METAL-FACH

MANURE SPREADER
“CERBERUS”
N277/6, N277/7

INSTRUCTIONS MANUAL PART I
TRANSLATION OF THE ORIGINAL INSTRUCTION MANUAL
REV. II
OCTOBER 2022

UE

Instructions Manual No. N277/6_2-02-167/2013

EC DECLARATION OF CONFORMITY

The undersigned,	Jacek Kucharewicz, President of the Board,	
hereby declares, with full responsibility, that the complete machine:		
MANURE SPREADER		
1.1.	Brand (the trading name of the manufacturer)	Metal-Fach
1.2.	Type:	N277
1.2.1.	Variant:	-
1.2.2.	Version:	-
1.2.3.	Trade name(s) (if any):	Cerberus N277/6, Cerberus N277/7
1.3.	Category, subcategory, and vehicle speed indicator	S2a
1.4.	Company name and manufacturer's address:	Metal-Fach Sp. z o.o. ul. Kresowa 62 16-100 Sokółka, Poland
1.4.2.	Name and address of the manufacturer's authorised representative (if applicable)	N/A
1.5.1.	The location of the manufacturer's rating plate	On the right side panel of the load body
1.5.2.	The method used to fix the rating plate of the manufacturer:	Riveted, glued
1.6.1.	The location of the vehicle-identification number on the chassis	On the front beam of the load body
2.	Machine-identification number:	

Complies with all the appropriate regulations of Directive 2006/42/EC and the Regulation of the Minister of the Economy dated 21 October 2008 on the principal requirements for machines (Journal of Laws of 2008, No. 199, item 1228, as amended)

The following harmonised standards were applied to assess the compliance.

PN-EN 690:2014-02, PN-EN ISO 12100:2012, PN-EN ISO 4254-1:2016-02, PN-EN ISO 13857:2020-03

and the following standards: PN-ISO 3600:2015, PN-ISO 11684:1998 and Regulation of the Minister of Infrastructure dated 31 December 2002 on technical conditions of vehicles and the range of their necessary equipment (Journal of Laws of 2003, No. 32, item 262, as amended).

Safety Testing Report No.: LBC/24/22

This EC Declaration of Conformity shall become null and void if the machine is modified or reconstructed without the manufacturer's consent.

Sokółka
(Place)

21/09/2022
(Date)

Jacek Kucharewicz
(Signature)

President of the Board
(position)

Machine data

Machine type:		Manure Spreader
Type designation:		N277/6, N277/7
Serial Number[1]		_____
Machine manufacturer:		METAL-FACH Sp. z o.o. 16-100 Sokółka ul. Kresowa 62 Phone: (0-85) 711 98 40 Fax: (0-85) 711 90 65
Reseller:		_____
	Address:	_____
		_____
	Phone/Fax.:	_____
		_____
Delivery date:		_____
Owner or user:	Last Name:	_____
	Address:	_____
		_____
	Phone/Fax.:	_____

[1]The data is located on the machine's rating plate located on the front part of the machine's main frame

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INTRODUCTION

The information included in the operating instruction is valid as of the date of its drawing up. The manufacturer reserves its right to make design changes to machines, and due to this, some values or illustrations might not correspond to the actual state of the machine supplied to the user. The manufacturer reserves its right to make design changes without amending these instructions. The Instruction Manual is part of the basic equipment of the machine. Before using the machine, the User is obliged to read the contents of this Instruction Manual and to comply with its recommendations. This will ensure the safe operation and reliable performance of the machine.

The machine has been built in compliance with the standards in force and current regulations of the law. This operating instructions describes the basic safety and operation principles of the Manure Spreader made by Metal-Fach, type N277/6 and N277/7.

The significant obligations of the manufacturer are shown in the Guarantee Certificate, which includes the complete regulations currently in force regarding guarantee services.

If you do not understand the information in the Operating Manual, consult the original reseller of this machine or the manufacturer directly.

The spare parts catalogue functions as a separate list, and is attached in the form of a CD at the time of the machine purchase, and is also available on the manufacturer's website: www.metalfach.com.pl.

The Warranty Card, including the terms and conditions of warranty, is attached to this Instruction Manual as a separate document.

Manufacturer's address:

Metal-Fach Sp. z o.o.

ul. Kresowa 62

16-100 Sokółka

Contact:

Phone: (0-85) 711 98 40

Fax: (0-85) 711 90 65

The symbols used in these Instructions:

DANGER

A hazard warning symbol: This indicates the occurrence of a serious hazard condition that, if not avoided, can result in death or serious injury. This symbol warns against the most dangerous situations.

CAUTION

This symbol indicates very important information and instructions. Non-compliance can lead to serious damage to the machine, resulting from its incorrect operation.

WARNING

This symbol indicates potential hazards that, if not avoided, can result in death or serious injury. This symbol indicates a lower level of risk of injury than the DANGER symbol.

The symbol indicating useful information.

The symbol indicating service operations that should be performed periodically.

1. Basic information

1.1 Introduction

THIS INSTRUCTION MANUAL IS PART OF THE BASIC ACCESSORIES OF THE MANURE SPREADER

The machine can only be operated by persons who have read this Instructions Manual who are familiar with the design and functioning of the Manure Spreader, and with the operation of the tractor unit it works with.

Read and follow all the information provided in this Instruction Manual, in order to operate the machine in a safe manner. Abiding by the guidelines provided in the operating instruction ensures safe operation for the User, and also prolongs the machine's service.

1.2 Identification of the N277/6 and N277/7 manure spreaders

The manure spreader must be identified with its rating plate, which is permanently attached to the load body.

The position of the rating plate and serial number is shown in Figure 3. The data on the rating plate of the manure spreader can be found in Figure 1. An explanation of the rating plate fields is shown in Figure 2.

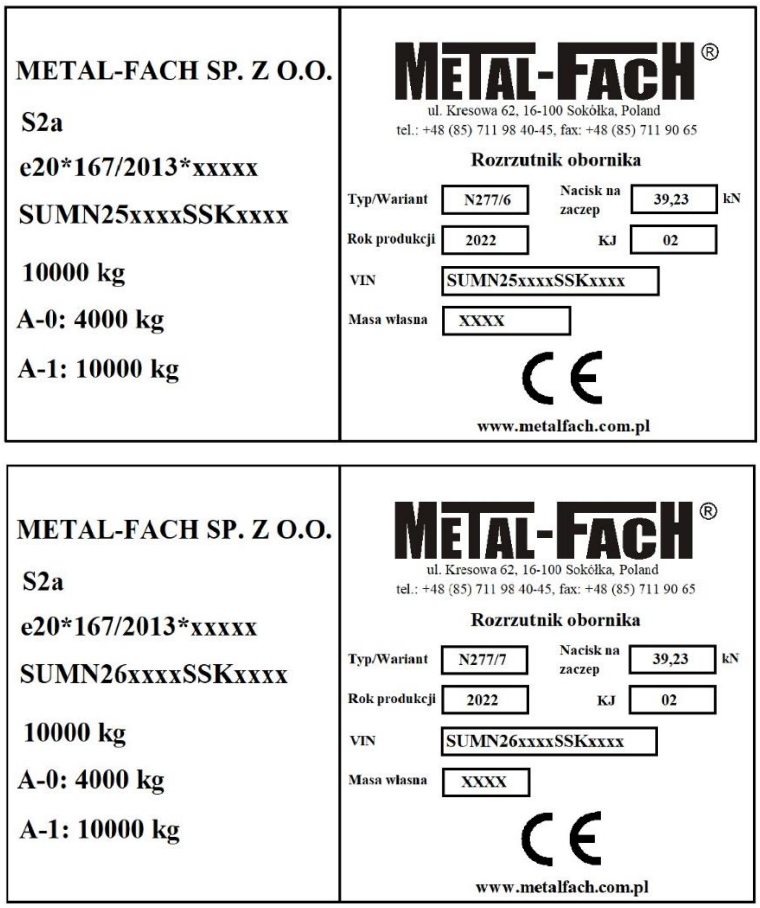


Fig. 1. Rating plate

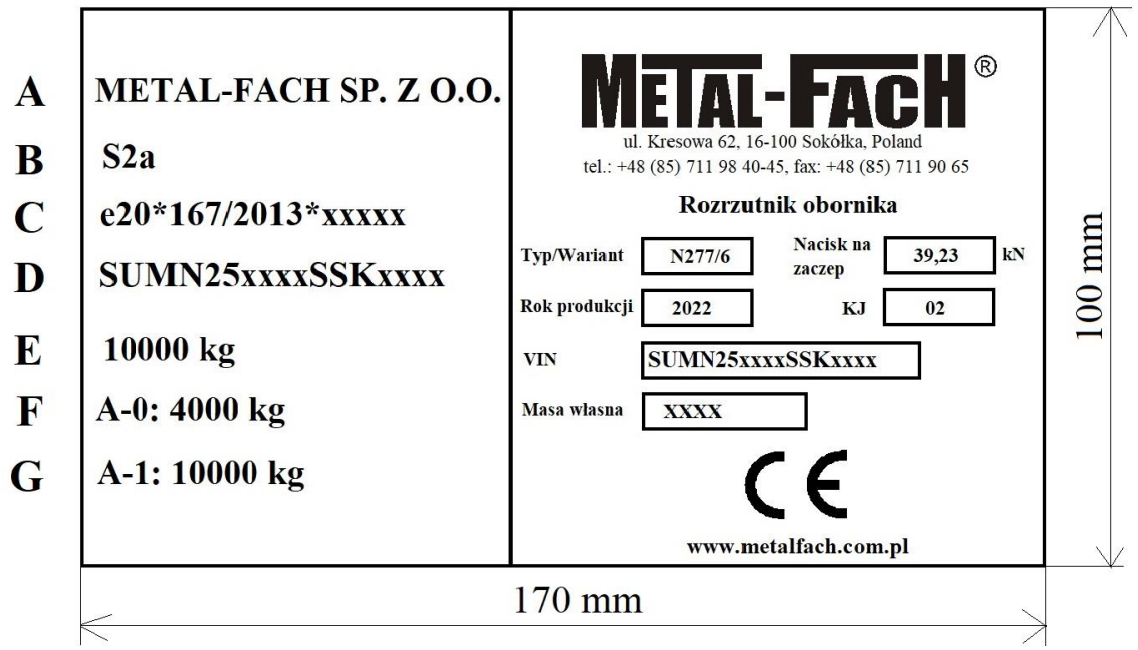


Figure 2. Key to the fields on the rating plate:
A – Manufacturer's name;
B – Category, Subcategory, and Vehicle-Speed Indicator;
C – EU-Type Approval Number;
D – VIN;
E – Permissible total design weight of the vehicle;
F – Permissible maximum hitch eye pressure;
G – Permissible maximum weight on the 1st rear axle;

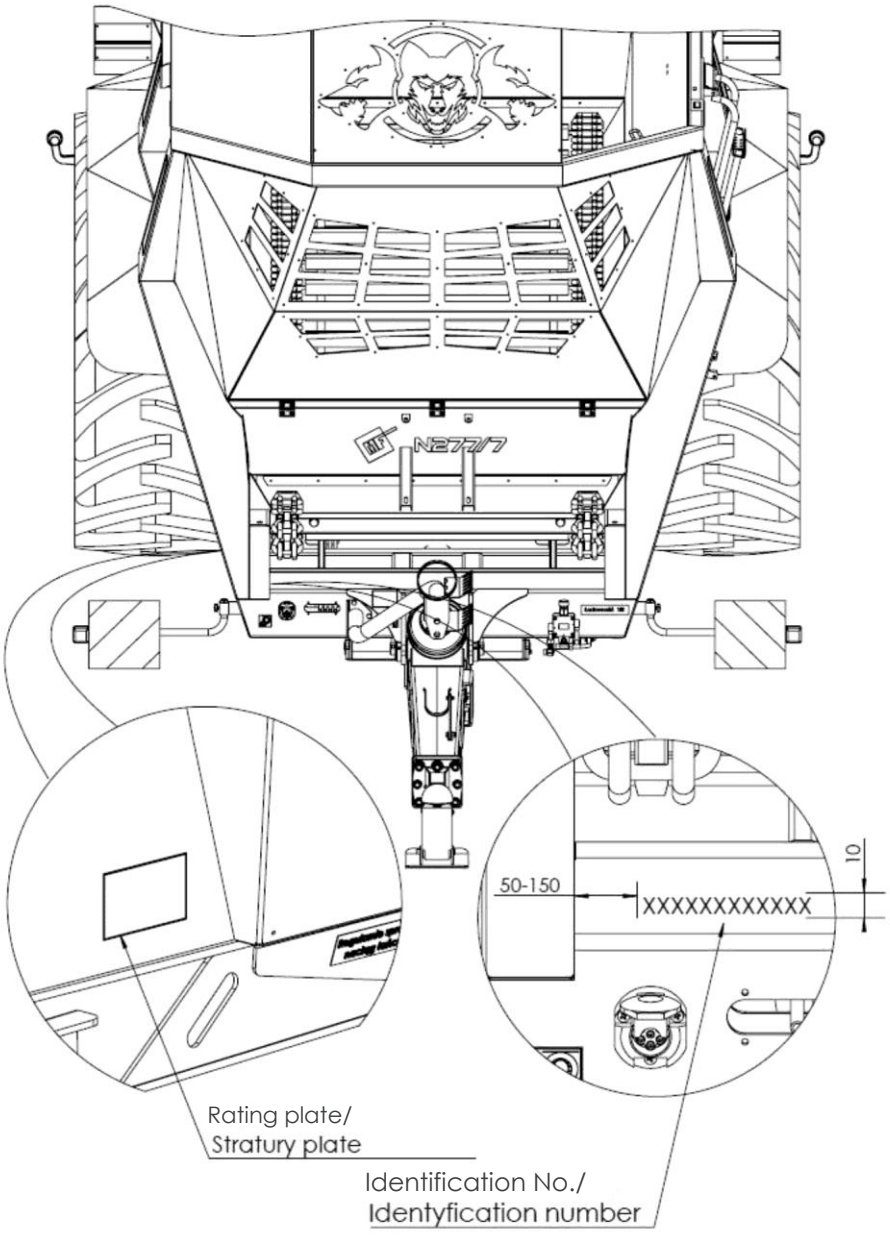


Figure 3. The position of the rating plate and serial number

CAUTION

CAUTION!
Entering public roads without a rating plate or with an illegible rating plate is prohibited.

Upon the purchase, check the compliance of the factory number located on the machine rating plate with the number written in the operating instruction and Guarantee Certificate – it is crucial for recognizing the guarantee. When contacting the technical service, the seller, or the manufacturer, the User is obliged to provide the information included on the machine's rating plate.

The Instruction Manual is provided as the basic equipment of each Manure Spreader.

Should the spreader be sold to a different User, it is obligatory to hand the operating instruction to them. It is recommended that the supplier of the spreader keeps a record of every confirmation of receipt signed by the purchaser, when the operating instruction is submitted with the machine to the new User.

Please read the operating instruction carefully!

If you follow its recommendations, it will be possible to avoid hazards, operate the machine efficiently and productively, and maintain the warranty for the duration granted by the manufacturer.

CAUTION

CAUTION!

It is prohibited to use the spreader by the persons who have not read this operating instructions.

1.3 Intended use of the manure spreader

The manure spreader is designed for the even spreading of manure, peat, compost, etc., and for transport of agricultural products on farms and on public roads. It is not permitted to use the spreader in any other way than the one described above.

The operator must use the machine in accordance with its intended use by carrying out activities involving the correct and safe operation and maintenance of the spreader, which will include:

- reading and understanding the spreader's principles of operation
- safe and correct operation of the machine
- Always maintain or have the machine maintained on schedule.
- Comply with the general safety regulations.
- Comply with the traffic laws.

DANGER!
The Spreader must not be used contrary to its intended purpose, in particular to:

- carry people and animals
- operate it with exceeded payloads
- spread and transport toxic and flammable materials,
- distribute liquids, sand or fibrous substances
- carry goods, machinery and equipment not secured, which, while driving, may shift its position or affect the stability of the spreader
- carry out transport of building materials, individual objects or any materials that are not included in its intended use

Unauthorised structural changes to the spreader voids the manufacturer's liability for consequential damage.

Table 1. Requirements for agricultural tractors

Description	Requirements	UoM
Braking system 2-line braking system Pressure rating of the system:	 as per PN-ISO-1728:2007 650–800	kPa
Hydraulic system Hydraulic oil Nominal pressure Oil purity	 HL 46 16 20/18/15 acc. to ISO 4406-1996	MPa
Electrical system Electrical system voltage Connection socket	 12 7-pole acc. to ISO 1724	V
Tractor hitch Minimum vertical load-bearing capacity of the hitch	 4000	kg
Minimum power demand of the tractor	N277/6 – 140 -150 N277/7 – 140 -150	HP
Minimum turning radius	7	m

1.4 Standard equipment

The basic accessories of each Spreader include:

- Operating instructions;
- guarantee certificate and warranty conditions
- A bracket for fixing a slow-vehicle marking plate
- two-line pneumatic brakes with manually adjustable braking force;
- automatic parking brake (parking-release valve);
- Lights.

1.5 Transport

The Spreader is sold fully assembled and does not require any further assembly. It is delivered to the User by means of motor transport or independently, when coupled with a tractor.

CAUTION

CAUTION!
Observe the general health and safety regulations, regarding handling of cargo, when loading and unloading the spreader. Those operating the loading and unloading equipment must have the required authorisation to use it.

CAUTION

CAUTION!
It is forbidden to attach slings of lifting devices to the upper mounting brackets of the body and the beater unit to lift, load or unload a complete spreader.

If transported on a platform, secure the spreader by means of clamping straps or chains with a tensioning mechanism. Such fasteners must have a valid safety certificate. Place chocks or other elements without any sharp edges under the wheels of the spreader to prevent the machine from rolling. Attach the chocks to the platform of the means of transport. Special attention must be paid during loading and unloading, so as not to damage the accessories of the spreader and its paint coating. Attach the fastening straps or chains to the shipping brackets welded to the frame of the load body. The longitudinal members or other robust structural elements of the frame can also be used for that purpose.

Before loading the spreader on the platform, couple it with the tractor's hitch and connect the brake system lines. Use the unfolded ramps to drive the spreader onto the low-loading platform.

DANGER

DANGER!
Improper use of fasteners can cause an accident.

CAUTION

CAUTION!
Pay particular attention to the angle of inclination of the ramps on the low loader. It may not exceed 10°. The excessive inclination of the ramps can lead to damage to both the spreader and the transport trailer.

The Spreader may be driven on public roads, as a machine attached to the **lower hitch** of a farm tractor.

Before merging with the traffic on public roads, make sure that the tractor is fully manoeuvrable. The front-axle load of the tractor must be at least 20% of the tractor's weight, which also applies when transporting and operating a loaded Spreader. If this condition is not satisfied, the front-axle of the tractor must be additionally loaded.

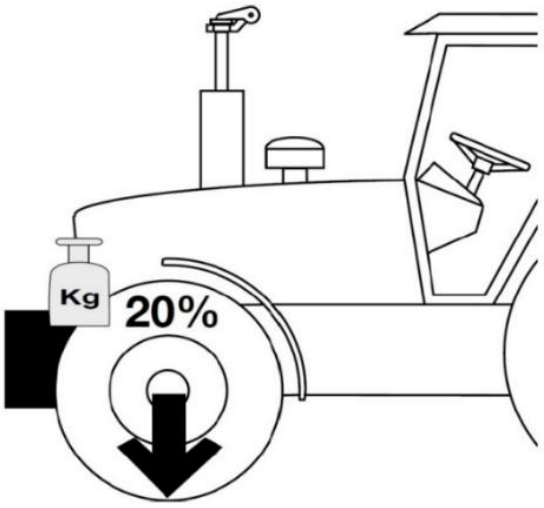


Fig. 4. Minimum front-axle load of the tractor

CAUTION

CAUTION!
During the transport of the machine on public roads adapt the speed to the traffic conditions and do not exceed the speed of 30 km/h.

Prior to spreader transport make sure that

- the spreader is properly coupled to the tractor and the hitch device is secured against accidental disconnection
- both the spreader and the tractor brake systems function correctly
- both the spreader and the tractor lighting work correctly and the front position lamps of the spreader are in the transport setting
- the ladder is folded in the transport position;
- the beater shields are closed
- the body gate is in its lowest position
- the hydraulic and pneumatic lines are arranged in such a way that they are protected from damage during travel
- the parking jack is raised to its uppermost position;
- the parking brake is released.

During transport of the spreader on public roads adhere to the road traffic regulations. During emergency parking of the tractor with the attached machine the driver must:

- Ensure that no hazard to the safety on the road ensues when stopping the vehicle
- Park the vehicle as close to the edge of the road as possible, parallel to the road centre line

- Stop the tractor engine, take out the key from the ignition switch, engage the auxiliary brake and place the chocks under a spreader wheel
- Outside a built-up area, place a warning triangle between 30 and 50 metres behind the vehicle and switch on hazard-warning lights
- when in a built-up area, switch on the hazard-warning lights and place a warning triangle behind the vehicle, unless it is installed on a bracket on the rear of the machine; make sure that it is clearly visible to other road Users;
- in the case of a breakdown, undertake relevant steps to secure the area where the breakdown occurred.

1.6 Environmental hazards

Leaking hydraulic and gear oils can pose a direct threat to the natural environment. Carry out all maintenance and repairs in rooms with an oil-resistant surface if there is a risk of oil leakage. If an oil leak occurs, secure the source of the leak and collect the spilled oil. Use absorbent materials to collect oil residue. When collected, all pollutants must be stored in tightly closed, oil-resistant, and marked, containers.

DANGER

DANGER!
Store used hydraulic and gear oil or any collected residue mixed with absorbent materials in tightly sealed containers. Do not use food containers for this purpose.

CAUTION

CAUTION!
Dispose of all waste oil and used oil, in accordance with the applicable regulations.
It is forbidden to dispose of oil into the sewage system or water reservoirs.

1.7 Decommissioning

If the machine is to be withdrawn from use, the User must comply with the national regulations regarding withdrawing from use and recycling of end-of-life machines, applicable in a given country. Before dismantling, remove all oil from the hydraulic system and gearboxes. Reduce air pressure in the braking system to the minimum.

DANGER!
When dismantling, use suitable tools, lifting equipment and personal protective equipment such as gloves, shoes, protective clothing, glasses, etc.
Avoid contact with skin. Prevent any oil leaks.
Dispose of all waste oil and used oil, in accordance with the applicable regulations.
When changing worn, damaged, or unrepairable parts and components, send them to buy-back recycling centres.

2. Safety of use

2.1 Basic safety principles

2.1.1 Obligation to provide information

CAUTION

CAUTION!
If the spreader is sold to further users, attach the operating instruction, and the purchaser of the spreader must undergo training as indicated in the Manual.

2.1.2 General principles for work safety and use

Before each activation, the spreader must be checked for safe operation:

- Observe the generally applicable safety and accident-prevention regulations, and follow the information provided in this Instructions Manual;
- The attached symbols, warning and informatory inscriptions provide important guidelines for safe operation – observing them ensures your safety;
- Operate the spreader only if all required devices are connected and protected against unintentional disconnection or opening (e.g., hitch and drawbar, couplings, PTO shaft)
- Before starting work, familiarise yourself with all control equipment and elements, and their functions. It will be too late to do this during the operation;
- Persons under the influence of alcohol or other stimulants, and those who are not trained and do not hold proper driving licences are forbidden to operate the spreader

2.1.3 Operational safety

1) Before using the machine, the user must read and understand the content of this Instruction Manual. During operation, observe all the guidelines included in this manual.
2) If any information contained in this manual is unclear, please contact the seller running an authorised technical-support service on behalf of the manufacturer, or contact the manufacturer directly.
3) Careless and improper use and operation of the spreader, as well as failure to observe the recommendations contained in this manual, are dangerous to health and life.
4) Failure to observe the safety rules poses a threat to the health and life of the operators and third parties.
5) Please note that during the spreader's operation some residual risks can occur, so exercising safety rules must be a priority.
6) All safety-related information must also be passed on to all other users and operators of the spreader.
7) Any structural and functional modifications of the spreader release Metal-Fach Sp. z.o.o. from liability for damage to property or health.
8) Use only the recommended PTO shafts with the correct parameters to transmit power from the shaft.
9) Do not use uncovered articulated telescopic shafts (without guards) for power transmission.

10) Before starting to drive, make sure that the parking brake is released and the braking-force regulator is in the correct position corresponding for the load status (it applies to a 2-line pneumatic system with a manual braking-force regulator).
11) Before operating the machine, inspect the direct vicinity (for any children and bystanders). Extreme attention is required if visibility is poor.
12) After you finished spreading, lower the slide gate completely, switch off the PTO shaft drive, switch off the floor conveyor's drive, and close the adapter's guards. Never leave the spreader with the slide gate of the load body open, if the PTO shaft drive or the floor conveyor drive are switched on, and/or the adapter shields open, without supervision.
13) It is only allowed to enter the load body, if the spreader has come to a complete stop, the PTO shaft is disengaged, the tractor's engine switched off, and the machine is protected against unauthorized access.
14) Always activate and deactivate the PTO shaft and hydraulically-controlled components from the driver's seat.
15) Couple the spreader, according to the applicable regulations. Connect it only to the recommended coupling equipment, and secure the drawbar's eye against uncoupling from the tractor's transport hitch.
16) Special care must be exercised when coupling and uncoupling the spreader to and from the tractor.
17) When installing and removing any support and safety devices and ladders, always place them in a position that ensures safe operation.
18) Follow the acceptable axle loads, total weight, and transport dimensions.
19) Check the transport equipment by inspecting the connections and operation of the light and brake systems, the Slow Vehicle warning plate, and other protective devices and equipment.
20) Before driving, check the operation of the lights and brakes, and prepare the spreader, in accordance with the recommendations provided in the "Driving on public roads" section.
21) Ensure that the spreader is loaded in such a way that the material does not contaminate surfaces, when travelling on public roads.
22) After finishing work and before driving on a public road, remove any residue of the spread material from the external parts of the machine, to prevent it from falling down and contaminating roads.
23) Notice all changes in vehicle behaviour, steering and braking performance due to the loaded spreader being coupled to it.
24) When driving with a coupled spreader, take into account the distribution of the load and/or inertia forces, especially if the load distribution is asymmetrical.
25) Do not stand within range of the material being spread.
26) The spreading of manure can only be carried out, if:
    - the spreader is coupled with the tractor,
    - the tractor and spreader unit is standing on a firm surface,
    - the front-axle load of the tractor is at least 20% of the weight of the tractor,
    - there are no persons within the spreading area,
    - the tractor is aligned with the centre line of the spreader,
    - keeping a safe distance from the power lines,

- no strong gusts of wind occur, which can carry the spreading material away outside the permitted spreading area.

27) If it is necessary to carry out the final stage of spreading on a slope, align the tractor and the spreader in the direction of the down slope. When spreading on slopes, make sure that the surface inclination does not exceed 10°.
28) Exercise care when opening the shields, so your fingers and hands are not crushed.
29) When starting the spreader, observe the signs warning against places, where crushing, dragging, and entangling hazards can occur. When coupling to and uncoupling the spreader from the tractor, there is a risk of crushing and injuring limbs.
30) No person is allowed to be present between the tractor and the spreader, unless the vehicle is protected against rolling by the parking brake and/or wheel chocks.
31) Secure the spreader and the tractor against rolling, when stationary.
32) It is forbidden to transport the spreader with the load body slide gate raised and the adapter's covers removed.
33) Keep a safe distance from power lines, when lifting the slide gate of the load body.
34) When carrying out repair and maintenance work that requires entering the load body, the tractor must be stationary and protected against the risk of starting the engine and the use of the control elements by unauthorised personnel.
35) Always adjust your driving speed to the existing conditions. Avoid sudden up or downhill turns on sloping terrain.
36) Maintain a sufficient safe distance when turning back with the coupled equipment.
37) When reversing, ensure that you have sufficient visibility (if possible, have someone to assist you with guidance).
38) When cornering, take into account the inertia of the spreader.
39) Observe a minimum turning radius of approx. 7 m when turning and reversing.
40) Remove any functional faults of the attached devices only when the engine is switched off and the ignition key removed.
41) In the event of a failure of the hydraulic or pneumatic systems, the spreader must be taken out of service, until the failure has been remedied.
42) It is forbidden to carry out maintenance or repair work, when the load body is loaded.
43) Before carrying out repair work on the hydraulic or pneumatic systems, the oil or air pressure must be reduced.
44) In the event of an injury sustained from a strong hydraulic oil jet, consult a physician immediately. Hydraulic oil can penetrate under the skin or into the eye, and cause infections.
45) Use the hydraulic oil recommended by the manufacturer. Never mix two different types of oil.
46) Use the gear oil recommended by the manufacturer. Never mix two different types of oil.
47) Switch off the engine and remove the ignition key before leaving the tractor. Engage the parking brake and secure the spreader with a chock.
48) Do not exceed the maximum permissible axle loads of the spreader.

49) Exceeding the permissible technical load carrying capacity of the spreader can damage the machine, and cause the loss of its stability while driving, and spillage of the load, and also compromise the safety of other road traffic. The braking system has been adapted to the permissible total weight of the spreader, which, if exceeded, will considerably reduce the performance of the main brake.
50) It is forbidden to exceed the permissible driving speed.
51) The maximum permitted pressure in the hydraulic power system is 16 MPa.
52) The maximum allowable pressure in a double-line pneumatic system is 0.80 MPa, and the minimum is 0.65 MPa.
53) Preparing the spreader for operation (connecting hydraulic lines, pneumatic system, PTO shaft, etc.) must be made with the tractor engine switched off and the ignition key removed.
54) The manufacturer delivers the spreader fully assembled.
55) Change the hydraulic (rubber) lines every 4 years.
56) Noise – the equivalent A-weighted emission sound pressure level (LpA) should not exceed 75 dB. The peak C-weighted instantaneous sound pressure value (LCpeak) is 82±1 dB.
57) Keep the spreader clean.

WARNING

WARNING!
If operated during a storm, there is a risk of lightning striking the spreader.

2.1.4 Working with the machine

- When working with the machine, make sure that no people or animals are present in the vicinity of the spreading area.
- It is forbidden to stand within the spreading area, since the spreading material can contain stones, fragments of wood, or other objects.
- Before commencing work, check the condition of the adapter blades and their fasteners.
- Before loading, check the tension of the chains of the floor conveyor. Regularly check the tension of the conveyor chains.
- Make sure that the designated spreading zone is not exceeded, when working close to roads, drainage ditches, plot boundaries, and water bodies.

2.1.5 Pneumatic and hydraulic systems

CAUTION

CAUTION!
The pneumatic braking system is under high pressure.
Before starting work on the system, switch off the tractor engine, secure the spreader with the parking brake and support chocks and depressurise it.

- When connecting pneumatic lines to the tractor's pneumatic system, ensure that the valves on the tractor and spreader side are not under pressure.
- Check the pneumatic connection on a regular basis and change damaged and ageing parts. Replace the lines as required by the manufacturer's specifications. Replace flexible pneumatic lines every 5 years unless damage has been found earlier.
- Air leaks from the pneumatic braking system are not allowed.
- The hydraulic system is under high pressure during operations.
- Use the hydraulic oil recommended by the manufacturer. Never mix two different types of oil.
- Regularly check the technical condition of the hydraulic connections and lines.
- When connecting the hydraulic lines to the tractor, make sure that the hydraulic systems of the tractor and the spreader are not under pressure. If necessary, reduce the residual pressure of the system.
- In the event of an injury sustained from a strong hydraulic oil jet, consult a physician immediately. Hydraulic oil can penetrate under the skin and cause infections.
- Repair work on the pneumatic or hydraulic systems may only be carried out by an authorised representative of the spreader manufacturer.
- In the event of a failure of the hydraulic or pneumatic system, the spreader must be taken out of service until the failure has been removed.

Change flexible pneumatic lines every 5 years, unless damage is found earlier.
Change rubber hydraulic lines every 4 years, regardless of their technical condition, unless a fault has been found earlier.

CAUTION

CAUTION!
Required cleanliness of the 20/18/15 hydraulic oil according to ISO 4406-1996.

2.1.6 Working with the PTO

- The spreader may only be connected to the tractor, by means of an appropriately selected PTO shaft recommended by the manufacturer.
- Before starting work, read the manual of the drive shaft and follow its guidelines.
- Connect and disconnect the PTO shaft only when:
  - the spreader is coupled with the tractor hitch,
  - the tractor's engine is switched off,
  - the key is removed from the ignition switch,
  - the parking brake is on,
  - and the PTO shaft is switched off.
- Before starting the tractor hitched with the spreader, make sure that the PTO shaft drive in the tractor is switched off.

- The PTO shaft must be fitted with guards.
- It is forbidden to use the PTO shaft without its guards or with damaged components.
- Install the articulated telescopic shaft, in accordance with the guidelines provided in the Operating Instructions issued by the shaft's Manufacturer.
- Secure the guards of the PTO shaft against rotating, using chains. Fasten the chains of the shaft to the permanent structural components of the spreader and the tractor.
- The PTO shaft's guard is marked indicating which end of the shaft should be installed on the machine's side and which on the tractor's side. The protective couplings must always be fitted on the machine side.
- After installing the PTO shaft, make sure that it is correctly and safely connected to the tractor and the spreader.
- Each time you start the spreader, make sure that the PTO shaft's guards are in good technical condition and correctly positioned. Change any damaged or faulty components for new ones.
- When working with and maintaining the machine, it is forbidden to wear loose clothing, which can be caught by the rotating parts of the PTO shaft. Contact with the rotating PTO shaft can result in serious injury or death.
- When working in conditions of reduced visibility, use the tractor's service lights to ensure adequate sight of the working PTO shaft and its immediate vicinity.
- Transport and store the PTO shaft horizontally with its chains fastened together, to prevent damage to the guards and other components.
- It is forbidden to overload the PTO shaft and the drive system of the spreader's adapter. It is not allowed to start the PTO shaft of the tractor in a sharp manner. Before starting the PTO shaft, make sure that the direction of rotation is correct.
- **Use a PTO shaft speed of 1000 rpm during operation.** Operating at different speeds can damage the machine or its components.
- Switch off the PTO shaft drive, whenever there is no need to drive the machine, or when the tractor and Spreader are oriented at an unfavourable angle.
- Do not exceed the maximum permissible working length of the PTO shaft.
- When uncoupling the PTO shaft from the tractor, place it in a special holder designed for that purpose.
- It is forbidden to use chains for suspending or supporting the PTO shaft, when the spreader is parked or transported.

2.2 Residual risk

2.2.1 Residual risk description

It is inevitable that some risks will occur during the spreader's operation, although METAL-FACH in Sokółka assumes responsibility for the machine's design and structure, in order to eliminate hazards.

Residual risk can result from incorrect behaviour by the spreader's operator, e.g. carelessness, ignorance, or improper actions. The following prohibited actions cause the highest level of risk.

1) The operating of the spreader by minors or persons without authorisation to drive a tractor, as well as by persons who have failed to read the manual.

2) The operating of the spreader by persons who are sick or under the influence of alcohol or other intoxicating substances.
3) Using the spreader for purposes other than those described in the operating instruction.
4) Standing between the tractor and the spreader, while the tractor's engine is running.
5) Oil leakage and sudden movement of components caused by rupturing of hydraulic lines.
6) Standing on the machine while operating or transporting.
7) Bystanders, children in particular, standing close to the running spreader.
8) The presence of persons or animals in areas not visible from the operator's position.
9) Cleaning, maintaining and inspecting the spreader assemblies connected to the PTO shaft while the tractor engine is running.
10) Checking its technical condition, when the spreader is in operation.
11) Operating a defective power take-off shaft.
12) Exceeding the permitted speed and load carrying capacity.
13) Making changes to the machine without the manufacturer's consent.

When specifying the residual risks, we assume that the spreader is a machine that was designed and manufactured to the state-of-the-art in the year of its manufacture.

2.2.2 Residual risk assessment

The residual risk can be reduced to the minimum by applying the following recommendations:

1) Adhering to the safety rules described in the operating instruction.
2) Using common sense, when operating the machine.
3) Do not hurry when operating the machine.
4) Maintain a safe distance from the restricted and dangerous places.
5) Do not reach into dangerous and/or restricted areas with your hands.
6) Do not stand on the machine, while it is in operation.
7) Have repair and maintenance work performed by trained personnel.
8) Wear the appropriate protective clothing.
9) Make sure no unauthorised persons have access to the machine, especially children.
10) Make sure there is no person present in the blind spot (especially when reversing and coupling).

CAUTION

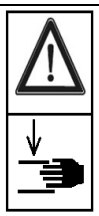
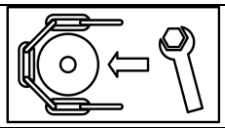
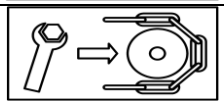
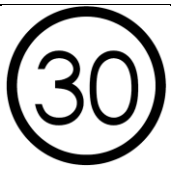
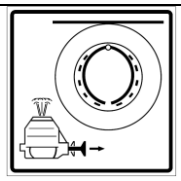
CAUTION!
Failure to comply with the instructions and guidance provided herein may result in residual risks!

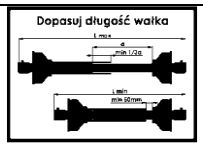
2.3 Warning and information stickers

The manure spreader is marked with information and warning stickers. The User is obliged to ensure that the inscriptions, warning signs, and informative pictograms provided on the spreader remain legible for the duration of its working life. If any information or warning sticker has been damaged or removed, place an order at the manufacturer or at the distributor the machine was purchased from. Re-attach stickers to any new components that have been fitted during repair work. When cleaning, do not point a strong jet of water at the labels and do not use solvents.

Table 2. Information and warning stickers

No.	Safety symbol (sign)	Meaning of the symbol (sign) or content of the inscription	Location on the spreader
1.		Caution! Before you start operating the machine, read the operating instruction.	On the side panel of the load body.
2.		Caution! Switch off the engine and remove the key before maintenance or repair.	On the side panel of the load body.
3.		Caution! Risk of electric shock. Keep a safe distance from power lines.	On the side panel of the load body.
4.		Caution! Torso crushing hazard. Stay clear of the area where the articulated coupling joints rotate, if the engine is running.	On the side panel of the load body.
5.		Caution! Danger of being dragged in by the drivetrain. Do not reach into the area of rotating parts.	At the hitch and at the rear, on the left and right-hand side of the load body.
6.		Caution! Thrown or flying materials. Hazard to the whole body. Keep a safe distance from the machine.	On the adapter frame, on both sides

7.		Caution! Hand crushing hazard. Keep a safe distance from moving parts.	On the adapter frame, on both sides
8.		Caution! Danger of hand or upper torso being dragged in by the rotors of the adapter. Do not reach into the area of rotating parts.	On the rear panel of the load body. At the adapter, on both sides
9.		Caution! Risk of falling. Do not travel on platforms or ladders.	On the left panel of the load body. Next to the ladder
10.		Caution! Danger of crushing toes or a foot. Keep a safe distance from the parking jack and the drawbar.	At the parking jack
11.		Attachment points of the transport tie down straps	At the attachment points
12.		Lubricating points	The front and rear sections of the floor conveyor
13.		Tensioning the floor conveyor chain	On the left panel of the load body
14.		Tensioning the floor conveyor chain	On the right panel of the load body
15.		Speed limit of 30 km/h	At the rear, on the adapter's rear guard
16.		Pneumatic brake release mechanism	On the frame
17.		PTO rotational speed	On the front sheath

18.		Jacking point	On the driving axles
19.		Adjust the length of the shaft	On the hitch
20		Do not put your hand into moving parts of the conveyor, be careful	On the right and left panels of the load body front and rear

	Warning inscriptions	Meaning of the symbol (sign) or content of the inscription	Location on the spreader
21.		Turn off the PTO drive and close the adapter covers when the machine is stationary!	Load body front wall
22.		Check chain tension regularly	On the right and left panels of the load body
23.		Do not enter the load body when the drive is enabled	On the left panel of the load body. Next to the ladder
24.		Tighten the wheel nuts after a few kilometres and then periodically	Above the road wheels
25.		Adapter weight ...	On the adapter frame, on both sides
26.		Load capacity: 16 t – N277/6; 18 t – N277/7	Load body front wall
27.		Switch off the PTO shaft drive when cornering.	On the side panel of the load body.
28.		Use a hitch for single-axle trailers to couple the trailer.	On the side panel of the load body.

CAUTION

CAUTION!
The user of the spreader must maintain legibility of all warning inscriptions and signs attached on the trailer over the whole period of operation. If they are damaged or destroyed, change them to new ones.

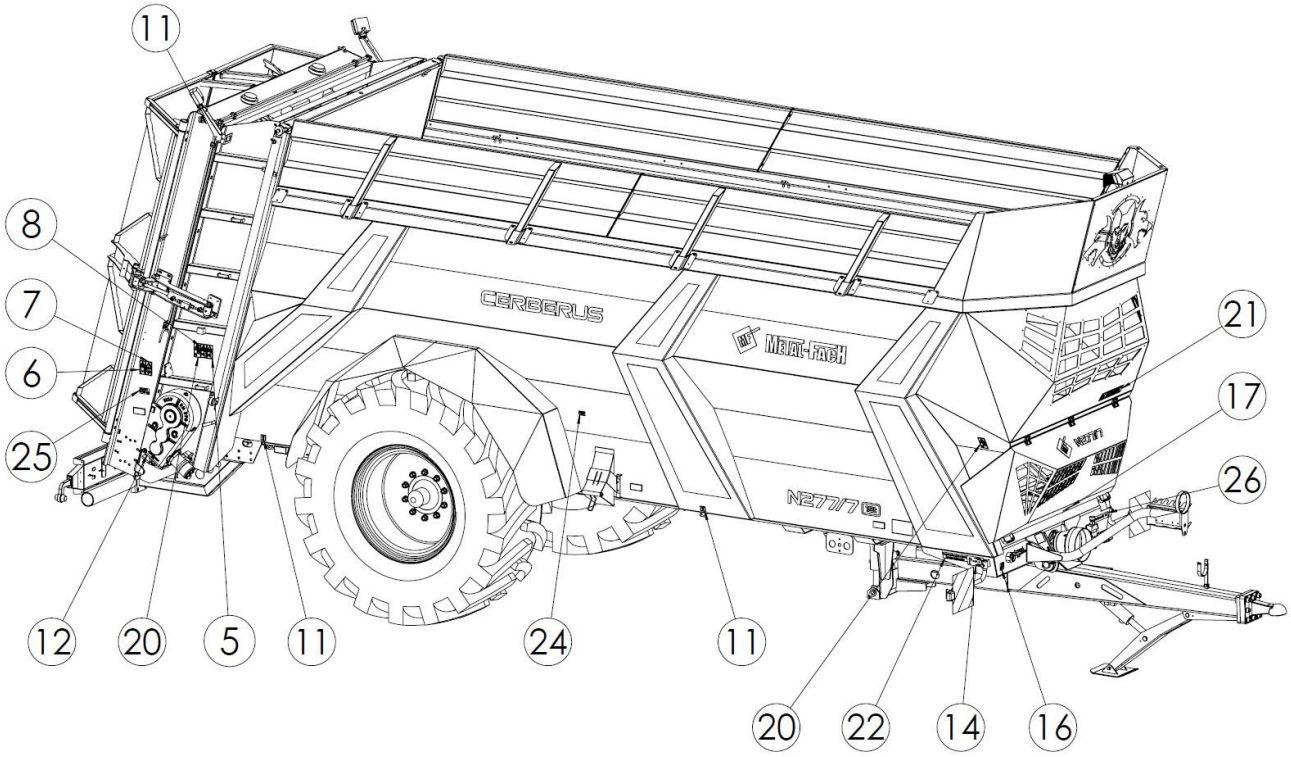


Fig. 5. The locations of warning and information stickers – front

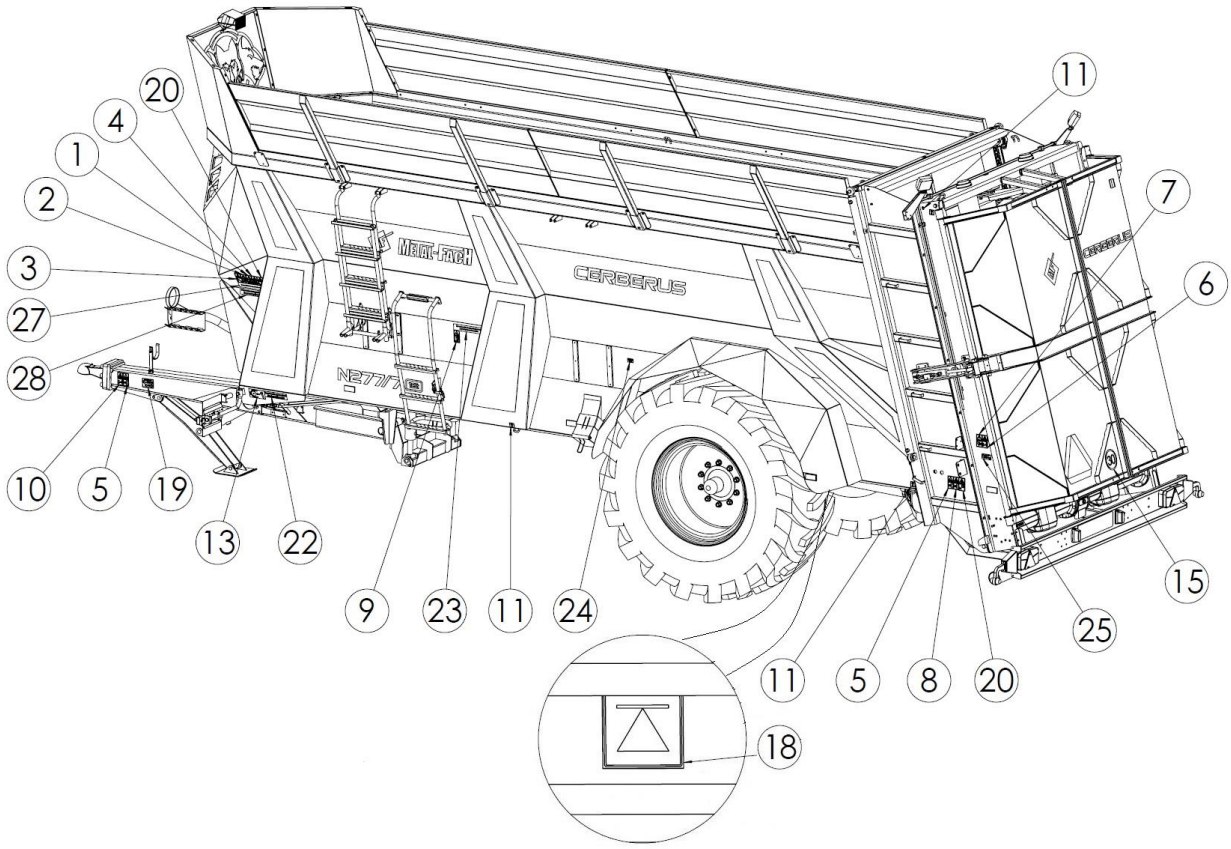


Fig. 6. The locations of warning and information stickers – back

3. The Design and Principles of Operation

3.1 Main technical data

Table 3. Basic technical data

No.	General data				
1.	Vehicle type			Manure Spreader	
2.	Suspension			Single-axle, rigid	
3.	Type (trade name)			N277 (N277/6, N277/7 **CERBERUS)**	
4.	Body type			Shell type load body	
5.	Rating plate location			Front beam of the load body	
Overall dimensions					
			UoM	**N277/6 (16 t)**	**N277/7 (18 t)**
6.	Length		mm	9490	
7.	Width		mm	2800 - 3000	
8.	Height (650/6075 R32 wheels)		mm	3450	3600
9.	Wheel track		mm	2200 - 2350	
Loading height					
10.	Loading height		mm	2800	2950
11.	Loading height with extensions	0.5 m	mm	3300	3450
12.	Ground clearance of the load body floor		mm	1250	
Internal dimensions of the spreader body					
13.	Length		mm	6175	
14.	Width (top/bottom)		mm	1500/2000	
15.	Height		mm	1550	1700
16.	Height with extensions (mesh)	0.5 m	mm	2050	2200
Performance parameters					
17.	Technical permissible total weight		kg	10000	
18.	Poor visibility in traffic*		kg	5500 - 7500	5300 - 7200
19.	Permissible axle load		kg	10000	
20.	Kerb weight (max)		kg	6500 - 8500	6800 - 8700
21.	Drawbar eye load (max)		kg	4000	
22.	PTO rotational speed		RPM	1000	
23.	Tractor power demand (min)		HP	140–150	
24.	Cargo space	Volume of the load body to the slide gate	m³	17.1	19
		Height after piling-up		20.8	22.7
25.	Cargo space with extensions	0.5 m	m³	22.9	24.8

* depending on the equipment

		UoM	N277/6 (16 t)	N277/7 (18 t)
26.	Effective spreading width	m	10	
27.	Maximum spreading width	m	10-16	

28.	Permissible transport speed			km/h	30
29.	Working speed			km/h	4-10
Miscellaneous					
30.	Pressure in the hydraulic system (max)			MPa	16
31.	Maximum pressure in the 2-line pneumatic braking system			MPa	0.80
32.	Electrical system voltage			V	12
33.	Types of hitch	Type of shock absorption	Standard	-	Longitudinal suspension spring
			Optional		Hydraulic springs
		Coupled with a tractor	Lower hitch		YES
			Upper hitch		NO
34.	Drawbar eye	Standard		-	K80 ball drawbar eye
35.	Driving axle	Standard		-	Fixed □150
		Optional			NONE
36.	Brakes	Standard		-	Pneumatic, 2-line
37.	Parking brake			-	Pneumatic – manually controlled by the parking and release valve, braking the axle
38.	Tyre size	Standard		-	650/75 R32
39.	Tyre air pressure*			bar	1.8–4.0
40.	Minimum load index and speed rating of tyres			-	164 A6
41.	Adapter type [2 m wide]	Vertical 2-rotor 2000 x 2385, fastened with bolts	Standard	-	- rotor blades and disc blades made of HARDOX 450 steel - Grazioli gearbox
			Optional		- rotor blades and disc blades made of HARDOX 450 steel - SISP gearbox with increased strength and lifetime
42.	Adapter weight			kg	1220 (with covers – 1550)
43.	Oil in the hydraulic system (HL-46)			L	6
44.	Oil in the gearbox of the floor conveyor (gearbox oil 80W90)			L	6
45.	Oil in the gearbox of the spreading adapter (gearbox oil 80W90)*			L	10.7 – SISP gearbox 13.5 – GRAZIOLI gearbox
46.	Chain of the floor conveyor	Chain link		mm	∅ 20 (VAUCANSON) or ∅14 (14 x 50)
		Number of rows		pcs.	2

* depending on the equipment

			UoM	N277/6 (16 t)	N277/7 (18 t)
47.	Tensioning the chain of the floor conveyor	Tension bolts in the front load bar	pcs.	2	

48.	The chain wheel scrapers on the floor conveyor	Front		-	YES – for chain NK14
		Rear			YES – for chain NK14
49.	Safeguards (overload couplings)	Adapter		-	Front articulated telescopic shaft – shear pin / Articulated telescopic shaft at the rear – friction clutch
		The floor-conveyor gear			The cross-directional hydraulic valve
50.	The slide gate-lifting indicator			-	NONE
51.	Wall thickness of the spreader body (steel grade)			mm	4 (S355)
52.	Floor thickness of the spreader body (steel grade)			mm	3 (S355)
53.	The wheel chocks included in the delivery			-	YES
54.	Wheel mudguards	Standard		-	YES
55.	Deflectors	Vertical adapter	Standard	-	Hydraulically controlled tailgate
56.	Rear adapter guard	Vertical adapter	Standard		Hydraulically opened
57.	External ladder	External		-	Fixed permanently with bolts on the left-hand side of the load body (foldable)
		Internal			Fixed on the external side of the shell
58.	Extensions	Optional	0.5 m	-	Net
The hydraulic system					
59.	Slide gate of the load body			-	Hydraulic control
60.	Parking jack	Standard		-	Hydraulic – scissors
		Optional			Hydraulic – rotary
61.	The drive of the floor conveyor			-	Hydraulically controlled
62.	Tailgate				Hydraulically controlled
63.	Drawbar	Standard		-	Longitudinal suspension spring
		Optional			Hydraulic springs
60.	No distributor	Standard		-	4 pairs (4 sections)
		Optional	Hydraulically sprung drawbar		5 pairs (5 sections)
61.	Distributor	Optional	With or without a spring drawbar	-	1 pair of lines

* - depending on the equipment

Table 4. Basic technical data of tyres

Tyre assembly No.	Axle No.	Tyre size, including load index and speed rating symbol	Rolling radius (1) [mm]	Rated load per tyre [kg]	Maximum permitted axle load [kg] (*)	Maximum permissible vehicle weight [kg] (*) Maximum permissible mass of the vehicle [kg] (*)	Maximum permissible vertical load at the coupling point [kg] (*) (**) (***)	Wheel track [mm]	
								Minimum	Maximum
O	1	650/75R32 164 A6	863	Min 5000 kg	10000 kg	10000 kg	4000 kg	2200	2350

(*) In accordance with tyre specifications.

(**) Load transmitted onto the reference centre of the coupling under static conditions, regardless of the coupling device;

The User must observe the permissible transport speeds commensurate with the maximum load carrying capacity of the spreader.
If another brand of tyre is used, observe its parameters.

DANGER!

Failure to adhere to the permissible speed, tyre and axle loads can result in a serious accident.

3.2 Design and operation principle

The components of the spreader are shown in Figure 7. The main structural components include a monocoque body (10) with a rigid single-axle wheelset (5) . A sprung hitch equipped with a ball drawbar's eye (1) is used for connection with the tractor's lower hitch. The hydraulic parking jack (3) is attached to the drawbar to support the spreader, when it is not connected to the tractor, and to adjust the drawbar's height, during coupling.

The foldable ladder (13) installed on the right-hand side of the hopper is used to inspect the load compartment and to enter the hopper during cleaning or maintenance work. There is a hydraulically controlled slide gate (12) at the rear of the load body, which is used to separate the loaded material from the adapter and prevent it from falling out during transport. The main operation component is the beater unit (6) with two vertical augers. The loaded material is moved towards the adapter unit by the chain feeder installed on the floor of the spreader body. The beater unit is fitted with hydraulically controlled protective shields (11) to be used as spreading limiters (deflectors) during operation.

After installing the side extensions (17) and removing the adapter (6), the spreader can be used as a self-dumping manure conveyor.

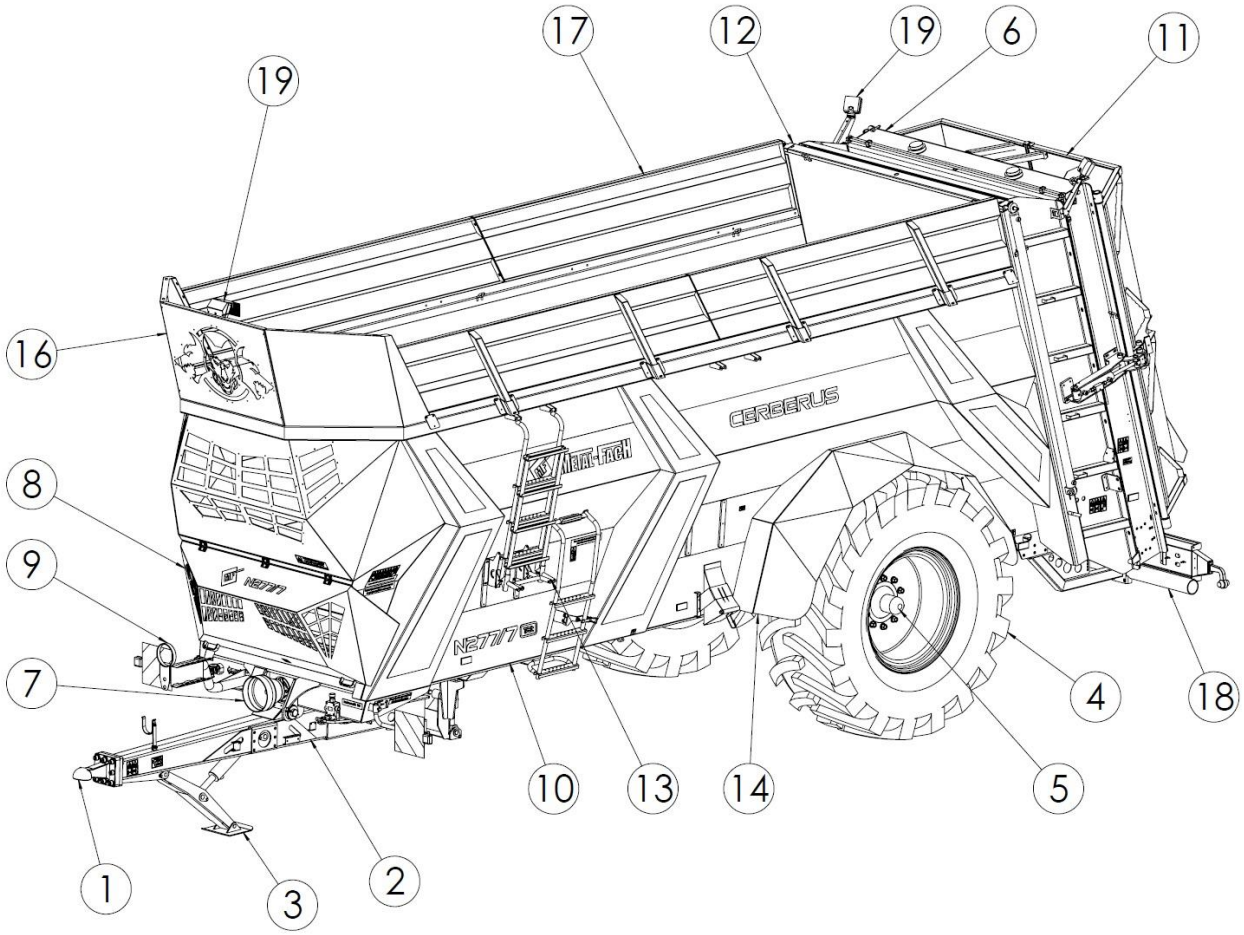


Fig. 7. General design of the manure spreader:
1 – drawbar eye, 2 – sprung hitch, 3 – support leg, 4 – wheels, 5 – suspension, 6 – beater unit, 7 – beater unit drive, 8 – front guard, 9 – lighting beam, 10 – spreader body, 11- beater unit shields, 12- body gate, 13 – ladder, 14* – side extensions, 15* – mudguards, 15 – hand brake, 16 – front extension, 17 – side extension, 18 – overrun protection, 19 – search lights,

3.2.1 Feeding unit

The feeding unit consists of a floor conveyor, a feeder roller, and a tensioning system. The entire unit is driven by the tractor's hydraulic system.

The floor conveyor consists of a pair of chains connected by scraper bars. The chains are driven by sprocket wheels mounted on the feeder roller. The feeder roller is driven by the reduction gear and the hydraulic motor. The front part of the spreader contains a tensioning system that controls the tensioning of the chains of the feeder.

The floor conveyor is protected against damage by an overload hydraulic valve located at the hydraulic motor. If overloaded or blocked mechanically, the conveyor is paused immediately.

3.2.2 Adapter drive unit

The drive unit of the adapters consists of a PTO shaft coupled with the tractor, rotating at the nominal torque of 900 Nm with a shear-pin coupling, a split quill shaft that transmits power from the front part to the rear part of the spreader, and a PTO shaft that transmits power to the adapter.

Table 5. Articulated telescopic shafts

Symbol of the tractor's PTO shaft	Nominal torque	L min	L max	Transmitted power	Overload coupling
	Nm	mm	mm	kW	Nm
680005/802.K68-1/5NW	900	1460	2490	51	2700
680060/S802.K68-1/5NW*	900	1530	2220	51	2700
Symbol of the adapter's PTO shaft	**Nominal torque**	**L min**	**L max**	**Transmitted power**	**Overload coupling**
680440/804.C6803A/5NW	900	710	1110	51	1300

3.2.3 2-rotor vertical spreading adapter

The 2-auger vertical beater unit is used for shredding and scattering the material supplied by the floor conveyor. The beater unit is mounted on the rear of the spreader. The adapter is supplied by the drive unit and the PTO of the tractor.

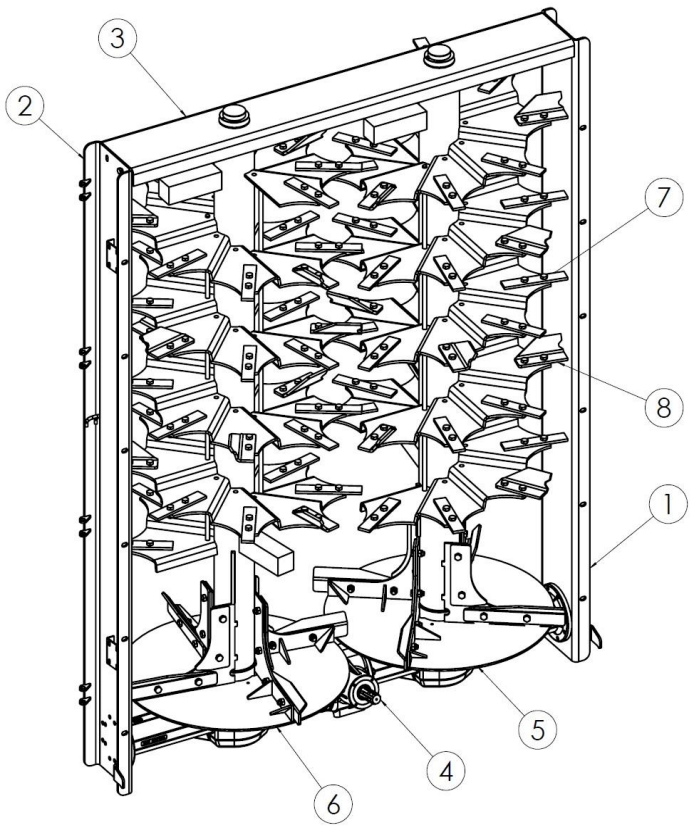


Fig. 8. 2-rotor vertical adapter

The beater unit consists of a left beam (1), a right beam (2) and an upper beam (3) to form the beater unit frame. In its lower part, there is a gearbox (4) with the vertical augers (5) and (6) mounted inside it. The main working tools are the replaceable blades (8) screwed to the rotor segments. When revolving, the rotors shred the fed material and eject it backwards and sideways. The bottom section of the rotors features bladed discs, which increase the spreading width of the material.

The beater unit is fixed to the spreader body with M16 bolts. To disassemble the beater unit:

- disconnect the PTO shaft from the beater unit gearbox
- remove the adapter covers,
- remove the adapter lower covers,
- undo the bolts connecting the adapter to the load body,.
- use a lifting device with the minimum lifting capacity of 1200 kg to remove the adapter,
- after removing the adapter, place it on a solid surface and secure against tipping over.

3.2.4 Adapter covers

The adapter covers are attached to the adapter unit by means of pins and are opened or closed by means of hydraulic cylinders. They are controlled directly from the tractor cab via the lever of the external valve block. The right guard is additionally equipped with a shut-off valve, so that it can be locked in any position. A partially opened shield can be used as a deflector to limit the spreading width of the material.

3.2.5 Ladder

The figures (Fig. 9, 10, 11) show a folding ladder and an internal ladder that allows access to the load body for cleaning maintenance or repair purposes only.

In order to enter the interior of the load body:

1. Unfold the external ladder to the working position (Figure 9).
2. Unfasten the rubber tensioning element (1).
3. Unfasten the ladder from the lower bracket (2).
4. Slide the ladder up (3).
5. Place the ladder inside the box in the brackets provided (5).
6. After cleaning or maintenance work has been carried out, the internal ladder must be removed from the load body internal brackets and installed in the transport brackets.
7. Fold the external ladder into the transport position.

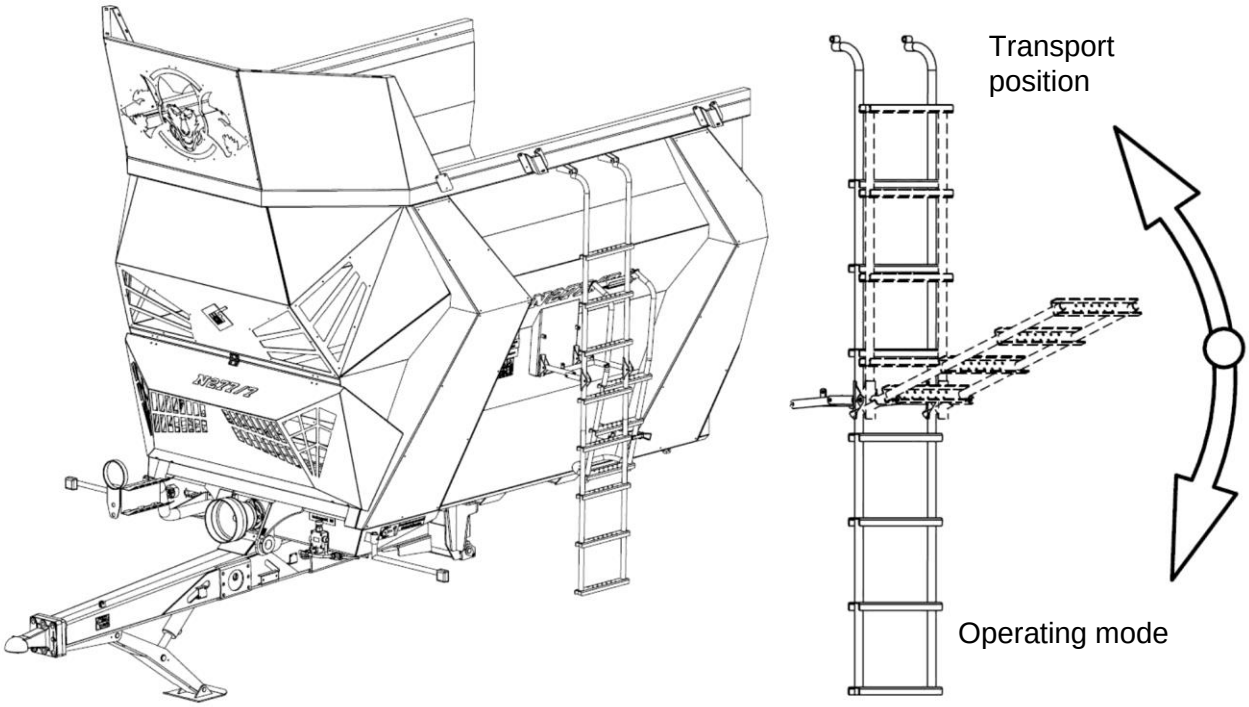


Fig. 9. Unfolding the ladder

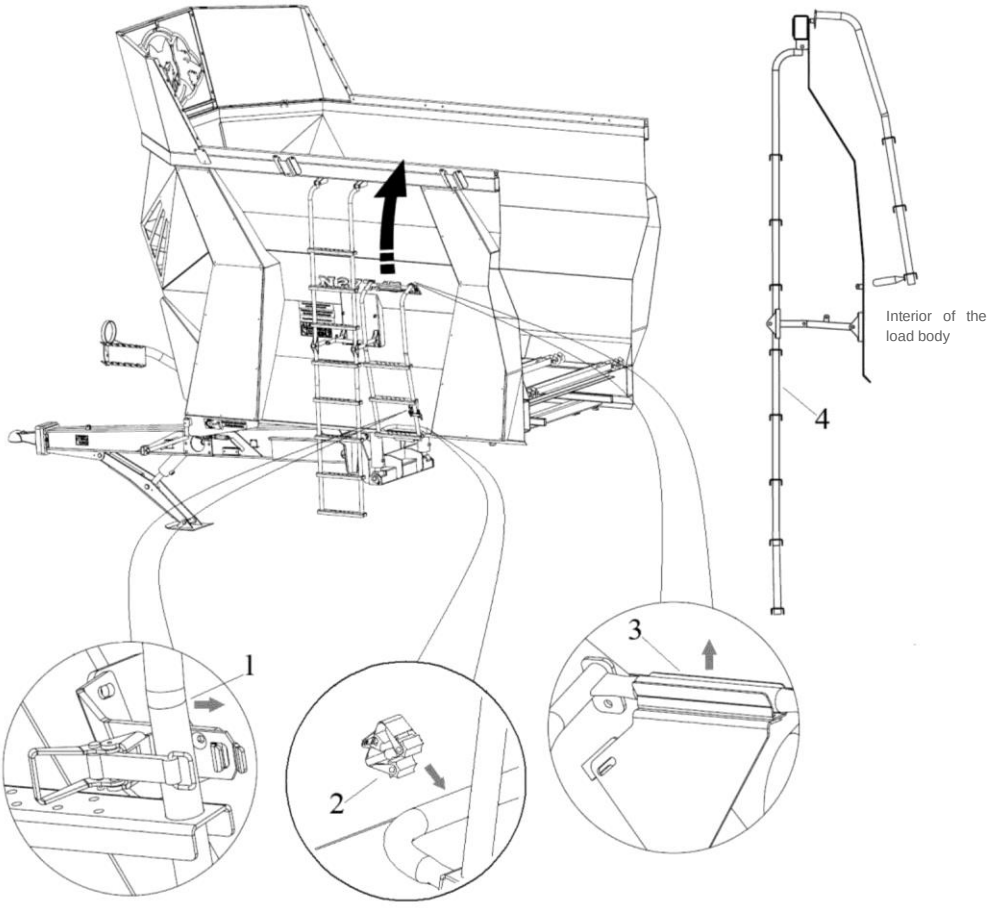


Fig. 10. Assembly of the internal ladder

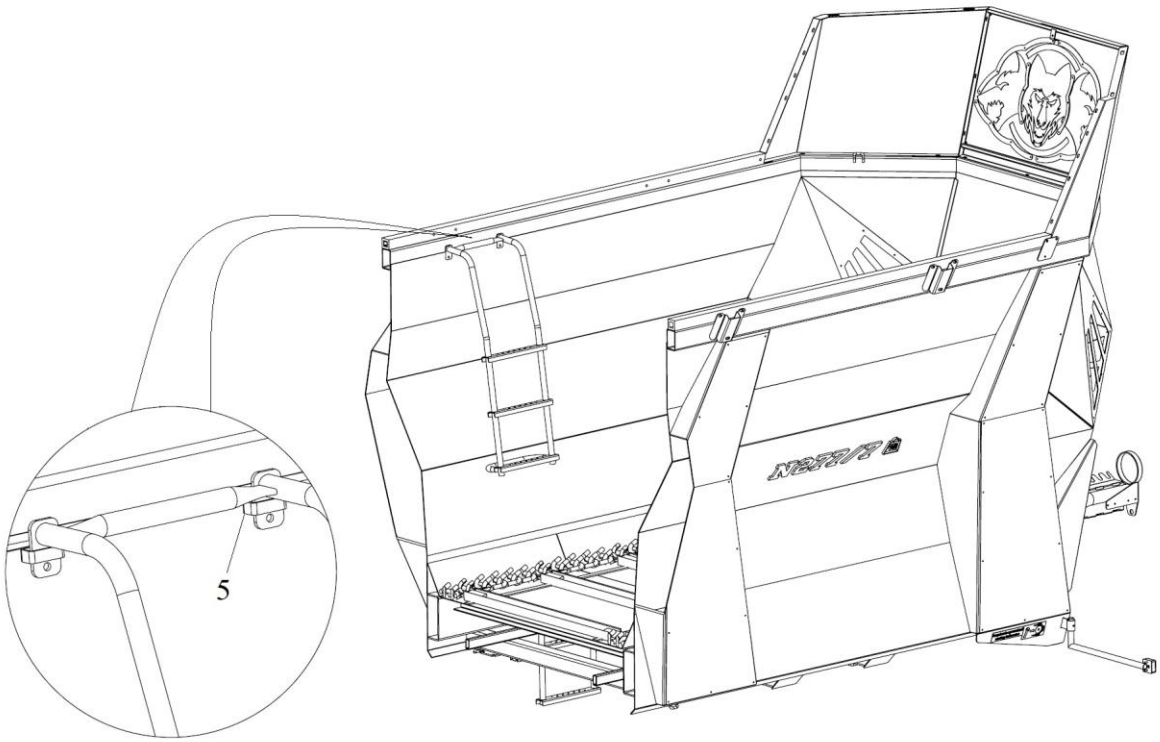


Fig. 11. Internal ladder

3.2.6 Load body slide gate

The N277/6 and N277/7 spreaders are fitted with a body gate as standard. It separates the transported material from the adapter. It is supported in the side guides that seal and protect the material against penetrating outside the load body. The bottom section of the slide gate is reinforced, which protects the gate against damage resulting from excess manure pressing on it. At the bottom of the gate (as at the front of the body) a rubber sealing belt is fixed, matching the shape of the conveyor chains.

The gate is opened by hydraulic cylinders, controlled by the tractor's external hydraulic system, to move it upwards.

3.2.7 Main brake system

The spreader is equipped with a 2-line air brake system with a manual brake force regulator and diaphragm-spring actuators – Figure 12.

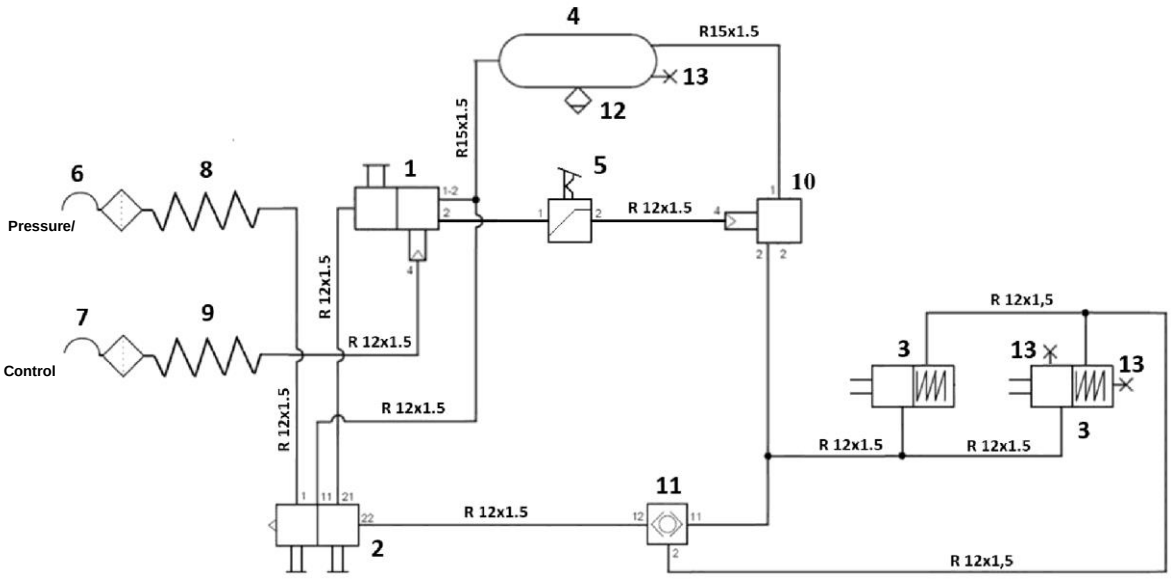


Fig. 12. Pneumatic brake system with manual brake force regulator and diaphragm-spring actuators.
1 – main valve, 2 – parking and release valve 3 – diaphragm-spring actuator, 4 – air reservoir, 5 – manual brake force regulator, 6 – cable connector (red), 7 – cable connector (yellow), 8 – spiral cable (red), 9 – spiral cable (yellow), 10 – damping relay valve, 11 – 2/3-way valve, 12 – drainage valve, 13 – controlconnector

The main brake is activated from the driver's seat by pressing the brake pedal of the tractor. The pneumatic control valve (1) applied in the pneumatic system operates the brakes of the spreader simultaneously with the brakes of the tractor. In the event of an accidental disconnection of the lines (8) and (9), the control valve will automatically activate the brakes of the machine. With this type of system, by adjusting the manual brake force regulator (5) accordingly, the braking force on the spreader wheels should be adjusted according to the filling level of the load body.

3.2.8 Parking brake

The parking brake is used to stop the spreader while it is parked. The parking brake control valve is shown in Figure 13.

The parking brake is controlled with a park-and-release pneumatic valve located on the right side of the spreader, acting on the axle wheels. This valve is used on spreaders with diaphragm spring actuators and is equipped with an emergency brake function. The emergency braking is activated in the event of a pressure drop in the supply line, rupture, abrasion of the line, disconnection of the line from the tractor connector. Two buttons located on the valve allow you to set the spreader to the appropriate mode of operation.

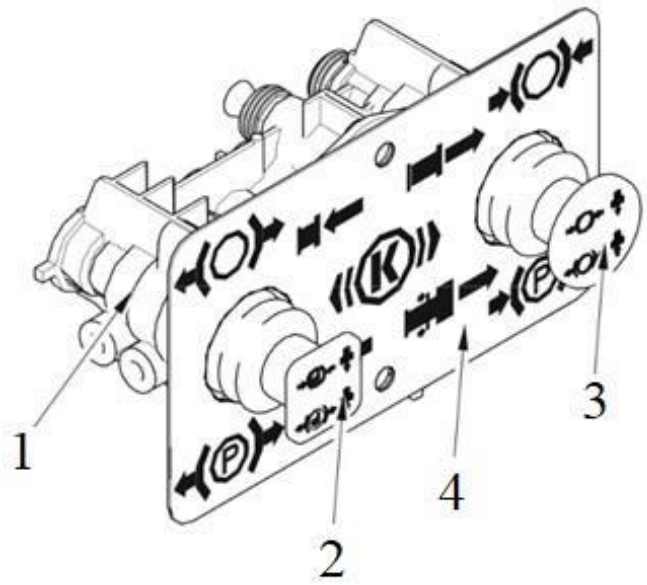


Fig. 13. Parking brake:
1 – valve, 2 – red button, 3 – black button, 4 – rating plate

The red button (2) controls the operation of the parking valve. When the button is pulled out, the parking brake (spring-loaded) is applied. The black button (3) controls the shuttle valve. It is used to release/apply the brake when the spreader is disconnected from the tractor. This button cannot be pressed when the pneumatic lines are connected to the tractor's connections. In the depressed position, the spring (parking) brake is released.

Table 6. System operating mode.

No.	Black button (release valve)	Red button (parking valve)	The spreader is connected to the tractor with pneumatic lines	Operating conditions	Parking brake
1.	extended	retracted	yes	driving	released
2.	extended	extended	yes	parking	started
3.	retracted	retracted	no	manoeuvring	released
4.	retracted	extended	no	parking (spreader uncoupled)	started

3.2.9 Electrical and lighting system

The electrical system of the spreader can supply power from a 12 V DC power source from the tractor electrical system. Connect the electrical system of the spreader to the electrical system of the tractor system by means of a connecting cable supplied with the machine. The wiring diagram is shown in Figure 14 and the arrangement of lights in Figure 15 and 16.

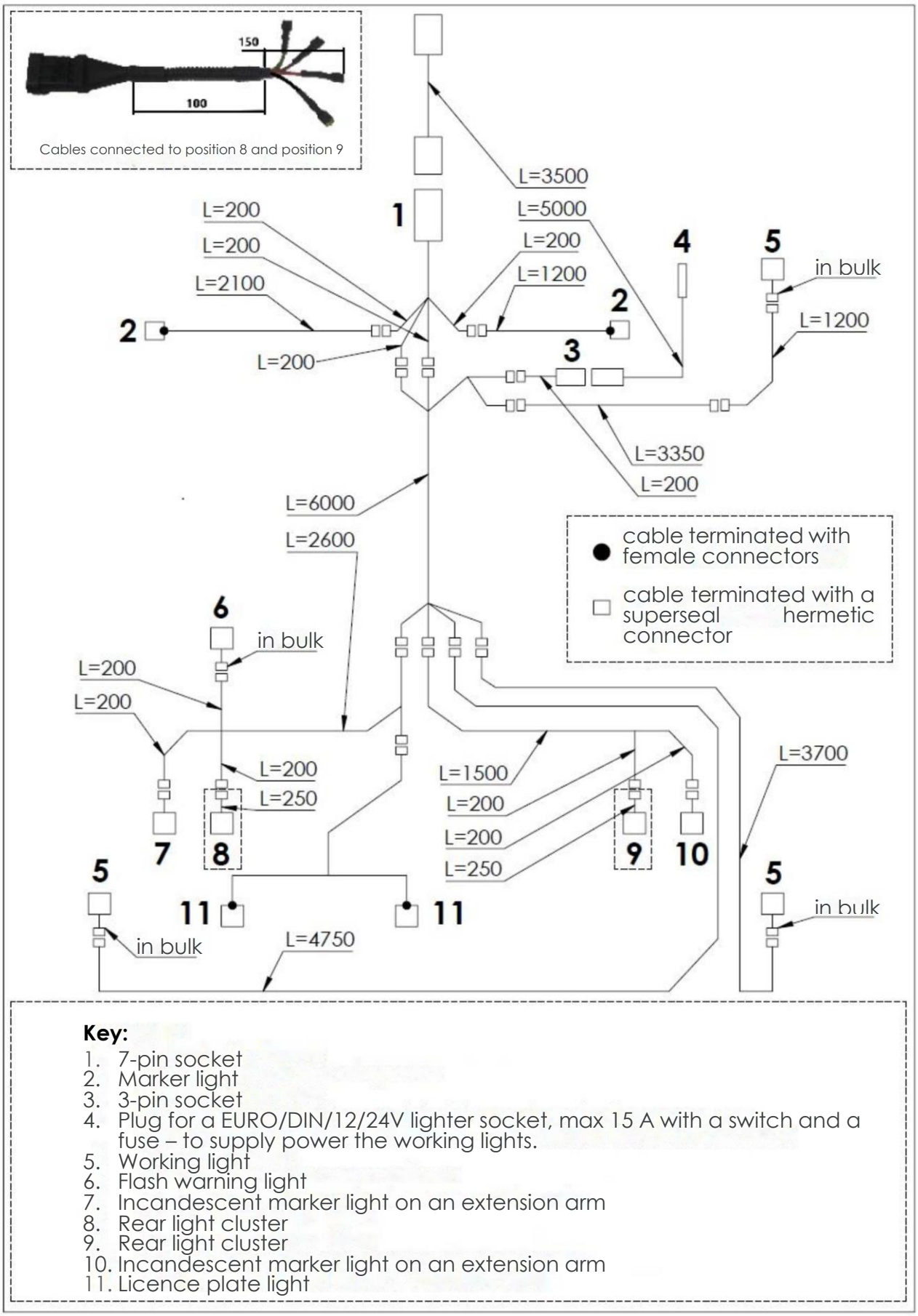


Fig. 14. Wiring Diagram

Table 7. GT sockets connection marking

Designation	Function
1 - L	Traffic indicator lamp, left
3 - 31	Earth
4 - R	Traffic indicator lamp, right
5 – 58R	Running lights
6-54	Brake light

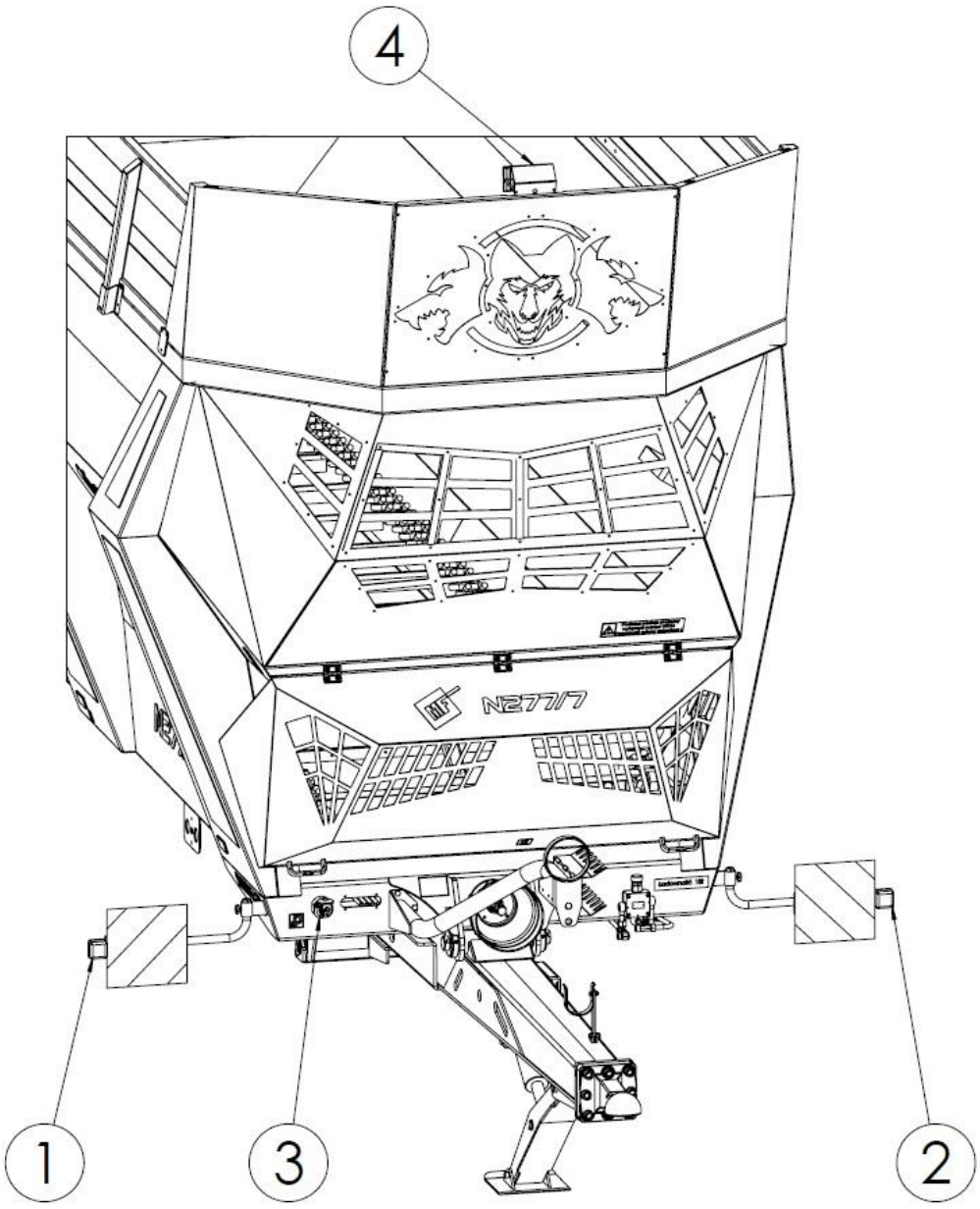


Fig. 15. Arrangement of the electrical system components:
1 – front running light, right, 2 – front running light, left, 3 – connection socket, 4 – working light

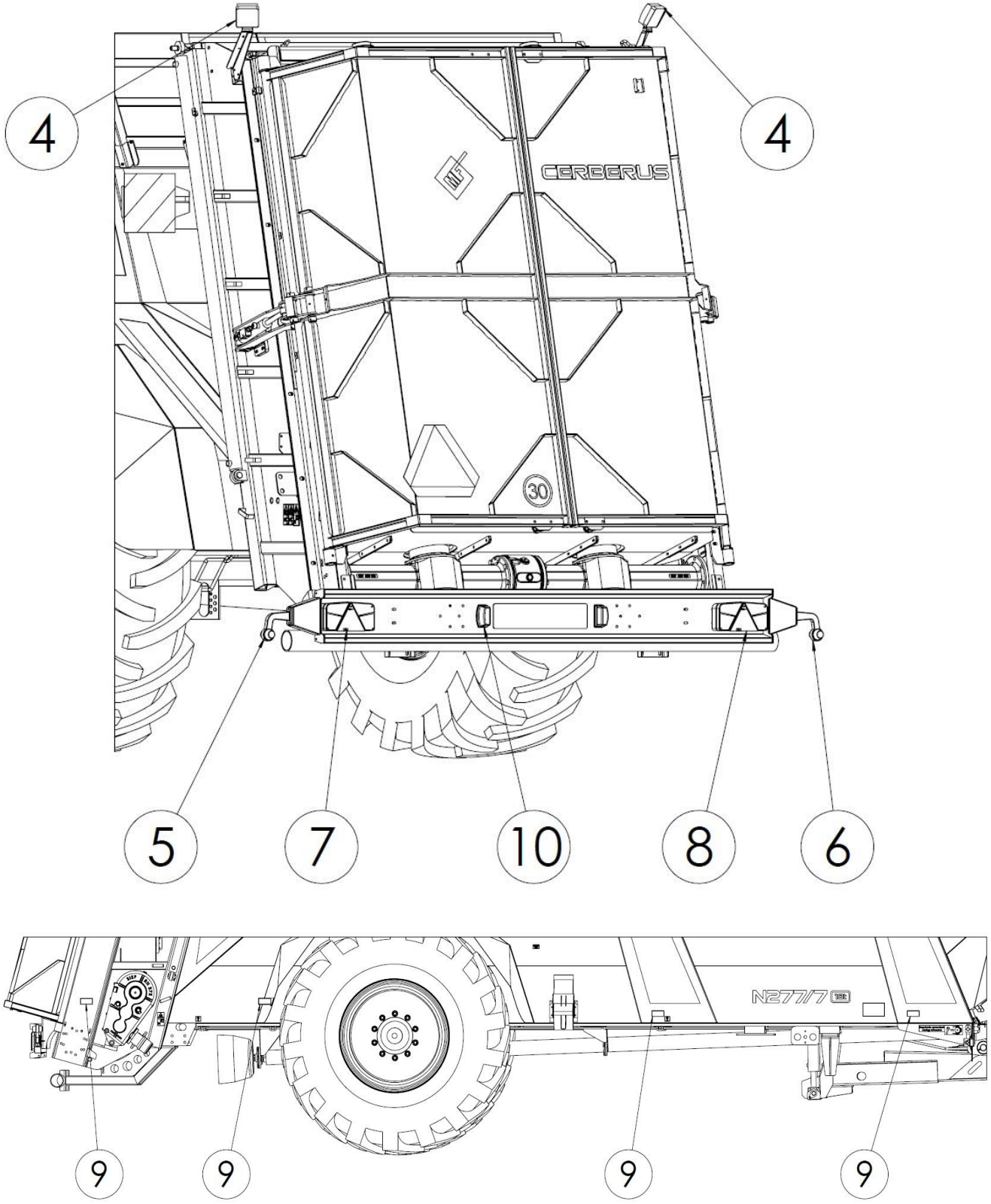


Fig. 16. Arrangement of the electrical system components:
4 – working light, 5 – marker light, left, 6 – marker light, right, 7 – rear-light cluster, left, 8 – rear-light cluster, right, 9 – reflector, 10 – number plate lamp

INDEX OF NAMES AND ABBREVIATIONS

dB (A) – decibel A, sound pressure unit;

kg – kilogram, weight unit;

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

kPa – kilopascal, pressure unit

HP – horse power, power unit;

m – metre, length unit

mm – millimetre – auxiliary length unit equal to 0.001 m

kPa – Megapascal, a pressure unit;

N – Newton, an SI unit of force;

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

Pictogram – an information plate;

t – tonne, a mass unit;

Rating **plate** – a manufacturer's plate unambiguously identifying the machine

V – Volt, a voltage unit;

UV – Ultraviolet radiation; It is an invisible electromagnetic radiation with a negative impact on human health; UV radiation has a negative effect on rubber parts;

PTO – Power take-off shaft;

Transport (pickup) hitch – the hitching components of a farming tractor (see the tractor's manual).

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