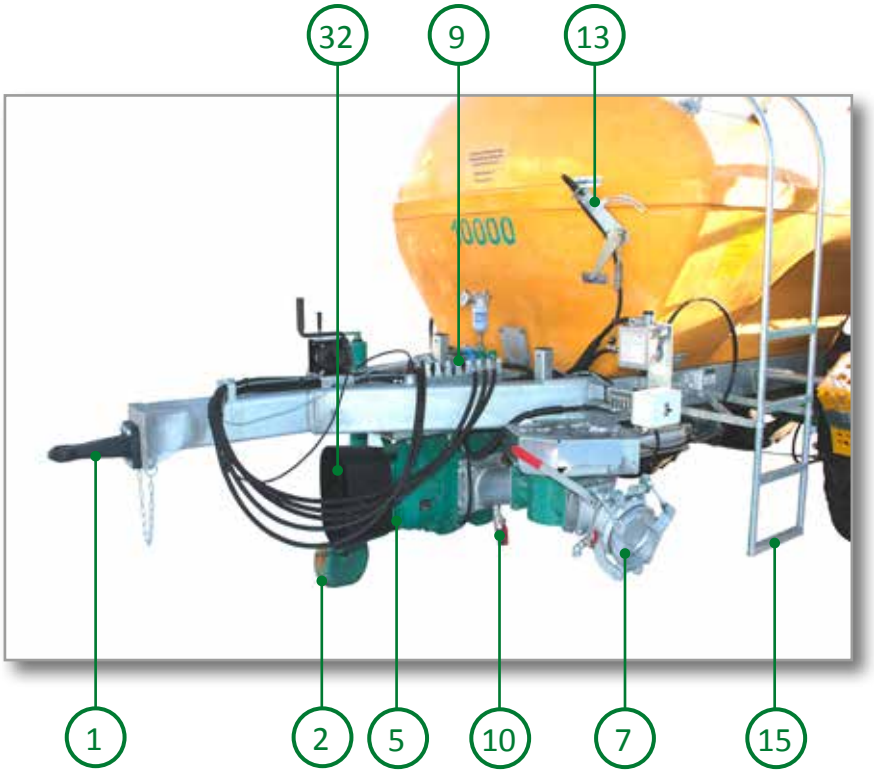
The filling arm can only be operated from the driver's seat of the tractor. Ensure that an additional button must be pressed for the movement direction of the filling arm.

Attention

If an equipment height of 4 m is exceeded, it may entail a risk due to suspended power lines.

3.7. Illustration of the configuration



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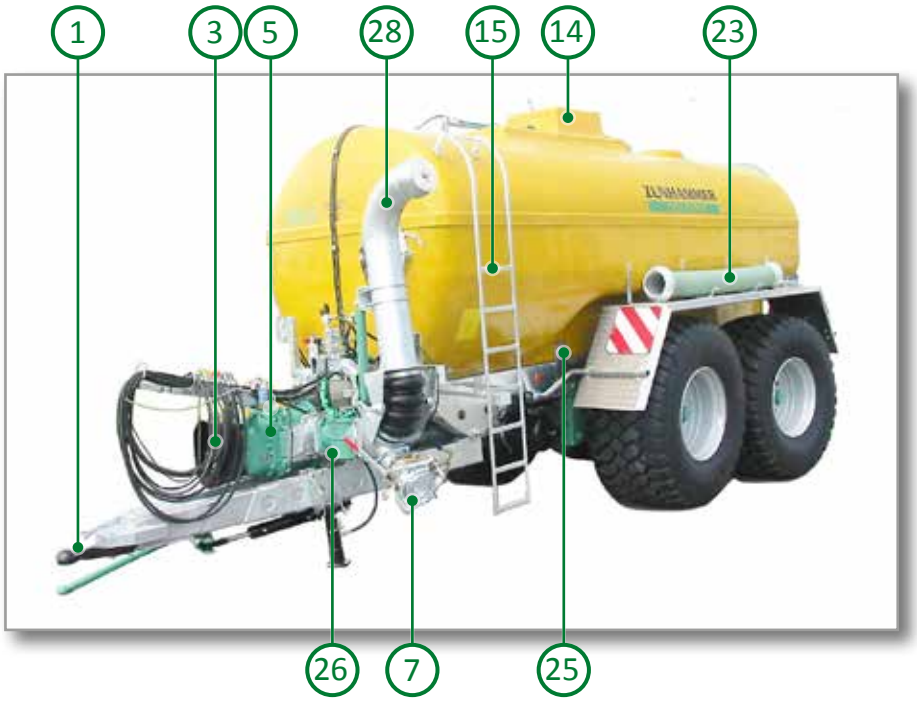
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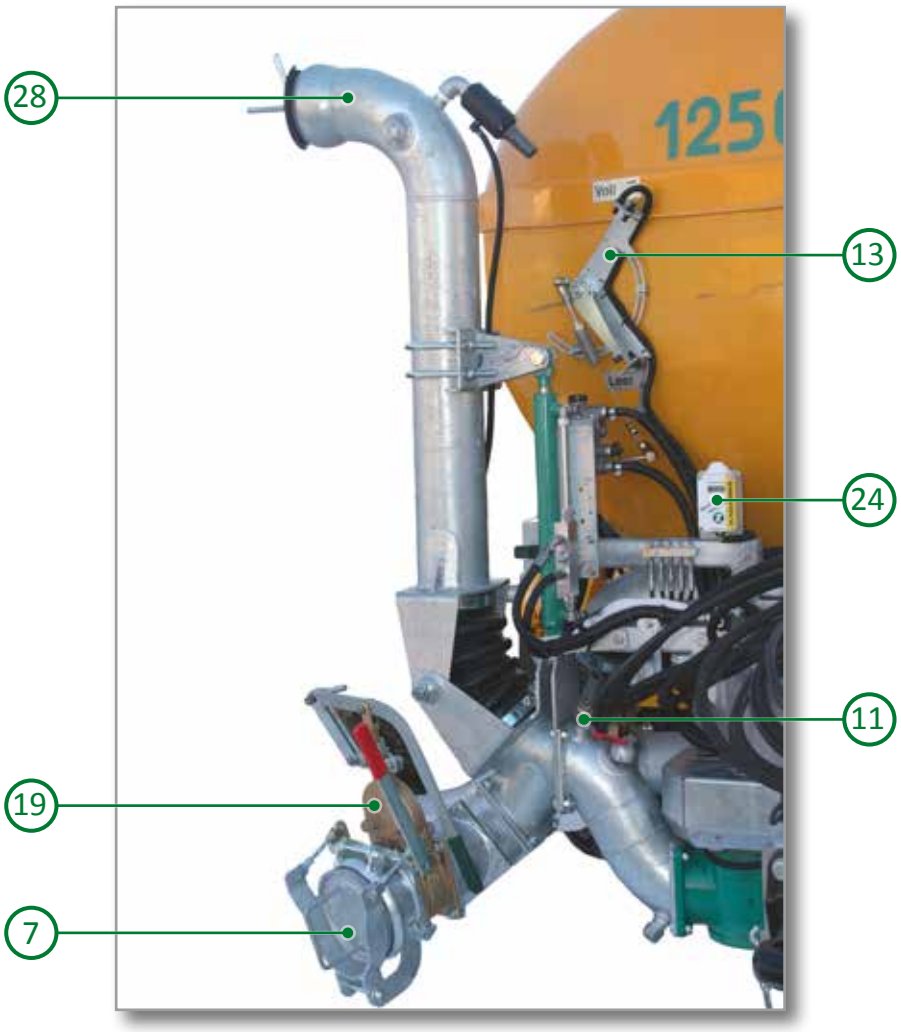
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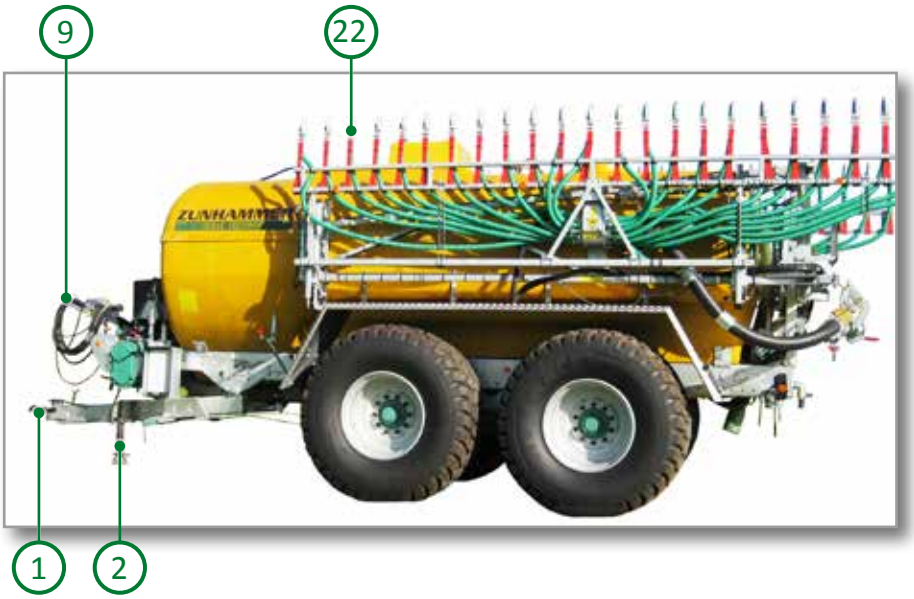
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3.8. Parts list

No.	Description
1	Attachment device
2	Supporting wheel, supporting foot [1]
3	Power take-off connection
4	Gear unit (not illustrated)
5	Pump
6	Supporting foot actuation [1] (not illustrated)
7	Suction connection
8	Hydraulic block / control unit [1]
9	Connection lines
10	Drain opening
11	Flushing connection
12	Parking brake
13	Fill level indicator
14	Filling opening / filling hopper [1]
15	Climbing aid
16	Baffle head spreader
17	Ventilation hose
18	Mud guard [1]
19	Slurry slide valve
20	Underrun guard [1]
21	Service flap (not illustrated)
22	Drag hose spreader / farmland fix spreader [1]
23	Suction line
24	TANK-O-NUM (recording of the application quantity) [1]
25	Tank fastening
26	Three-way tap
27	Chock (not illustrated)
28	Suction arm [1]
29	Warning sign
30	Lighting system
31	HYDAC hydraulic accumulator [1]
32	Power take-off guard

[1] Special equipment

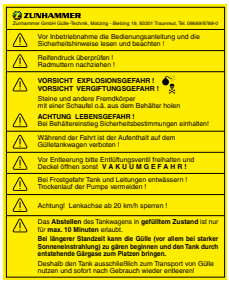
4. Safety labels

4.1. Standard labels

Designation: **Read operating manual**

No.: **1** Art. no.: **1-911-42-0017**

This warning label requires the operator to read the operating manual for the assembly shown on the label.



Designation: **Precautionary measures**

No.: **2** Art. no.: **1-911-42-0029**

The purpose of this label is to remind you of the most important safety information. **It is not a substitute for reading the operating manual!**

Designation: **PTO shaft speed**

No.: **3** Art. no.: **1-911-42-0025**

Max. specified speed of PTO shaft: 540 rpm.

Designation: **Tighten wheel nuts**

No.: **4** Art. no.: **1-911-42-0028**

The label is a reminder to tighten the wheel nuts.

Designation: **Air pressure 1.6 bar**

No.: **5** Art. no.: **1-911-42-0030**

This label specifies the required tyre pressure for the wheels. When ordering, please include the air pressure for your vehicle with the article number!

Damaged labels

Please replace damaged labels immediately! The labels are part of the safety equipment of your machine and are provided for accident prevention!
Please bear in mind that uninvolved third parties may also be near your machine. They are not familiar with the handling of the machine and have no t been instructed with respect to these warning notices!

[1] Equipment varies

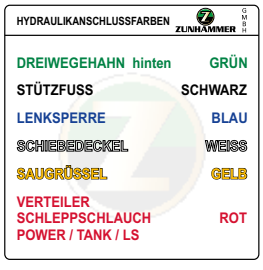
Voll	Desig-nation:	**Full**	
	No.: **6**	Art. no.:	**1-911-42-0031**
	Label for fill level “Full”		

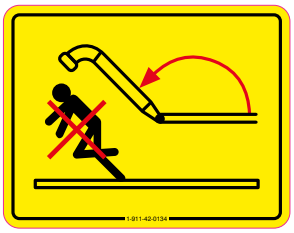
Leer	Desig-nation:	**Empty**	
	No.: **7**	Art. no.:	**1-911-42-0032**
	Label for fill level “Empty”		

40	Desig-nation:	**Speed**	
	No.: **8**	Art. no.:	**1-911-42-0014**
	The sticker indicates the maximum permissible speed. Please indicate the desired speed with the item number when ordering.		

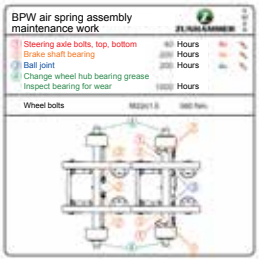
4.2. Equipment-specific labels

The following labels depend on your basic equipment.

	Desig-nation:	**Hydraulic connection colours 01[1]**	
	No.: **9**	Art. no.:	**1-911-42-0027**
	The label identifies the hydraulic connections based on their colour. The representation depends on your equipment.		

	Desig-nation:	**Handy suction arm pivot range [1]**	
	No.: **10**	Art. no.:	**1-911-42-0134**
	Standing in the pivot range of the assembly is prohibited. The moving suction arm poses life-threatening danger!		

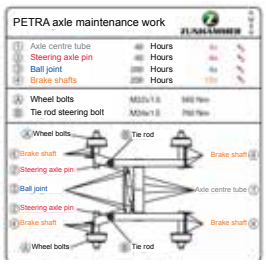
[1] Equipment varies



Desig-nation: **BPW air spring assembly maintenance [1)]**

No.: **11** Art. no.: **1-911-42-0033**

This label give you an overview of the key maintenance work on the BPW air spring axle.



Desig-nation: **PETRA axle maintenance [1)]**

No.: **12** Art. no.: **1-911-42-0034**

This label give you an overview of the key maintenance work on the PETRA axle.

Unterfahrschutz

Typ: 2340

Prüfbericht Nr.:

05-PB-324/87

Hersteller:

Zunhammer GmbH
Matzing-Biebing 19
83301 Traunreut

Desig-nation: **Underrun guard [1)]**

No.: **13** Art. no.: **1-911-42-0037**

The label must be affixed on the underrun guard. It is the type plate of the underrun guard.
The underrun guard is mandatory for trailers with high-speed axles!

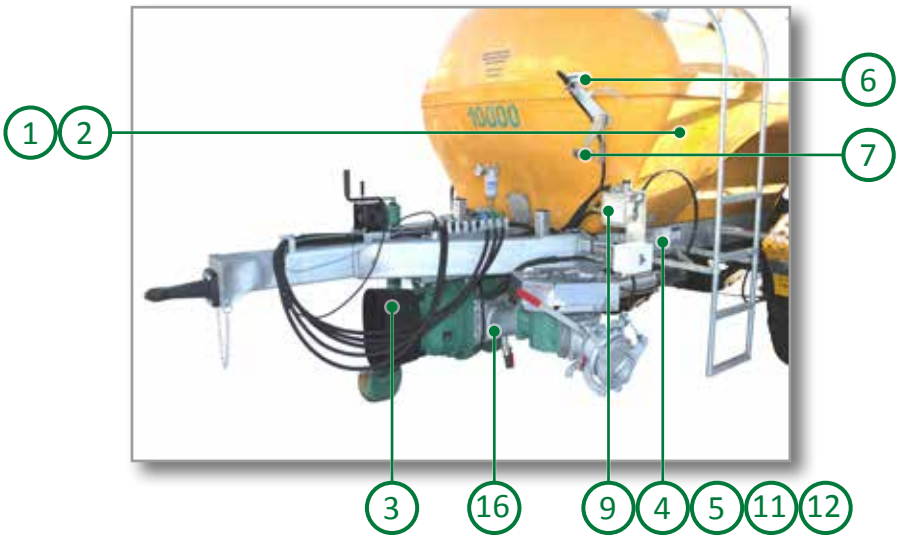
4.3. Aluminium signs

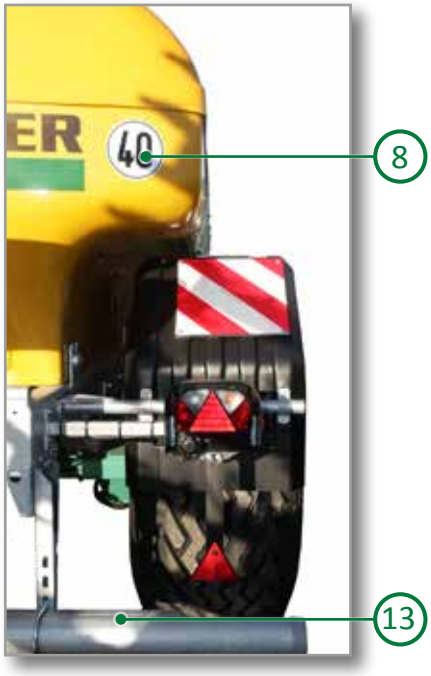
Desig-nation: **Danger of frost**

No.: **16** Art. no.: **1-911-42-0026**

The assembly must be drained if there is a danger of frost.

4.4. Position of labels





5. Transport

5.1. General safety information for transport

- **The locally applicable standards, guidelines and laws on the use of motor vehicles, including the insurance regulations, define the general conditions for every form of transport. You must be familiar with these for every transport.**
- **You must be in possession of a valid driving license.**
- **Observe the maximum permissible axle loads and gross weights.**
- **The tractor must way more than one third of the permissible gross weight of the pump tanker.**
- **The pump tanker must only be attached using the intended towing devices. Observe the maximum supported load (see Appendix B, p. 56) of the towing device of the trailer. The data can be found in the operating permit or in the vehicle registration. Bear in mind that the supported load must not be negative!**

Attention

Handling, steering and braking control are affected by the tank level, attached implements, trailers and environmental influences (e. g. terrain, weather, etc.). Therefore, ensure that you have sufficient steering and braking control and adjust your speed accordingly.

Supported load

For additional information, refer to the Appendix B on page 56.

5.2. Transport on public roads and paths

- The maximum transport speed is normally 25 km/h. However, it may also be higher, depending on the version of the pump tanker. In the process, pay attention to the information in the official vehicle documents.
- The towing machine must be suitable for transporting the station.
- Be aware of the wide overhang of the pump tanker when making turns!
- Never uncouple and / or shift on slopes. Switch to a lower gear beforehand.
- Avoid sudden curves when driving crosswise to sloping terrain.
- You must use the towing eyes on the main frame (special equipment) for towing in reverse of the pump tanker. Use the axle body as a stopping point for the tow rope for reverse towing for a pump tanker with PETRA axle. Fastening the tow rope to the brake camshaft is prohibited.
- Folding support devices must be pivoted inward and locked before road travel.
- The hose supports and mounts (holding straps) must be checked to ensure they are safe and properly functioning prior to every use in public traffic.

Attention

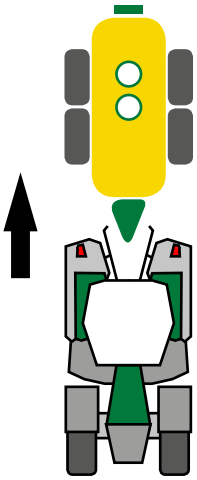
The working speed is limited to 15 km/h in all cases.

5.3. Transport using suitable transport means

For every transport, always comply with the relevant regulations for securing loads.

Also take into account the actual dimensions of the transport (oversize dimensions). Oversize transports generally require an official permit. You can obtain the necessary information from your local traffic directorate.

The pump tanker must only be pushed using suitable transport equipment (see figure 5.1). In the process, the drawbar must be retracted. The pushing work machine must be suitable for the transport of the pump tanker and have appropriate equipment for correct attachment. The attachment devices of the pushing work machine must be used.



▲ Figure 5.1 Pushing direction on transport vehicle

5.4. Lifting with a crane

Lifting or loading of the pump tanker with a crane or forklift is prohibited!

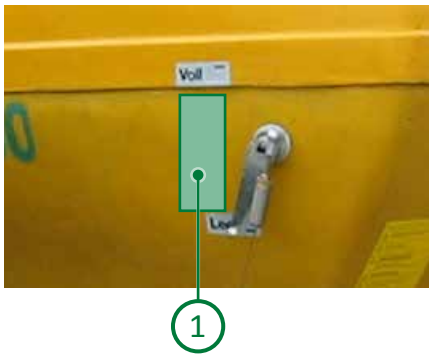
6. Commissioning

6.1. Safety information for commissioning

- **Prior to commissioning, the operating person must receive instruction from the manufacturer, dealer or owner. This instruction must point out all dangers of the machine and must encompass the entire content of this operating manual, including all operating instructions for the attached implements / components.**
- **Please check your pump tanker for completeness based on the table in chapter 1 on page 12! Operation of the pump tanker without all operating manuals being available is prohibited.**
- **Before working with the equipment for the first time, the operating person must read all parts of the operating manual and become familiar with all operating elements and the equipment and their functions. During use is too late.**
- Prior to commissioning, the pump tanker must be approved by the responsible authorities in accordance with the local regulations. Trailers with a permissible maximum speed higher than 25 km/h require a vehicle registration certificate in the Federal Republic of Germany. The trailer must be approved by supervisory authorities.
- **Compliance with registration and insurance regulations as well as inspections required by the specific country are the responsibility of the customer!**

6.2. Preparations for commissioning

- Prior to initial commissioning of the pump tanker, all bolts and nuts must be tightened. For tightening torques please refer to chapter 9.2 on page 53.
- Check the drive shaft length when coupling for the first time. The path of the overrun brake must be factored in! Short the drive shaft as necessary. The slip clutch must be positioned on the pump side.
- Check the air pressure in the tyres. The air pressure must be significantly increased for extended road transport and high-speed vehicles at speeds above 25 km/h. Please observe the tyre pressure table (Techn. manual, chapter D on page 100). The air pressure in tubeless tyres should be checked regularly when cold. Increase the air pressure by 25 % for travel on slopes.
- Tighten the wheel nuts after approximately 20 km. This applies for the new vehicle and after each tyre change!
- Connect the hydraulic connections and check the hydraulic functions
- Prior to the initial filling, fill about 20 litres of water into the pump via the flushing connections. This will prevent the pump from running dry.



▲Figure 6.1
Tank fill range

- Fill the slurry tank. Tighten the tank mounting bolts when the tank is filled! For tightening torques please refer to chapter 9.2 on page 53.
- The weight of the tank contents depends on its composition (whether the slurry is from cattle or poultry, for example) and consistency. This significantly affects the maximum filling capacity of the tank. The pump tanker must therefore be weighed after it is filled for the first time. The fill level limited for the maximum supported load and / or for the maximum permissible gross weight must be identified on the fill level marking (see figure 6.1 on page 32 in section (1)). The necessary data can be found in the vehicle registration documents of your tractor vehicle.

6.3. General commissioning

General commissioning is relevant when you have parked the the pump tanker and now wish to use it again for working (see chapter 6.1 on page 31).
Carry out the following tasks every time you start up the vehicle:

- Check the pump tanker for roadworthiness and operational safety.
- Before each use, ensure that the safety devices are in proper working order!
- Check the pump tanker for rust and damage. Rectify any ascertained defects prior to commissioning of the pump tanker.
- Open and close the filler neck and the slurry gate valve completely (hydraulically and / or manually). If the gate valve gets stuck, do not use force; use only the lever provided by the manufacturer (manual lever assembly, for example)!
- Check for leaks in the tank attachments.
- Check the float in the fill level indicator for foreign objects. Any foreign objects must be removed before using the trailer. It may be necessary to dismantle the fill level indicator and clean it outside of the tank.
- Check the bleeder hose. Remove any impurities prior to commissioning.
- After extended downtimes of the pump tanker the hydraulic three-way tap must be checked without the hydraulic cylinder to ensure it is functioning properly. To do so, remove the cylinder and make the brass plug move freely using a pipe wrench and grease or adjust the brass plug as necessary. (Information is provided in chapter 8.10 on page 47 of this operating manual.)

- Close all drain openings and flushing connections on the pump tanker.
- After extended downtimes, fill about 20 litres of water into the pump via the flushing connections (do not forget to close the drain openings first). This will prolong the life of the pump by preventing it from running dry. Observe the information in the operating manual for the pump.
- When connecting hydraulic cylinders and motors, make sure that the specified connection assignment of the hydraulic hoses is adhered to. Instructions for this are provided on the vehicle sticker at the position 9 on page 26 and the operating manual of your tractor and the operating manuals of the attachments / equipment.
- Connect hydraulic hose lines only to depressurised hydraulic systems (shut off the motor on the tractor).

7. Normal operation

7.1. General safety information for operation

Attention

Before starting work, always observe and implement the information in chapter 5 on page 29 and chapter 7.3 on page 36.

- **When removing and mixing slurry, be aware that the gases arising from the slurry are highly toxic and, in combination with oxygen, are explosive. Open flames, light probes, spark discharges and smoking are therefore prohibited when working with slurry.**
- **Special caution due to the formation of gases is necessary in the case of slurry cellar and channel systems in the area of the open slide valve to the receiving pit, the main tank or cross channels. The same applies to mixing or pumping stations, below-floor manure removal systems and similar systems, such as slurry pits and cesspools.**
- **When working with slurry, always provide for sufficient ventilation of the workplace!**

Attention

Be aware of the danger of being caught by the rotating drive shaft. Operate the control devices at a distance of at least 550 mm from the running drive shaft. In general, all controls should be operated from the driver's seat.

- **Do not start up the the pump tanker until all safety devices are attached and in the protective position (this also applies to all attached implements).**
- **Observe the maximum permissible axle loads and gross weights.**
- The maximum permissible transport speed is 25 km/h. Higher transport speeds are possible. In the process, pay attention to the information in the vehicle documents.
- The working speed is limited to 15 km/h.
- **Handling, steering and braking control are significantly affected by the tank level, attached implements, trailers and environmental influences (e. g. terrain, weather, etc.). Therefore, ensure that you have sufficient steering and braking control and adjust the speed accordingly.**
- Be aware of the actual width of your pump tanker and the tyre pressure. This also affects the handling of your pump tanker. For specifications and dimensions applicable to your trailer, refer to the vehicle documents and this operating manual (chapter 3.2 on page 14).
- **Riding on the pump tanker is prohibited.**
- The trailer must be attached as specified. Make sure that no one is in the area between the towing equipment and the pump tanker during the coupling process.
- For operation of the pump tanker, use only drive shafts that conform to the parameters defined by the manufacturer and that are equipped with intact safety devices. The PTO shaft guard must always be mounted during operation.
- Do not step on the coupled drive shaft.
- The pump tanker must be filled only in the coupled state. This also applies to cleaning measures.

Attention

Before every intervention with the tanker, for example mounting and removal of the drive shaft, switch off the PTO shaft, switch off the motor of the towing machine and secure against accidental start-up (remove ignition key).

Attention

During all work, be aware of the actual dimensions of the pump tanker and attached implements or components. If the total height exceeds 4 metres there is a danger of contact with overhead power lines. It is prohibited to work under overhead power lines in this state!

- **Slewing movements of attached implements and components may be executed only when the vehicle / rig is stopped.**
- The (optional) attachment equipment must be emptied every time the machine is transported, serviced or parked
- If the of the pump tanker is not to be used for an extended period, all drain openings must be opened. Make sure that the parking area is sufficiently ventilated.
- **The climbing aid on the tank is only intended as an aid for visual inspection of the top of the tank. It must never be used as a ladder to climb into the tank!**
- It is prohibited to step on the hose attachments or other attached components, especially the mud guard.
- The hose supports and mounts (holding straps) must be checked to ensure they are safe and properly functioning prior to every use in public traffic.
- Check regularly whether the hydraulic plug connectors are clean.
- **Before attaching implements to the three-point hitch, you must first make sure that control apparatus is in the position in which accidental raising and lowering is not possible. This also applies when detaching the equipment!**
- **It is prohibited to operate hydraulic attachments and components (e. g. drag hose spreader) if anyone is within the slewing range.**
- **The parked pump tanker must be secured with the parking brake and chocks to prevent rolling away. Securing on only one side (single-wheel braking) is not permitted.**
- **To prevent potential interference, mobile phones, antennas and radios must be kept at a distance of approximately 1 metre from our electrical components.**
- Observe the specific density of the pumpable substances. This affects the actual weight of the load. Label the permissible load for each substance in the tank. It is prohibited to transport or spread other substances than water, slurry and faeces in liquid form, unless written permission has been obtained from ZUNHAMMER GmbH.
- ZUNHAMMER GmbH will assume no liability or guarantee whatsoever for damage to the pump and drive shaft resulting from the failure to use freewheel PTO shafts in combination with PTO shaft brakes.

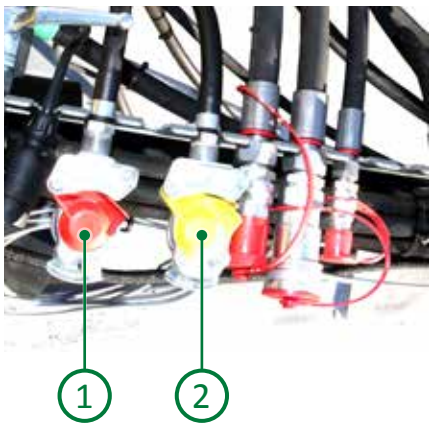
Attention

Exercise caution in the vicinity of airports or radar stations. The emitted radiation can cause malfunctions in the electronic equipment.

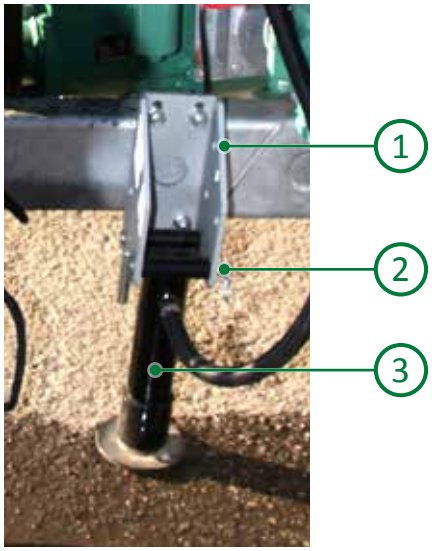
7.2. Hitching

Special care must be taken when hitching the of the pump tanker to the towing equipment. Only use the towing equipment / eyes specified by the manufacturer. For this purpose, also refer to the Appendix B on page 56. Operate the lifting hitch of the towing equipment according to the manufacturer's specifications.

Attention



▲ Figure 7.1
Hydraulic and brake connections



▲ Figure 7.2
Hydraulic supporting foot

Attention

Weigh the pump tanker after the initial filling. The fill level limited for the maximum permissible supported load must be indicated on the fill level marking (see figure 6.1 on page 32).

Perform the following tasks:

- Drive carefully to the towing eye of the trailer. Attach the trailer. Ensure the secure seating of the towing eye in the towing attachment.
- Connect the connecting cable and check the signal devices on the pump tanker.
- Connect the coupling head of the brake system in clean condition and adjust the compensator.

  The compensator must only be adjusted if the brake system is not equipped with an ALB regulator.
- With a two-line brake, observe the colour identification of the coupling heads for the reserve (1) (red) and brake (2) (yellow).
- Crank up the support wheel until the wheel can be moved into transport position. Then crank it up until the crank is fixed. Secure the supporting wheel in transport position.
- Proceed in a similar fashion for hydraulic supporting devices. Retract the support piston (3) and remove the securing pin (2). Fold up the supporting foot (3) and secure the supporting foot (3) in transport position (1) with the securing pin (2).
- Hitch up the drive shaft and secure the guard.
- Connect the hydraulic hoses according to identification (see sticker no. 9 on page 26) in clean condition, ensuring a pressure-free return in the process.
- Remove the chocks and hang them in the mount.
- Release the parking brake.
- Perform a functional test of the brake.

7.3. Filling

- **The pump tanker must be filled only in the coupled state.**
- The medium must be in a pumpable condition. The tank can be refilled yourself or by a third party.

7.3.1. Filling yourself:

You can fill the tank yourself with the built-in pump and a suitable suction connection for the particular version. Proceed as follows:

- Connect the suction hoses to the suction connection.
- Hang the suction hose with basket in the recess and connect the suction hoses already mounted at the suction connection.
- Adjust the three-way tap on the suction side to “Suction”. Switch on the pump via the PTO shaft (540 rpm).
- Open the slurry gate valve.

▶ Figure 7.2

When filling with your own pump, monitor the fill level indicator!

- Monitor the filling process by watching the indicator on the fill level marking.
- Once the maximum fill level is reached, close the slurry gate valve.
- Switch off the pump via the PTO. Switch the three-way tap back to “Pressure”.
- If the indicator on the fill level marking points down after the manometer has returned to zero, refilling can take place again.
- If you pump a highly viscous medium or if the slurry tends to precipitate strongly, it is advisable to switch the three-way tap to “Pressure” and to close the slurry gate valve on the suction side. In this position the pump sucks liquid from the tank and presses it back through the flushing connection. This allows the pump to stir the liquid in the tank. In principle, this is also possible while driving **on non-public roads.**
- Before disconnecting the suction hose, bleed it by actuating the ball valve on the suction nozzle. The liquid in the suction hose will then flow back into the pit. The ball valve can also be used to pump a slurry additive or water for dilution.

Pumps that are loud or vibrate will wear out more quickly. The cause of this could be that the medium being pumped at the respective speed cannot flow sufficiently to the pump or that the medium cannot flow sufficiently away from the pump (possible causes: incorrect speed, overly viscous medium or closed lines, see also chapter 10 on page 54).

Attention

If equipment with a (optional) safety device (manometer), it must be monitored. If the maximum permissible operating pressure is exceeded the pumping process must be stopped immediately and the position of the three-way taps and the slurry gate valve must be checked!

Service life of the pump

Only smooth-running pumps will operate efficiently and without excessive wear, enabling a long life.

Dry running of the pump

Also use the available sight glasses in the suction system of the pump to check the suction process for pump tanks. In the process, extended dry running of the pump is recognised and thus prevented! Following the instructions in chapter 8.11 on page 48 for gentle use of the pump.

7.3.2. Third-party filling:

The tank can be filled by a stationary pump system through the filling port. Perform the following steps:

- Open the filling opening (e.g. filling dome by actuating the joystick).
- Lower the filling pipe of the pump system (the filling pipe should be lowered as far as possible into the tank of the pump tanker).
- Fill the tank by switching on the stationary filling system.
- Monitor the filling process by watching the indicator on the fill level marking.
- Once the desired level is reached, stop the filling process by switching off the stationary filling system.
- Close the filling opening.

Also observe the information in the operating manuals for the attached implements / components.

Attention when using poultry slurry!

When filling the tank with poultry slurry, the tank should be filled by a third-party filling unit.
(There is heavy foam formation due to secondary fermentation)!

7.4. Transport

Attention

The PTO shaft must be switched off during transport to the field.
Make sure that all valves are tightly closed to prevent pollution of roads and paths, which could hinder public traffic.

Observe all information from chapter 5 on page 29.

- With extended road transport and speeds above 25 km/h, the air pressure specified in the Technical Manual under D on page 9 must be increased significantly (a tyre has 20 % less load bearing capacity at 40 km/h than at 30 km/h). Contact the manufacturer of your tyre for the appropriate values.

7.5. Spreading

Attention

All of the following steps must be carried out from the driver's seat only.

- Start spreading on the field by switching on the PTO shaft and switching the hydraulic three-way tap from "Tank" to "Spreading" .
- Open the slurry gate valve on the tail gate!
- Before emptying the tank completely (visible at the fill level indicator or application width), switch off the PTO so that the tank is not completely emptied during use. The purpose of this is to prevent the pump from running dry. Close the slurry slide gate.
- After spreading, set the three-way tap back to "Tank".
- The interplay of spreading speed, pump type and quantity per hectare can be found in our "Technical Manual 2006", which you can request from ZUNHAMMER GmbH.
- **Make sure that all persons not participating in the process are at least 20 m away from every part of the equipment.**
- **If you use optional attached implements or components, then you must also observe the information in the corresponding operating manuals.**

Danger due to sharp curves!

The power take-off must be switched off before sharp curves!

7.6. Parking

- Find a solid and level area for parking.
- Make sure the three-way tap is set to “Tank”.
- Pull the pump tanker parking brake when in the parking position.
- Position chocks on both sides of the pump tanker so that the pump tanker is secured from rolling away.
- Disconnect the connecting cable of the electrical system, hydraulic hose lines and brake lines and hang them in the mounts.
- Uncouple the drive shaft and position it in the mount.
- Unscrew the supporting wheel approximately four rotations, then fold out the wheel. Ensure that the wheel is locked. Then lower the supporting wheel until the pump tanker can be detached from the tractor vehicle.
- When equipped with a hydraulic supporting foot, first remove the securing pin, then fold down the supporting foot. Secure the supporting foot vertically with the pin. Then extend the supporting wheel hydraulically until the pump tanker can be detached from the tractor vehicle.
- Fold down the front supporting device and position the pump tanker so that it is stably supported.
- Uncouple the tractor from the pump tanker.
- **If parking the vehicle for an extended period (more than one hour), always open the stone trap and the drainage systems.**
- Check the bleeder hose. Remove any impurities.

In general, the pump tanker must empty when parked. If uncoupling while still laden is unavoidable (e.g. tyre damage), find a location with a stable foundation or use an underlay to assure stable support of the supporting device.

Use the tank only for transporting slurry and empty it immediately afterwards!

Check the bleeder hose. Remove any impurities.

Attention

Always switch hydraulically actuated gate valves and three-way taps to a position that enables depressurised attachment and detachment of the hydraulic lines!

Protection of connections from soiling

Protect all connections by using dust caps.

Attention

When filled, the of the pump tanker may be parked for a maximum period of 10 minutes. After this period, the slurry can start to ferment (especially if the vehicle is exposed to sunlight) and the tank can burst.

Extended inactivity

If the pump tanker is to be shut down for an extended period (in winter, for example), we recommend cleaning the vehicle, lubricating moving parts (see also chapter 6.3, p. 32) and protecting the attachment with wax.

8. Maintenance and care

Attention

When working on the pump tanker, observe the safety information in the other chapters.

8.1. General safety information for maintenance and care

All warning notices and rules for behaviour indicated in this chapter apply for all subsequent chapters and sections!

- **Please keep your vehicle clean, so that all markings are clearly visible! The safety labels on your pump tanker must be replaced immediately if they show signs of damage or if their legibility is otherwise impaired.**
- When working on the pump tanker, a second person must always be present. This person must be informed at least of the dangers of the pump tanker and the dangers posed by the tasks to be performed and must also be aware of emergency measures to be taken in case of an accident. The second person must be outside of the danger zone.
- Inspect the brake systems thoroughly on a regular basis. Adjustments and repairs to the brake system may be performed only by specialist shops or recognised brake servicing companies or the manufacturer.
- **Parked pump tanker must be secured with the parking brake and chocks to prevent rolling away. If this is not described in grater detail in this operating manual or the specific operating manuals of the attachments, this entails actuation of the parking brake and positioning of the chocks, as well as the measures of the applicable accident prevention regulations. Securing on only one side (single-wheel braking) is not permitted.**
- **The pump tanker must be filled only in the coupled state. This also applies to cleaning measures.**
- **Always use safety supports when performing maintenance on attached and raised implements and components.**
- **Before working on the hydraulic system, it must be depressurised. There is an acute risk of injury from fluids under high pressure, which can penetrate the skin. Seek medical attention immediately in the event of an injury!! There is a risk of infection.**
- **Exercise caution when draining hot oil – there is a danger of burns to the skin!**
- Stones and other foreign objects must be removed only in accordance with the instructions in chapter 8.2 on page 41. Always comply with the safety information in this operating manual as well as the local regulations for health and safety at the workplace.
- The hose supports and mounts (holding straps) must be checked to ensure they are safe and properly functioning prior to every use in public traffic.

Attention

Prior to working on the pump tanker, it must be empty of content and gases. The procedure is described in chapter 8.2 on page 41.
It is forbidden to enter the inside of the tank without a respirator unit or equivalent safety equipment!
In case of extended downtimes the drain holes must be opened.

- Do not use force if the slurry gate valve is jammed! Only use the operating lever supplied by the manufacturer (e.g. manual lever unit)!
- When working on the electrical system, make absolutely sure to disconnect electrical connections. Only use original fuses.
- **Oils, fuels and filters must be disposed of properly**
- **Fastening the tow rope to the brake camshaft is prohibited.**
- **Use only ZUNHAMMER original replacement parts, without exception. We will assume no liability if third-party parts or replica parts are used.**

Attention

Before working inside the tank or before working on the tank with weld-splatter and open flames, the tank must be completely emptied of liquids and fermentation gases. To do this, open all drain openings on the pump tanker and wait about one hour. Make sure that the workplace is sufficiently ventilated. Prior to starting work, you must flush the tank sufficiently with clear water. After working on the tank the mechanical safety devices for the filling opening must be properly mounted! Secure the entry opening against accidental closing of the lid!

8.2. General tasks and work precautions

- Every time the pump tanker is cleaned with a high-pressure hose, all greased and oiled components must be lubricated again.
- When performing welding tasks on the pump tanker, all electrical equipment must be protected against power surges. To do so, unplug the electrical connections. Attach the earth connection of the welding unit directly to the parts to be welded!
- Stones and other foreign objects are generally discharged during the spreading process. If any stones or other objects remain in the tank, you do not have to enter the tank to remove them. It is generally sufficient to clean the tank via the service flap. Remove the four screws (no. 1 figure 8.1) at the corners and remove the panel. You can promptly remove stones in the immediate vicinity by reaching in. Otherwise, flush the tank thoroughly with water again with the service flap open. Take sufficient protective measures; wear safety gloves, skin and eye protection. When closing the service flap make sure that no objects remain in the tank and that the service flap is sealed tightly. Re-tighten the 4 screws at no. 1 (see screw tightening torques, chapter 9.2 on page 53).

▲ Figure 8.1
Service opening

8.3. Care of the tank

- The standard plastic tank is heat-resistant up to a maximum temperature of 60 °C (with water). The tank is heat-resistant up to a maximum temperature of 40 °C with slurry or biogas substrate. Special tanks are available for high-temperature liquids.
- The construction of plastic tanks makes them resistant to corrosion.

Attention

Our plastic tanks are designed for transporting slurry, faeces and water. Other liquids may be transported only with our express approval!

- Never climb onto the tank or use a climbing aid for cleaning on top of the tank, under any circumstances. Use a separate, stable aid for ascending. This can be a ladder, a scaffold or a building component (e.g. a passageway). In doing so, please observe the relevant occupational safety and accident prevention regulations.
- Water should be used for cleaning. If a high-pressure cleaner is used, the pressure nozzle must be at least 30 cm from the surface, to prevent chipping of the fibreglass mats.
- For general care it is recommended to treat the tank with a liquid that contains oil (rapeseed oil) or with wax. This does not affect the life of the tank, but facilitates cleaning.
- Keep ventilation and bleeder valves clean and functioning.
- Excess or insufficient pressure in the tank is not permissible.

Attention

If the tank is still under warranty, the repair should be performed by a recognised specialist shop! Otherwise, your warranty may be voided!

8.4. Repair of the tank

To carry out repairs (leaks) on the plastic tank, a repair kit is required, which is available from ZUNHAMMER GmbH under order no. 1-902-22-0019. It consists of resin, hardener and a glass fibre mat.

Attention

Secure straight ladders against tipping over and slipping with a belt / chain / 2nd person and use ladder hooks on the tank!

▲ Ladder hook

8.5. Maintenance and cleaning of the ventilation

Use separate, stable climbing or work aids for work on the ventilation. This can be a ladder, a platform ladder, a scaffold or a building component (e.g. a passageway)!

8.5.1. Ventilation until 2011

Reversing the ventilation flaps (see Fig. until 2011)

Check the safety valve ① for ease of movement and clearance. The valve can be disassembled with an 1½" AF spanner.

▷ Open the Perrot coupling ③.

▷ Reverse the ventilation as shown in the diagram.

▷ Secure the ventilation with the spring retainer ④.

➥ The ventilation is secured on the tank. The spring retainer ④ is correctly attached on the mounting plate ⑤.

✓ Finished

▷ Clean the ventilation with a strong water jet.

▷ Ensure that the safety valve ① moves easily.

▷ Remove all deposits from the pipe elbow and the hose.

➥ The ventilation has been cleaned. Assembly takes place in reverse order.

- Finished

Attention

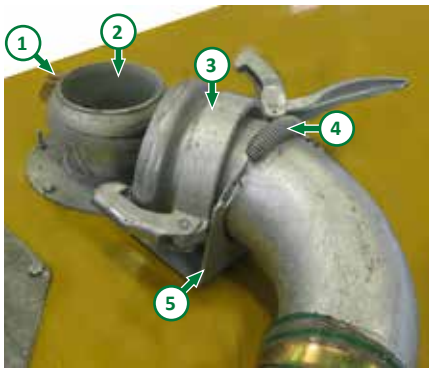
Secure the necessary tools from falling (attachment) and only bring tools that are necessary.

Ventilation disassembly (see figures. until 2011)

With heavy soiling of the hose, it may be necessary to disassemble it. It is best to disassemble the ventilation, because re-mounting the hose can be very difficult.

- ▷ Open the Perrot coupling ③.
- ▷ Reverse the ventilation as shown in the diagram.
- ▷ Secure the ventilation with the spring retainer ④.
  - ➥ The ventilation is secured on the tank. The spring retainer ④ is correctly attached on the mounting plate ⑤.
    - ✓ Finished
- ▷ Remove all connections of the ventilation hose on the tank.
- ▷ Attach the hose (approx. 100 kg) to suitable slinging gear. Secure it with suitable load-carrying equipment (e.g. front-end loader, telehandler, crane)
- ▷ Now loosen the spring retainer ④ from the mounting plate ⑤.
- ▷ Lift the ventilation off of the tank.
  - ➥ The ventilation has been disassembled. Assembly takes place in reverse order.

• Finished



▲ Ventilation until 2011

8.5.2. Ventilation starting from 2011

Reversing the ventilation (see figures starting from 2011)

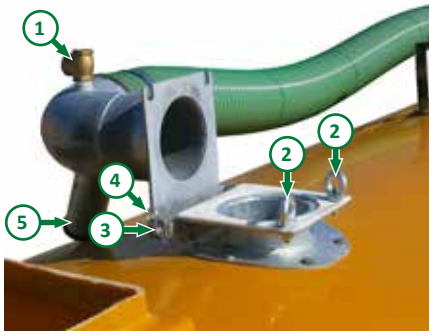
Check the safety valve ① for ease of movement and clearance. The valve can be disassembled with an 1½" AF spanner.

- ▷ Unscrew the ring nuts ②.
- ▷ Reverse the ventilation as shown in the diagram.
  - ➥ The ventilation is secured on the tank. The splint ④ and pin ③ are fitted correctly.
    - ✓ Finished
- ▷ Clean the ventilation with a strong water jet.
- ▷ Ensure that the safety valve ① moves easily.
- ▷ Clean the second safety valve ⑤ from below with a strong water jet.
- ▷ Remove all deposits from the pipe elbow and the hose.
  - ➥ The ventilation has been cleaned. Assembly takes place in reverse order.

• Finished

Attention

Secure the necessary tools from falling (attachment) and only bring tools that are necessary.



Ventilation starting from 2011

Ventilation disassembly (see figures. starting from 2011)

With heavy soiling of the hose, it may be necessary to disassemble it. It is best to disassemble the ventilation, because re-mounting the hose can be very difficult.

- ▷ Unscrew the ring nuts ②.
- ▷ Reverse the ventilation as shown in the diagram.
  - ➥ The ventilation is secured on the tank. The splint ④ and pin ③ are fitted correctly.
    - ✓ Finished
- ▷ Remove all connections of the ventilation hose on the tank.
- ▷ Attach the hose (approx. 100 kg) to suitable slinging gear. Secure it with suitable load-carrying equipment (e.g. front-end loader, telehandler, crane)
- ▷ Now remove the splint ④ and pin ③.
- ▷ Lift the ventilation off of the tank.
  - ➥ The ventilation has been disassembled. Assembly takes place in reverse order.

- Finished

8.6. Care instructions for tyres

For maximum running performance, observe the following requirements:

- Observance of the tyre air pressure (see Technical Manual, chapter D, page 9).
- Regular inspection of the rims for damage.
- Relief of stress on the tyres during extended downtimes.
- Protection from direct solar radiation during extended downtimes.
- Avoidance of driving along tight curves on solid surfaces (concrete, asphalt) as far as possible.

Attention

Re-tighten the wheel nuts regularly and observe the appropriate tightening torque (for instructions, see chapter 9.2 on page 53).

8.7. Changing wheels

The mounting of wheels and tyres requires sufficient knowledge and suitable tools.

- Secure the pump tanker from unintended movement. For this purpose, attach the pump tanker to a suitable tractor and actuate the parking brake of the tractor. Place chocks under the wheel that is not raised on both sides of the pump tanker.
- The wheel to be worked on should be raised until it is no longer in contact with the ground. Place your lifting jack at the end of the axial pendulum. In the process ensure the stable positioning (stability) of your lifting equipment.

- **Use suitable lifting tools with an adequate load bearing capacity.**
- Support the raised trailer side so that unintended falling of the trailer is prevented.
- Change the wheel. Observe the necessary tightening torques when tightening the wheel nuts. (for instructions, see chapter 9.2, page 53)
- The wheel nuts must be checked and re-tightened after 20 km.

Attention

Wheels should only be changed when the pump tanker is empty as a basic rule!

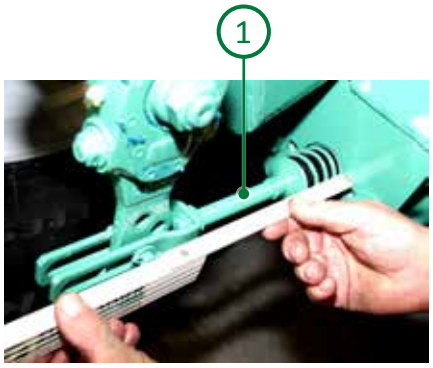
8.8. Adjustment of the wheel brakes

Fundamental behaviour is described below. This is not a substitute for reading and complying with the specific operating manual. As a basic rule, we recommend contracting a specialist shop to carry out this work.

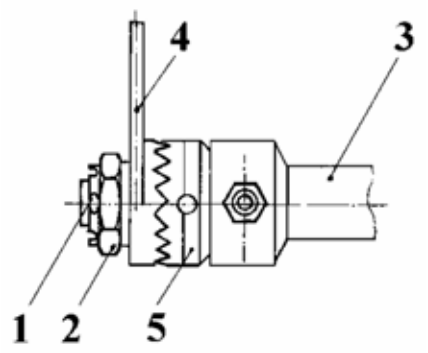
- The stroke of the piston rod ① (s. figure 8.2) of the diaphragm cylinder on the tanker must be inspected daily. The wheel brake must be adjusted when the piston rod protrudes more than 6 mm (piston cylinder) or more than 40 mm (diaphragm cylinder) during full braking.
- **Secure the pump tanker from unintended movement when working on the wheel or brake. For this purpose, attach the pump tanker to a suitable tractor and actuate the parking brake of the tractor. Place chocks under the wheel that is not raised on both sides of the pump tanker.**
- The wheel that is currently being worked on should be raised. In the process the stable positioning (stability) of your lifting equipment must be assured.
- Support the raised trailer side so that unintended falling of the trailer is prevented.

Attention

Observe the instructions in the operating manual for the axle and brake.



▲ Figure 8.2
Piston rod stroke

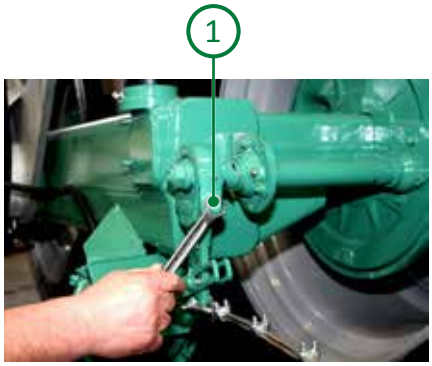


▲ Figure 8.3
Notched toothing on the cam shaft.

8.8.1. Parking brake with notched toothing on the cam shaft

All positions are shown in figure 8.3.

- Move the brake system and hand spindle brake to the release position.
- Loosen and remove the nuts (2) on the brake cam; pull the brake lever (4) out of the toothing until it is disengaged from the toothing of the toothed shaft (3).
- Turn the toothed shaft (3) in the spreading direction of the brake jaw until the wheel moves freely.
- Engage the brake lever (4) in the toothing, then screw the nut (2) onto the thread (1) of the brake cam and tighten it.
- Check whether the wheel brake rotates freely and whether all wheels have the same braking effect (use a brake test stand, if necessary).



▲ Figure 8.4
Parking brake with linkage adjuster.

8.8.2. Parking brake with linkage adjuster

- Move the brake system and hand spindle brake to the release position
- Reduce the idle stroke – turn the linkage adjuster (1) (s. figure 8.4) clockwise.
- Check whether the wheel brake rotates freely.
- Check whether all wheels have the same braking effect (use a brake test stand, if necessary).

Attention

Use suitable materials (e.g. cardboard or wood) when searching for leaks.

8.9. Hydraulic lines

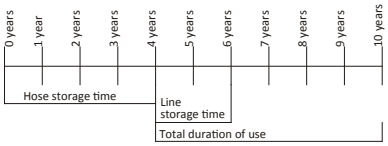
- Keep the hydraulic lines clean, especially the connection points.
- Inspect the hydraulic lines for damage after every use of the pump tanker; this inspection must be performed at least once a year.
- If defects are found during inspections, they must be remedied immediately by taking suitable measures.
- The duration of use of hose lines must not exceed six years. Check this based on the date imprinted on the lines. The following example shows how to determine when the hose lines need to be replaced:
  The hose material shown in figure 8.5 was manufactured in the month of July (=07M) in the year 2010 (/10). According to a recommendation in DIN 20066:201010 hose material can be stored for a maximum of 4 years before being used to manufacture a hose line. After the hose material has been used to manufacture a line, both ends of the hose have connecting elements showing the date the line was manufactured. In the example shown here (No., p. 8), the manufacturer is Schild (1) in Nilling (2), the date of manufacture of the line is 03 (3) / 2011 (1) and the pressure rating is PN 330 (5). The maximum recommended period for using a hose is 6 years.

▲ Figure 8.5
Hydraulic hose date of manufacturer

The hose material may be stored for a maximum of 2 years. This means the line can be used in the machine for a minimum of 4 years (max. duration of use: 6 years minus maximum storage duration: 2 years = 4 years) and a maximum period of 6 years, if the manufacture of the line and the initial commissioning of the machine coincide (s. figure 8.6).

In this example that means the hose must be replaced no later than June 2017.

Since the hydraulic hoses installed on your vehicle are completely exposed to weather, they must be replaced after 6 years at the latest. The manufacturer will assume no liability for accidents resulting from lines that were not replaced as specified.



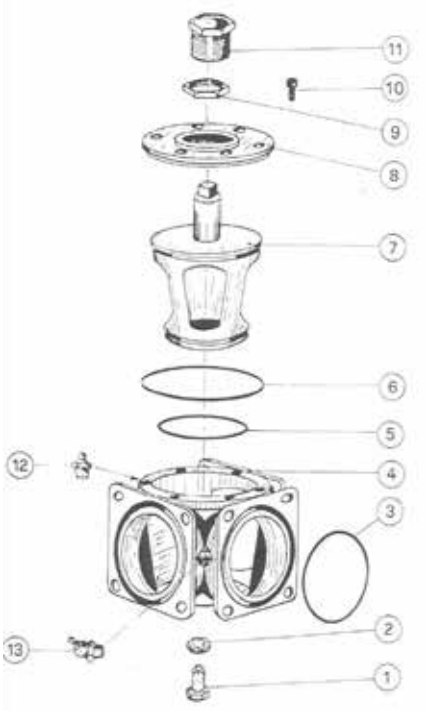
▲ Figure 8.6
Hydraulic hose total duration of use

▲ Figure 8.7
Hydraulic hose connecting piece

8.10. Three-way tap

The basic adjustment of the three-way tap is described below and in figure 8.8. This is not a substitute for reading and complying with the specific operating manual for the three-way tap.

- Loosen locknut no. ⑨, pressing screw no. ⑪, adjusting screw no. ① and locknut no. ②.
- Grease the lubrication nipples on the three-way tap, while simultaneously turning the brass plug no. ⑦.
- Apply the pressing screw no. ⑪ lightly by hand and secure with the locking screw no. ⑨.
- Unscrew the adjusting screw no. ① one-fourth of a revolution and secure with the locknut no. ②.
- Check function for free movement.
- In case the function is sluggish, it may be necessary to loosen the pressing screw somewhat.
- **If there is too much play, full sealing of the three-way tap is no longer ensured.**
- Maintenance of the three-way tap must be performed at least after every 25 hours of operation.
- **Grease the lubrication nipples in the bottom and top only lightly (do not create pressure)!**
- **If the plug cannot be moved after lubrication, unscrew and remove the lubrication nipple. This will relieve the pressure caused by lubrication and the plug can be moved again.**



▲ Figure 8.8
Three-way tap

8.11. Pump

To ensure a long service life of the pumps used by us it is absolutely necessary to observe the information in the manufacturer's operating manual for the pump tanker pump installed in your attachment.

The following general conditions are required for proper use:

- Keep pipes free of foreign objects such as stones, wood residue, etc.. Such foreign objects lead to increased wear of the rotary pistons and the pump housing.
- In the case of highly viscous substances the pump speed must be reduced according to the viscosity to prevent interruption of the suction flow. This protects the pump against cavitation.
- In case of frost hazard the pump must be emptied through the suction of air by forward or reverse pumping. This can be achieved by means of drain taps in the connections. For complete emptying the cover must be removed.
- **Before each commissioning, fill the pump with liquid (such as water) via the flushing connection to prevent dry running.**
- During hot periods, fermentation processes can take place in the closed pipes. The gas that is formed can damage the pump or pump system as a result of the sharp increase in pressure.
- Take breaks in operation (never operate the pump for more than one hour) and open the valve on the pump and empty the pump and the pipes.
- In case of extended downtimes flush the pump thoroughly with clear water and open all drain openings and flushing connections. Make sure that no medium is trapped in the pump.

▲ Figure 8.9
HYDAC hydraulic accumulator

8.12. HYDAC hydraulic accumulator

Hydraulic accumulators (see figure 8.9) are installed on your pump tanker. The number of accumulators depends on the hydraulic equipment, particularly on the number of hydraulic pumps.

The following applies for the hydraulic accumulators:

- The pressure equipment must only be operated within its permissible operating parameters (refer to identification on the pressure equipment).
- The pressure equipment (hydraulic accumulator) is gas-pressurised.
- Commissioning, maintenance and repair must only be carried out by trained / instructed qualified personnel. The pressure equipment (hydraulic accumulator) must normally be filled with nitrogen only. Fort this purpose, a filling device supplied by HYDAC must be used.

- No modifications (welding, drilling, forceful opening, etc.) are permitted on the pressure device.

Attention

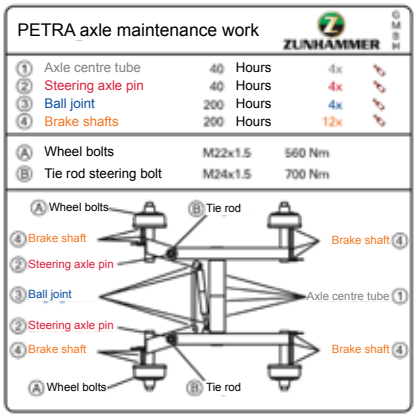
Do not open the pressure equipment (hydraulic accumulator before the gas and liquid side have been depressurised. The equipment contains nitrogen – danger of asphyxiation.

8.13. Maintenance of important components

- Depending on the equipment installed in your pump tanker you must conduct various maintenance tasks. For attached implements and components, refer to the information in the specific operating manuals.
- Inspect the hose mounts for proper condition before and after each use. If the mount shows signs of damage, it must be replaced immediately.
- Every time you start up the pump tanker, inspect it for rust and remove any rust that is found. Components such as screws may need to be replaced.
- Check to determine which axle is installed in your pump tanker. You must follow the instructions in the respective operating manual of the axle for the maintenance of the axle.

8.13.1. PETRA axle:

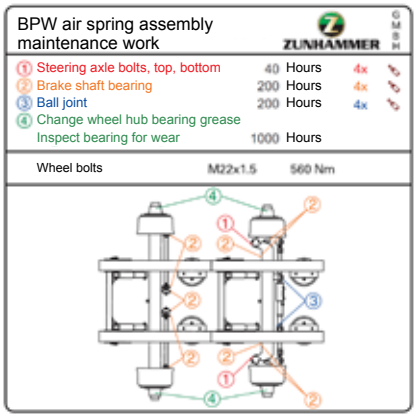
- Axle centre tube (no. 1) and steering axle pin (no. 2) must be lubricated with 4 strokes of a grease gun at least every 40 operating hours.
- The location of the sticker 12 on the vehicle is indicated in chapter 4.4 on page 28.
- The ball joint (no. 3) must be lubricated with 4 strokes of a grease gun at least every 200 operating hours.
- The brake shaft (no. 4) must be lubricated with 12 strokes of a grease gun at least every 200 operating hours.
- Check the tightening torque of the screw connections according to the specifications of the sticker at least once per season. The connections should be checked at least every 3 months when the pump tanker is in continuous use.
- **Always conduct maintenance tasks within the scheduled periods. Failure to do so can result in damage to components and loss of guarantee and liability claims**



▲ Figure 8.10
PETRA axle maintenance work

8.13.2. BPW air spring assembly

- The upper and lower steering axle pins (no. 1) must be lubricated with 4 strokes of a grease gun at least every 40 operating hours.
- The brake shaft bearing (no. 2) and ball joint (no. 3) must each be lubricated with 4 strokes of a grease gun at least every 200 operating hours.
- The wheel hub bearing (no. 4) must be inspected for wear at least every 1000 operating hours. The bearing grease must be changed in the process.



▲ Figure 8.11
BPW air spring assembly maintenance work

- Check the tightening torques for the wheel bolts every 40 hours. The connections should be inspected daily for trailers in continuous use. After a wheel change, check the specified torque after 2 hours and after 8 hours of use. Then you can repeat the inspection in standard intervals. The location of the sticker from figure 8.11 on the vehicle is indicated in chapter 4.4 under no. 11, page 27.
- **Always conduct maintenance tasks within the scheduled periods. Failure to do so can result in damage to components and loss of guarantee and liability claims**

9. Tables

9.1. Lubrication and maintenance table

GTW K...PU	prior to every commissioning	after every use	prior to extended downtime	after 25 hours[2]	after 40 hours[2]	after 200 hours[2]	after 1000 hours, at least 1 x per year[2]
Check for roadworthiness and operational safety.	●	●		●			
Check if the safety devices are in proper operating condition.	●			●			
Check for rust and damage. Remedy identified defects.	●		●				
Check the serviceability of the slurry gate valve and the seal for the filling hole (see chapter 6.3, p. 32)	●			●			
Visually inspect the entire hydraulic system for leaks and in particular for damage to the hydraulic hoses and lines (see chapter 8.9, p. 46). Also the check the duration of use of the hydraulic hoses (see chapter 8.9, p. 46)	●	●	●	●			
Check for leaks in the tank attachments	●			●			
Inspection of the brake lifting link (see chapter 8.8, p. 45)	●			●			
Check of the fill level indicator (see chapter 6.3, p. 32)	●						
Inspection of the ventilation hose (see chapter 6.3, p. 32)	●		●	●			
Functional test (especially after extended downtime) of the three-way tap (check without hydraulics, see chapter 6.3, p. 32 and 8.10, p. 47 [1])	●			●			
Visual inspection of pump	●			●			
Fill water in the pump to prevent dry running (see chapter 6.3, p. 32)[1]	●						
Flush pump with water, open all outlets (see chapter 8.11, p. 48)	●	●					
Visual inspection of the rims for damage	●	●	●				
Check of the tyre air pressure (tyre pressure table in Technical Manual, chapter D, p. 9)	●			●			
Relief of the wheels			●				
Protection from direct solar radiation			●				
Check of the tightening torque of the wheel nuts (for correct torque, refer to chapter 9.2, p. 53)	●			●			
Drain condensate from the air tank [3]	●						
Check of the tightening torque of the tie rod steering bolt							●
Check the hydraulic accumulator for tightness and expiration date (see chapter 8.12, p. 48)					●		

[1] Refer also to the component-specific operating manual
[2] Vehicle in continuous operation
[3] Equipment varies

GTW K...PU	prior to every commissioning	after every use	prior to extended downtime	after 25 hours[2]	after 40 hours[2]	after 200 hours[2]	after 1000 hours, at least 1 x per year[2]
BPW air spring assembly [3] (see chapter 8.13.2, p. 49)							
Steering axle bolts (no. ①), top and bottom: 4 strokes with grease gun					●		
Brake shaft bearing (no. ②): 4 strokes with grease gun						●	
Ball joint (no. ②): 4 strokes with grease gun						●	
Wheel hub bearing (no. ④): change grease							●
Inspect bearing (no. ④) for wear							●
PETRA axle [3] (see chapter 8.13.1, p. 49)							
Axle centre tube (no. ①): 4 strokes with grease gun					●		
Steering axle bolt (no. ②): 4 strokes with grease gun					●		
Ball joint (no. ③): 4 strokes with grease gun						●	
Brake shafts (no. ④): 12 strokes with grease gun						●	
Check of the tightening torque of the tie rod steering bolt							●

[1] Refer also to the component-specific operating manual
[2] Vehicle in continuous operation
[3] Equipment varies

9.2. Screw tightening torques

Name	Dimensions	Torque
Hitch Z 40	M 16 x 1.5	280 (+20) Nm
Wheel bolt for bolt centring	M 18 x 1.5	270 Nm
	M 20 x 1.5	350 Nm
	M 22 x 1.5	450 Nm
	M 22 x 2.0	430 Nm
Wheel bolt for centring	M 18 x 1.5	320 Nm
	M 20 x 1.5	450 Nm
	M 22 x 1.5	650 Nm

Attention

Screws, washers and nuts may be replaced only with fastening material of the same quality and strength as the original parts! Please also observe the manufacturer's information!

Tightening torques for screws and nuts:

- Screws in accordance with EN ISO 4762:2004 and EN ISO 4014:2000
- Nuts in accordance with EN ISO 4032:2000

Thread diameter	Strength class 8.8	Strength class 10.9
M 8	23 Nm	34 Nm
M 10	46 Nm	68 Nm
M 12	79 Nm	117 Nm
M 14	125 Nm	185 Nm
M 16	195 Nm	280 Nm
M 18	280 Nm	390 Nm
M 20	390 Nm	560 Nm

10. Troubleshooting table

Fault	Cause	Remedy
Weak braking effect	Linings have not been broken in	The braking effect improves after a few braking processes.
	The brake slides all the way in	Adjust the brake (see chapter 8.8, p. 45)
	Heavy friction loss	Check the transmission device, oil if necessary
Inadequate hand brake effect	Linings have not been broken in	The braking effect improves after a few braking processes.
	Incorrectly adjusted	Adjust the brake (see chapter 8.8, p. 45)
	Heavy friction loss	Check the transmission device, oil if necessary
Rough handling	Shock absorber defect	Replace shock absorbers
	Brake system incorrectly adjusted	Adjust the brake (see chapter 8.8, p. 45)
	Loose wheels	Tighten wheel bolts (see chapter 9.2, p. 53)
Sluggish reverse travel	Brake system adjustment too tight	Adjust the brake (see chapter 8.8, p. 45)
Pump vibrates heavily or is very loud	Incorrect speed	Reduce the speed (monitor the suction flow via the inspection glass; there must not be any bubbles)
Pump does not pump	Substrate too viscous	Dilute the substrate with water
		Reduce the speed (monitor the suction flow via the inspection glass; there must not be any bubbles)
	Three-way tap in incorrect position	Set the three-way tap to “Tank”.

VI. Appendix

A. EC Declaration of Conformity

corresponding to EC Directive 2006/42/EC in the version from May 2006

The company	ZUNHAMMER GmbH Biebing 19 83301 Traunreut Germany

hereby declares that the product:

with the types:	K6.5PU	MK11PU
	K8PU	MK12PU
	K10PU	MK14PU
	K11PU	MK15.5PU
	K12.5PU	SK15.5PU
	K14PU	SK17PU
	K15.5PU	SK18.5PU

conforms to the following standards and guidelines:	Machinery Directive 2006/42/EC DIN EN ISO 12100:2010 DIN EN ISO 4254-1:2009 DIN EN ISO 13857:2008 DIN EN 707:2009
Documentation officer:	Rudolf Zunhammer Dipl.-Ing. (FH) Mechanical Engineering Robert-Bosch-Str. 23 83374 Traunwalchen

Traunreut, 01/08/2013

Dipl.-Ing. (FH) Rudi Zunhammer

B. Hitch

Attention

The permissible supported load must never be exceeded and / or never be negative!

In order to ensure that the vehicle combination conforms to statutory and technical minimum requirements, the following items must be checked:
A maximum supported load must be specified on the type plate of the towing attachment of the tractor. This specification must never be exceeded.
Alternatively, a “D-value” is specified on the type plate of the towing attachment of the tractor. This must never be exceeded. The D-value of the vehicle combination is calculated as follows:

$$D = g \times (m_K \times m_A) / (m_K + m_A) \text{ [kN]}$$

$g = 9.81$

m_K = permissible gross weight of the tractor (motor vehicle) [in tons]
m_K = permissible gross weight of the trailer [in tons]
A brief example should illustrate this:
The permissible gross weight of the tractor is 15.5 tons and the permissible gross weight of the trailer is 20.0 tons. The D-value on the type plate of the towing attachment is 103 kN.

$$D = g \times (m_K \times m_A) / (m_K + m_A) \text{ [kN]}$$
$$D = 9.81 \times (15.5 \times 20.0) / (15,5 + 20.0) \text{ kN}$$
$$D = 85.6 \text{ kN} < D_{\text{permissible}} = 103 \text{ kN}$$

Therefore, the combination between this tractor and trailer complies with specifications.

Type of device	Type	$V_{max.}$ [km/h]	Gross weight [kg]	Supported load [kg]	D-value	Comment
Towing eye	40	< 25 > 25	18,000	2,250 1,800	86.7	Drawbar coupling DIN 11029, height-adjustable
Towing eye	40 B	< 25 > 25	20,000	2,500 2,000	77.3	Upper suspension
Towing eye	40 D	> 25	32,000	2,000	79	Upper suspension
Towing eye	B50-30 A50-30	< 25	18,000	2,000 3,000	97.1 63.06	Lower suspension
Towing eye	D50-41	> 25	33,000	3,000	93.6	Lower suspension
Towing eye	80-3045	< 40	33,000	3,000	97.2	Ball coupling 80

C. Own notes