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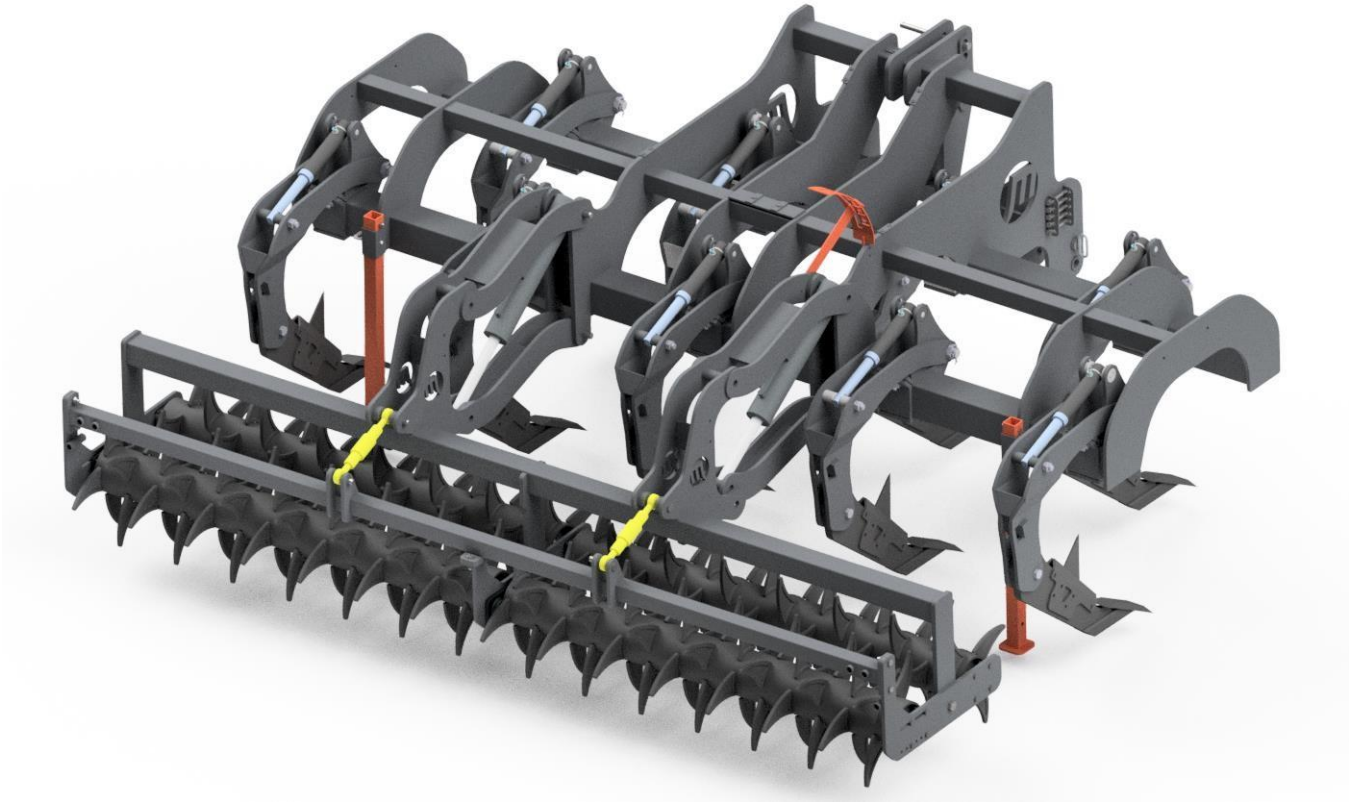
OPERATION MANUAL

SUBSOILER GROT



Revision II
Gliwice 2023

DECLARATION OF CONFORMITY EC

FOR THE MACHINE

Pursuant to the Ordinance of the Minister of Economy of 21 October 2008 (Journal of Laws No. 199, item 1228) and the Directive of the European Union 2006/42/EC of 17 May 2006

MANDAM Sp. z o.o.
ul. Toruńska 14
44 -100 Gliwice

declares with full responsibility that the machine:

SUBSOILER GROT
type/model: ……
year of production: ……
Serial No.: ……

under this declaration, complies with:
Ordinance of the Ministry of Economy of October 21, 2008 on the essential requirements for machines (Journal of Laws No 199, item 1228).
and **Directive** of the European Union 2006/42/EC of 17 May 2006
Persons responsible for the machine documentation: Jarosław Kudlek, Łukasz Jakus ul. Toruńska 14, 44-100 Gliwice
The following standards were also used to assess compliance:
PN-EN ISO 13857:2010,
PN-EN ISO 4254-1:2016-02, PN-EN ISO 12100-1:2005/A1:2012 PN-EN ISO 12100-2:2005/A1:2012
PN-EN 982+A1:2008
This EC declaration of conformity is no longer valid,
if the machine is changed or rebuilt without the manufacturer's approval.

Prezes Zarządu
Dyrektor
inż. Bronisław Jakus

V-ce Prezes Zarządu
Dyrektor ds. Techniczno-Organizacyjnych
mgr inż. Józef Seidel

…… *Place and date of issue*

…… *Full name, position and signature of authorized person*

1 Introduction

We would like to congratulate you on the acquisition of a GROT subsoiler. This manual provides information on hazards that may occur when operating the subsoiler, technical data and the most important instructions and recommendations, the knowledge and application of which are prerequisites for correct operation. Keep this manual for future use. If you do not understand any of the provisions of this manual, please contact the manufacturer.
Notes that are important for safety reasons are marked with the sign:

Machine identification.

The identification data of the subsoiler can be found on the rating plates on the support frame. The rating plate contains basic information about the manufacturer and the machine, as well as the CE mark.

The guarantee for the subsoiler is valid for 12 months from the date of sale.

The warranty card is an integral part of the machine.

Please always quote the serial number when making enquiries about spare parts.
Information on spare parts can be found:

- on the web site: http://mandam.com.pl/parts/,
- or at the phone number: +48 668 662 289,
- E-mail: parts@mandam.com.pl,
- Mandam's authorised distributors.

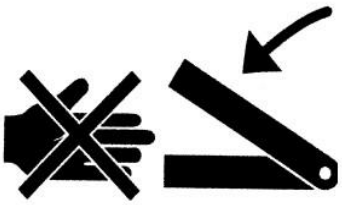
1.1 Safety signs

Remember! When using a subsoiler, special care should be taken in areas marked with special information and warning signs (yellow stickers).

The signs and inscriptions on the machine are detailed below. Safety signs and inscriptions should be protected against loss and loss of legibility. Signs and inscriptions that are lost and illegible should be replaced with new ones.

Table 1. Information and warning signs

Safety signs	*Safety sign meaning*	*Placement on the machine*
	Read the operating instructions before use.	Frame near mounting of the upper fastener.
	Crushing of the toes or foot.	Frame near mounting of the upper fastener.
	Pressurised liquid jet - bodily harm.	Actuators.

Safety signs	*Safety sign meaning*	*Placement on the machine*
	Do not reach into the crushing area if the parts may move.	Near work depth control, contour rollers, side screens.
	Fixing point for transport belts	Upper part of the drawbar (upper fastener bolt) Rear part of subsoiler frame.

2 General information

2.1 Construction and purpose of the GROT subsoiler.

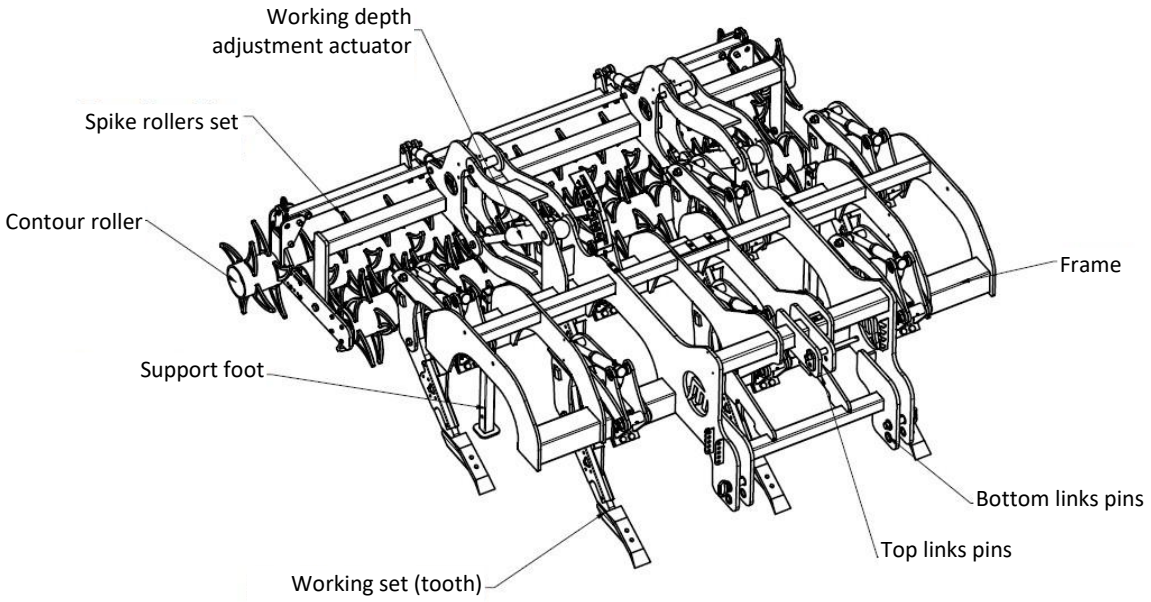


Fig. 1 Construction of the Grot subsoiler.

Table 2. GROT subsoiler types.

Subsoiler type.	Working width [m]	Number of working teeth [pcs.]	Working teeth spacing [mm]	Min. power of tractor [KM]	Weight [kg]
GROT 2,2/5	2,20	5	500	180	2250
GROT 3,0/5	3,00	5	675	180	2580
GROT 3,0/7	3,00	6	450	260	2900

Table 3. GROT-NS subsoiler types.

Subsoiler type.	Working width [m]	Number of teeth [pcs.]	Teeth spacing [mm]	Min. power of tractor [KM]	Weight [kg]
GROT 2,2/5 NS	2,20	5	500	180	2560
GROT 3,0/5 NS	3,00	5	675	180	2877
GROT 3,0/7 NS	3,00	6	450	260	3175

2.2 Intended use of the GROT subsoiler

The subsoiler is designed for crushing, aerating the soil, deep loosening of the subsoil to improve its physical and biological properties and for intensive no-till cultivation. The working depth oscillates between 15 - 45 cm. Recommended working speed - 6 - 12 km/h depending on conditions. The geometry of the three-fold tooth allows it to penetrate even dry soil, pierce the plough pan and stir up plant residues. The aeration and irrigation of the lower soil layers achieved by using the subsoiler provides an excellent agrotechnical effect and benefits the development of plants that have a deeper root system. The machine can be successfully used for subsoiling, performed mostly on soils for sugar beet, rape and alfalfa. After using the subsoiler, there is no need for deep ploughing and crops can be sown after seasoning tools.

NOTE! The subsoiler is designed exclusively for agricultural use. Use for any other purpose will be construed as misuse and will void the warranty. Failure to comply with the recommendations in these operating instructions will also be construed as misuse.

NOTE! The manufacturer shall not be liable for damages resulting from the operation of the machine not in accordance with the intended use.

3 General safety rules

The subsoiler must only be started up, used and repaired by persons who are familiar with its operation and the mating tractor and with the rules of conduct for the safe operation and handling of the chisel plough.

The manufacturer is not responsible for arbitrary changes to the design of the subsoiler. During the warranty period, only factory-made "MANDAM"

parts must be used.
The machine should only be handled and operated by adults who are familiar with the operating instructions, taking all precautions and in particular:

- before each start-up, check the subsoiler and the tractor to ensure that they are in safe condition for movement and operation,
- use of the machine by minors, persons who are ill or under the influence of alcohol or other intoxicants is prohibited,
- use work clothes, footwear and gloves when carrying out maintenance work,
- permissible axle loads and transport dimensions must not be exceeded
- use only original pins, cotter pins and split cotters,
- do not approach the subsoiler when it is being raised and lowered,
- do not remain between the tractor and the subsoiler while the engine is running,
- move the subsoiler, lift and lower it slowly and gently without sudden jerks, taking care not to allow any bystanders in the vicinity,
- it is forbidden to reverse the tractor or make a U-turn with the machine lowered into the working position,
- the tractor's independent brake system must not be used when turning or working with the subsoiler,
- do not stand on the machine or put additional weights on it during operation or transport,
- during u-turns, special care should be taken if there are bystanders in the vicinity,
- carry out any repairs, inspections, maintenance work (greasing etc.), cleaning of working parts and any intervention in the machine only with the engine switched off and the subsoiler lowered,
- during maintenance and replacement of parts, entering or underneath the machine without adequate protection can cause head injuries - in this case a helmet must be used,
- when not in use, lower the machine to the ground and stop the tractor engine,
- driving and parking the subsoiler on a slope with unstable ground may cause a landslide, therefore the machine should only be unhooked from the tractor on a level surface guaranteeing a stable stand,
- machinery must be stored in such a way as to prevent injury to persons,
- keep agricultural equipment out of the reach of livestock.

3.1 Proper coupling and uncoupling with the tractor

- The connection of the machine to the tractor must be carried out as prescribed, remembering to secure the pins and to secure the suspension pins with cotter pins,
- When coupling the tractor to the subsoiler, it is forbidden for people to be between the machine and the tractor during this time,
- The tractor working with the subsoiler must be fully operational. It is forbidden to couple the machine to a tractor with a defective hydraulic system,
- Ensure that the following are maintained: tractor balance with the subsoiler

attached, its steering and braking ability - front axle load must not fall below 20% of the tractor's total axle load - front weight set,

- In the resting position, the machine, when uncoupled from the tractor, should maintain a stable equilibrium.
- The support foot should be rested on a stable surface. It is forbidden to use foot pads that may cause instability of the support.

3.2 Hydraulic system

The hydraulic system is under high pressure. All precautions should be taken, in particular:

- do not connect or disconnect the hydraulic lines when the tractor's hydraulic system is under pressure (hydraulics set to neutral),
- regularly check the condition of the connections and hydraulic lines,
- take the subsoiler out of service while the hydraulic failure is being rectified.

3.3 Safety regarding transport on public roads

NOTE! Special care must be taken when transporting the subsoiler. It is forbidden to drive on public roads without appropriate additional warning signage.

During transport, the clearance under the machine should be at least 30 cm.

The machine must be thoroughly cleaned of adhering plant debris and soil before being driven on the public road. Portable light-warning devices and a distinguishing sign for slow-moving vehicles (according to current traffic regulations) should be attached to the ends of the subsoiler frame. The machine must be fitted with rear lights and front contour lights (according to current traffic regulations) and side reflectors.

NOTE! Lighting and warning devices are not part of the subsoiler equipment. The user can purchase them at agricultural machinery dealers.

The travelling speed during transport must not be exceeded:

- on roads with a smooth surface (asphalt) up to 25 km/h,
- on dirt or paved roads: 6-10 km/h,
- on bumpy roads not more than 5 km/h.

After folding the machine (when using rollers for which the width of the machine in the working position exceeds 3.0 m), fold the rollers and secure them with pins to obtain a smaller transport width.

The driving speed must be adapted to the condition of the road and the conditions on the road, so that the agricultural equipment does not jump on the tractor's suspension system and there are no excessive loads on the machine's frame and the tractor's suspension system.

Particular care should be taken when passing and overtaking and on bends. The permissible width of the machine running on public roads is 3.0 m.

It is forbidden to transport the subsoiler when the slope transverse to the machine exceeds 7°.

Be aware of the length of the machine. On sharp turns, the machine swings in the

opposite direction to the direction of the turn. This can lead to collisions with obstacles or other road users.

WARNING! Failure to comply with the above rules may create hazards for the operator and bystanders as well as damage to the machine. Damage resulting from non-compliance with these rules is the responsibility of the user.

3.4 Description of residual risk

Mandam Sp. z o.o. makes every effort to eliminate the risk of accidents. There is, however, a residual risk that could result in an unfortunate accident. The greatest danger occurs when:

- using the machine for purposes other than those described in the instructions,
- using the machine by minors, persons who are not authorised, who are ill or who are under influence of alcohol or other drugs,
- persons and animals are within the operating range of the machine are present,
- no caution is paid when transporting and manoeuvring the tractor,
- staying on the machine or between the machine and the tractor while the engine is running,
- handling and failure to comply with operating instructions,
- driving on public roads.

3.5 Assessment of residual risk

Residual risk can be minimized by applying the following recommendations:

- prudent and unhurried operation of the machine,
- careful reading of operating instructions,
- keeping a safe distance from danger zones,
- prohibition on being on the machine and in the operating area of the machine while the tractor engine is running,
- carrying out maintenance work in accordance with safety rules,
- use of protective clothing and, if working under machinery, a helmet,
- protection against unauthorized access to machines, especially children.

4 Information on handling and use

The main frame of the subsoiler is the basic load-bearing element of the entire machine. The teeth are attached to the unit frame. The machine is equipped with a 'tandem' type spike roller unit with hydraulic adjustment of the working depth. The teeth have shear pin protection. At an extra charge, a version with "Non-Stop" hydraulic protection is available.

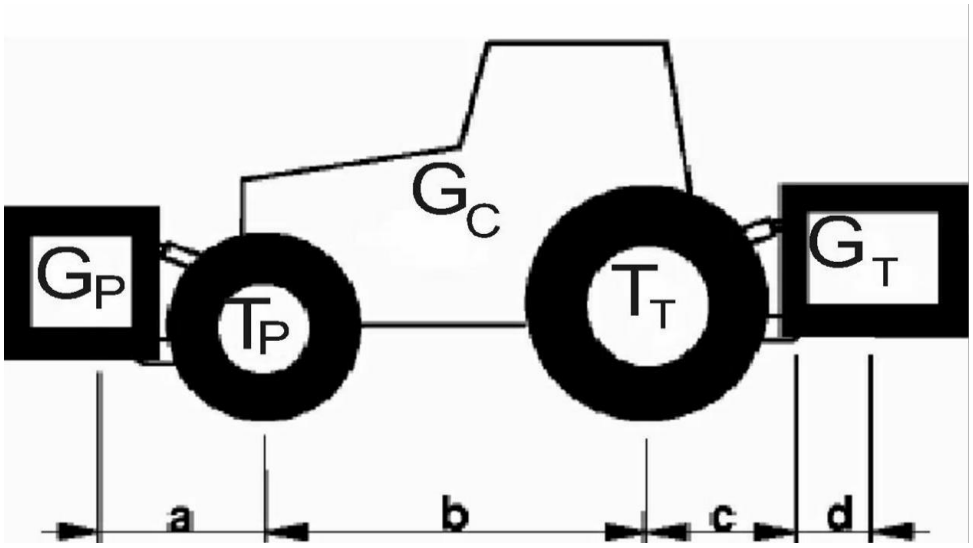


Fig. 2. Diagram of tractor load designations.

Axle load calculations

Designations:

G_C – tractor weight,

T_P– front axle load of the empty tractor,

T_T – rear axle load of the empty tractor,

G_P – total weight of front-mounted device,

G_T – total weight of rear-mounted device,

a – distance between the centre of gravity of the front-mounted device and the centre of the axle

b – tractor wheel track,

c - the space between the centre of the rear axle and the centre of the hitch pin of the rear device,

d - distance of the machine's centre of gravity from the tractor's hitching pins (suspended machine to be 1.4 m, semi-suspended machine to be 3 m and 0.6 weight),

x – distance of the centre of gravity from the rear axle (if the manufacturer does not specify this parameter, enter 0.45). Minimum load at the front for rear-mounted machine:

$$G_{P\,min}=\frac{G_T\cdot(c+d)-T_P\cdot b+0{,}2\cdot G_C\cdot b}{a+b}$$

Actual front axle load

$$T_{P\,cal}=\frac{G_P\cdot(a+b)+T_P\cdot b-G_T\cdot(c+d)}{b}$$

Actual total weight

$$G_{cal}=G_P+G_C+G_T$$

Actual rear axle load

$$T_{T\,cal}=G_{cal}-T_{P\,cal}$$

NOTE! The permissible axle loads and tyre load capacities must not be exceeded. The front axle load must not be less than 20%.

4.1 Subsoiler adjustment

The subsoiler is most often delivered for sale ready for operation. Due to the limitations of transport facilities, it is also possible to deliver it in a partially dismantled state - this usually involves disconnecting the roller assembly from the machine. When the machine is in operation, the working depth of the teeth is adjusted - this is done by changing the position of the roller via the hydraulic working depth. Before starting work, check the condition of the subsoiler, especially the condition of the working parts and bolted connections.

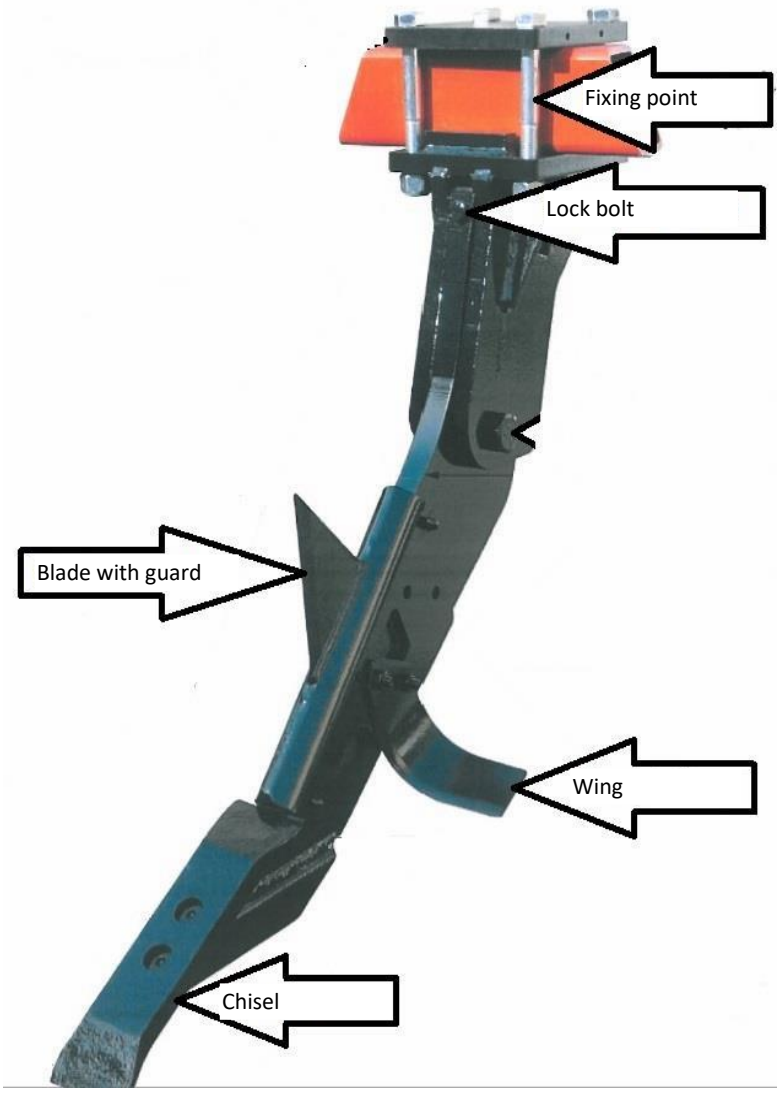


Fig. 3 Working element of the GROT unit.

The GROT subsoiler working element (Fig. 1) consists of:

- chisels - double-sided design allows 180° rotation when one end is worn,
- wing - create a 'soil explosion' effect by loosening, aerating the soil and mixing in crop residues. There are 2 possible positions,

- blade with guard - dedicated to heavy soils. Optionally, the following guards are available without blade.
- lock bolt.

The wing is a removable component. On compacted soils, it is advisable to work shallowly with the wings so as not to bring large soil aggregates to the surface. For deep loosening, it is advisable to remove the wings completely on compacted soils. To remove the wings, first knock out the protection and remove the tooth cover. Then unscrew the wings from the tooth guard and reinstall the guard on the tooth.

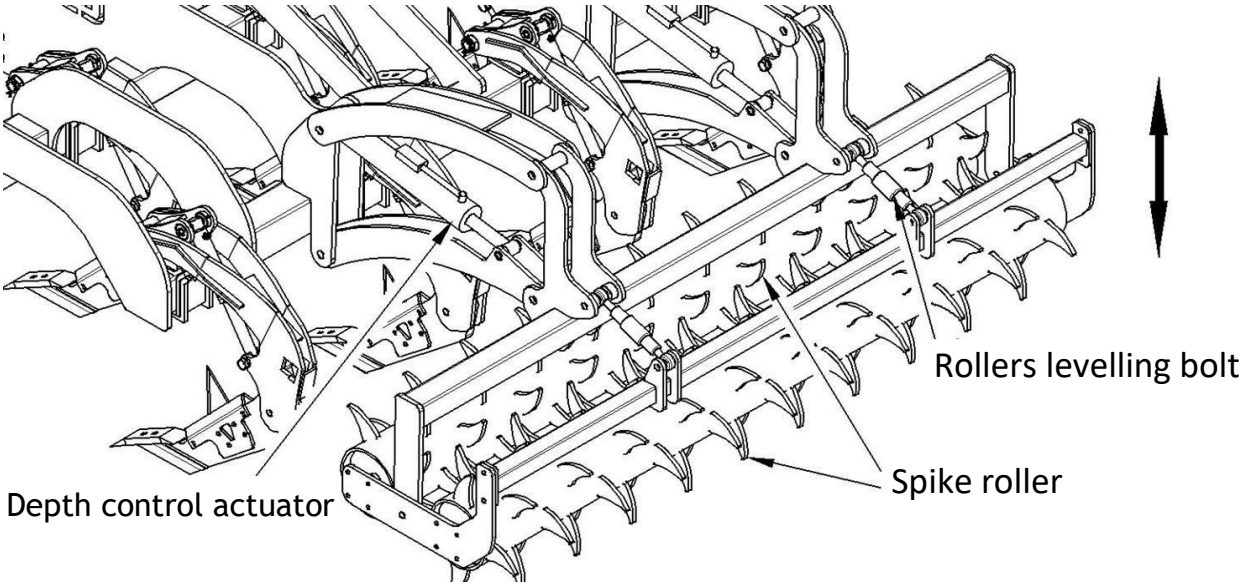


Fig. 4 Connection of the arms to the roller bracket: 1-tubular roller; 2-arms; 3-roller cover.

Behind the working section is a double spike roller. Its job is to maintain working depth, level the field surface and crush soil aggregates into smaller pieces. The working depth is set by actuators controlled by the tractor's external hydraulics. The current working depth is indicated by a marker on a scale above the unit frame (Fig. 3).

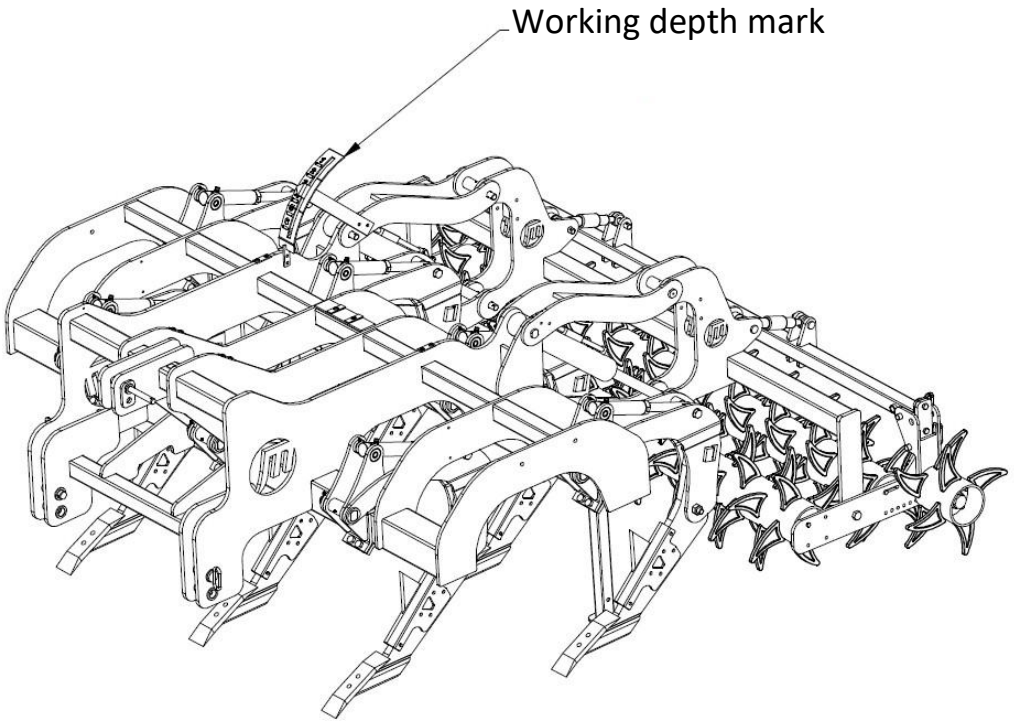


Fig. 5 Location of the working depth marker.

The graduation of the working depth marker is indicative and is intended to indicate the amount of change in depth during operation. The indication of the working depth depends on the type of roller mating with the machine, the wear of the working elements, the type of soil. The scale should be marked with values according to the prevailing conditions on the farm. The spike roller is levelled using turnbuckles.

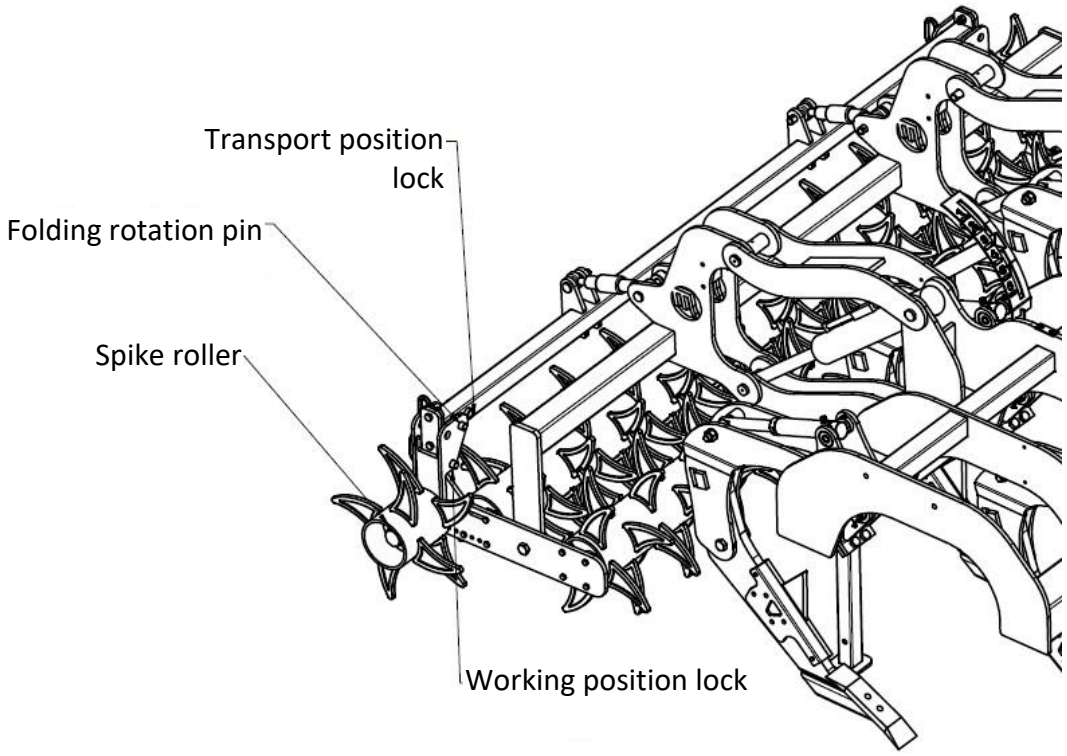


Fig. 6 Spike roller in working position.

The subsoiler can optionally be fitted with an contour spike roller. Its task is to level the field at the junction of the runs. Fig. 4 shows the contour roller haft in the operating position. Before driving on public roads, the roller must be folded into the transport position so that the width of the machine does not exceed 3 m. To do this, remove the locking pin from the operating position, turn the roller on the pivot pin to the transport position and lock with the pin.

4.2 Operation of the subsoiler

Before operating the subsoiler, it must be suspended from the tractor's three-point hitch, and for this purpose:

- remove the lower link pins,
- carefully reverse the tractor and insert the hitching pins into the tractor's lower links and secure them with cotter pins,
- connect the tractor's top link,
- check raising and lowering of the subsoiler,
- raise the supporting feet.

The machine must be cleaned of soil and plant debris before being driven on a public road. A warning light for road transport for slow-moving oversize vehicles (rear lighting and marker lights according to traffic regulations) must be mounted on the subsoiler frame.

NOTE! Hitching the tractor to the subsoiler must be done carefully, at minimum tractor speed! When hitching the machine, make sure there are no bystanders in the vicinity.

A properly hitched subsoiler should follow the tractor evenly during operation and loosen the soil uniformly over the entire working width. The subsoiler frame should occupy a horizontal position relative to the field surface (adjust with the tractor's top link). The correct working depth of the subsoiler is established using a spike roller unit with hydraulic depth control. The use of the spike roller unit also aims to break up the soil and compact it, which greatly accelerates the germination of volunteer seeds and weeds.

NOTE! The maximum working depth is 450 mm. If this parameter is exceeded, there is a risk of failure or accident.

NOTE! Operation of the subsoiler on heavily stony soil is not permitted, as there is a risk of damaging the machine's working parts or causing an accident. It is unacceptable to work the subsoiler on soil that is too wet.

The tractor hydraulics should be set to position control, but force or mixed control can be used in adverse conditions.

4.3 Setting the hydraulic body protection

During operation, the hydraulic body protection hoses must be permanently connected to the tractor's external hydraulics via the "P" input and "T" output. The pressure on the pressure gauge should indicate 140 bar. Pressurisation to the required pressure is carried out by topping up oil under pressure from the tractor's external hydraulics via the "P" input. A lower pressure than recommended will reduce the excitation force of the body protection system. The pressure increase in the system during operation is taken over by the hydroaccumulator used. When the limit values are exceeded, the excess oil is fed back to the tractor via output "T" and then automatically topped up via input "P".
The appropriate operating pressure can be achieved by adjusting the "BP", with which we set the appropriate operating pressure, and the "AP", with which we adjust the safety pressure. The valve is factory-adapted for the corresponding operation.

NOTE! The ball valve must be in the open position (free flow through the valve) during use. The ball valve must be closed when carrying out service work with the hydraulic system between the tractor and the ball valve.

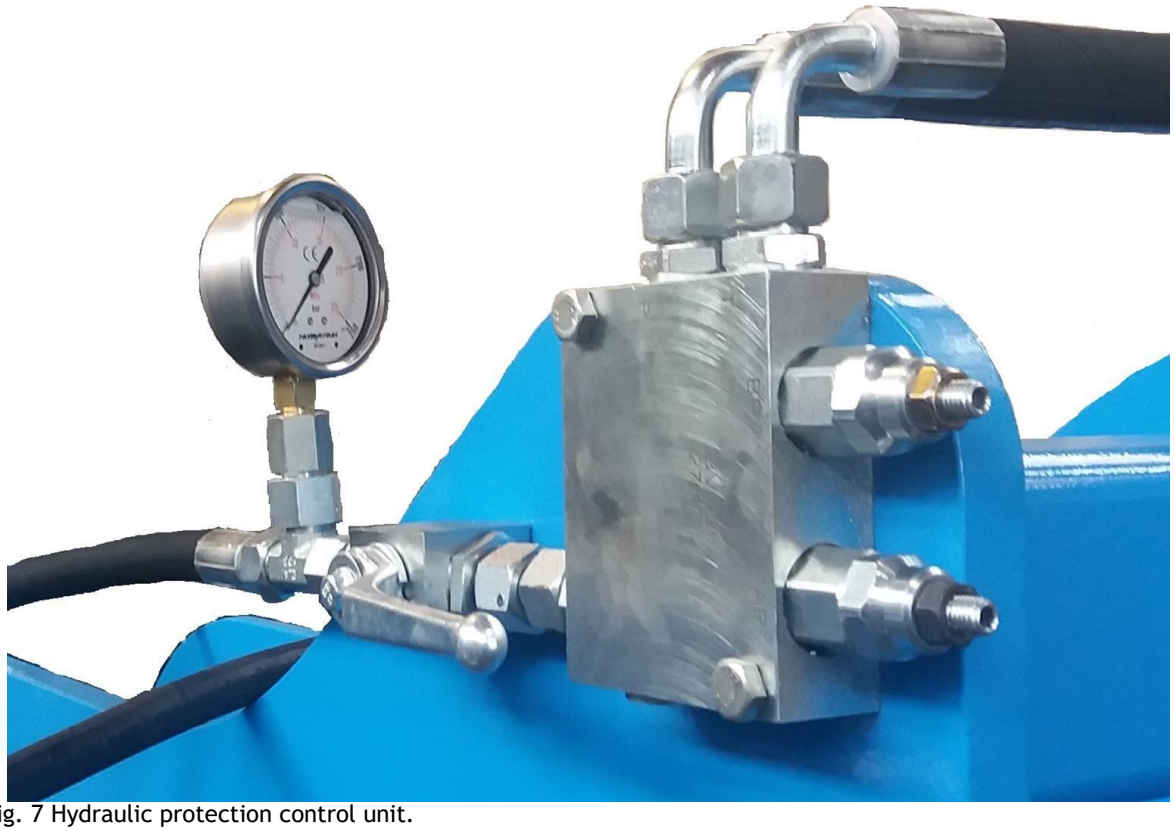


Fig. 7 Hydraulic protection control unit.

5 Technical maintenance

5.1 Everyday maintenance

Each time a subsoiler operation is completed, the machine should be thoroughly cleaned of soil and plant debris, the bolted and pin connections should be inspected and the condition of the working elements and other parts should be checked. When cleaning, plant debris and strings winding up at the bearing points of the roller should be removed. If parts are found to be damaged or worn, they should be replaced. All loose screw connections must be tightened and damaged cotter pins and pins must be replaced.

5.2 Replacement of working components

Excessive wear on the working elements makes it difficult for the machine to sink into the ground and increases working resistance. The working components must be changed on the machine lowered to the ground after the tractor engine has been switched off. To ensure that the elements to be replaced do not come into contact with the ground, sturdy shims (e.g. wooden blocks approx. 20 cm thick underneath adjacent elements or the roller) must be provided. After lowering the subsoiler, switching off the tractor engine and applying the handbrake, check the stability of the tractor-machine unit. Only typical screws should be used to fix new components.

5.3 Operation of the hydraulic system

A malfunctioning actuator (presence of leaks, etc.) must be dismantled and taken to a specialist workshop. The replacement actuator, once connected to the

system, should cycle through its operation several times in order to fill the actuator completely with oil.

The system pressure must be reduced before servicing the actuators, hoses and the accumulator. **When handling, take special care and work in full body protection (gloves to protect the hands, mask to protect the face).** To do this, connect the system to the tractor and reduce the spring tension on the valve with a screw until the pointer points to zero. The ball valve should be in the open (operating) position. There may be residual pressure in the system which will cause oil to suddenly flow out under pressure.

NOTE! When carrying out repairs and maintenance, the machine should be lowered to the ground and supported on supports to ensure full stability and the tractor engine switched off. Use proper spanners and protective gloves during maintenance and repairs.

5.4 Faults and malfunctions of the subsoiler

The GROT subsoiler is distinguished by its very low failure rate due to the simplicity of its design and the materials used. In order to extend the service life of the machine, all the recommendations of this manual regarding operation, adjustment, lubrication, transport and storage must be followed. When operating the machine on soils in the presence of stones, it is recommended to equip the machine with the optional hydraulic protection of the working elements.

Table 4. Causes and ways of repairing faults and malfunctions of the GROT subsoiler.

Fault, malfunction	Reason	Repair method
- uneven penetration of teeth	- poor levelling of the machine	- level the machine longitudinally and transversely
- poor tooth penetration	- excessively worn teeth - roller too low	- replace the teeth - raise the roller
- deep furrow at the junction of the working passages	- no contour rollers	- use of contour rollers
- clogging of teeth	- working depth too deep	- reduce the depth
- poor soil compression by the roller	- badly levelled machine - roller too high	- extend the top link - lower the roller

NOTE! When carrying out repairs and maintenance, the machine should be lowered to the ground and supported on supports to ensure full stability and the tractor engine switched off. Use proper spanners and protective gloves during maintenance and repairs.

5.5 Maintenance and lubrication of the machine

- The subsoiler should be cleaned from the soil ach time after work, followed by

an inspection of the parts and assemblies. **Otherwise, there may be a problem with the folding of the machine if the rollers are clogged with soil and there is an additional load!**

- Re-tighten all screws after the first 4 hours of operation and periodically check the tightness. **Failure to do so will exacerbate backlash and result in damage to the machine.**
- When replacing worn components, use thread glue, original bolts and nuts.
- Always ensure that screw connections are properly tightened.

NOTE! Periodic lubrication is a guarantee of the durability of the machine.

The service life and efficiency of the machine depend to a large extent on regular lubrication. Mineral lubricants should be used for lubrication. Lubrication points must be thoroughly cleaned before pressing in or applying grease.

NOTE! It is forbidden to work on a damaged machine caused by any event resulting in a broken, or deformed frame, roller or other assembly of the machine!

Lubricators should be well cleaned before lubrication. The points should be lubricated according to the intensity of use:

- Swinging of the spiked roller bearings (4 pcs.) - 10 h,
- Working depth adjustment pins (10 pcs.) - 20 h,
- Pins of the hydraulic protection system (3 pcs. x number of teeth) - 10 h in case of a large number of stones

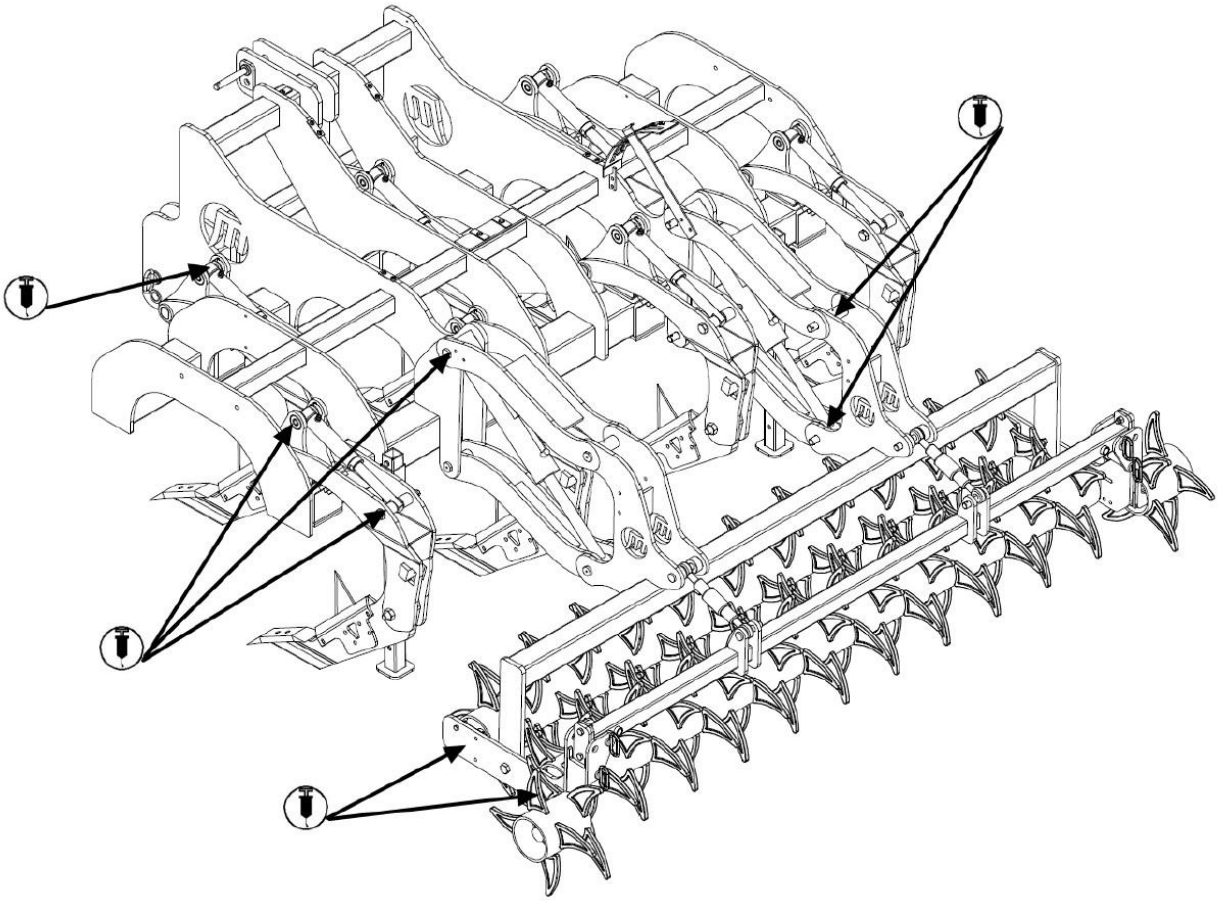


Fig. 8. Lubrication points in the GROT subsoiler.

Lubricate all lubrication points until the friction surfaces are completely filled. Remove any residual grease. Too much grease causes dust and soil particles to stick together.

5.6 Screw tightening torque

Bolts and nuts should be tightened in the machine with the correct torque depending on the strength class of the bolt and its thread size and pitch. Their respective tightening torque values are shown in Table 5.

Table 5. Tightening torque values for nuts and bolts.

Nuts & bolts torque [Nm]					
			Nuts & bolts strenght grade		
		Thread pitch	8.8	10.9	12.9
Size	M4	0,7	3,2	4,5	5,2
	M5	0,8	6	8,4	10
	M6	1,0	11	15	17
	M8	1,3	27	34	40
		1,0	21	30	35
	M10	1,5	46	65	76
		1,3	41	75	67
		1,0	36	50	59
	M12	1,8	79	111	129
		1,3	65	91	107
	M14	2,0	124	174	203
		1,5	104	143	167
	M16	2,0	170	237	277
		1,5	139	196	228
	M18	2,0	258	363	422
		1,5	180	254	296
	M20	2,5	332	469	546
		1,5	229	322	375
	M22	2,5	415	584	682
		1,5	282	397	463
	M24	3,0	576	809	942
		2,0	430	603	706
	M27	3,0	740	1050	1250
		2,0	552	783	933
	M30	3,5	1000	1450	1700
		2,0	745	1080	1270
	M36	4,0	1290	1790	2020
		2,0	960	1340	1500

NOTE! It is forbidden to work on a damaged machine caused by any event resulting in a broken, or deformed frame, roller or other assembly of the machine!

6 Replacement procedures

Replacement of working components

Excessively worn working element make it difficult for tools to penetrate and cause an increase in working resistance.

The working components must be changed on the machine lowered to the ground after the tractor engine has been switched off. To ensure that the elements to be replaced do not come into contact with the ground, sturdy shims (e.g. wooden blocks approx. 20 cm thick underneath adjacent elements or the roller) must be provided. In the case of a trolley, the maximum lowered wheels can also be used as supports. After lowering the subsoiler, switching off the tractor engine and applying the handbrake, check the stability of the tractor-machine unit. Only typical screws should be used to fix new components.

If machine components are disassembled several times, it is necessary to inspect and possibly replace connecting elements such as bolts, washers or nuts, excessive wear of which may lead to uncontrolled loosening of the connecting elements and subsequent damage.

When working on extremely worn work tools, such work can cause damage to other machine components, for example. Tools should be replaced when their wear and tear exceeds the limits allowed by the manual. If the recommendations are not followed, damage may occur for which the manufacturer is NOT RESPONSIBLE!

Replacement of cylinders

A malfunctioning cylinder, leakage, etc. must be replaced by dismantling and returning it to a specialist workshop. Replacement of the cylinder must be carried out on an unfolded machine. Connect the cylinder to the system and, mounted on one side, it should cycle a few times to fill the cylinder completely with oil. Failure to do so may result in a sudden fall of the drop section.

NOTE! When carrying out repairs and maintenance, the machine should be lowered to the ground and supported on supports to ensure full stability and the tractor engine switched off. Use proper spanners and protective gloves during maintenance and repairs.

7 Subsoiler storage

After the end of the operating season of the subsoiler, the machine should be thoroughly cleaned of soil and plant debris, the bolted and pin connections should be inspected and the condition of the working elements and other parts should be checked. When cleaning, plant debris and strings winding up at the bearing points of the roller should be removed. If parts are found to be damaged or worn, they should be replaced. All loose screw connections must be tightened and damaged cotter pins and pins must be replaced. The subsoiler should be stored in a covered area. In the absence of a covered area, outdoor storage of the machine is permitted. **The subsoiler should be stored in a place where it does not pose a danger to persons and the environment stably supported on support feet.** If the machine is stored outdoors for a long period of time, the maintenance of the working parts should be repeated when the preservative layer is rinsed off.

Clean the piston rods of the hydraulic cylinders during winter and when the machine is not in use for a long period of time, and protect them with vaseline or acid-free grease to protect them from corrosion.

The machine, when uncoupled from the tractor, should support itself on firm and level ground, maintaining a firm balance. All work units should rest on the ground. The machine should be lowered gently so as not to expose the working parts to impact on hard ground. Once the machine is down, disconnect the suspension system and drive the tractor away. Also, components dismantled from the machine must be stored securely supported on the ground, excluding the possibility of uncontrolled movement. It is advisable to store the machine in a paved and covered area that is inaccessible to bystanders and animals.

Store the machine securely supported on a hard surface to prevent injury to people or animals.

8 Disassembly and disposal

The machine used in accordance with the rules in the operating instructions will last for many years, but worn or damaged components must be replaced with new ones. In the event of emergency damage (cracks and deformation of the frames) impairing the quality of the machine's work and posing a danger to further operation, the machine must be scrapped.

The disassembly of the machine should be carried out by persons previously familiar with its construction. These operations should be carried out after the machine has been set up on a level and stable surface. Disassembled metal parts should be scrapped and rubber parts should be taken to a recycling facility. The oil should be poured into a sealed container and taken to a recycling facility.

The dismantling and disposal of a used subsoiler poses little risk to the environment. Start dismantling the machine by removing small components (pins, bolts, etc.) before moving on to larger ones. The dismantled machine should be taken to a steel scrap collection point as secondary material.

NOTE Take all precautions when dismantling the machine by using operable tools and personal protective equipment. Disassembled parts must be disposed of in accordance with environmental protection requirements.

9 Replacement parts for GROT subsoiler

To find, price and order original spare parts for MANDAM machines, please visit our website at: www.mandam.com.pl, under the "parts" tab.
On this page, we provide catalogues and spare parts sheets in PDF format, containing up-to-date parts diagrams for each machine, together with their numbers and prices.
Parts orders, or enquiries regarding them, can be made directly from this page (tab: "contact/order"), or by e-mail to : parts@mandam.com.pl

The order should include the part numbers and quantities, as well as the purchaser/payer's details including a contact telephone number.
Parts are shipped directly to the address provided and payment is made on delivery. If you are not sure, please contact the Mandam spare parts department on the following telephone numbers : +48 32-232-2660 ext. 39 or 45, or on the mobile number +48 668-66-22-89.
Original MANDAM spare parts are also available from all authorised MANDAM machine distributors.

NOTE The unit must be disconnected from the tractor before dismantling operations.