THE WORKER IS KING

Deep Tine Aerator

Manual_Deep Tine Aerator_EN_2302

DTA120-160-210-260

EC DECLARATION OF CONFORMITY CONCERNING MACHINES
According to Directive 2006/42/EG, annex 2, point 1, A

GKB Machines B.V.
Middelweg 1
2992 SP Barendrecht
Nederland

hereby declares that the

GKB Deep Tine Aerator

Type: DTA120 - DTA160 - DTA210 - DTA260

to which this declaration relates are in conformity with the provisions of:

- Directive 2006/42/EC Machinery Directive

At Barendrecht, 07/02/2023

T.J.W. Kraaijeveld

UKCA DECLARATION OF CONFORMITY CONCERNING MACHINES
According to Machinery (Safety) Regulations 2008

Manufacturer:
GKB Machines B.V.
Middelweg 1
2992 SP Barendrecht
Nederland

UKCA Delegate
GKB Machines ltd.
Warwick House, Ermine Buseniss Park, Spitfire Close
Huntingdon PE29 6XY
United Kingdom

hereby declares that the

GKB Deep Tine Aerator

Type: DTA120 - DTA160 - DTA210 - DTA260

to which this declaration relates are in conformity with the provisions of:

- Machinery (Safety) Regulations 2008

At Barendrecht, 07/02/2023

T.J.W. Kraaijeveld

TABLE OF CONTENTS

1. FOREWORD

The information contained within these operating instructions covers the necessary use, safety, operation, and maintenance of the machines mentioned in the CE declaration. Before operating anyone of the machinery has to read this operating manual in its entirety. The manufacturer will not be held liable for an injury or damage which occurs from improper use.

It is the goal of the manufacturer to create excellent products, therefore we hold the right to make changes at any time and will not be held under obligation to previously delivered machines. Certain aspects, such as weight and dimensions, may change at any time without notice. Images are also not bound to interim changes.

2. INTRODUCTION

The Deep Tine Aerator is meant to aerate natural and hybrid greens intensively. The tines of the machine penetrate deeply into the compacted turf, so the surface water together with the fresh air comes to the roots. With the adjustable tine angle upto 25 degrees, you will be able to aerate the greens more intensively. De models 210 and 240 are equipped with hydraulic hight adjustment by which the desired tine depth can be set up very easily with a maximum of 40 cm. The machine has also an unique tine-mountingsystem.

Every machine is marked with a code, as seen in the image below.

Example:
Model 'DTA120':

DTA 120
- 120 — Working width of the machine
- DTA — Type of machine (Deep Tine Aerator)

The manufacturer shall not be held liable for any damage resulting from unintentional use.

3. CONTACT

Manufacturer:

GKB Machines B.V.
Middelweg 1
2992 SP Barendrecht
NETHERLANDS
info@gkbmachines.com
www.gkbmachines.com

Productnumber Manual: See footer/ front page

Your personal Dealer:

Your GKB dealer:

4. WARRANTY

The statutory warranty period of two years from the invoice date applies to the machines. Warranty repairs or product replacements do not extend the warranty period of the machine or parts. The guarantee does not apply to items arising from normal wear and tear or ageing.

A warranty procedure starts with an investigation to determine whether the problem is covered by the warranty. Your cooperation is required to verify that the warranty conditions have been met. To this end, keep a record of the maintenance and repairs carried out in a maintenance logbook.

If the manufacturer receives a warranty notification, it will be determined whether the defect is covered by the warranty. If this is the case, a suitable solution will be found in consultation with the customer. In all cases, consult with the dealer before you try to solve the problem yourself. Warranty can only be given if the machine is in its original condition.

The manufacturer's written permission is required to ensure that the machine does not deviate in any way from the aforementioned purpose of use. Use other than as described will lead to the loss of product liability and warranty.

Product liability obliges the manufacturer and the dealer, when selling machines, to provide a manual and to instruct the user on the operating, safety and maintenance instructions.

The manufacturer is not responsible for any (unintended) damages to grass or sport fields.

Caution! The operating instructions must also be supplied if the machine is subsequently exchanged or resold by the user. Also inform the new user of the regulations.

5. SAFETY

5.1. General

The safest operation requires these machines are operated exactly according to these instructions. In addition, there are also safety warnings on the machines to warn of potential dangers and instructions on how to handle them. The only way to 100% guarantee no property damage or personal injury occurs is to follow these instructions. While using this machine, keep this handbook nearby and always ensure that safety markings on the machines are visible.

Any local safety regulations, including road traffic regulations, must be observed at all times.

The warranty, CE marking, and product liability automatically expire upon changes being made to the machine without consultation of the manufacturer.

The machine is equipped with several safety stickers, to instruct the user how to handle the machine with care. An example of a safetysticker is shown next.
Annex III describes every type of safety sticker. Read them carefully before using the machine.

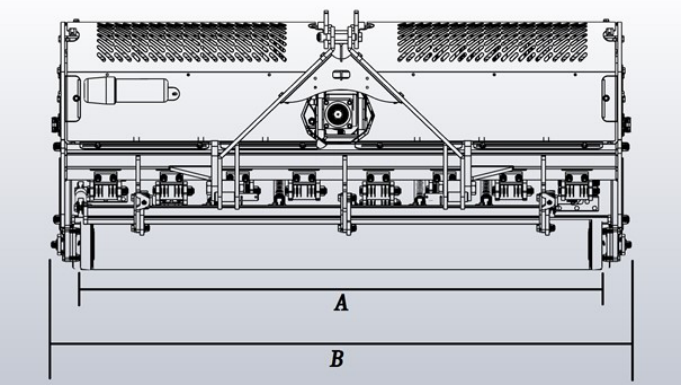
5.2. Safety instructions

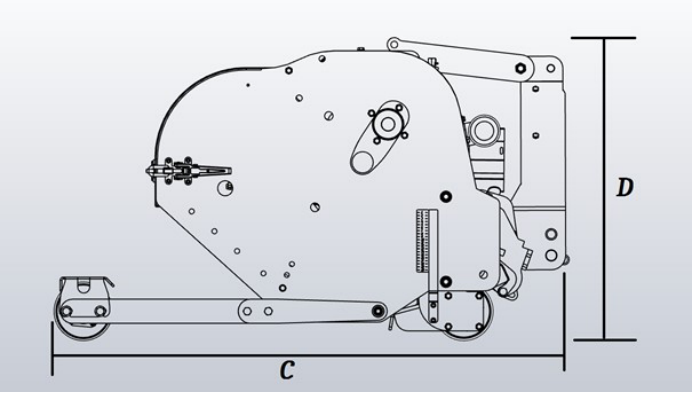
1. These operating instructions must be read and understand by everyone who works, checks or maintains the machine in order to avoid risks and to avert dangers.
2. Pass on all safety and operating instructions to all users.
3. The machine may only be used for the intended work.
4. For optimum performance, the surface to be worked on must be flat and free of obstacles.
5. Only use parts and accessories specified by GKB. The installation and/or use of non-original parts and accessories may change or impair the specific characteristics of the machine. GKB is excluded from any liability for damage resulting from the use of non-original parts and accessories.
6. Before working with the machine, it is necessary to become familiar with all control components, their functions, safety aspects and risks. The machine may therefore only be operated and maintained by qualified personnel.
7. Maintenance must be carried out in accordance with the instructions in the manual. The maintenance carried out must be recorded. Never come under the machine in any situation!
8. Before commissioning, the safety of operation and transport must be checked. The inspection includes, but is not limited to, the correct functioning of the mechanical, hydraulic and electrical components.
9. If leaks are suspected, stop the entire hydraulic system and allow it to cool down before carrying out maintenance.
10. Before use, check that there are no persons and/or obstacles within the working area of the tractor and the machine.
11. There are several warning labels on the machine. These stickers contain important instructions for safe use and must always be clean and visible.
12. All safety devices must be attached to the machinery and be in good working order. Timely replacement of worn and damaged protective equipment is required. This also applies to the warning labels. Fixed guards must always be present during operation.
13. The operator's clothing must be close-fitting. If necessary, wear head and hearing protection.
14. Driving on the machine during work and transport is not permitted.
15. When using the machine on public roads, the (local) traffic regulations of the respective country apply. Observe the markings, lighting and safety devices applied. Only drive if all required permits and approvals have been obtained.
16. Maintain an adjusted speed when the machine is hanging behind the tractor. Especially when driving over tresholds or poor road conditions. Always place the toplink in the round hole!
17. The driver is responsible for ensuring that the tractor and the machine are on public roads in accordance with the regulations. Permitted axle loads and weights must be considered.
18. If the driver is unable to oversee the carriageway immediately behind him, he must be instructed when reversing. Instructors must be within the driver's field of vision only and never between the tractor and the machine.
19. Connect the machine with the tractor according prescribed tools.
20. When connecting and disconnecting, parking or storing the machine, it must be prevented that the machine moves unintentionally. Depending on the machine, this can be prevented by applying the brakes, using the parking position or locking the wheels by placing wedges.
21. During use, transport or storage on a sloping slope or during maintenance, one should be aware of the risk of tipping over.
22. Prevent burns by careful use of hot components such as oil lines and engines. When carrying out maintenance work, allow the system to cool down completely.
23. It is not allowed to drive or maintain the machine under the influence of medication, drugs or alcohol.
24. Using headphones or hearing protection with music or radio is not permitted.
25. Smoking and open fire is prohibited in and around the machine.

5.3. Product specifications Deep Tine Aerator

	Unit	DTA120	DTA160	DTA210	DTA260
Dimensions					
Working width A	*cm*	120	160	210	260
Total width B	*cm*	130	170	220	270
Length C	*cm*	120	120	120	160
Height D	*cm*	90	120	140	180
General specifications					
Working depth	*cm*	25	30	40	40
Empty weight	*kg*	500	930	1400	2000
Noise production	*dB(A)*	80	80	80	80
Outgoing shaft speed	*rpm*	500	500	500	500
Towing vehicle					
Power**	*hp*	15-35	35-50	55-70	65-90
Pumpcapacity oil	*l/min*	20	20	20	20
Max. hydraulic pressure	*bar*	150	150	150	150

* *When using personal protective equipment, bear in mind that in many cases the sound of the Deep Tine Aerator is drowned out by the towing/powering vehicle.*



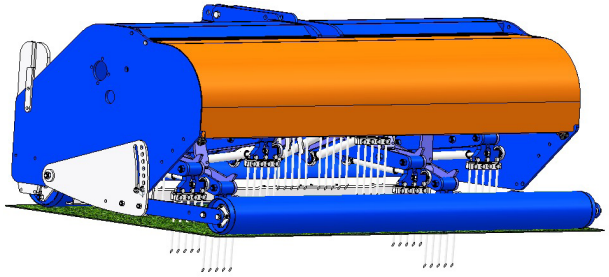


5.4. Results aerating

*With 540 rpm	0,5km/h	1km/h	1,5km/h	2km/h	2,5km/h
Distance between holes in cm			**DTA120**		
1st gear	7,3	14,5	21,8	29,0	36,3
2st gear	6,2	12,4	18,5	24,7	30,9
3st gear	4,5	8,9	13,3	17,8	22,2
			DTA160		
1st gear	7,3	14,5	21,8	29,0	36,3
2st gear	6,2	12,4	18,5	24,7	30,9
3st gear	4,5	8,9	13,3	17,8	22,2
			DTA210		
1st gear	7,0	14,0	21,0	28,0	35,0
2st gear	5,7	11,3	17,0	22,7	28,3
3st gear	4,5	9,0	13,5	18,0	22,5
			DTA260		
1st gear	7,0	14,0	21,0	28,0	35,0
2st gear	5,7	11,3	17,0	22,7	28,3
3st gear	4,5	9,0	13,5	18,0	22,5
			Hectare per hour		
DTA120	0,06	0,12	0,18	0,24	0,30
DTA160	0,08	0,16	0,24	0,31	0,40
DTA210	0,11	0,21	0,31	0,48	0,53
DTA260	0,13	0,26	0,39	0,52	0,65

6. CONSTRUCTION OF DEEP TINE AERATOR

A Deep Tine Aerator has many different components and parts. This chapter will describe each of them.

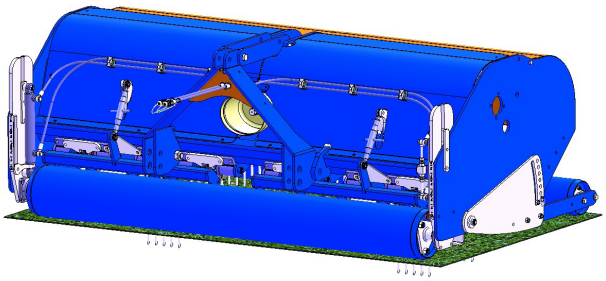


6.1. The frame

The frame of the Deep Tine Aerator is forms the base for the different components of the machine. The frame serves as the security for the rotor and the pressure roller.

6.2. The guiding rollers

The front of the machine has a three-point hitch CAT 1. The machine connects by the three-point hitch with the top link. In the front there is a height-adjustable roller. With the DTA 210 and 260 this roller is hydraulically adjustable. By adjusting this roller the puncture depth will change.



At the back there is a second roller which can be adjusted manually. By adjusting this roller the tine angle will change, with a maximum of 25 degrees.

6.3. The rotor

At the heart of the Deep Tine Aerator there is a teeth-system. The teeth are driven by a PTO shaft with a crank-connecting rod mechanism. The machine is also equipped with a unique tooth-mounting system, hereby changing the teeth goes very easily.

De machine is also equipped with a heavy-duty gearbox with three speed shifts, by which the required pattern of holes in the grass can be created.

6.4. The result

Het resultaat is een opengewerkt veld welke optimaal is belucht. Water en zuurstof kunnen op deze wijze optimaal bij de wortels van het gras terecht komen.

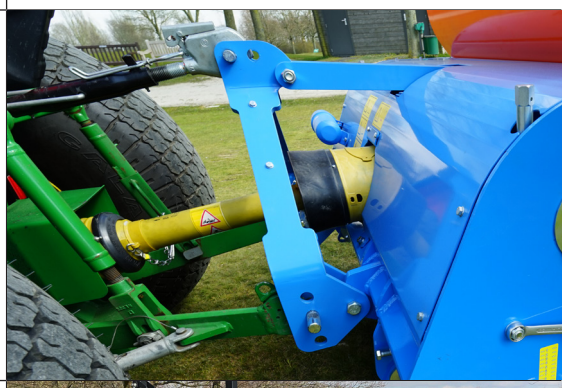
The result is an openwork field of grass which is aerated optimally. Water and oxygen can optimally reach the roots of the grass this way.

7. OPERATION DEEP TINE AERATOR

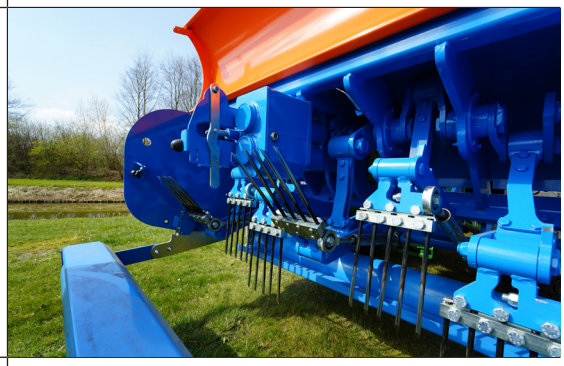
7.1. Connecting and disconnecting the machine

The following steps describe how to connect and disconnect the Deep Tine Aerator.

Connecting:

1	Make sure that the tractor and machine are placed horizontal;	
2	Connect the machine to the three-point hitch of the tractor and secure the attachment points with the locking pins; Attach the top link in the round hole of the hitch to lift the machine; Connect the hydraulic hoses and PTO.; *Pay attention! Control if the right slip clutch is assembled!*	
3	Lift the machine and check if the distance between the machine and ground is equal on the left and right side; If necessary, change the positions of the adjustable stabilizer arm on the tractor; Expand the tinesets so they point to the ground;	
	See risk analysis: Rotor/ machine environment	

Disconnecting:

1	Make sure that the tractor and machine are placed horizontal;	
2	Collapse the tinesets before lowering the machine;	
	Lower the machine slowly untill it is completely on the ground; Disasemble the PTO shaft; Disassemble the three-point hitch and move the tractor;	
	See risk analysis: Rotor/ machine environment	

7.2. Fine tune the machine

Opening the cover:
- The cover is locked on both sides of the machine;
- Unlock the two locks and open the cover;

Changing the height of the front roller:

Manually:
- Loose two bolts per side;
- Adjust the height by srewing the two bolts at the top in or out;
- Fix the two bolts per side;

Hydraulically:
- Control if the hydraulic hoses are connected the right way;
- The heigt can now be adjusted inside the tractor;

Changing the heigth of the back roller:
- Remove the locking clip from the spindle;
- Adjust the roller to the desired height and place the locking clip;
- It is also possible to place the roller floating behind the machine;

WARNING! Make sure both side are the same height!

Changing tine angle:
- The tine angle is adjustable for each type of tines specifically;
- Beneath the three-point hitch there is an adjustment bolt;
- Screw this bolt in or out to change the tine angle;

Changing machinespeed:
- *The gearbox has three gears;*
- *Move the stainless steel strip to shift into the right gear;*

7.3. Start with aerating

1	Lower the machine slowly until it is completely on the ground; Fine tune the machine horizonatally with the top link; Place the front roller at the desired height; Place the rear roller at the desired height, or let it float behind the machine;	
2	Choose the right gear on the gearbox to make the desired pattern of holes in the grass; Start driving and keep a low drivingspeed;	
3	Stop aerating, lift the machine and turn it off; Control if the desired depth is reached, if the desired hole pattern is created and if the area is edited smooth. If that is not the case, fine tune the machine according to step 1 *Pay attention: Never come under the machine!*	
⚠	See risk analysis: Rotor/ measuring rod/ machine environment	

7.4. Transport and storage

Transport:
When transporting the machine, a suitable means of transport must be selected. Make sure that the machine is secured against rolling away and tipping over. If you don't have sufficient knowledge for a transport, carry it out by a specialised transport company. Provide at least four attachment points on the transporting vehicle.

Storage:
The following points must be taken care when storing the machine:

1. Before storage, clean the machine in such a way that no sand or other impurities are left behind;
2. Store the machine at a dry place;
3. Check if the machine is positioned right with the support legs or place wheel chocks in front and behind the wheels;
4. Never put the machine away on the brake (if applicable);
5. Empty the tanks of the machine if they are filled with water;
6. To prevent corrosion of uncoated parts, apply a protective oil layer;

If the machine is to be used again after storage, all maintenance points must be gone through. Before use, make sure that all components are working properly.

Lifting:
There are fastening eyes provided at the machine for safe lifting. It´s recommended to hoist the machine with lifting straps. Use at least two straps in all cases. The lifting points are indicated in the figure. Before lifting, make sure that the machine is free from loose materials like seeds or infill materials etc.

8. MAINTENANCE

8.1. Maintenance schedule

To maintain machine quality, adhere to the following diagram. The list of spare parts will show the correct parts to replace. See chapter 7.3 for safe exectution of the maintenance points.

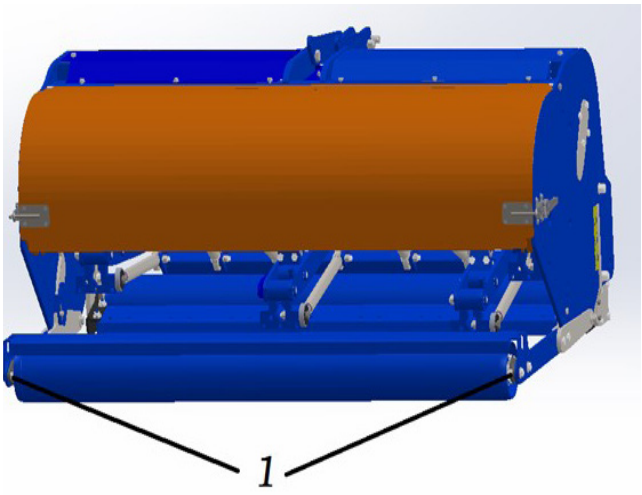
Always ensure that the machine is switched off, cannot move and has cooled down completely.

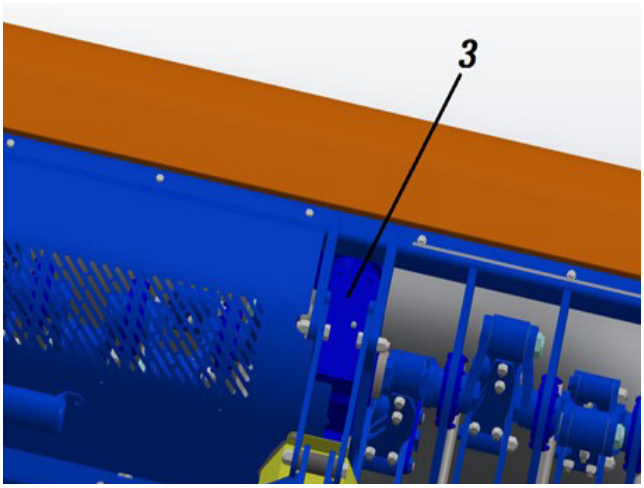
		Operating hours					
		Before use	50 h	250 h	500 h	1000 h	Annually
General	Outside cleaning of the machine	x					
	Check if all safety stickers are on the machine	x					
	Check for oil stains/ traces	x					
	Check freewheeling of the rotor	x					
	Check state of wearing parts for broken pieces or deformation	x					
Hydraulic	Clean the hydraulic main connections of the towing vehicle and hoses	x					
	Check operation of the crank connecting rod mechanism	x					
	Check the operation of hydraulic components	x					
	Check hydraulic components for damages/ leakages. Replace when needed.	x					
	Check hoses and fittings for dehydrations/ cracks			x			
Remaining	Check locking pins	x					
	Tighten bolted connections of rotating parts		x				
	Tighten bolted connections of fixed parts			x			

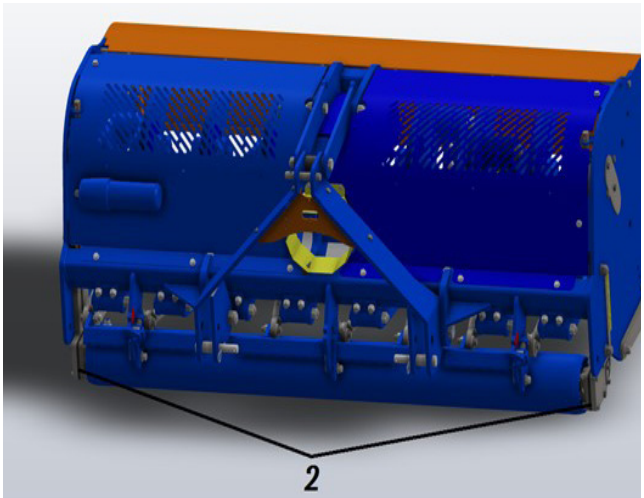
8.2. Lubrication scheme

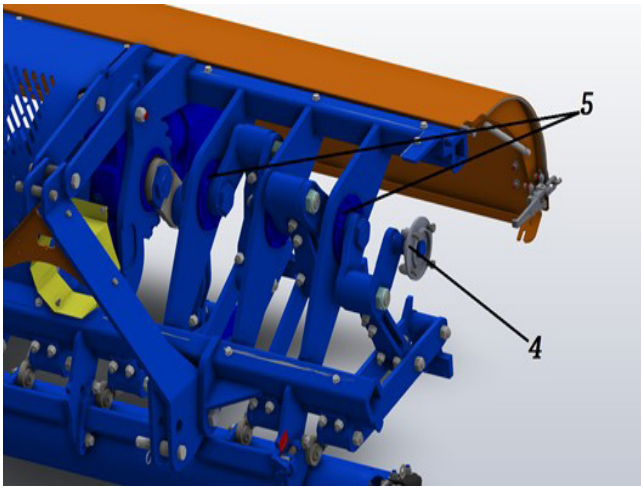
For optimum machine performance, please refer to the plan below for lubrication of the maintenance points.

		Operating hours					
		Before use	50 h	250 h	500 h	1000 h	Annually
EP2 grease	1 Lubricate bearings rear roller		x				
	2 Lubricate bearings front roller		x				
	4 Lubricate bearings side (only 210 & 260)		x				
	5 Lubricate bearings crank shaft (only 210 & 260)		x				
SAE90 oil	3 Check oil level gearbox	x					
	3 Replace oil of gearbox		x(1st)		x		x





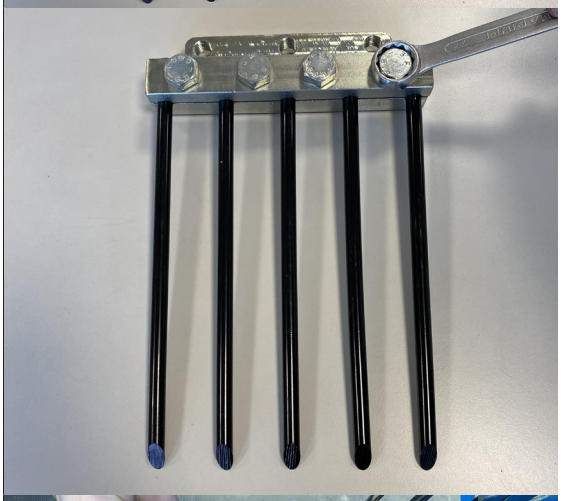


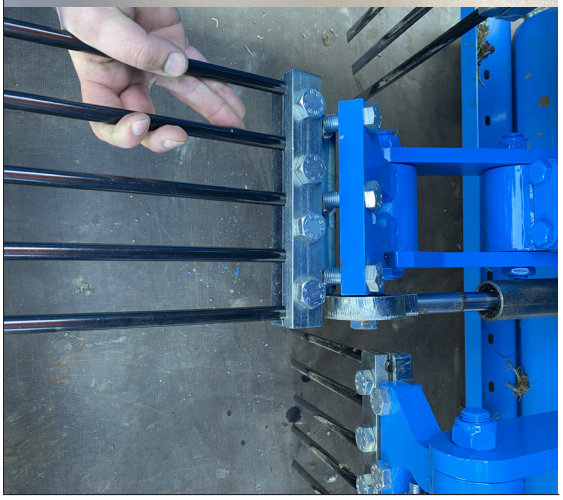


8.3. Performing maintenance

Changing tines:

- When the tines are assembled at the machine, flip the tines up en disassemble the bolted connections.
- The tines are clamped between two little steelplates. Loosen the capscrews to change the tines.
- Remove the old tines and place new tines at the same positions.
- Attach the little steelplates and tighten the capscrews
- Reassemble the tinesets back at their positions at the machine





9. FAILURES

If a failure is detected, please go through the following points before contacting your dealer.

Symptom	*Cause*	*Solution*
The tines do not come deep enough	The rollers is placed too high	Lower the guide rollers
	The tines are blunt	Replace the tines
Grassfield comes off	The roller at the back is placed too high	Lower the guiding roller
	The tines are polluted	Clean the tines
	The tines are blunt	Replace the tines
	The driving speed is too high	Lower the driving speed
	The speed of the tines is too high	Change a different speed switch
The machine is vibrating	De crankshaft rotates irregular	Control crankshaft, if neccesary maintain the crankshaft
	The field is to dry / hard	Use thinner / shorter tines
		If the field is to dry, irigate the field
The front roller is not stable at the ground	Wrong tines	Change tines
	The field is to dry / hard	Use thinner / shorter tines
		If the field is to dry / irrigate the field
The PTO shaft rattles	The teeth of the slip clutch do not interlock	Turn the PTO down and wait untill the rotor is stationary. Restart the PTO
	The slip clutch is broken	Replace the slip clutch
		Replace the PTO

10. END OF LIFE

To dispose of a machine, follow all local regulations. Practice appropriate safety measures.

Follow these steps:

1. Decommission the machine and shut it down hydraulically;
2. Drain and recycle all consumables;
3. Dispose of the machine in accordance with the local regulations.

ANNEX I TIGHTENING TORQUE

When tightening bolts, observe the following maximum torques (ISO898/1).

The following types of bolts are used in the machine:

- Bolts for wear parts (chisels, etc.): 10.9
- Other bolts: 8.8

Tightening torque [Nm]

	Bold strength:	8.8	10.9
Metric	M5	6	8,5
	M6	10,3	14,7
	M8	25,5	35,3
	M10	50	70,6
	M12	87,3	122,6
	M14	138,3	194,2
	M16	210,8	299,1
	M20	411,9	578,6
	M24	711	1000

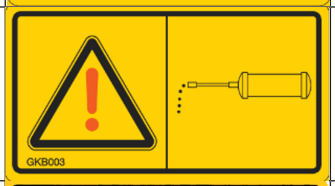
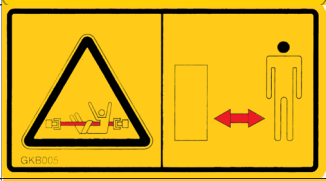
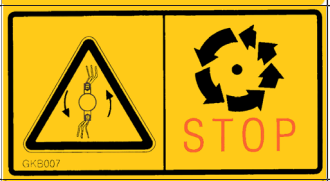
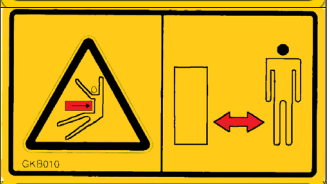
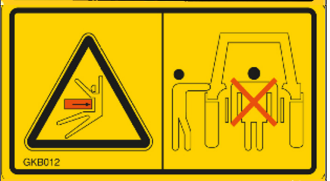
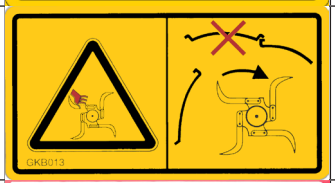
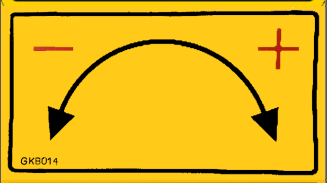
ANNEX II RISK ANALYSIS

Based on risk analyses, measures were taken during the development of the machines to ensure the safety of users and bystanders. These results include, but are not limited to, the following measures:

Item	Risk	When	Risk reduction
Tines	Crushing injuries by rotating of the rotor or coulters	If a bodypart or clothing comes in contact with the tines	Fixed shieldings placed which can only be removed with tools Safety stickers placed Safety instructions in manual
		If a toe or feet comes under the machine during use.	
Front roller	Crushing injuries by the roller	If a person changes the height of the roller	Safety stickers placed Safety instructions in manual
		If the machine moves unintentionally	
Rear roller	Crushing injuries by the roller	If a person changes the height of the roller	Safety stickers placed Safety instructions in manual
		If the machine moves unintentionally	
Cover	Crushing injuries of fingers	When fingers comes in between the cover and frame when the cover is closing unintentionally	Locks places Safety stickers placed Safety instructions in manual
Machine environment	Being run over by the machine and/or tractor, resulting in serious injury	If the person is between the machine and the tractor and the combination is moving (unintentionally)	Safety stickers placed Safety instructions in manual
		During transport on public roads.	
	Tilt risk of instability resulting in bruising / pinching injury	If the person is next to or under the machine during maintenance.	Safety stickers placed Safety instructions in manual
		If the person is on a slope next to the machine.	
Hydraulic system	Poisoning by hydraulic injection	If, in general or during maintenance, the person is in the immediate area of the hazard.	Hydraulic circuits equipped with components that comply with “EN 875”. Inspection of hydraulic components
	Serious general injuries to unprotected parts of the body from exploding or escaping hoses		

ANNEX III SAFETY STICKERS

To promote safe practices and proper handling reminders, safety stickers are adhered to all machines. If a sticker cannot be read or found, it should be replaced immediately. The following page shows an overview of all the stickers and their positions.

GKB001	*Comply with all maintenance instructions*		**GKB002**	*Refer to the owner's manual. It contains useful information about the use, safety and maintenance*	
GKB003	*Regular lubrication*		**GKB004**	*Switch off the power take-off before lifting the implement*	
GKB005	*Risk of retraction due to rotating parts*		**GKB006**	*Risk of finger cutting due to rotating parts*	
GKB007	*Danger of rotating parts*		**GKB008**	*Risk of retraction due to rotating parts*	
GKB009	*Risk of crushing*		**GKB010**	*Keeps distance when the machine is in operation due to swinging parts*	
GKB011	*Keep a distance when the machine is in operation due to flying parts.*		**GKB012**	*Risk of crushing between tractor and implement*	
GKB013	*Danger of retraction when opening the cover when the rotor is switched on*		**GKB014**	*Choice in minimum to maximum adjustment*	
GKB015	*Danger of retraction due to rotating parts*		**GKB**	*Place a safety piece before entering the danger zone*	
HOT	*Keep a safe distance from hot surfaces*		**018417**	*Required speed*	

Location safetystickers

The illustrations below show all the safety stickers and their positions: