METAL-FACH

MANURE SPREADER
N272/1, N272/2

INSTRUCTIONS MANUAL – PART II

TRANSLATION OF THE ORIGINAL INSTRUCTIONS MANUAL

REVISION I

JANUARY 2019

Instructions Manual No. N272/1_2-01-167/2013

Table of contents

PART I

PART II

The symbols used in the instructions

DANGER

Hazard warning symbol - points to the occurrence of a serious hazard condition, which, if not avoided, can result in death or serious injury. The symbol warns against the most-dangerous situations.

NOTE

The symbol pointing to especially important information and recommendations. Non-compliance with the described recommendations threatens serious damage to the machine due to its incorrect operation.

WARNING!

The symbol indicating the possibility of the occurrence of a hazard, which, if not avoided, can result in death or serious injury. This symbol indicates a smaller level of risk of injury than the symbol including the word “DANGER”.

The symbol indicating useful information.

The symbol indicating service operations which should be performed periodically.

4. Instructions for use

4.1 Preparing the machine for operation

4.1.1 Checking the spreader after delivery

The spreader delivered to the user is completely assembled and does not require any additional assembly. However, this does not release the user from the obligation to check the machine before purchasing and commissioning it.

Before coupling the spreader, check if the tractor is suitable for this purpose. The spreader may only be coupled with a tractor that meets the requirements listed in Table 1

NOTE

NOTE!

Before coupling and putting the spreader into operation for the first time, it is mandatory to learn the design of the spreader, the layout of individual components, as well as read and follow the contents of this Instructions Manual and the PTO shaft manual supplied with the machine.

The spreader may only be coupled to an agricultural tractor which has a hitching device suitable for connection to single-axle trailers, as well as suitable sockets for the brake, hydraulic, and electrical systems.

The oil in the tractor's external hydraulic system must be compatible or miscible with the spreader oil.

Before connecting the machine to the tractor, the operator must check the technical condition of the spreader and prepare it for the start-up. The inspection includes

- machine completeness
- the condition of the paint coating and any mechanical damage to individual components
- protective guards and shields for their technical condition and the correctness of their installation
- hydraulic and pneumatic hoses for their technical condition
- articulated telescopic shafts with guards for their technical condition
- hydraulic system and transmissions for leaks

4.1.2 Preparing the spreader for start-up

Before starting the trailer for the first time, check

Before starting the trailer for the first time, check

- the lubrication points and lubricate the components, if necessary
- the correct tightening of screw connections (ground wheels, drawbar, spreading beater parts)
- the oil level in the gearboxes of the beater unit and floor feeder
- the floor feeder for chain tension
- that the PTO shaft transmitting the tractor's drive is of sufficient length when connected in all possible positions of the tractor in relation to the machine (Figure 18);
- the tractor's PTO shaft speed setting is compatible with the required spreader drive speed

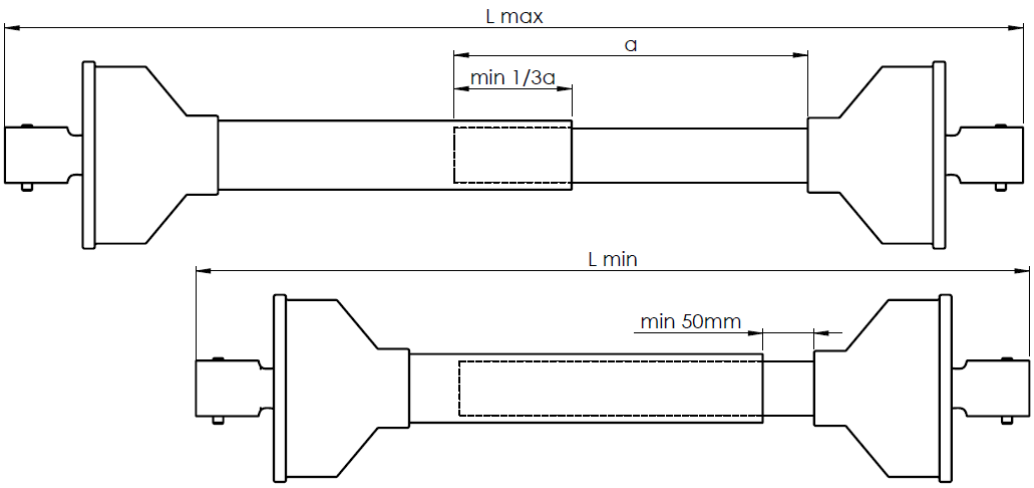

Figure 18 Adjusting the length of the shaft when the spreader is connected to the tractor

NOTE

NOTE!

The PTO shaft tubular profiles should work overlapped by 1/2 a shaft length under normal operating conditions, and 1/3 a shaft length under extreme operating conditions.

Observe the instructions of the shaft manufacturer when fitting the PTO shaft.

Due to the incorrect adjustment of the PTO shaft which transmits the drive from the tractor it can be damaged or destroyed when driving on uneven terrain, and when cornering.

The adjusted compatibility of the PTO shaft applies to only one type of tractor which works with the spreader. If the machine is coupled with another tractor, check that the shaft fit is correct again.

4.1.3 Shifting the hitch position

The pre-assembled spreader is designed to be coupled to the tractor's lower hitch - Figure 19.

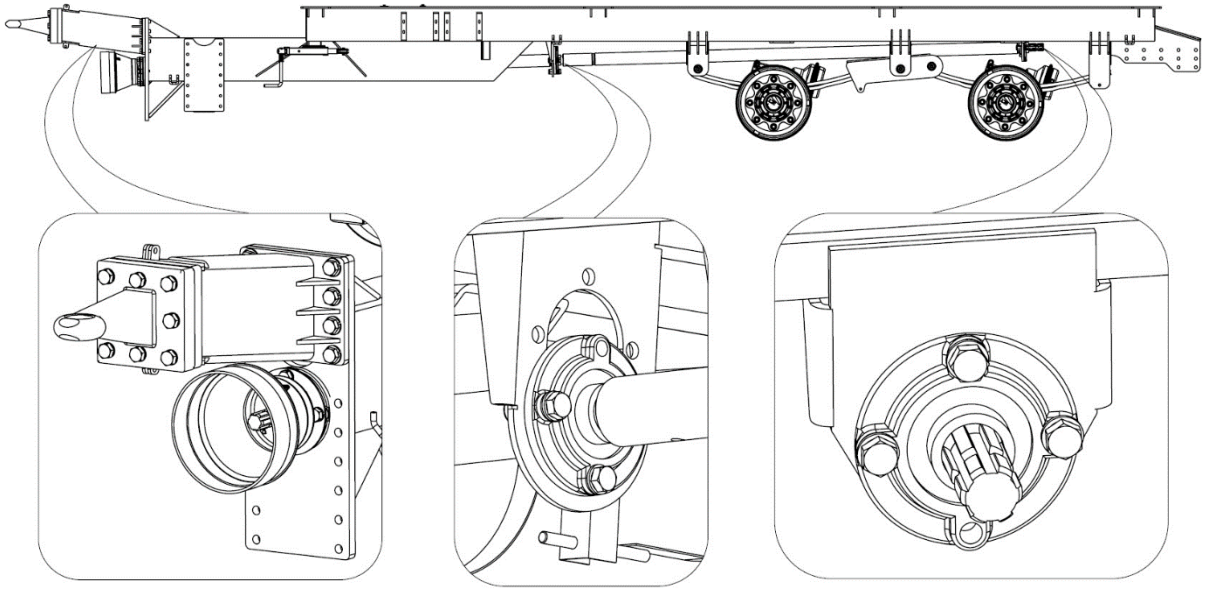

Figure 19 The positions suitable for connection to the tractor's lower hitch

It is possible to shift the position of the drawbar so as to adapt it to the tractor's top hitch. If it is necessary to shift the position of the hitch, the drive shaft of the spreader adapter must also be repositioned - Figure 20. Tighten the M20 10.9 screws with a torque of 468.9 Nm to fix the hitch, tighten the M16 10.9 screws with a torque of 237.4 Nm to fix the hitch eye, and tighten the other mounting screws of the drive shaft according to the torques given in Table 16.

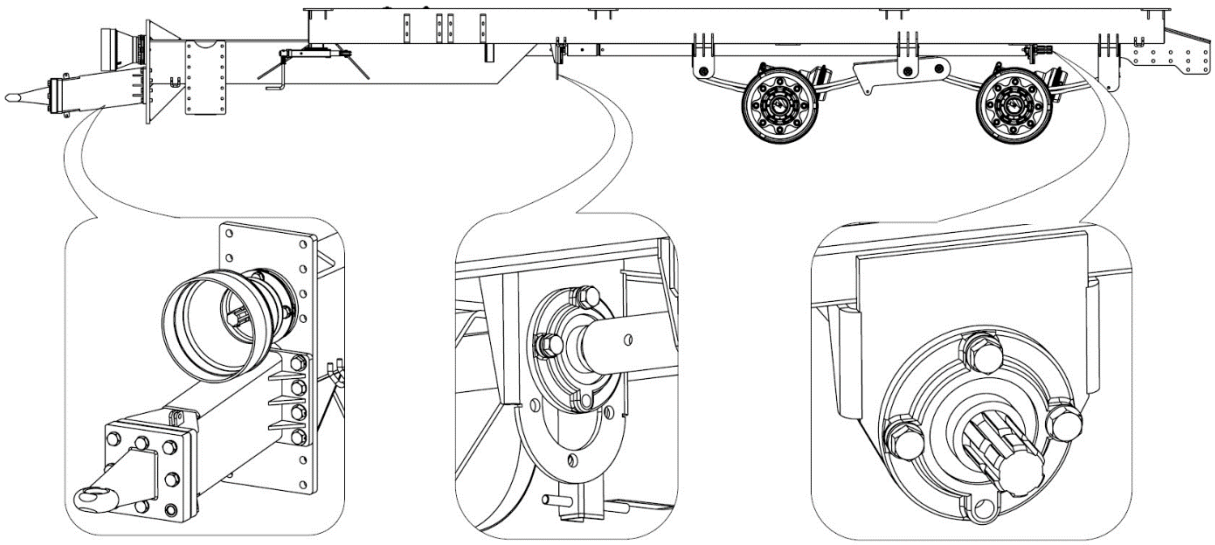

Figure 20 The positions suitable for connection to the tractor's upper hitch

If the spreader is connected to the tractor via the lower hitch, the height of the hitch can be shifted by moving it down to the next holes by 57 mm - Figure 21.

The adjustment is required if the spreader is not horizontal after being coupled with the tractor.

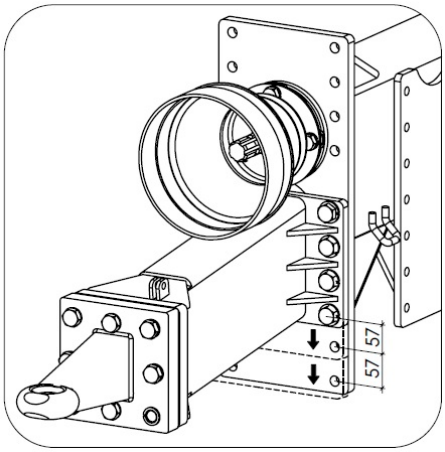

Figure 21 Adjusting the hitch height

The height of the lower plane of the hitch eye relative to the ground when connecting the tractor via the lower link is 600mm, and the link can be lowered to the heights of 543mm and 486mm. The height of the lower plane of the hitch eye relative to the ground when connecting the tractor via the upper link is 1010mm. The values are valid for standard 550/60-22.5 size tyres and an unloaded spreader.

4.1.4 Start-up

If the preparatory work has been completed and the spreader is in good working order, couple it with the tractor. After starting the tractor, check the function of the individual systems when parked and without load. For the start-up follow the procedure below

1) Couple the spreader with the tractor hitch
2) Connect the power take-off shaft and secure it correctly
3) Connect the braking, hydraulic and electrical hoses
4) Lift the support leg
5) Check the proper operation of the lighting system
6) Release the parking brake of the spreader
7) Start the tractor
8) After you have moved off check the function of the service brake.
9) Check the operation of the floor conveyor
   - on the front-mounted flow controller, select the feed rate from “3” to “10”
   - use a corresponding tractor valve block lever to actuate the floor conveyor
   - look through the openings in the front shields to observe the movement of the conveyor bars and verify their correctness of movement direction; reverse the conveyor direction by switching the position of the valve block lever on the tractor
10) check the proper operation of the beater-unit shields
   - open and close the beater-unit shields using a corresponding tractor valve block lever
11) start the PTO shaft drive at low engine speed (start the beater auger drive)
12) allow the beaters run at low engine speed for a few minutes and ensure that

- the beater drive system and the beater unit do not generate any knocks or other disturbing noises
- the beater augers rotate smoothly without jamming

13) Switch off the PTO shaft drive, switch off the tractor engine and uncouple the spreader from the tractor.

NOTE

NOTE!

The PTO shaft speeds must correspond to those specified in Table 3.

If all preparatory work has been completed successfully, the spreader may be approved for use. If any malfunction or faults of individual systems are found during the start-up, report them to the distributor or directly to the Manufacturer to solve the problem or to carry out repairs.

NOTE

NOTE!

Failure to follow the recommendations in the Instructions Manual or starting up the machine incorrectly can result in damage.

Ensure that there are no reservations as to the technical condition of the spreader before it is put into operation..

4.2 Coupling and decoupling the spreader

The machine may only be coupled with a farming tractor which is in good working order, and fitted with all the necessary connections (braking, pneumatic, hydraulic and electric) and a tractor hitch, according to the requirements of the spreader manufacturer.

Before coupling the spreader to the tractor, use the parking brake to make sure the spreader is not moving.

NOTE

NOTE!

Before coupling the machine, check the technical condition of the tractor and spreader hitch, as well as the connective parts of the braking, hydraulic, and electrical systems.

NOTE

NOTE!

Use particular caution when coupling the spreader.

The hydraulic oil in the tractor and spreader must be miscible.

After coupling the spreader to the tractor, secure the braking, hydraulic, and electrical lines in such a way that they cannot be broken, worn, bent, crushed, or accidentally disconnected while driving.

For travel and operation, raise the support leg to its uppermost position, and close the hydraulic valve retaining the leg.

Coupling the spreader

To couple the spreader, follow the procedure below

1) Use the parking brake to make sure the spreader is not moving, and put the safety chocks underneath the wheels
2) Align the tractor straight in front of the spreader hitch.
3) Set the drawbar eye to a height which enables the machine to be coupled,
   - Connect the hydraulic lines of the support leg to the hydraulic sockets of the tractor's external hydraulic system
   - Open the locking valve of the hydraulic support leg (located close to the leg)
   - Use the valve-block lever on the tractor to raise or lower the eye of the drawbar to a height which enables it to be coupled to the tractor's hitch
4) Reverse the tractor, connect the spreader to the tractor's hitch.
   - Check the securing pin of the coupling, which prevents accidental disconnection of the machine
   - If the tractor is fitted with an automatic hitch, make sure the coupling is completed and the drawbar eye is secured

DANGER

DANGER!

Bystanders are not allowed to stand between the spreader and the tractor during the coupling procedure.

When coupling the machine, the operator of the tractor should exercise particular caution, and make sure no unauthorised persons are in the danger zone.

When connecting the hydraulic lines, make sure the hydraulic systems of the tractor and spreader are not pressurised.

5) Use the valve-block lever on the tractor to lift the support leg to its uppermost position.
6) Apply the tractor’s parking brake, switch off the tractor’s engine, remove the ignition keys, and secure the tractor against unauthorised access.

7) Close the support leg's locking valve. If the tractor has too-few hydraulic sockets for the connection of other hydraulic systems, the hydraulic lines of the support leg can be disconnected for travel and operation. When disconnecting the hydraulic lines, make sure the pressure in the lines is reduced.
8) Connect the pneumatic braking system hoses of the 2-line braking system - the yellow pneumatic hose to the yellow pneumatic socket of the tractor, the red pneumatic hose to the red pneumatic socket of the tractor.
   - If the spreader is fitted with hydraulic brakes, connect the hydraulic hose for the spreader's brakes to the plug of the tractor's hydraulic braking system. Then connect the activation chain of the emergency brake valve to a permanent part on the tractor
   - if the spreader is equipped with hydraulic-pneumatic brakes, connect the pneumatic or hydraulic braking system, depending on which machine brake-control system the tractor is equipped with.
9) Connect the hydraulic hoses of the floor-conveyor driving system
10) Connect the hydraulic lines of the gate system
11) Connect the hydraulic hoses of the beater-shield control system
12) Fit the PTO shaft and secure the sheaths against rotation
13) Release the parking brake of the spreader

Uncoupling the spreader

To uncouple the spreader, follow the procedure below.

1) Use the tractor's valve-block lever to extend the support leg so that the drawbar eye is in a suitable position to safely uncouple the tractor.
2) Apply the tractor parking brake, switch off the tractor's engine, remove the ignition keys, and secure the tractor against unauthorised access.
3) Close the locking valve of the hydraulic support leg (located close to the leg)
4) Release the pressure in the individual hydraulic systems of the tractor.
5) Secure the spreader using the parking brake and place the safety chocks under the wheel.
6) Uncouple the hydraulic hoses of the systems for the hydraulic leg, the floor conveyor and the gate and beater-unit shields, then put covers over them and hang the plugs on the holder on the front wall.
7) Disconnect the braking-system hoses
8) Uncouple the hydraulic hoses of the floor-conveyor driving system
9) Disassemble the power take-off shaft and secure it correctly
10) Uncouple the spreader from the tractor hitch and pull away with the tractor.

NOTE

NOTE!

Use particular caution when uncoupling the spreader from the tractor.

Uncoupling the loaded machine from the tractor and leaving the loaded spreader parked and supported on the support leg are not allowed.

Dismantling the support leg and supporting the machine on temporary stands are not allowed.

4.3 Loading the spreader structure

Before loading, drive and park the correctly coupled tractor and spreader to stable, horizontal, ground. Park both machines in the straight-ahead position and apply the parking brake on both of them.

Before loading, make sure there are no persons, objects (stones, pieces of wood, etc.), inside the spreader's structure, that the structure's gate is fully lowered, and the floor conveyor is not damaged.

NOTE

NOTE!

For transporting and operating the laden spreader, the front-axle load of the tractor must be at least 20% of the tractor weight.

Use suitable loaders, front-end loaders or conveyors for loading. Start manure loading at the rear of the spreader structure and keep loading in layers. During the loading, empty the bucket smoothly from the lowest possible height. Do not try compacting the manure.

Ensure an even distribution of the load to achieve optimum spreading conditions. Due to the differences in the density of the spreading material, using the entire structure capacity can result in exceeding the spreader's permissible design payload capacity. Therefore, both the design and (gross) permissible vehicle weights must be observed. The approximate density of the selected materials is shown in Table 8.

Table 8 The approximate density of selected materials

Material type	**Density [kg/m^3]**
Fermented manure	700-800
Composted manure	800-950
Fresh manure	700-750
Compost	950-1100
Peat	330-650
Agricultural lime	2700-3400

Regardless of the type of material carried, the user is obliged to secure it in such a way that it cannot move freely and pollute the road. If this condition cannot be met, carrying such materials is prohibited.

NOTE

NOTE!

It is forbidden to exceed the gross weight.

An unevenly distributed load causes uneven spreading of the material in the field.

4.3.1 Loading and spreading lime

The spreading of loose agricultural lime and derivatives is permitted. Failure to observe the following guidance can result in damage to the spreader.

General recommendations for spreading agricultural lime

1) The maximum weight of the lime-loaded spreader must not exceed 5.5t for the N272/1, 6.5t for the N272/2, i.e. 1/3 of the height of the spreader structure (0.4 m in N272/1, and 0.45 m in N272/2 from the spreader structure floor)
2) Spread lime immediately after loading, as it can set permanently on the floor of the spreader after a long period of time, and can immobilise the chains and bars
3) Prevent any contact of the lime-loaded spreader with moisture, and switching the floor-conveyor drive on during any precipitation is not allowed (unload manually if water gets inside the lime-loaded spreader)
4) Due to its compaction properties, lime can accumulate in chain links and sprockets, so inspect the condition of all floor-conveyor components regularly (preferably after each pass)
5) Chains, feeder bars, and sprockets must be thoroughly cleaned after each lime-spreading work session (a pressure washer using clean water or appropriate products is recommended for this purpose), while washing and drying must be carried out at a temperature above zero
6) Degrease greasy or oily surfaces with petroleum ether or degreasers, and then wash with clean water and detergent

Manure spreaders are not typically designed for spreading lime and its derivatives. When spreading lime from the spreaders, the optimum spreading parameters will not be achieved in comparison to lime spreading from machines specifically designed for this purpose.

NOTE

NOTE!

Strictly adhere to the recommendations provided for lime spreading.

Failure to adhere to the rules for lime spreading with the spreader can result in damage to the machine.

When spreading lime or derived fertilisers, use suitable protective clothing and PPE, and observe the general regulations for fertiliser application.

4.4 Fertiliser application-rate control and manure spreading

4.4.1 Fertiliser-application-rate control

The spreading dosage over a certain area of the field depends on the following factors

1) Feeding speed of the floor conveyor
2) Driving speed
3) Loading heights of the structure
4) Effective spreading width, depending on the type of spreading material

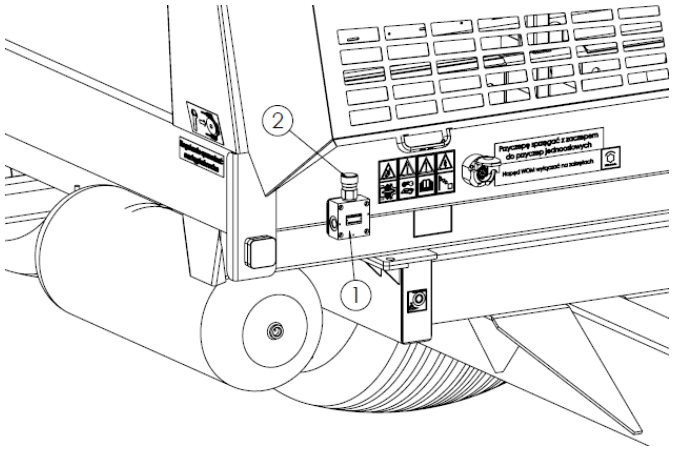

Figure 22 Adjusting the feeding speed of the floor conveyor
1 - oil flow controller, 2 - controller knob

Select the feeding speed of the floor conveyor by trial and error, and adjust it with the knob on the flow controller, on the right wall of the spreader structure.

Adjusting the feeding speed of the floor conveyor

- Turn the controller knob clockwise towards “0” to decrease the feeding speed of the conveyor
- Turn the controller knob counter-clockwise towards “10” to increase the feeding speed of the conveyor

Low travel speed and high load-feeding speed result in a high fertiliser-application rate.

High travel speed and low load-feeding speed result in a low fertiliser-application rate.

Table 9 The manure application rate (with a density of 950kg/m^3) depending on the feeding speed of the floor conveyor and the actual work speed of the 2-auger vertical beater unit

Setting No.	Conveyor capacity [kg/s]	Spreader work speed [km/h]						
		4	5	6	7	8	9	10
		Dose of manure [t/ha]						
2	4.2	5.5	4.9	4.1	3.6	2.8	2.3	1.8
3	8.5	9.6	7.7	6.4	5.5	4.8	4.3	3.8
4	19.1	21.5	17.2	14.3	12.3	10.7	9.6	8.6
5	34.3	38.6	30.9	25.7	22.0	19.3	17.2	15.4
6	51.2	57.6	46.1	38.4	32.9	28.8	25.6	23.0
7	66.8	75.2	60.1	50.1	42.9	37.6	33.4	30.1
8	86.2	97.0	77.6	64.7	55.4	48.5	43.1	38.8
9	102.4	115.2	92.2	76.8	65.8	57.6	51.2	46.1
10	132.7	149.3	119.4	99.5	85.3	74.6	66.4	59.7

Table 10 The manure application rate (with a density of 950kg/m^3) depending on the feeding speed of the floor conveyor and the actual work speed of the 2-auger vertical disc beater unit

Setting No.	Conveyor capacity [kg/s]	Spreader work speed [km/h]						
		4	5	6	7	8	9	10
		Dose of manure [t/ha]						
3	7.2	8.2	6.5	5.4	4.7	4.1	3.7	3.2
4	16.2	18.3	14.6	12.2	10.3	9.1	8.2	7.3
5	29.1	32.8	26.2	21.8	18.7	16.4	14.6	13.1
6	43.5	48.9	39.2	32.6	27.9	24.5	21.8	19.5
7	56.8	63.9	51.1	42.6	36.5	32.0	28.4	25.6
8	73.3	82.4	65.9	55.0	47.1	41.1	36.6	33.0
9	87.0	97.9	78.4	65.3	55.9	49.0	43.5	39.2
10	112.3	126.9	101.5	84.6	72.5	63.4	56.4	50.7

4.4.2 Spreading manure

Before starting to spread manure, recheck the condition of the hydraulic connections and safety guards.

To limit the spreading action and achieve precise fertilisation of the field at the boundaries, set and lock the right-hand shield of the beater unit in a desired position. Use a hydraulic valve to lock it - Figure 23. The degree of opening of the left-hand shield of the beater unit can be adjusted from the driver's position using the valve-block lever after the right-hand shield has been locked.

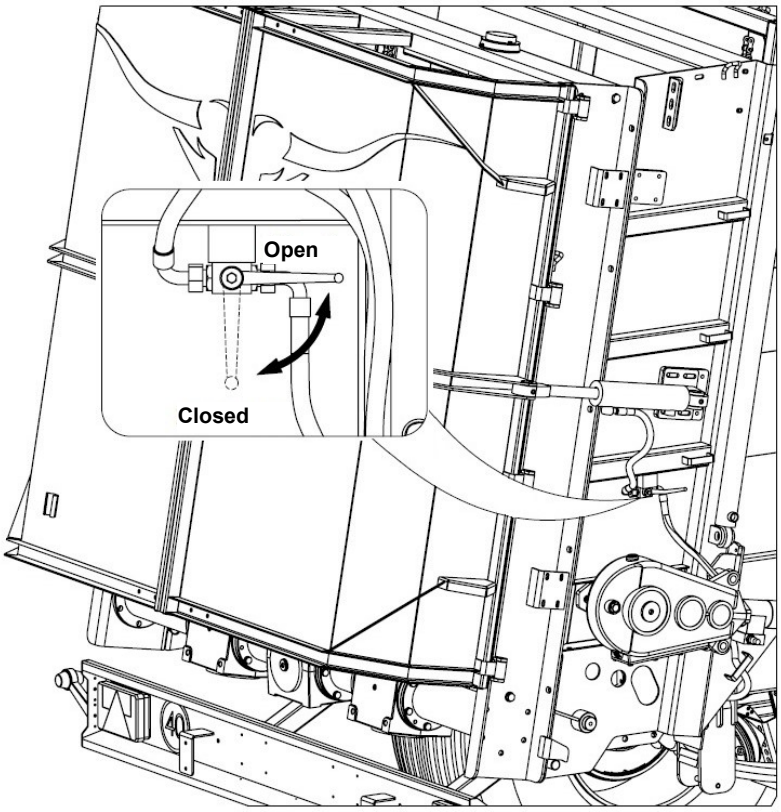

Figure 23 The hydraulic valve for locking the beater-unit shield

DANGER

DANGER!

Operating the spreader with safety guards removed or a damaged telescopic articulated shaft poses a direct risk to the life and health of the operator.

Bystanders or animals are not allowed to stand in the spreading zone.

Keep a safe distance from power lines, especially when working with the spreader structure gate raised.

The PTO shaft speeds must correspond to those specified in Table 3. Using different PTO speeds can damage the beater unit or its drive

The procedure for starting manure spreading

1) Align the tractor and spreader combination directly straight with the point where fertilisation is to be started
2) Use proper valve-block lever on the tractor to open the beater shields
   - If the lock valve of the right beater shield is closed. only the left shield will open
   - To limit the spread, open the right-hand beater shield to the required position and then lock it with the hydraulic valve Open the left shield fully or move it other required position
3) Check that the PTO shaft of the tractor is set within the correct speed range
4) At low engine speeds, switch on the tractor's PTO shaft, increase engine speed until the beater augers reach optimum speed and keep it within this range
5) Raise the spreader structure gate fully
6) Use a correct valve-block lever to start the floor-conveyor drive and ensure that the correct direction of drive has been selected
7) Engage the tractor gear and start working as soon as sufficient manure volume has been fed onto the augers.

Completing the spreading procedure

1) In the final spreading phase, it is advisable to shift the structure gate down to the height of the fed material
2) In order to obtain the same spread rate in the final stage of spreading, reduce the travel speed or increase the feeding speed of the floor conveyor using the knob on the flow controller
3) Switch off the floor-conveyor drive after the spreader structure is completely empty
4) Lower the spreader structure gate fully
5) Reduce the engine speed and switch off the PTO shaft drive
6) Close the beater-unit shields fully
7) Clean the spreader after every spreading work if you are to drive on public roads to avoid surface contamination

NOTE

NOTE!

Strictly observe the sequence specified for starting the spreader. Following any different sequence can damage the spreader and endanger the health or life of the operator.

At headlands, after switching off the floor-conveyor drive, switch off the tractor's PTO shaft.

The direction of movement of the floor conveyor can only be reversed if the augers of the beater unit are locked. When moving the load towards the front, any contact by the load with the front wall of the spreader structure is not allowed.

4.4.3 Clogged spreader beater unit

When spreading manure, the spreader beater unit can get clogged, and the augers of the beater unit can be blocked due to the safety pin's being broken in the PTO shaft which transmits the drive from the tractor to the spreader. If the beater-unit augers come to a stop during spreading, immediately switch off both the floor-conveyor drive and the tractor PTO shaft drive.

Causes of the clogged beater unit can include

- objects such as stones, wood, etc. get into the unit together with the manure
- the feeding speed of the floor conveyor too high
- maintaining low PTO-shaft speed
- insufficient PTO shaft-speed
- high load density

Unblocking the spreader's beater unit

1) Switch off the PTO shaft drive and uncouple the PTO shaft from the tractor.
2) Reverse the floor conveyor by switching the valve-block lever on the tractor in the direction opposite to the normal feeder operation
   - Perform this action gradually
   - Reverse the conveyor only to such an extent that the material does not press on the augers
   - It is not permitted to move the conveyor forward when the load is in contact with the front wall of the spreader structure
3) Switch off the tractor's engine, apply the parking brake to stop the tractor and spreader, remove the ignition keys, and secure the tractor against unauthorised access
4) Use the appropriate tools to remove any objects which block the augers

5. Technical-service activities

5.1 Checking and adjusting the tension of the floor-conveyor chains

The tension of the floor-conveyor chains during operation must be checked daily, especially during the initial period of operation. Carry out the tensioning of the conveyor chains by adjusting the screws at the front of the spreader structure side walls - Figure 24. To increase chain tension, loosen the nut (2) while holding the nut (3) with a wrench and use the bolt (1) to move the bearing unit (4) forward. Follow the tensioning procedure on both sides of the spreader, ensuring that the chain tensions are equal.

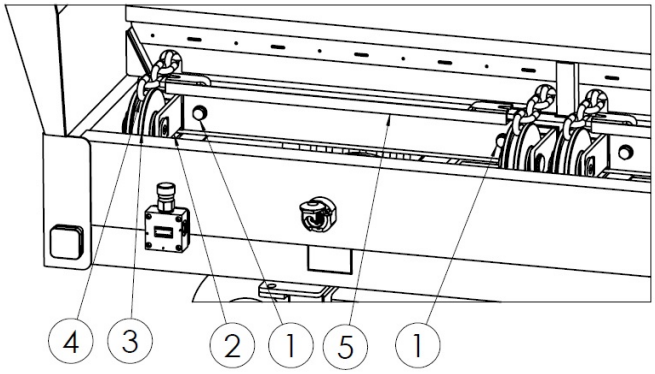

Figure 24 Tensioning the floor-conveyor chain
1 - adjusting screw, 2 - tensioner slide, 3 tensioner pulley, 4 - conveyor chain, 5 - conveyor bar

A chain with the correct tension can be moved to a height of 40-80 mm if a force of 50 kg is applied to the chain halfway along the length of the spreader structure.

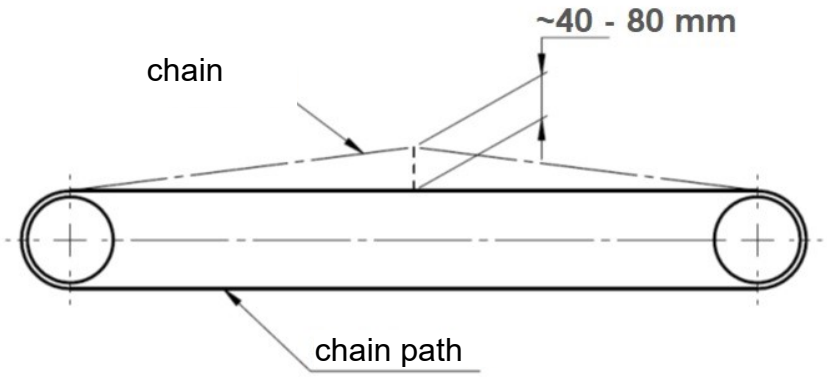

Figure 25 Checking the tensioning of the spreader chains

Should the range of chain-tensioning adjustment not be enough, the conveyor chain can be shortened by removing 2 chain links. An overly extended chain can be caused by incorrect chain tension adjustment and the clogging of the chain sprockets in the floor-conveyor. Chain-wheel clogging is caused by damaged or worn chain-sprocket scrapers, so check them regularly for working condition and replace if necessary.

NOTE

NOTE!

All conveyor chains must be adjusted to equal tension.
Too-weak tension in the chains can lead to damage to the spreader and pose a direct risk to bystanders or operators.

5.2 Checking the tension and tensioning the chains of the 2-auger horizontal disc-beater unit

Check the chain tension of the 2-auger disc horizontal beater-unit drive systematically every 8 hours of operation, and shorten this interval during the initial period of operation. To check the tension of the chains, remove the side guards of the beater unit. A properly tensioned chain should give 5-20mm under a force of 200 N (20kg) applied in the middle of the chain. If the chain is too loose, loosen the screws (2) and adjust the tensioner (3), retighten the screws, and recheck the chain tension. If the tension adjustment range is not enough, the chain must be replaced.

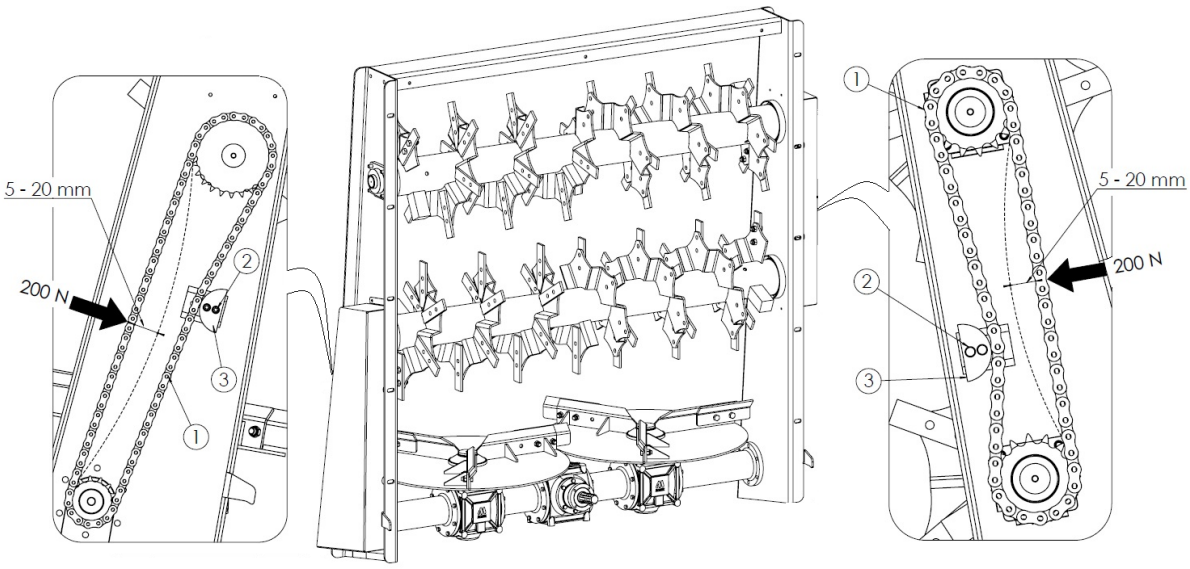

Figure 26 Tensioning the beater-unit chains

5.3 Hydraulic-system maintenance

The hydraulic system of the spreader must be leak-proof. Operating the spreader with a leaking hydraulic system is not permitted. Checking the tightness involves activating individual circuits of the hydraulic system several times. If an oil leakage is found, the connection must be sealed or the leaking line replaced.

Table 11 HL-46 hydraulic-oil specification

No.	Name	Value
1	Viscosity class as per ISO 34448VG	46
2	Kinematic viscosity	41.4 - 50.6 mm²/s (40°C)
3	Quality class as per ISO 11158	HL

A new spreader is fitted with a hydraulic system filled with HL-46 oil. The oil in the tractor's hydraulic system should be of the same type as the oil in the spreader's hydraulic system. Mixing oils of the same type is permitted provided that it is approved by the oil manufacturer. The hydraulic system of the spreader is not equipped with a filter, so the cleanness of the oil in the system depends on the condition of the filters in the hydraulic system of the tractor. The correct and trouble-free operation of the hydraulic system depends on the cleanness of the hydraulic oil.

Keep clean both the hydraulic quick couplings of the spreader hydraulic hoses and the hydraulic sockets of the tractor. After disconnecting the hoses from the tractor, wipe the plugs with a clean and dry cloth and cover them with protective caps.

Replace the rubber hydraulic hoses every 4 years, regardless of their technical condition, unless a fault has been found earlier.

Replace the filters and oil in the tractor's hydraulic system regularly to ensure the reliable and the durable operation of the spreader's hydraulic system.

NOTE

NOTE!

The hydraulic system is under high pressure during operation.

Check the tightness of the hydraulic system and the technical condition of the hoses regularly, and remove any leaks on an ongoing basis.

Use the hydraulic oil recommended by the manufacturer.

Never mix two types of oil.

Contaminated oil can cause the failure of hydraulic components

The oil used in the hydraulic system is not listed as a hazardous substance, but prolonged skin exposure can cause irritation. Use soap and water to wash the skin which has come into contact with oil.

5.4 Gearbox maintenance

Spreader-gearbox maintenance involves checking the level of, topping up, and changing the gear oil.

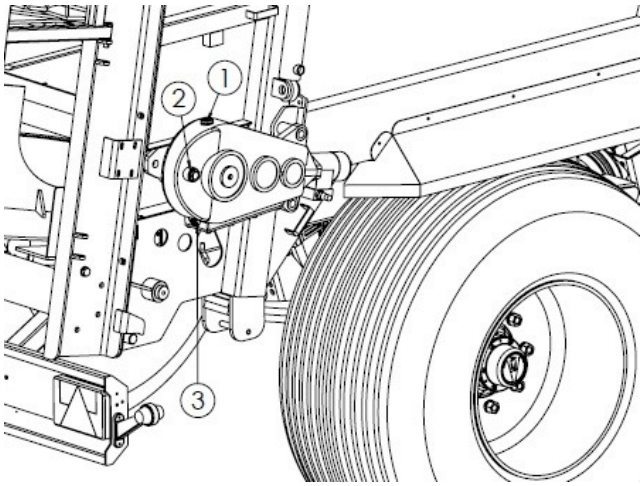

Figure 27 The oil-level check points of the floor-conveyor gearbox
1 - oil inlet (vent), 2 – oil-level sight glass, 3 - drain plug

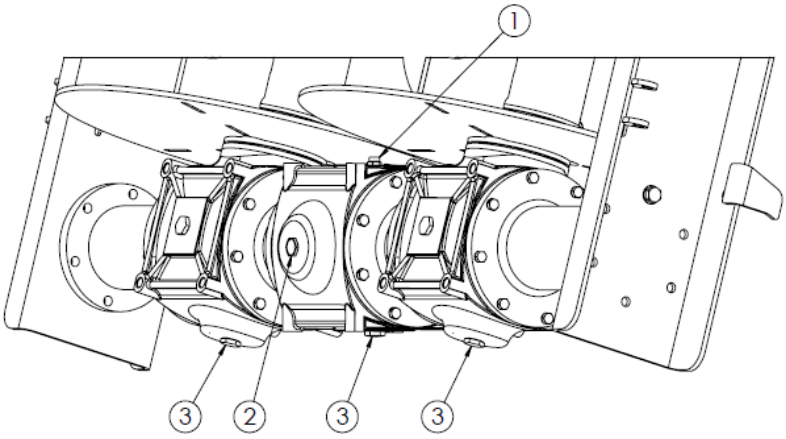

Figure 28 The oil-level check points of the floor-conveyor gearbox.
1 - oil inlet (vent), 2 - oil level sight glass, 3 - drain plug

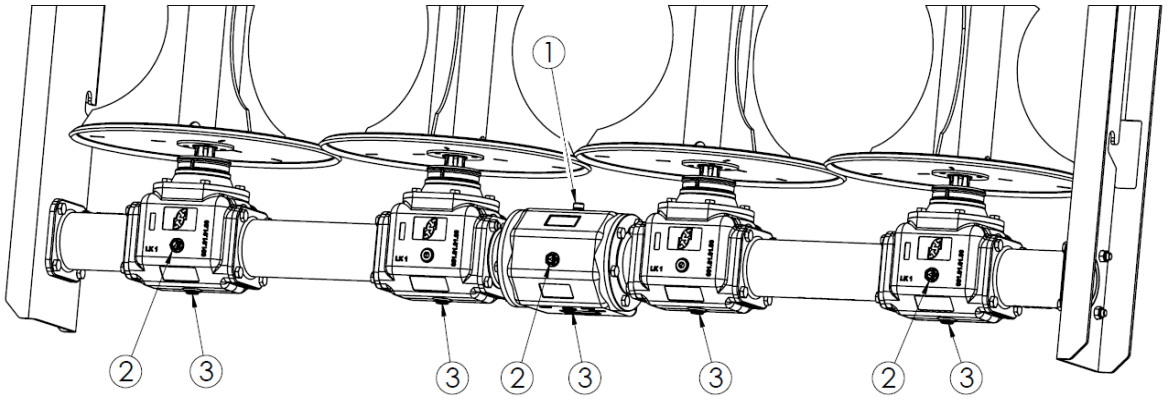

Figure 29 The oil-level check points of the beater-unit gearbox
1 - oil inlet (vent), 2 – oil-level sight glass, 3 - drain plugs

Change the oil at operating temperature immediately after an operation is completed, when the oil is still hot. Carry out the work by driving the spreader on hard, horizontal, ground. Wear suitable protective clothing, and use water and the appropriate tools and tanks during replacement. Store the waste oil in appropriately marked tanks, and send it for disposal in accordance with the applicable regulations.

To drain the oil from the gear unit (Fig. 27, 28, 29), unscrew the drain plugs (3). Fill the gearboxes with new oil via the oil filler (1) until oil becomes visible in the sight glass (2). The correct oil level is reached when the oil is visible in the middle of the sight glass.

All the gearbox housings are interconnected in the beater-unit gearbox, so it is enough to use only the filler and a level sight glass of the central housing to top up and check oil level of the entire unit.

Check the oil level in the beater-unit gearbox and the floor-conveyor gearbox via a sight glass each time before you start the machine.

Change the oil in the beater-unit gearbox and the floor-conveyor gearbox after the first 50 operating hours and then every 700 operating hours.

Table 12 Oil volume in N272/1 and N272/2 spreader gearboxes

Name	Type of oil	Volume
2-auger vertical and 2-auger horizontal-disc beater-unit gearboxes	Hipol GL 4 80/W90	12 L
4-auger vertical beater-unit gearbox	Hipol GL 4 80/W90	7.5
Floor conveyor gearbox	Hipol GL 4 80/W90	4.3 L

DANGER

DANGER!

During oil changes, use the appropriate personal protective equipment such as safety clothing, gloves, goggles, and footwear.

Avoid contact with skin.

Oil can cause an allergic skin reaction.

The oil has a harmful long-term effect on aquatic species.

5.5 Lubrication

Proper lubrication is one of the most-important factors which determine the efficient operation of individual spreader assemblies and mechanisms.

Compliance with the manufacturer's lubrication recommendations significantly reduces the possibility of damage or the early wear and tear of individual parts. Lubrication points are. Lubrication points are indicated in Figures 30, 31, 32 and 33 and the lubrication schedule in Table 13.

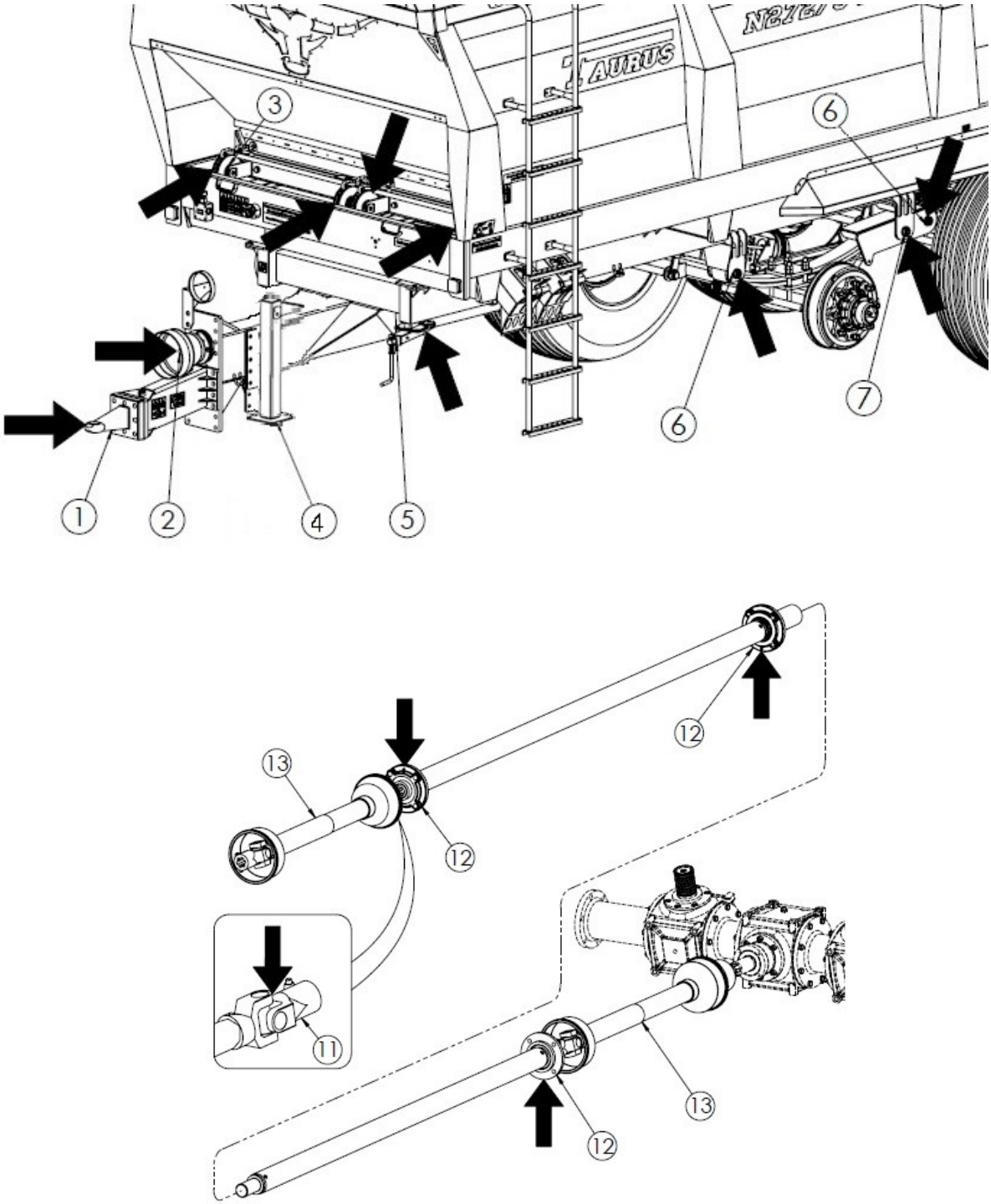

Figure 30 The spreader lubrication points

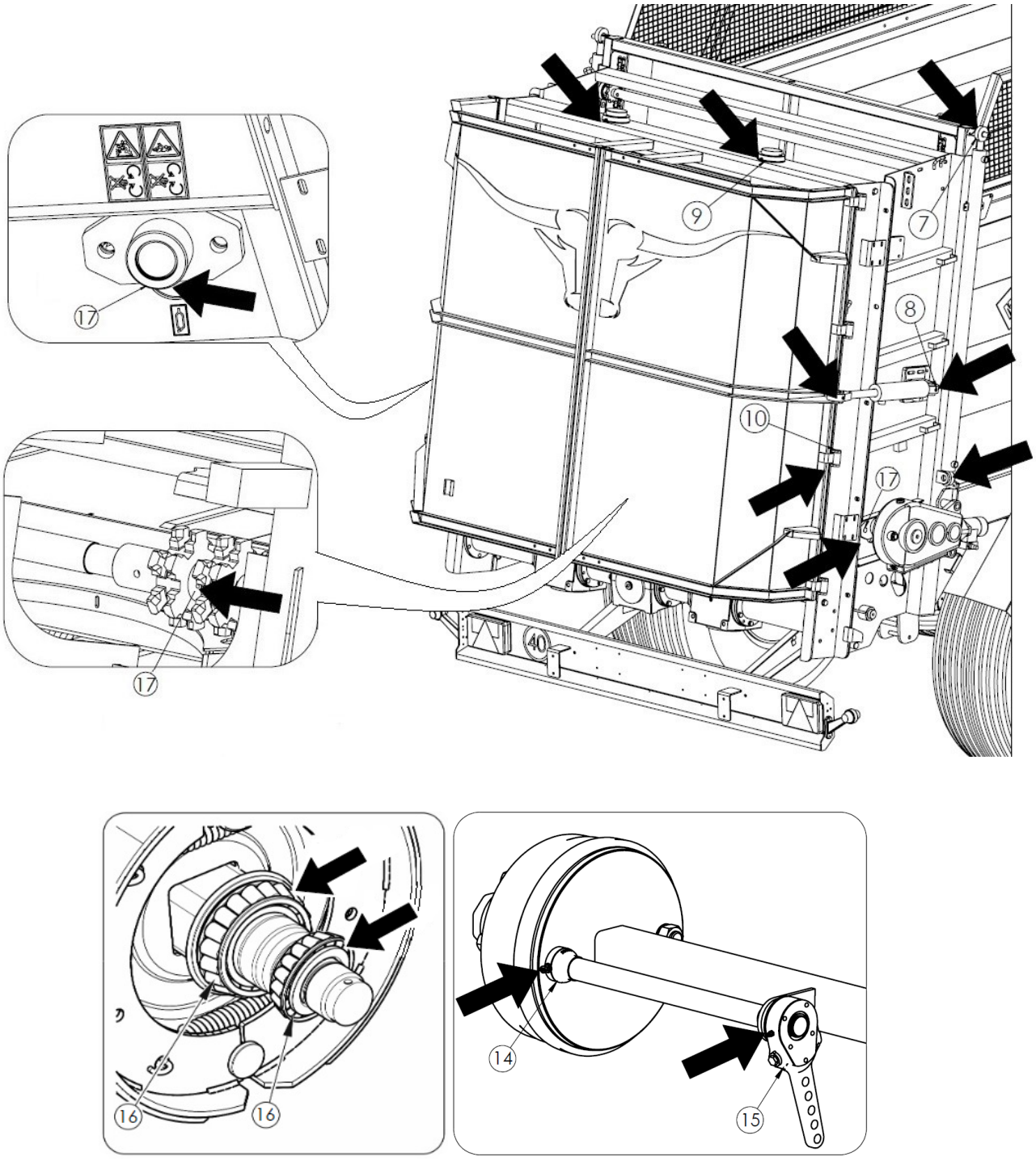

Figure 31 The other spreader lubrication points

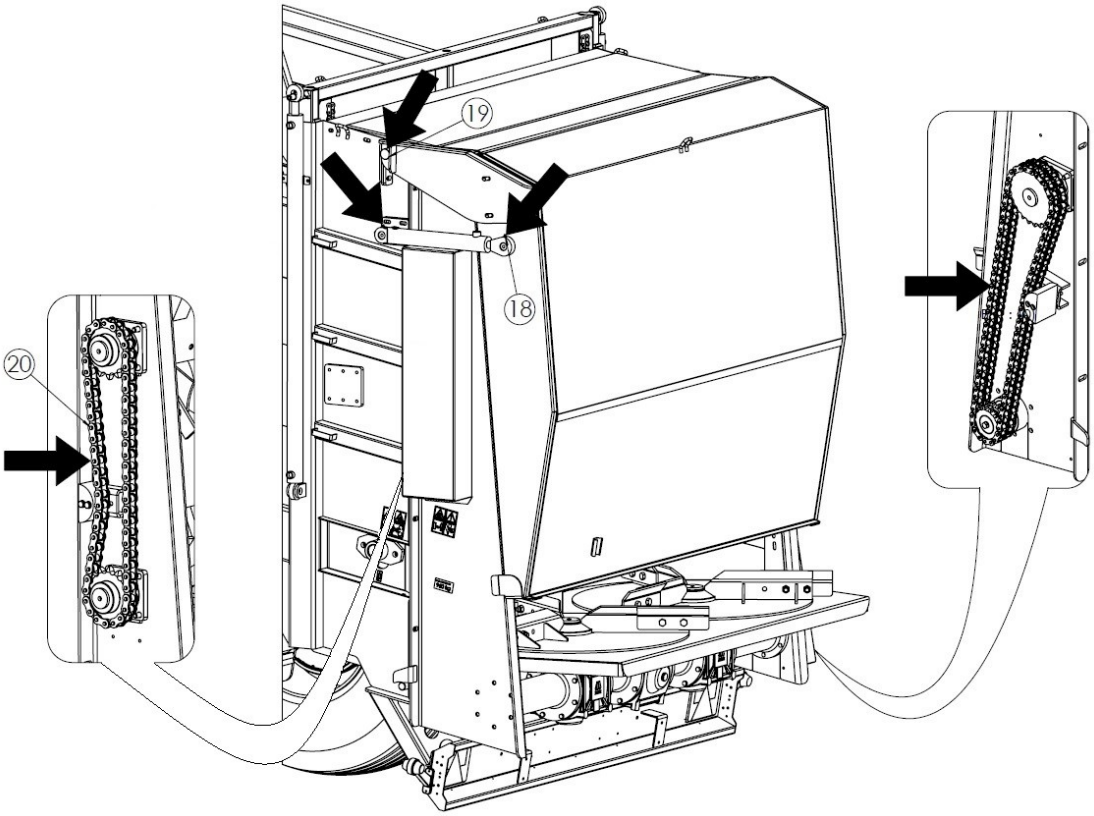

Figure 32 The spreader lubrication points (The 2-auger horizontal-disc beater unit)

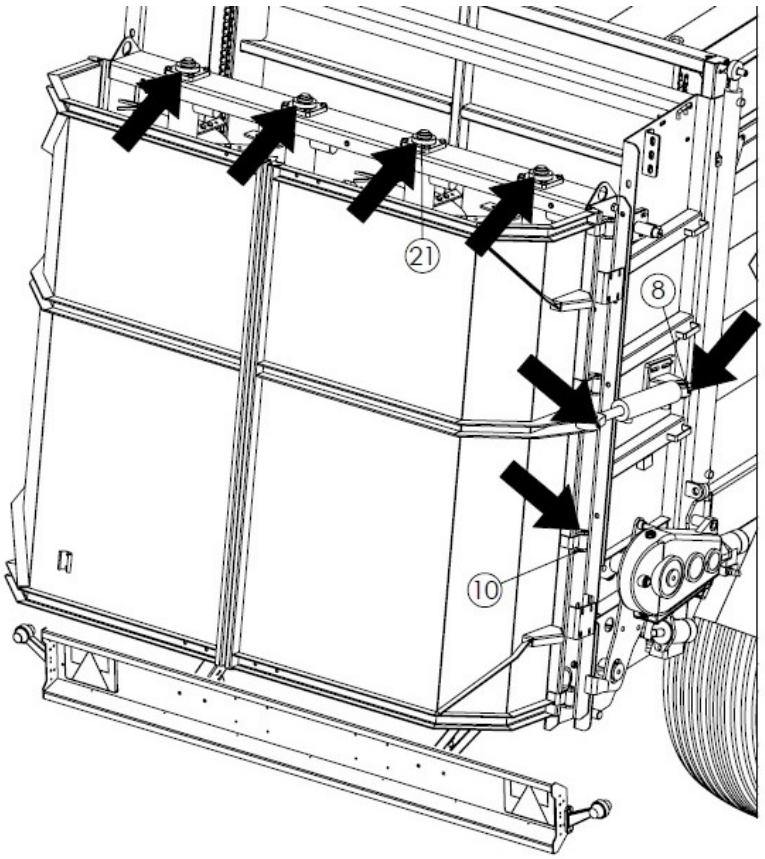

Figure 33 The spreader lubrication points (The 4-auger vertical beater unit)

Follow the guidelines below during lubrication

- Clean the grease nipple before starting to pump the grease
- Pump the grease until fresh grease appears in the slots through which the used grease is squeezed out during pumping; after the lubrication completed leave some grease on the nipple head

Table 13 Lubrication schedule

No.	Name of assembly	Number of lubrication points	Grease type	Interval
1.	Drawbar hitch	1	ŁT	2D
2.	Spline of the drive shaft	1	ŁT	6M
3.	Tension-bearing housing	4	ŁT	8H
4.	Drawbar pins	1	ŁT	24M
5.	Parking-brake assembly	1	ŁT	6M
6.	Feeder shaft sleeves	4	ŁT	2D
7.	Spherical plain bearings of the gate cylinder	4	ŁT	6M
8.	Spherical plain bearings of the beater-unit shield cylinder	4	ŁT	6M
9.	Beater-unit top bearings	2	ŁT	8H
10.	Beater-shield hinges	8	OM	6M
11.	Shaft universal joints	4	ŁT	24H
12.	Drive-bearing housings	3	ŁT	6M
13.	Articulated telescopic shafts	*	*	*
14.	Expander-shaft sleeves	2	ŁT	6M
15.	Brake-expander lever	2	ŁT	6M
16.	Wheel-hub bearings	2	ŁT	24M
17.	Drawbar hitch	2	ŁT	8H
18.	Spline of the drive shaft	4	ŁT	6M
19.	Tension-bearing housing	2	OM	6M
20.	Drawbar pins	2	OM	6M
21.	Parking-brake assembly	4	ŁT	16H

***** - Observe the guidelines in the Instructions Manual supplied with the PTO shaft

Lubrication-interval code H - working hour, D - working day, M - month

Table 14 Lubrication products

Code from Table 10	Description
ŁT	ŁT-42, ŁT-43 General-purpose grease
OM	Machine oil

Wipe the parts to be lubricated with machine oil with a clean cloth, and then apply a small amount of oil to the lubricated parts. Wipe off excess oil.

Lubricate the wheel hub bearings by applying fresh grease after removing the hub and removing used grease. Each time grease is replaced, assess the condition of the bearings and replace them if necessary. After mounting the hub, adjust the bearing play.

NOTE

NOTE!
Driving the spreader without hub caps is not allowed. Dirt entering the wheel bearings causes damage to the wheel bearings.

5.6 Pneumatic-system maintenance

Have the air-braking system components repaired, replaced and regenerated by professional workshops with all the appropriate qualifications and tools to perform this type of work.

The pneumatic system maintenance by the user involves

1. checking the system tightness and visual inspection
2. air-filter cleaning
3. draining the air tank and cleaning the drain valve
4. replacing the flexible connection lines
5. cleaning and maintaining the pneumatic-hose fittings

NOTE

NOTE!
It is not allowed to operate the spreader if the braking system is faulty.

5.6.1 System tightness and visual inspection of the pneumatic braking system

System tightness and visual inspection

- At start-up
- After the first 1,000 km
- Each time system components are repaired or replaced
- Annually

Checking the tightness of the pneumatic system

- Couple the tractor with the spreader
- Use the parking brake to immobilise the tractor and spreader, and put a chock under a spreader wheel
- Start the tractor’s engine to supply air to the braking system of the spreader
- Switch off the tractor’s engine,
- Check the air tightness of the pneumatic components after the tractor’s brake pedal is released
- Check the air tightness of the pneumatic components after the tractor's brake pedal is pressed (another person is required)

If leaky, air will escape outside with characteristic hissing at the damaged places Minor leaks can be detected by putting a layer of a foaming agent onto an inspected part (washing-up liquid, soap).

Replace the damaged parts or have them repaired. Remove any leaks in the joints by tightening the joint or replacing the fitting or sealing.

Carry out a visual check of the air braking system at the same time as the tightness check. Pay particular attention to the condition of the pneumatic hoses, the way they are fixed, and the cleanness and completeness of the components. Do not leave worn, permanently deformed, partially cut, and/or bent hoses. Contaminating the system components with oil and grease is not allowed.

NOTE

NOTE!

Have the pneumatic system components repaired, replaced, and regenerated by professional workshops only.

5.6.2 Air-filter cleaning

DANGER

DANGER!

Depressurise the spreader's brake system before dismantling the filters.

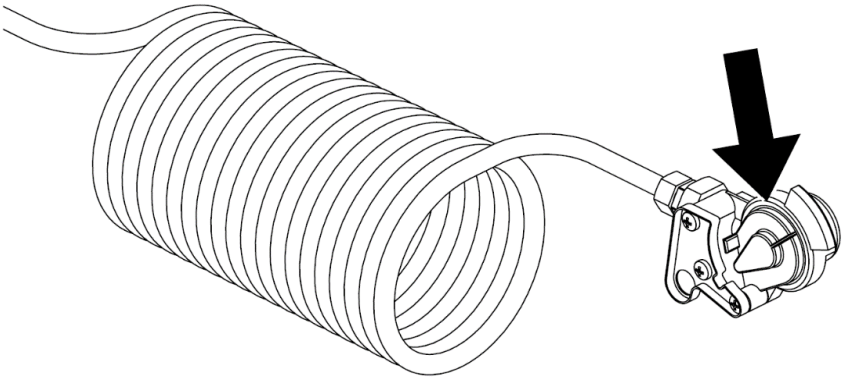

Figure 34 Haldex brake-system air filters

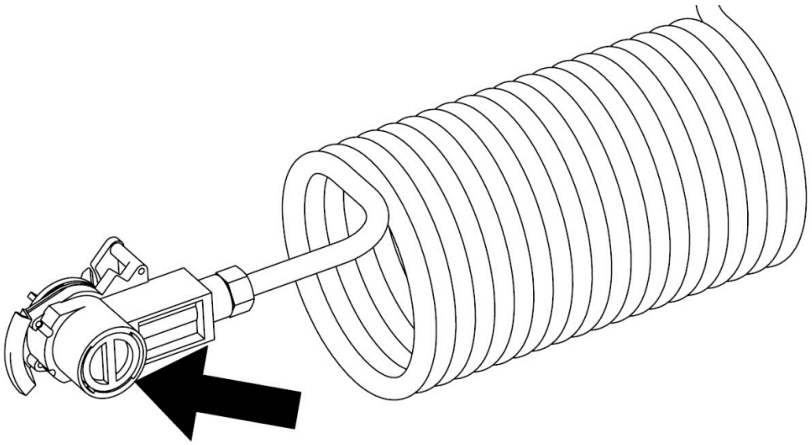

Figure 35 Knorr-Bremse brake-system air filters

Clean the air-filter inserts depending on the operating conditions, but at least every 6 months. The filters in pneumatic hose fittings - Figures 34, 35. The air-filter inserts are reusable and need not be replaced unless damaged.

5.6.3 Draining the air tank

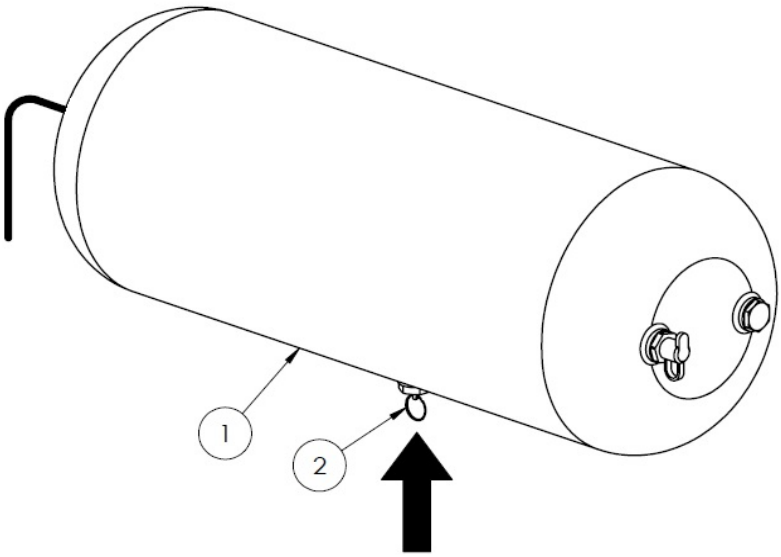

Figure 36 Draining the air tank
1 - air tank, 2 - drain valve

Drain the air tank every 7 days of use.

To drain the air tank

- pull the drain valve (2) to let water escape (compressed air will make water escape outside)
- release the drain valve (the valve will close automatically and cut off the airflow).

If the drain valve is leaking, it must be dismantled and cleaned or replaced if necessary.

5.6.4 The replacement of flexible connection hoses

Replace all flexible connecting hoses every 5 years unless damage (permanent deformation, wear or splits) has been found earlier.

To replace the hoses follow this procedure

- Depressurise the system
- Unscrew the pneumatic fittings from the hoses
- Unscrew the hoses from the brake valve
- Fit new hoses
- Check the tightness of the connections

5.6.5 Cleaning and maintaining the pneumatic hose fittings

DANGER

DANGER!

Faulty, damaged or dirty air hose fittings can cause a malfunction of the braking system.

If any damage to the hose fittings is found, replace them with hose fittings in good working order. The exposure of fitting gaskets to oils, petrol, greases, etc. can cause them damage or accelerate the ageing process.

If the spreader is uncoupled from the tractor, the connections must always be protected with caps and placed in the appropriate holders. Preserving the fitting gaskets with a suitable product is recommended for the post-season period, using e.g. silicone spray for rubber parts.

Check the technical condition of the pneumatic fittings of the spreader and the tractor before connecting the machine. Keeping the fittings clean ensures an extended service life and the correct functioning of the entire braking system.

Always check the technical condition of the pneumatic connections before connecting the spreader to the tractor.

5.7 Driving-axle and brake maintenance

5.7.1 Driving-axle maintenance

Regular checks of the driving-axle bearings for play are recommended - Figure 25. Carry out such a check on a newly purchased machine after the first 100 km. From then on, during operation, recheck after driving about 1,500-2,000 km and adjust if necessary.

To adjust the bearing play, follow the procedure below.

1. Couple the spreader with the tractor and engage the parking brake of the tractor
2. Lift one side of the spreader so that the wheel does not touch the ground, and secure it against dropping
3. If the wheel shows excessive play, remove the hub cap and the securing pin to prevent the castellated nut from unscrewing
4. Turn the wheel while simultaneously tightening the castellated nut until the wheel is stopped completely
5. Loosen the nut by 1/6-1/3 of a turn until the nearest groove overlaps the pin with the hole on the hub spigot
6. Secure the nut with a new pin, replace and fasten the hub cap

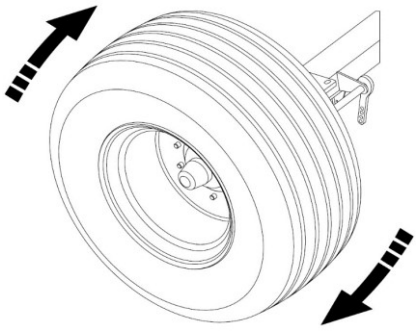

Figure 37 Checking wheel-bearing play

If the bearing play is adjusted correctly, the wheel should rotate freely, without stoppage or evident resistance (other than friction of the brake shoes against the drum). Slight friction of the shoes against the drum, particularly in a new trailer, or after their replacement, is a typical occurrence. Check the degree to which the hubs are heated to ultimately verify the correct adjustment of the bearing play after driving a few kilometres. In addition to the improper adjustment of the bearing play, considerable resistance to wheel rotation and hub heating can be caused by impurities in the lubricant, or by bearing damage. The above symptoms require disassembly of the wheel hub and rectifying the malfunction.

5.7.2 Brake maintenance

Once you have purchased the spreader, carry out a general check of the braking system on the driving axle; repeat the check according to the set schedule.

Have the brake components repaired, replaced, and regenerated by professional workshops with all the appropriate qualifications and tools to perform this type of work.

The operator is responsible for the following maintenance works of the driving axle brake.

- Function check of the brakes
- Inspection of the brake lining for wear
- Service-brake adjustment
- Function check of the parking brake
- Replacement of the parking-brake cable and adjustment of its tension

Brake-function check

- Couple the spreader with the tractor, place chocks underneath the tractor wheel
- Check the way the pneumatic cylinder and its forks are mounted on the brake-lever arm
- Check the axle-brake components (pins, lynch pins, nuts, etc.)
- For completeness apply and release the service brake and repeat with the parking brake (the action of the brakes should be smooth and with retraction without resistance or pausing)
- Check the cylinder piston-rod stroke
- Check the pneumatic cylinders for tightness
- Carry out an unladen test run and apply the service brake several times to check its function

Brake-lining wear check

Look through the inspection windows in the brake-drum cover to check the brake linings for wear - Figure 38. Replace the brake jaws when the brake-lining thickness drops below the minimum value specified by the manufacturer.

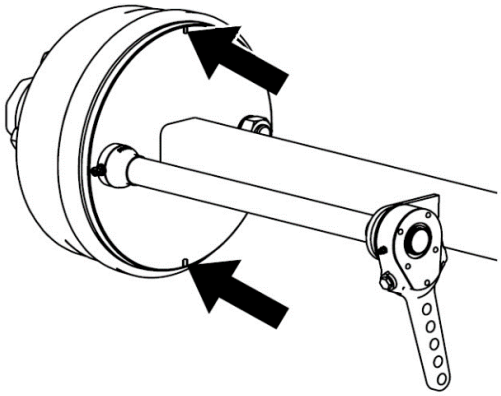

Figure 38 Brake-lining wear check

The minimum brake-lining thickness is 5 mm.

Check brake linings for wear

- Every 3 months of use
- If the cylinder piston rod stroke is significantly longer
- If any strange noises are heard in the brake-drum area

Service-brake adjustment

As the brake linings wear, the work stroke of the pneumatic cylinder piston rod increases. Excessive strokes can reduce the effectiveness of the brakes; therefore check, and adjust if necessary, the work stroke of the brake to keep it within the specified operating range. In a brake which is adjusted correctly, the angle between the piston rod and the expander lever in the braking position shall be 90˚ - Figure 39.

The brake-function check involves the measurement of the stroke length of the piston rod of each of the pneumatic cylinders. If the piston-rod stroke is longer than the maximum value (45 mm), the system must be adjusted.

Adjust the stroke of the cylinder piston rod and the angle of the expander lever by correctly setting the cylinder forks (3) and adjusting the stroke with the adjustment screw (7). During the adjustment maintain uniform settings for both cylinder and expander lever.

The correct stroke of the piston rod should be in the range 25-45 mm.

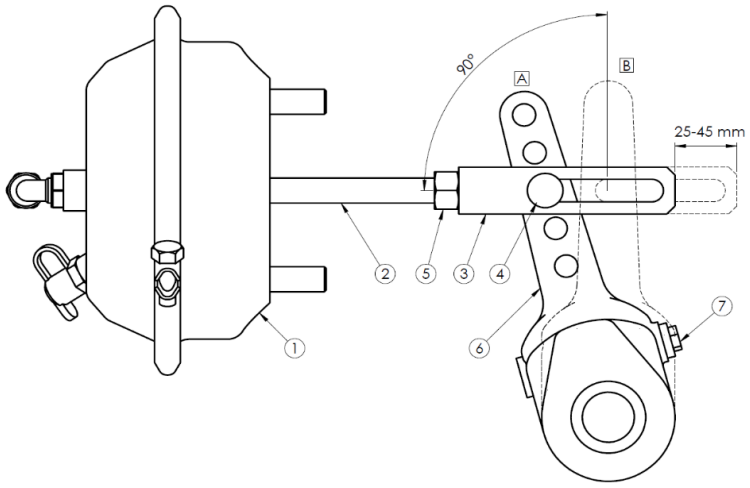

Figure 39 The adjustment of the service brake
1 - pneumatic cylinder, 2 – cylinder-piston rod, 3 - cylinder forks, 4 - fork pin, 5 - fork lock nut, 6 - expander lever, 7 - adjusting screw
(A) lever position for the released brake, (B) lever position for the applied brake

Checking the technical condition of the brake

- After the first 100 km
- Every 6 months
- After each repair of the braking system
- If the braking action of the spreader wheels is uneven

NOTE

NOTE!

An improperly adjusted brake can cause the brake shoes to rub against the drum, which can result in faster wear of the brake linings and/or overheating of the brake.

NOTE

NOTE!

The mounting positions of the pneumatic brake cylinder in the holes of the bracket and fork pin of the cylinder in the holes of the expander lever are set by the manufacturer, and any change to their position is prohibited.

Parking-brake adjustment

The correct functioning of the parking brake depends on the effectiveness of the driving-axle brakes and the correct tension of the brake cables.

	Checking and/or adjusting the parking brake: • Every 12 months • If required

Carry out the adjustment of the hand brake cable if

- the cable is stretched
- the cable is damaged
- the cable clamps are loose
- the driving-axle brake has been adjusted
- the mechanism in the driving-axle brake has been repaired
- the mechanism in the parking brake has been repaired

If the parking brake needs adjusting, make sure the brake on the driving axle is correctly adjusted and functions correctly.

Adjust the parking-brake cable tension by setting the appropriate length of the loop at its ends to pre-tension the cable. Carry out this adjustment when the brake of the driving axle is released and the parking brake crank mechanism is fully loosened.

.

5.7.3 Tyre maintenance - wheel changing

Secure the machine with the parking brake and the wheels with chocks when maintaining the tyres. Changing the wheel is only permitted if the spreader structure has been emptied. Use suitable tools for repairing the wheels. Due to the risks associated with the maintenance and repair works of tyres, the repairer should be trained for this purpose. Before the start-up, after the first laden drive and after each intensive use of the machine, and/or every 100 kilometres, it is advisable to check the tightening of the nuts. Repeat the checks after each time you change the wheels.

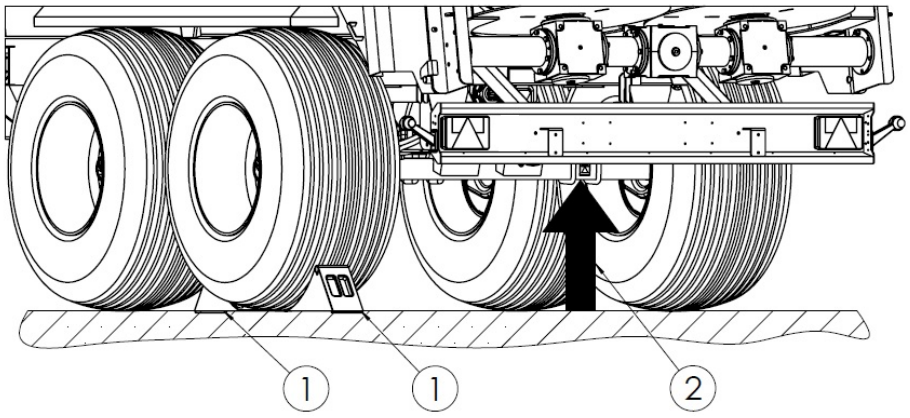

Figure 40 The jacking points
1 - chocks, 2 - jack

If the wheel needs to be lifted off, use the jacking points (2) under the axle. The lifting point is shown in Figure 40. Place the safety chocks (1) under one wheel only.

The air pressure must be checked regularly. Maintain the recommended air pressure. The correct pressure is indicated on the tyre or as a sticker on the spreader.

NOTE

NOTE!

Inspect the tightening of the wheel nuts regularly.

M18x1.5 = 270 Nm, M20x1.5 = 350 Nm, M22x1.5 = 475 Nm.

- Regularly check and maintain the correct tyre pressures, as recommended in the Instructions Manual and/or information on the tyre.
- Do not exceed the permissible load capacity of the tyres according to the Instructions Manual and/or information on the tyre.
- Do not exceed the speed limit according to the Instructions Manual and/or information on the tyre.
- Tyre valves must be fitted with protective caps.
- During the whole day's work, regularly check the temperature of the tyres, and, if they are heating up, take 30 minutes breaks to cool them down.
- Avoid excessive bumps, inconsistent manoeuvres and high speeds when cornering.
- Regularly check the condition of the tyres and replace them if cut or damaged.

NOTE

NOTE!

Do not exceed the permitted transport speed, working speed, or the gross and design payload capacities of the spreader.

5.8 Maintaining the electrical system and warning devices

NOTE

NOTE!

The electric system of the spreader is supplied with 12V voltage.

The user's responsibilities related to maintaining the electric system include

- technical inspection of the electrical system and retro-reflectors
- replacement of light bulbs

Have the electrical system components repaired or regenerated by professional workshops with all with appropriate qualifications and tools to perform this type of work.

NOTE

NOTE!

It is not allowed to drive when the lighting system is in an unusable condition. Damaged lamp covers and burnt-out bulbs must be immediately replaced before starting to drive. Replace damaged or lost retro-reflectors.

Before driving on a public road, make sure the lighting and retro-reflectors are not blurred.

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Maintenance work

- Check the condition of the electrical connection cable and the socket in the spreader
- Verify the lighting for completeness, technical condition, and correctness
- Verify all retro-reflectors for completeness and technical condition
- Verify the correct fixing in the bracket of the indicating plate for slow-moving vehicles
- Before driving on a public road, make sure the tractor is equipped with a retro-reflective warning triangle
- Before driving on a public road, make sure the lighting and retro-reflectors are not blurred

Table 15 Light bulb list

Lamp	Lamp type	Bulb identification/quantity	Number of lamps
Rear- lamp cluster, right	HOR45-LZT 478	C5W / 1 pcs. P21W / 2 pcs.	1
Rear- lamp cluster, left	HOR45-LZT 471	C5W / 1 pcs. P21W / 2 pcs.	1
Marker lamp, right	LO 355	C5W / 1 pcs.	1
Marker lamp, left	LO 355	C5W / 1 pcs.	1
Front running light, right	LO 093	W5W / 1 pcs.	1
Front running light, left	LO 093	W5W / 1 pcs.	1

Check the electrical system each time the spreader is coupled.

The spreader lights are equipped with replaceable bulbs. Replace the bulbs if necessary, remove the covers, and replace the bulbs with ones of the same power and marking as the original ones. A list of bulbs used in spreader lamps is given in Table 15.

5.9 Cleaning, maintenance and storage

It is recommended that the spreader be thoroughly cleaned of any residual manure every day after the completion of work.

After each “seasonal” manure spreading, thoroughly wash the spreader with clean water, dry it, and carry out maintenance work. It is recommended to use pressure washers for this cleaning. Particular caution should be exercised during cleaning.

Cleaning guidelines

- Do not let the water jet to be closer than 40 cm from the surface to be cleaned; washing surfaces with a strong jet of water from a short distance can damage coated surfaces
- The water temperature must not exceed 50°C
- Do not point the water jet directly at electrical components, hydraulic and pneumatic components (cylinders, valves, fittings), warning and information stickers, rating plates, lubrication points, and the like
- If the use of cleaning agents is necessary, carry out a trial surface wash in an inconspicuous place
- Use petroleum ether or a degreaser to degrease and wash any greased parts with clean water
- Do not use organic solvents or substances of unknown origin
- Use suitable cleaning products to clean plastic or rubber surfaces
- Wash the spreader in the designated areas according to the environmental-protection regulations

- Clean and dry the spreader at a temperature above 0°C

DANGER

DANGER!

Clean with the drive off, the PTO shaft disconnected, and the tractor's engine stopped. Remove the key from the ignition switch. Secure the tractor against unauthorised access.

Entering the spreader structure is only permitted when the machine is stationary.

NOTE

NOTE!

Wash with the appropriate safety clothing on and use personal protective equipment.

Refer to the Instructions for use for cleaning products and the Instructions for use for the pressure washer.

After the thorough cleaning and drying of the spreader, carry out proper maintenance works, fill in missing coats, and lubricate the machine. After the lubrication of the lubrication points, turn on all the mechanisms of the spreader to distribute the grease.

Apply a small amount of oil or anti-corrosive products at sites where the coat has rubbed off naturally as a result of the friction of the moving material or the friction between the abrasive parts.

Store the spreader in a roofed area, adequately protected against unauthorised access. Storing the spreader outdoors exposes the spreader to corrosion and UV radiation, which can cause the coat's ageing.

5.10 Tightening the torques of bolt connections

The optimum tightening torques for bolts with metric threads are shown in Table 16.

Table 16 Metric bolt-tightening torques

Bolt		Tightening torques for bolts with metric threads [Nm]					
Diameter d [mm]	Lead of thread [mm]	Bolt-strength classes					Wheel nuts, wheel bolts
		4.8	5.8	8.8	10.9	12.9	
3	0.50	0.9	1.1	1.8	2.6	3.0	
4	0.70	1.6	2.0	3.1	4.5	5.3	
5	0.80	3.2	4.0	6.1	8.9	10.4	
6	1.00	5.5	6.8	10.4	15.3	17.9	
7	1.00	9.3	11.5	17.2	25	30	
8	1.25	13.6	16.8	25	37	44	
8	1.00	14.5	18	27	40	47	
10	1.50	26.6	33	50	73	86	45
10	1.25	28	35	53	78	91	
12	1.75	46	56	86	127	148	
12	1.50						80
12	1.25	50	62	95	139	163	
14	2.00	73	90	137	201	235	
14	1.50	79	96	150	220	257	140
16	2.00	113	141	214	314	369	
16	1.50	121	150	229	336	393	220
18	2.50	157	194	306	435	509	
18	1.50	178	220	345	491	575	300
20	2.50	222	275	432	615	719	
20	1.50	248	307	482	687	804	400
22	2.50	305	376	502	843	987	
22	2.00						450
22	1.50	337	416	654	932	1090	500
24	3.00	383	474	744	1080	1240	
24	2.00	420	519	814	1160	1360	
24	1.50						550
27	3.00	568	703	100	1570	1840	
27	2.00	615	760	1200	1700	1990	
30	3.50	772	995	1500	2130	2500	
30	2.00	850	1060	1670	2370	2380	

5.11 Faults and troubleshooting

Table 17 Faults and troubleshooting

Fault	Cause	Way to rectify
Impacts on the conveyor	Improper adjustment of conveyor chain tension. Excessive length of conveyor chains	Check and adjust the tensioning of chains
Spreader-beater unit blocked in places	Feeding speed of the floor conveyor too high	Reverse the floor conveyor to unblock the beater unit and reduce the feeding speed
	Blocking objects have entered the spreading assembly together with the manure	Remove the cause of stopping the augers in the beater unit
	Rotational speed of tractor's PTO not correct	Change the rotational speed of the tractor's PTO
	Operation at low-speed PTO	Maintain an adequate tractor's engine speed
Floor feeder does not distribute the loaded material towards the beater unit	The knob on the flow controller is set to "0-1"	Increase the setting value on the flow controller
	Excessive load weight results in overloaded floor feeder	Unload part of the load
	Low pressure in the tractor hydraulic system	Check the pressure in the tractor's hydraulic system. The minimum-required hydraulic pressure of the tractor, measured with hot oil 14 MPa, (140 bar)
	Engine overload valve of the hydraulic floor conveyor dirty and non-functional	Replace the overload valve. Check the condition of the hydraulic filters on the tractor - replace both filters and oil if necessary
	Interrupted oil supply to the hydraulic motor of the conveyor	Check the connection and tightness of the hydraulic system
Spread width too small	Rotational speed of tractor's PTO not correctly selected	Change the rotational speed of tractor's PTO
	Operation at low-speed PTO	Maintain an adequate tractor-engine speed

NAME AND ABBREVIATION INDEX

dB (A) – scale-A decibel, sound-pressure unit

kg – kilogram, weight unit

km – kilometre, a commonly used multiple measure of the metre, a basic unit of length in the SI system

kPa – kilopascal, pressure unit

m – metre, length unit

mm – millimetre, an auxiliary length unit equal to 0.001m

MPa – megapascal, pressure unit

N – newton **–** an SI force unit

Nm - Newton metre, a unit for moment of force in the SI system

Pictogram – an information plate

t – tonne, a unit of mass

Rating plate - a manufacturer's plate unambiguously identifying the machine

V – Volt, voltage unit

UV – ultraviolet radiation, invisible electromagnetic, invisible electromagnetic radiation with a negative effect on human health; UV radiation has a negative effect on rubber parts

Transport hitch – hitch components of an agricultural tractor (see the tractor's instructions manual).

ALPHABETICAL INDEX

PART I

NOTES

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