Original Operating Manual

ROCKWHEEL

D20

2021

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1 Introduction

In case of questions with regard to the machine, please contact the customer service, stating the serial number, at:

S.A. TRAMAC BENELUX N.V.
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Tel.: +32 4 263 99 84 Fax: +32 4 263 99 85
Mail: tramac@tramac.be www.tramac.be

1.1 About the operating manual

- The operating manual describes the technical status of the exchangeable equipment at the time of delivery.
- The operating manual is an integral part of the exchangeable equipment. The operating manual and the safety information must always be available at the place of application of the exchangeable equipment in complete and legible condition.
- It is the owner's responsibility to include any instructions and provisions specific to the local application conditions in the safety regulations, as necessary.
- All persons working with the exchangeable equipment must read this operating manual and familiarize themselves with correct handling and safe operation.
- This operating manual does not take into account any modifications of the exchangeable equipment implemented at a later stage.
- The operating manual must be kept safely for future use and must be forwarded to new owners of the equipment.
- Any statutory or other regulations applicable in the respective country of use must be complied with.

1.2 Advice for use of the operating manual

Marking of text types

Text type	Example
Continuous text	The front and rear end position of the transfer cart is monitored by end switches.
• List – List, indented	• Main switch • Emergency stop button • Safety equipment – Safety switch – Light barriers – Sensors
Instruction ➢ Step of an instruction ☞ Addition of an instruction → Result of an instruction	**Activate the button** ➢ Press the “inactive” button. ☞ Please note that ... → The button becomes green and changes to “active”.
Fault message Fault cause ➢ Remedial measure	**Control voltage fault** Wire break in the wiring, or emergency stop relay defective. ➢ Service staff: Inspect the wiring and the emergency stop relay.
1 Key ☞ Description of the key **2** Key a) Key_level2	**1** Emergency stop button **2** Main switch **3** Mode selector switch a) Automatic mode b) Manual mode ☞ For service and maintenance work

Table 1 Marking of text types

Notice!

This symbol is used for providing important information and advice with regard to handling of the machine.

1.3 Declaration of Conformity

The machine complies with the basic requirements of the applicable European Directives. Conformity has been verified. The declaration of conformity is issued separately for each machine.

Declaration of conformity for machines
according to guideline no. 2006/42/EG

Manufacturer

Name:	ROCK.ZONE GmbH
Address:	Sandweg 10 D-74595 Langenburg Germany

Hereby the manufacturer declares, that the following product meets the relevant regulations and/or the guidelines including the current changes at the date of the declaration.

Product

Product:	Rockwheel Hydraulic Cutting Unit
Type:	XXX
Serial No.:	XXXXXXXXX

The following harmonized standards were applied:

☒ EN ISO 12100:2010
Safety of machines – General principles of design- risk analyses and risk minimization

☒ EN ISO 4413:2010
Fluid technology –General rules and safety relevant requirements for hydraulic equipment and the components

Name and address oft the responsible for technical documentation:

ROCK.ZONE GmbH, Sandweg 10, D-74595 Langenburg

Langenburg,	Klaus Volkert, Operating Manager
Place, Date	**Name, Function**

Signature

2 Safety

2.1 Safety notes

2.1.1 Structure of safety notes

⚠ Signal word of hazard classification	
	**Type and source of the hazard** Consequence of the hazard ➢ Remedy of the hazard

2.1.2 Hazard classification

The hazards that may occur at the machine are classified as follows:

- Danger
- Warning
- Caution
- Attention

Danger

This warning note identifies a high-risk hazard. Non-compliance with the safety regulations will result in death or severe injury.

⚠ Danger	
	**Type and source of the hazard** Consequence of the hazard ➢ Remedy of the hazard

Warning

This warning note identifies a moderate-risk hazard. Non-compliance with the safety regulations might result in death or severe injury.

⚠ Warning	
	**Type and source of the hazard** Consequence of the hazard ➢ Remedy of the hazard

Caution

This warning note identifies a low-risk hazard. Non-compliance with the safety regulations may result in injuries.

⚠ Caution	
	**Type and source of the hazard** Consequence of the hazard ➢ Remedy of the hazard

Attention

This warning note identifies a low-risk hazard. Non-compliance with the safety regulations may result in property damage.

Attention	
	**Type and source of the hazard** Consequence of the hazard ➢ Remedy of the hazard

2.2 Intended use

The Rockwheel is referred to as exchangeable equipment for excavators and serves for loosening and removal of hard and solid materials (rock, bitumen, timber, frozen soil, concrete, demolition work). The Rockwheel is used in road and tunnel construction, gardening and landscaping, in mines / stone quarries, for demolition work and in the construction machinery industry. The appropriate bits must be used depending on the structure of the soil/rock.

- The hydraulic Rockwheel is designed for assembly in earthmoving machinery for cutting work. Media supply for the hydraulic system, setting and monitoring of operating parameters and all equipment/prerequisites for safe operation of the Rockwheel is performed through the earthmoving machine.
- The hydraulic Rockwheel can be equipped with various drum types and a number of different bit types. Depending on the type of material to be cut, e.g. soil, sandstone, hard rock, asphalt, timber, concrete.
- It is possible for the hydraulic Rockwheel to be operated in swampy areas or under water.
- Initial assembly, commissioning and setting of parameters of the hydraulic Rockwheel is performed by ROCK.ZONE GmbH service staff or by vendors' authorized qualified staff.

The Rockwheel may only be operated as intended.

Intended use also includes compliance with the operating, maintenance and servicing conditions established by the manufacturer.

Any use other or beyond that specified above is regarded as improper. The manufacturer shall not assume any liability for damage resulting from improper use. The risk for any such damage shall be borne by the user.

2.3 Misuse

2.3.1 Foreseeable misuse

- Operating the hydraulic Rockwheel with parameters (e.g. oil pressure) that are outside the limits of the machine.
- Operating the hydraulic Rockwheel with earthmoving machines for which they are not designed.
- Operating the hydraulic Rockwheel with damaged or missing bits.
- Operating the hydraulic Rockwheel at incorrect direction of rotation.
- Slamming the hydraulic Rockwheel onto the working surface in standstill; this may result in damage of the cutting bits.
- Operating the hydraulic Rockwheel while persons, who have not received any safety instructions, are present in the hazard area.
- Operating the hydraulic Rockwheel in potentially explosive atmospheres.

2.3.2 Limitation of use

Any use other or beyond that stated above, e.g. with higher power values, for higher speeds, also for lower speeds, in non-agreed operating conditions or upon any structural modifications is regarded as improper.

2.4 Residual risks

At the time of placing on the market, the machine is state of the art.

However, there will still be residual risks for persons and the machine.

2.4.1 Hazards due to specific types of use or application of specific accessories

- During operation of the Rockwheel there is a risk of flying or projecting stones, dust and debris.
- The Rockwheel may cause severe injuries.

Protective measures

- ➢ Never stand within the operating range
- ➢ Wear personal protective equipment

2.5 Operator's obligations

- The operator is obliged to only operate the machine in sound and impeccable condition. Machines that are not in sound condition may cause personal injury and property damage.
- Hazard points that occur between the machine and customer's equipment, must be secured by the operator.
- The machine generates heat, which increases the temperatures in the working environment and may affect persons present. The operator is obliged to ensure consistent appropriate ventilation.
- For working at the machine, the operator must ensure appropriate lighting.

2.5.1 Appointment and instruction of responsible persons

- Only employ personnel who have receive technical, safety-relevant instructions.
- Clearly define competences of the personnel for operation, set-up, maintenance and servicing.
- Monitor the personnel in regular intervals for safety-conscious and hazard-aware working, as well as compliance with the operating manual.

2.5.2 Obligation for information

- The operator of the machine must make this operating manual available to all persons involved in working with and handling this machine.
- All persons must have read and understood the operating manual prior to use of the machine.
- Have the machine staff confirm their knowledge of the operating manual.

2.6 Description of target groups

This operating manual is intended for a wide-range audience. The knowledge required for any of the target groups is explained below.

Every target group must have read this operating manual and fully understood its contents.

Operating staff must

- be of minimum age.
- have received instructions in terms of handling the machine.
- be familiar with the country-specific accident prevention regulations.

Maintenance staff must

- be of minimum age.
- be familiar with the maintenance points at the machine.
- be familiar with the country specific environmental protection regulations for disposal of lubricants and cleaning agents.

Service staff must

- be of minimum age.
- have profound school education and vocational training.
- be trained by ROCK.ZONE GmbH or authorized service staff with regard to service work at the machine.
- be trained with regard to conduct in case of fault/failure.

2.7 Personal protective equipment

The operating manual and the signs and symbols described therein must be read and understood by all persons working at and with the machine.

The following items of personal protective equipment must be worn during operation of the machine:

	Personal protective equipment
	Use eye protection
	Use hearing protection
	Wear protective gloves
	Wear safety shoes
	Protective clothing

Table 2 Personal protective equipment

The operating manual and the signs and symbols described therein must be read and understood by all persons working at and with the machine.

2.8 Warning sign

	Warning sign
	Hazard point warning

Table 3 Warning sign

2.8.1 Warning signs and positions at the machine

The warning signs are attached at the following positions:

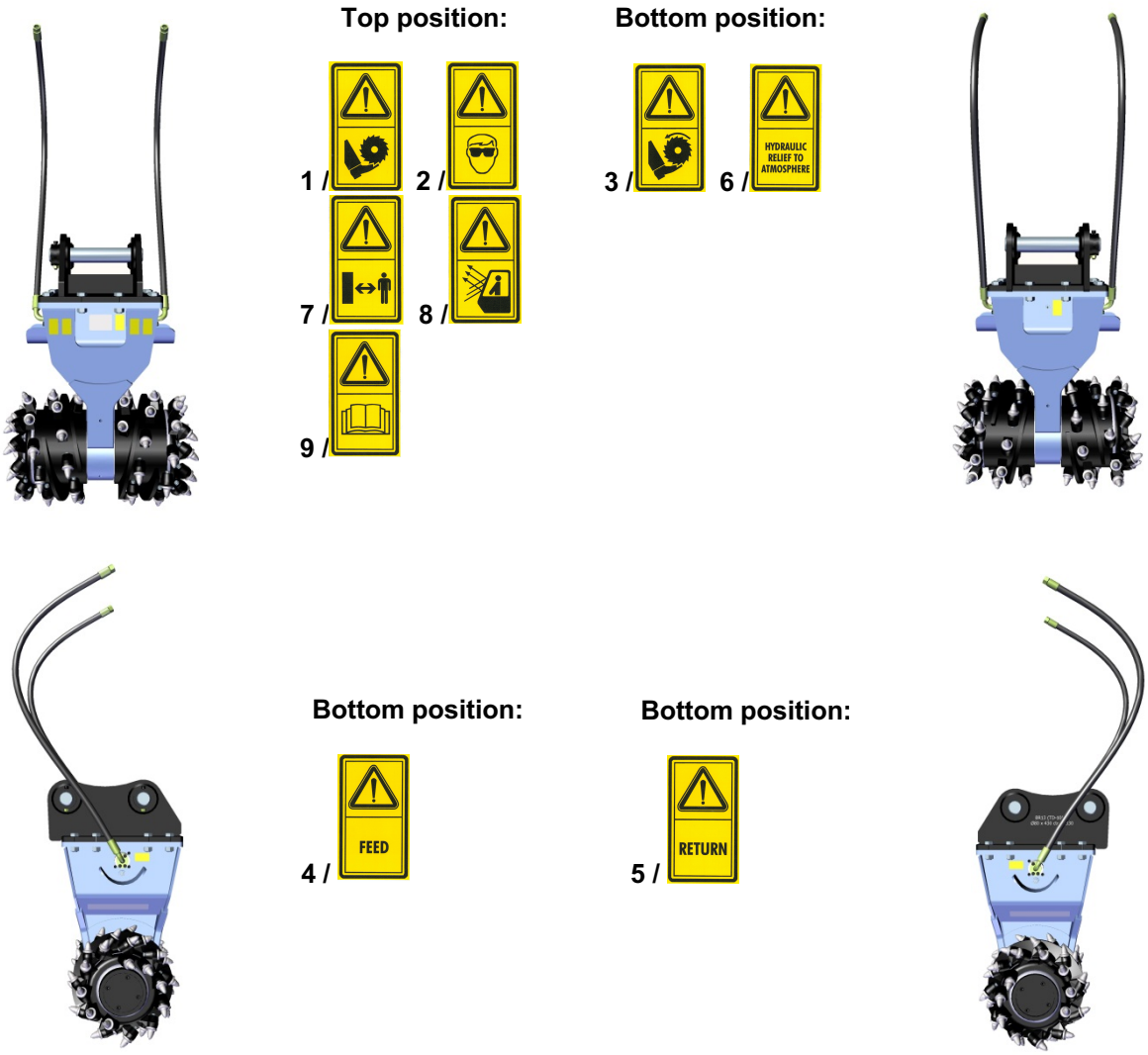


Figure 1 Positions of warning signs

1 Rotary parts warning
2 Advice, wear goggles
3 Rotary parts warning
4 Attention: feed
5 Attention: Return
6 Caution, release of hydraulic oil
7 Attention: stand clear
8 Projecting parts warning
9 Advice, read operating manual

Servicing and replacement of safety and warning signs

Every safety and warning sign that is damaged or no longer visible must be immediately replaced.

- Clean safety and warning signs with a mild detergent and water. Do not use solvent-containing detergents.

2.9 Work area safety

2.9.1 General information

Due to the low cutting speed and depending on the type of layers, only slight dust formation occurs with the ROCK.ZONE hydraulic Rockwheels.

However, in rare cases with high degrees of dust generation, appropriate counter-measures must be taken (e.g. spray water systems, mobile/fixed anti-dust systems, wearing of personal protective equipment).

2.9.2 Shut-down and protection against re-start

Make sure that all of the following safety notes are read prior to use or maintenance of the rotary hoe in order to prevent any personal damage or injuries.

- Prior to beginning with any cutting work, it must be ensured that no persons are present in the proximity during operation. During cutting operation, there is a risk of small fragments being ejected and causing injuries and property damage. In the event that persons enter or are present in the operating area unexpectedly, immediately stop the cutting process and shut down the motor.
- During breaks or when dismounting the excavator, always lower the cutting head onto the floor. Always shut down the motor and secure against re-start (remove the key).
- Before dismounting the excavator, lower the cutting head onto the floor, shut down the motor and secure it against unauthorized re-start.
- Never touch the rotary hoe while the rotary drums are turning.
- Always shut down the motor and secure against re-start (remove the key) prior to maintenance / servicing and inspection work.
- Never perform any settings or adjustments at the hydraulic system during operation.
- Immediately replace cracked or damaged hoses and tubes.
- Only use original spare parts and immediately replace parts when damaged.

2.10 Vibration

⚠ Warning	
	**Hazards caused by vibration** Vibration may lead to damage to health. ➢ Never exceed the specified working hours per day.

Limits of exposure and trigger values in accordance with Directive 2002/44/EC

For whole body vibration

- the value of exposure per day, standardized for a reference period o 8 hours, is limited to 1.15 m/s^2 , or, if required by a member state, to a vibration dose value of 21 $m/s^{1.75}$.
- the daily trigger value, standardized for a reference period o 8 hours, is limited to 0.5 m/s^2 , or, if required by a member state, to a vibration dose value of 9.1 $m/s^{1.75}$.

Vibrations occur during cutting work. These are transferred to the operating equipment and the operator. Depending on the material to be cut, the intensity of vibrations may vary.

Material	Vibration intensity	Working hours per day
soil	low	8
sandstone	medium intensity	6
hard rock	high intensity	4

2.11 Advice for operation

Danger	
	**Danger of death due to non-compliance with safety notes** Danger to one's own life and the life of third persons. ➢ Comply with all safety notes.

2.11.1 Environmental protection regulations

- The valid environmental protection regulations must be observed during any work at and with the exchangeable equipment.
- In particular during installation-, repair- and maintenance work make sure that substances hazardous to the environment, such as lubrication grease and oil, hydraulic oil, fuels, cooling agents and solvent-containing cleaning agents do not leak into the ground or enter the sewer system. These substances must be kept, transported, collected and disposed of in suitable containers.
- If any of the liquids specified above leak into the ground, immediately stop the leakage and set the liquid using a suitable binding agent. If required, contaminated soil must be excavated.
- The binding agent and excavated soil must be correctly disposed of observing the applicable environmental protection regulations.

2.11.2 Rules and regulations for working with hydraulic equipment

Warning	
	**Injury hazard** ➢ Only have work at hydraulic components/assemblies performed by competent and authorized persons in accordance with the rules of fluidics. ➢ Any defects or malfunctions identified in hydraulic parts must be remedied immediately. ➢ Only work in accordance with the hydraulic diagram. ➢ Do not use defective parts.

The 4 safety rules

When working at pneumatic / fluidics equipment, always heed the 4 safety rules:

1 Shut down the hydraulic system.

2 Secure the hydraulic supply against re-start.

3 Depressurize the lines.

4 Check for absence of pressure.

2.11.3 Prior to work

- Before beginning with any work, obtain information about first aid and rescue options (emergency doctor, fire service, ambulance).
- Obtain information about the position and operation of fire extinguishers as well as local fire alarm and fire fighting measures.

2.11.4 During work

Notice!

In addition to the operating manual and the mandatory rules and regulations for accident prevention applicable in the country of use and at the application site, the generally accepted technical rules for safe and professional working must be heeded.

- The Rockwheel must only be operated in safe and functional condition.
  - Avoid any work and operating methods limiting or impairing safety.
  - Never operate the machine with the monitoring system defective.
- The hazard areas of the Rockwheel are specially marked.
  - Observe the warning signs at the machine and keep them in legible condition.
- At a pressure of >50 bar, the pressure relief valve is triggered.
- Do not perform any changes or modifications at the Rockwheel. This also applies for attachment and welding of load-bearing parts.
- Wear protective clothing during operation. Remove any rings, scarves, open jackets, etc. For specific work, use goggles, safety shoes, hard hat, protective gloves, high visibility vests, hearing protection, etc.
- Never climb onto the machine.
- Do not store or leave any tools or other objects on the running machine.
- Only use such tools and other appliances that are required for the intended work sequence and that are in impeccable, functional conditions.
- During set-up, the Rockwheel must only be operated by one person.
- Any faults or damage in the Rockwheel must be immediately reported to the competent superior. Interrupt operation of the machine until the damage is remedied.
- Spare parts must meet the technical requirements as specified by the manufacturer. Installation of parts that are not original (spare) parts may result in hazards for man and machine. In such cases the manufacturer's liability becomes null and void.
- Problematic substances and waste material that are no longer used, such as lubricants and detergents must be correctly disposed of.

3 Transport/installation/disassembly

3.1 Delivery

3.1.1 Packaging

The transport unit are fixed on wooden pallets and some may be protected with a plastic foil. In some cases, the wooden pallets are, in turn, packed in wooden crates.

If not agreed otherwise by contract, the packaging corresponds to the packaging regulations of the Bundesverband Holzmittel, Paletten, Exportverpackung e.V. (German federal registered association for wooden structures, pallets and export packaging)

3.1.2 Scope of delivery

Gather the exact scope of delivery from the order documents and compare the data with the delivery documents.

3.1.3 Checking for completeness

Inspect the entire shipment for completeness by means of the enclosed delivery documents. Observe the terms and conditions for sales and delivery.

3.1.4 Reporting damage

Any damage resulting from incorrect / insufficient packaging or from transport must be reported to the shipping company, the insurance and the delivering site immediately after delivery.

3.2 Transport options

⚠ Danger	
	**Danger of death due to moving loads** Moving loads may tilt, fall, or trap persons. When lifting the transport units, parts may topple over, shift or fall. ➢ Use suitable hoisting gear and lifting tackle. ➢ Do not stand under or around moving loads! ➢ Prior to lifting the transport units, all persons must leave the hazard area of the hoisting gear. ➢ Wear safety shoes.

Notice!

In order to determine suitable hoisting gear and lifting tackle, the weight and dimensions of the machine must be taken into account. See chapter 'Technical data'.

3.2.1 Maximum load of hooks, eyes, ...

	Load
Hooks	min 1.5 t
Eyes	min 1.5 t

Table 4 Maximum load

3.2.2 Hoisting gear

For lifting the Rockwheel use the following hoisting machinery:

- Crane
- Forklift truck

3.2.3 Sling points

1

Figure 2Sling points

1 Excavator attachment

Notice!

The weight may change due to special attachments.

3.2.4 Center of gravity

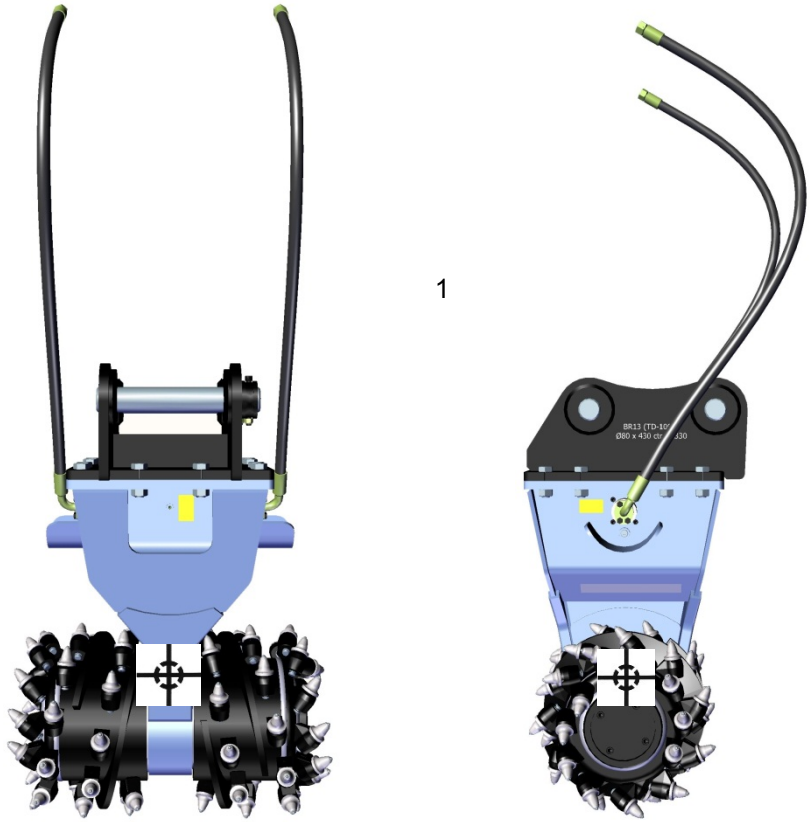


Figure 3 Position of the center of gravity

1 The center of gravity is in the position, where the hole for the eye bolt is.

Attention	
	**Loads toppling over** The center of gravity may shift due to attachment of other drums, adapter plates, quick couplers, rotators, etc. The hydraulic Rockwheel may topple over, injure persons or cause property damage. ➢ Re-determine the center of gravity after installing attachments.

3.2.5 Transport of the packed machine (loading using a crane, a forklift truck, on rolls)

Transport using a forklift truck

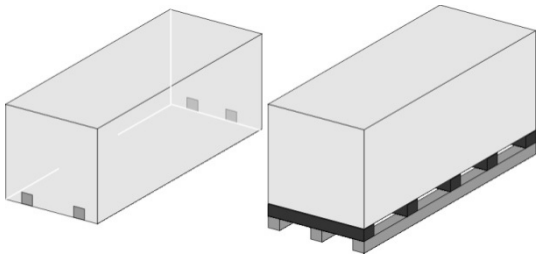


Figure 4 Transporting the packed machine using a forklift truck

Insert the fork underneath the transport unit.

- ☞ Make sure that the forklift truck has sufficient load-bearing capacity! Load-bearing capacity per forklift truck = total gross weight.
- ☞ The center of gravity of the transport unit must be between the fork tines.
- ☞ There must be no parts between the fork tines and the transport unit.
- ➢ Pay special attention to the position of the fork, particularly while lifting the transport unit.
- ➢ If during lifting, unstable condition of the transport unit is noted, lower the transport unit, re-insert the forks and lift the unit again.
- ☞ The transport unit must always maintain a position parallel to the ground.
- ➢ Slowly and carefully move the transport unit to the installation site. Avoid any vibrations, impact and inclined positions.
- ➢ At the installation site, slowly and evenly lower the transport unit to the ground. Avoid jerky lowering or slamming.

Transport using a crane

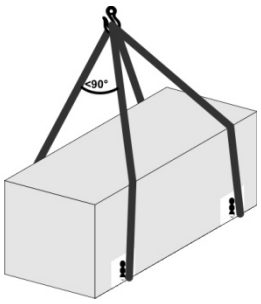


Figure 5 Transporting the machine using a crane

- ➢ Sling the hoisting gear at the points marked with the chain symbol. Make sure that the crane and the hoisting gear has sufficient load-bearing capacity! Load-bearing capacity per rope/chain = ½ gross weight.
- ☞ The angle of spread of the ropes/chains must not be larger than 90°.
- ➢ Carefully lift the crate and slowly and carefully move it to the installation site.
- ➢ At the installation site, slowly and evenly lower the transport unit to the ground. Avoid jerky lowering or slamming.

Transport using transport rolls

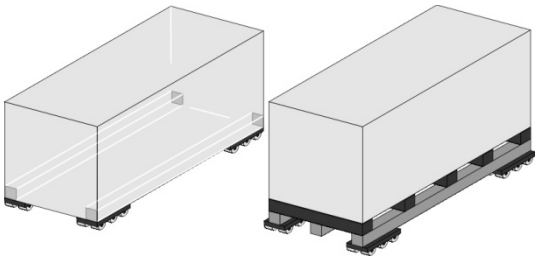


Figure 6 Transporting the packed machine using transport rolls

- ➢ Carefully lift the pallet using a crane or a forklift truck.
- ☞ Make sure that the transport rolls have sufficient load-bearing capacity! Load-bearing capacity per transport roll = ½ gross weight.
- ➢ Position the transport rolls underneath the pallet at the points marked with the chain symbol.
- ➢ Carefully lower the pallet and inspect for stable condition.
- ➢ Carefully and slowly move the pallet, e.g. by pushing it using the forklift truck.
- ☞ The pallet may slide off the transport rolls. Constantly check the position of the transport rolls.
- ➢ Remove the transport rolls; to this end slightly lift the pallet.
- ➢ Then, slowly and evenly lower the pallet to the ground.

Unpacking

- ➢ Remove the load securing straps.

3.2.6 Transport of unpacked machinery and system parts

Notice!

Unpacked machinery must only be transported by means of a transport frame.

Transport using a forklift truck

- ☞ Make sure that the forklift truck has sufficient load-bearing capacity! Load-bearing capacity per forklift truck = total gross weight.
- ➢ Insert the fork underneath the transport unit.
- ☞ The center of gravity of the transport unit must be between the fork tines.
- ☞ There must be no parts between the fork tines and the transport unit.
- ➢ Pay special attention to the position of the fork, particularly while lifting the transport unit.
- ➢ If during lifting, unstable condition of the transport unit is noted, lower the transport unit, re-insert the forks and lift the unit again.
- ☞ The transport unit must always maintain a position parallel to the ground.
- ➢ Slowly and carefully move the transport unit to the installation site. Avoid any vibrations, impact and inclined positions.
- ➢ At the installation site, slowly and evenly lower the transport unit to the ground. Avoid jerky lowering or slamming.

Transport using a crane

- ➢ Sling the hoisting gear at suitable points of the transport unit.
- ☞ Make sure that the crane and the hoisting gear has sufficient load-bearing capacity! Load-bearing capacity per rope/chain = ½ gross weight.
- ☞ The angle of spread of the ropes/chains must not be larger than 90°.
- ➢ Carefully lift the transport unit and slowly and carefully move it to the installation site.
- ➢ At the installation site, slowly and evenly lower the transport unit to the ground. Avoid jerky lowering or slamming.

3.2.7 Quality check

- ➢ Check for visible damage.

3.3 Connection

3.3.1 Hydraulic equipment

- Assemble the Rockwheel to the excavator.

Connect the Rockwheel to the control circuit (hydraulics) of the excavator as is described below:

- Connect the pressure line to the excavator and firmly tighten the screw fitting using an open-end wrench.
- Connect the return line to the excavator and firmly tighten the screw fitting using an open-end wrench.
- Enable the hydraulic circuit in the excavator.

3.3.2 Output rating

Notice!

In order to be able to correctly connect the machine, the technical data of the machine must be taken into account. See chapter 'Technical data'.

Connection of pressure and return lines	
Towards Rockwheel	1“ SAE 6000PSI
Towards excavator	4 SP1“ 60° SW41
Internal hose diameter	NW25,4 SP

3.3.3 Connection, installation diagram

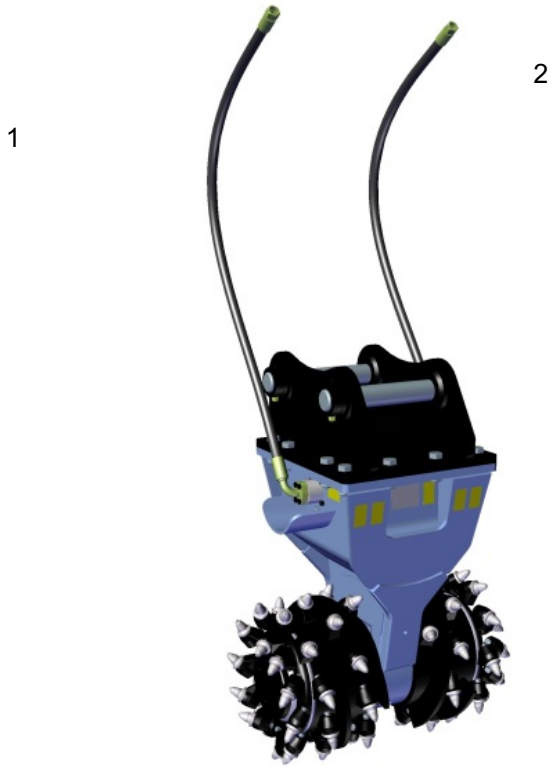


Figure 7 Connection, installation diagram

1 Return line

2 Supply line

3.3.4 Hydraulic oil

- Oil type HLP 46 or 68
- HV mineral oil with improved viscosity / better temperature properties (DIN 50524, part 3). Category: 46 Viscosity at 40°C
- Category: 68 Viscosity at 40°C
- Biodegradable oil

Notice!

Please contact ROCK.ZONE prior to using any other hydraulic oil. The use of other hydraulic oil types must be approved in writing.

3.3.5 Contamination and filtration

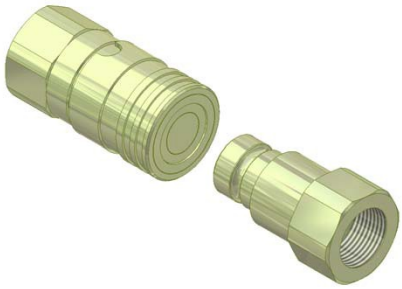
A low degree of contamination of the hydraulic oil ensures a long service life of the moving parts in the hydraulic motor (piston, manifold). The required degree of contamination must be below class 9 of NAS 1638.

Notice!

In case of insufficient filtration, the manufacturer's warranty for the hydraulic motor is limited.

3.3.6 Quick coupler

If several attachments or appliances are exchanged at the excavator, we recommend using a quick coupler. The following conditions must be met for quick couplers:



Only use flat-type couplers.

Make sure that the coupler is clean before it is (re-)connected.

Use at least one 1" coupler on both lines.

Use male and female connection fittings.

Check that the counter pressure in the return line is not too high; otherwise, this will result in leakage.

3.3.7 Flow limiting device

The flow limiting device can be optionally ordered. It is auxiliary equipment facilitating setting and adjustment of the Rockwheel.

3.3.8 Installation of a leak oil line

This kind of work should only be performed by persons who are experienced in working with hydraulic systems. The carrier device (excavator) must be equipped with a third line that is directly connected with the reservoir.

The leak oil line can be installed at any time but it is only required in cases where oil leaks from the overpressure line and it is not possible to adjust the pressure at the carrier device appropriately so that the pressure in the return line can be regulated.

- In case that the Rockwheel rotary hoe is still attached to the excavator, the rotary hoe must be dismounted.
- Remove the adapter plate
- Remove the leak oil line from the leak oil accumulation at the return.
- Remove the sealing screw on the left or right side of the housing below the supply or return connection.
- Seal the connection of the leak oil accumulation at the return with this sealing screw
- Connect the leak oil line to the port at the Rockwheel housing
- Now, the rotary hoe can be connected to a leak oil line at the excavator. It must be taken into account that the leak oil line is designed for a pressure of at least 50 bar and has an internal diameter of ½ inch. We recommend using a leak oil line with a filter.

3.3.9 Installation for underwater applications

The Rockwheel rotary hoes can be used in depths of up to 30 meters. However, in case of long-term applications at depths of more than 10 meters, please contact the ROCK.ZONE service department. In case that the Rockwheel rotary hoe is not connected via a leak oil line, we recommend connecting a line from the overpressure relief to the surface. For this purpose, use a ½ inch hose and connect it to the ¼ BSP connection.

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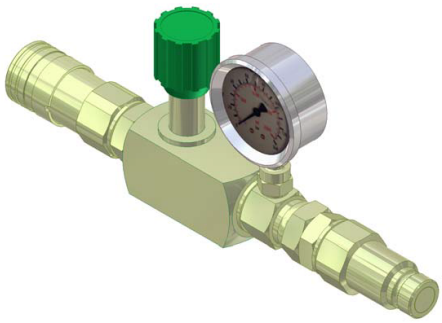
3.4 Initial commissioning

Initial commissioning (first setting and adjustment of pressure and oil volume) of the Rockwheel is performed by the ROCK.ZONE service or authorized qualified personnel.

The Rockwheel is driven by the hydraulic system of the excavator.

- Set the hydraulic pressure in the excavator to approximately 190 bar.
- Interconnect a measuring turbine at the front of the excavator attachment (connect).
- Set the specified pressure for the Rockwheel at the excavator side.
- Set the specified oil volume for the Rockwheel.
- Backup the pre-settings.
- Write down the setting values.
- Disassemble the measuring turbine.



3.5 Process sequence

Prior to start-up

1 Measure the flow in the breaker control circuit of the excavator. For this purpose use a flow meter.

2 Adjust the pressure in the breaker control circuit to the Rockwheel.
Make sure that the flow and the pressure do not exceed the nominal output of the Rockwheel.
Based on the flow values, the required maximum pressure can be calculated as is specified below:

Pressure (in bar) =

Power of the Rockwheel (kW) x 600 (constant)

Flow (liters)

With the Rockwheel having a maximum effective output of 70 kW and with an optimum oil volume of 220 liters, the following pressure setting is obtained:

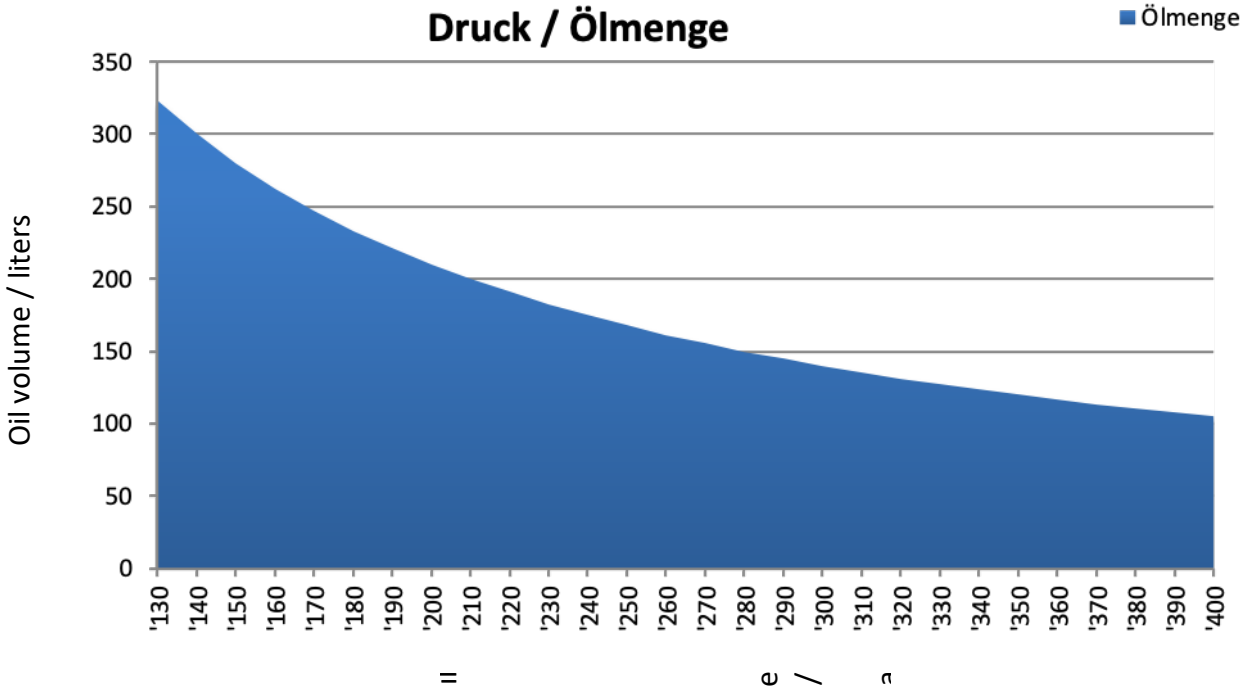
Pressure setting at max. oil volume =

70 (kW) x 600
---------- = 190 bar
220 (liters)

3 Make sure that the discharge line is directly connected to the reservoir.

4 The discharge line must be directly connected to the hydraulic oil reservoir of the excavator. It must not be connected to another hydraulic line or another hydraulic valve or be subjected to any other restrictions. If this is not possible, please contact ROCK.ZONE GmbH.

5 Make sure that the Rockwheel and the adapter plate are firmly assembled to the excavator and that all hydraulic hoses and fittings are tightly connected.



3.6 With the Rockwheel running freely:

1 Check the Rockwheel drums for correct direction of rotation. If the direction of rotation is not correct, switch over the hydraulic pressure and the return line in the control circuit of the excavator (breaker).

2 Check the pressure in the motor return line.

3 The pressure must be at least 5 to 10 bar higher than the pressure in the leak oil line. Only then it is possible to ensure trouble-free functioning of the hydraulic motor.

3.7 Taking into service

Prior to taking the rotary hoe into service, the following maintenance work must be performed and the following torque settings must be verified.

- Make sure that the hydraulic circuit corresponds to the technical description of the device.
- During the run-in time, check the hydraulic oil temperature; the value must be between 50°C and 60°C. This temperature value must not exceed 80°C under any circumstances. If the temperature rises to more than 80°C, the cooling output must be increased or the power must be reduced.
- Subsequent to the run-in time, the delivery rate and the pressure values must be checked and re-adjusted, as necessary.

3.8 Dismantling/disassembly

➢ Properly disconnect the Rockwheel from the excavator.

➢ Pump of any liquids as required and dispose of them as appropriate.

➢ Seal open line ends.

➢ Properly pack the machine and store it in a dry place.

3.8.1 Re-packing

- Position the Rockwheel on a pallet and secure it with load securing straps.

Packing and inventory check list

- Tool kit for bit replacement

3.9 Storage

In order to keep a machine functional even through a longer storage period, the following points must be heeded:

- The storage room must be dry and clean.
- Store the machine on an even floor and secure it against tilting, rolling and unauthorized use.
- Clean the machine, apply an acid-free oil film on blank metal parts to protect them from corrosion.
- Cover the machine completely to keep away any dirt and dust.
- Do not expose the machine to extreme cold or heat.

3.10 Intermediate storage

	Requirements
Ground structure	solid ground (concrete, rock)
Packaging	pallet with load securing straps
Temperature	-35°C to +55°C
Humidity	dry and sheltered

Table 5 Requirements for the storage area

3.11 Preservation measures

- Apply corrosion protection agent prior to storing the Rockwheel.

3.12 Returning into service

Prior to returning the machine into service after long-term storage, please perform the following work:

- Clean and inspect the entire machine in accordance with the maintenance plan.

3.13 Disposal

- Protect the environment!
- Problematic substances that are no longer used, such as lubricants, must be correctly disposed of at a waste collection point.
- Prior to disassembly for recycling or scrapping, remove oil and other substances hazardous to water without leaving any residues.

4 Description

The figure below provides and overview of the layout of the complete system. The individual sections are described in more detail below.

4.1 Machine overview

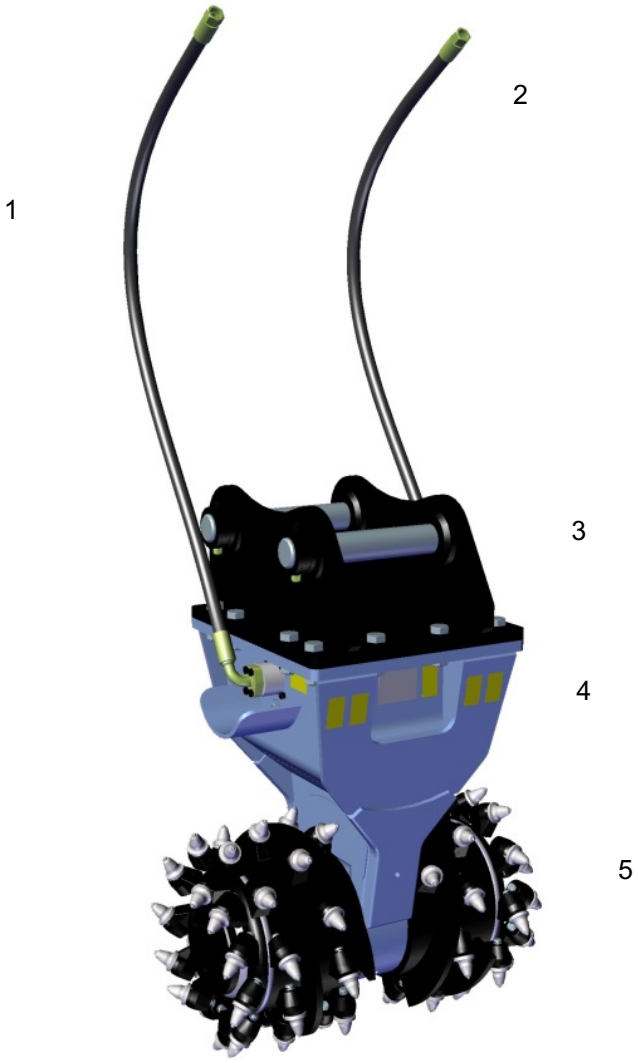


Figure 8 Machine overview

1 Return line

2 Supply line

3 Attachment plate

4 Rotary hoe

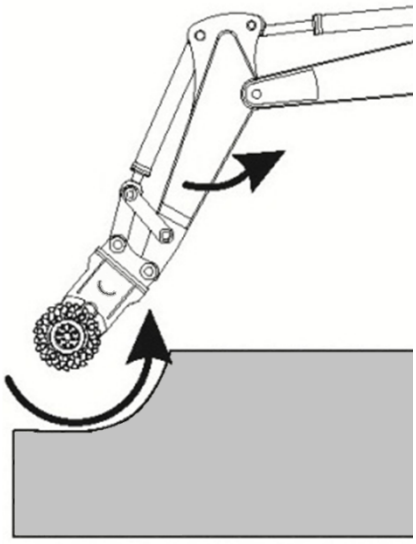
5 Drum

4.2 Function

The hydraulic Rockwheel is suitable for attachment to all conventional hydraulic excavators. However, it must be ensured that the hydraulic excavator provides the required power and that the stability of the excavator is not impaired by the attachment of the hydraulic Rockwheel. The hydraulic Rockwheel is mounted to the bucket arm of the excavator via the quick coupler equipment. Since hydraulic Rockwheels are very powerful, they can be flexibly used for a variety of applications. They cut through almost all types of rock, pavement (asphalt), walls (masonry walls made of bricks, concrete, cement) etc. Since the hydraulic Rockwheel operates at full system pressure, the secondary pressure must not be set lower than the system pressure. This prevents overheating of the hydraulic system.

The hydraulic Rockwheel generates less noise than other excavation processes. Nevertheless, the operator must apply the provisions of the Noise Directive; if required, a measurement of continuous sound pressure level must be performed and suitable protective measures must be implemented as necessary.

In order to ensure safe operation of the hydraulic Rockwheel, correct handling and proper maintenance and servicing at regular intervals must be observed. Incorrect handling may cause performance impairment. The hydraulic Rockwheel is exclusively designed for excavators and carrier vehicles with a total operating weight between 15t and 25t. For other vehicles or vehicle that do not comply with the provisions, please contact ROCK.ZONE.



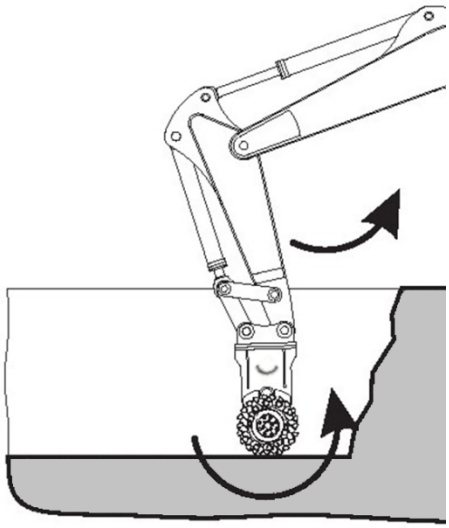
Notice!

Optimal cutting operation is only possible if the drum of the Rockwheel is guided in the direction of the carrier vehicle. When swiveling the Rockwheel to the sides, it must be ensured that the forces for reaching large distances, acting on the boom or the arm of the carrier device and the bearings of the rotary hoe drum are not too high

4.2.1 Examples for application of the Rockwheel

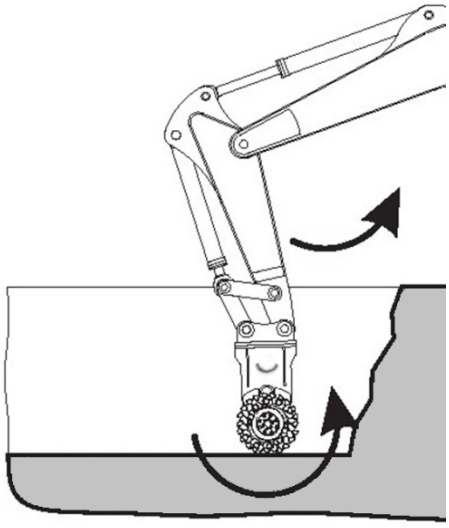
If the Rockwheel is operated at vertical surfaces (walls), the direction of the Rockwheel drum should be changed, i.e. the Rockwheel must be turned. This reduces vibrations and counter-forces during cutting.

Examples for application of the Rockwheel in trenches

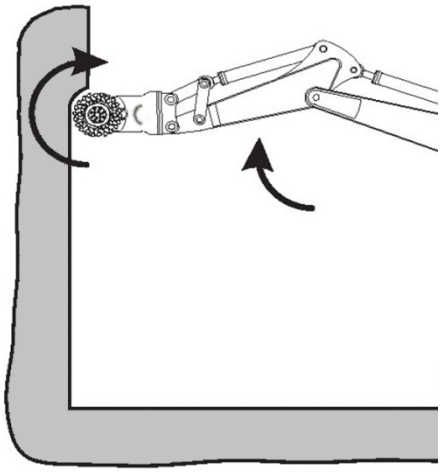


Examples for application of the Rockwheel on asphalt

Prevents uncontrolled break-off of large pieces.



Examples for application of the Rockwheel at walls



Application in water

Notice!

Application of the Rockwheel in swampy areas or under water in depths of up to 20 m is possible upon conversion of the Rockwheel and upon agreement with our technical service.

5 Drum types

Selection of the various Rockwheel drums and cutting bits depends on the operating conditions.

- **Breaker drums/cutting drums**
  These drums are used for cutting of rock with low to medium hardness. The bits must be arranged such that they provide best-possible cutting output.

  Properties:
  - For rock of low to medium hardness
  - Bits for maximum productivity and cutting output
  - No spiral guard plate for restriction of the cutting depth (cutting depth limitation)

- **Profiling drums**
  These drums are used for profiling and smoothing (for accurate or rather smooth surfaces). Since these drums only produce small pieces of rock, they are not suitable for breaking rock.

  Properties:
  - For rock of low to medium hardness - particularly for accurate or smooth surfaces.
  - A higher number of bits allows for smoother surfaces and lower vibration; however, also the cutting output is reduced.

- **Demolition drums**
  These drums have a similar structure than breaker drums. The demolition drums are equipped with a spiral, which serves as cutting depth limitation and cuts the reinforcement material during demolition work.

  Properties:
  - For medium-hard to hard rock and concrete
  - Application of a wear-protected spiral guard plate for cutting depth limitation reduces vibrations and allows for smoother operation

However, it is possible to use different Rockwheel drums and different bit layouts simultaneously.

6 Technical data

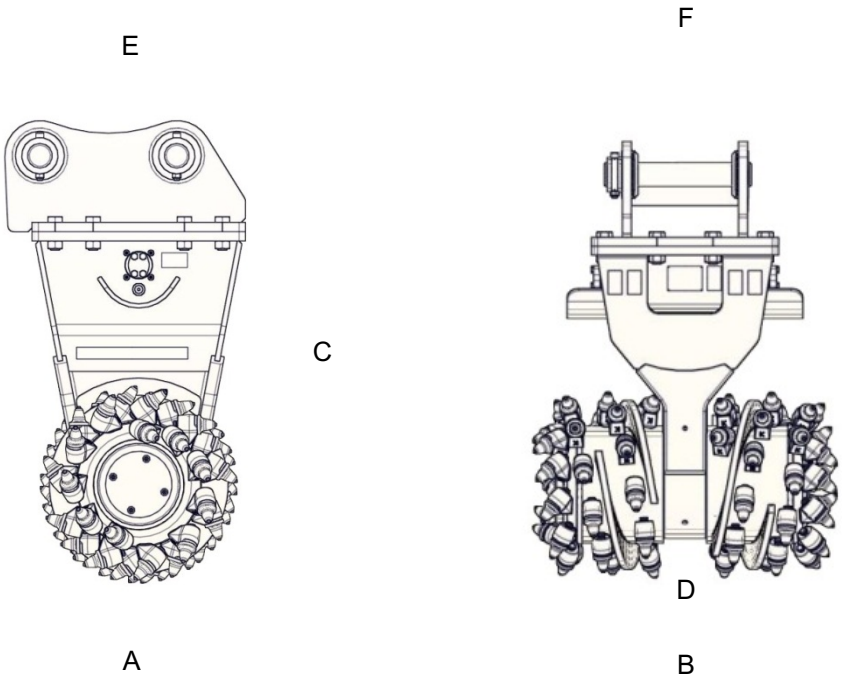
	Quantity / Quality / Value
Max. input power	70 kW
Max. delivery rate	320 lpm
Recommended delivery rate	220 lpm
Max pressure	400 bar
Drive shaft torque	15.6 kNm
bit force	48.4 kN
Drive shaft speed	78 rpm / 220 lpm
bit speed	2.2 m/s / 220 lpm
Weight	1170 kg
Recommended excavator size	15 – 25 tons

Table 6 Technical data

Notice!

*Do not operate the rotary hoe with maximum pressure and maximum delivery rate at the same time since this exceeds the admissible nominal output. The Rockwheel must be operated within the nominal output range.**Please take into account the output diagram.***
In case of doubt, please contact ROCK.ZONE GmbH in Langenburg (Germany).

Cutting drum dimensions



Drum width A mm	Drum diameter B mm	Structure height C mm	Width at the middle web D mm	Connection plate E mm	Connection plate F mm
646	1058	1155	143	700	650

Table 7 Technical data - dimensions

Bit (cutting tools)

1 Standard bit

2 heavy-duty bit

3 Wear-protected Bit

4 excavation bit

D20 / D30 Standard / AX20 / AX30

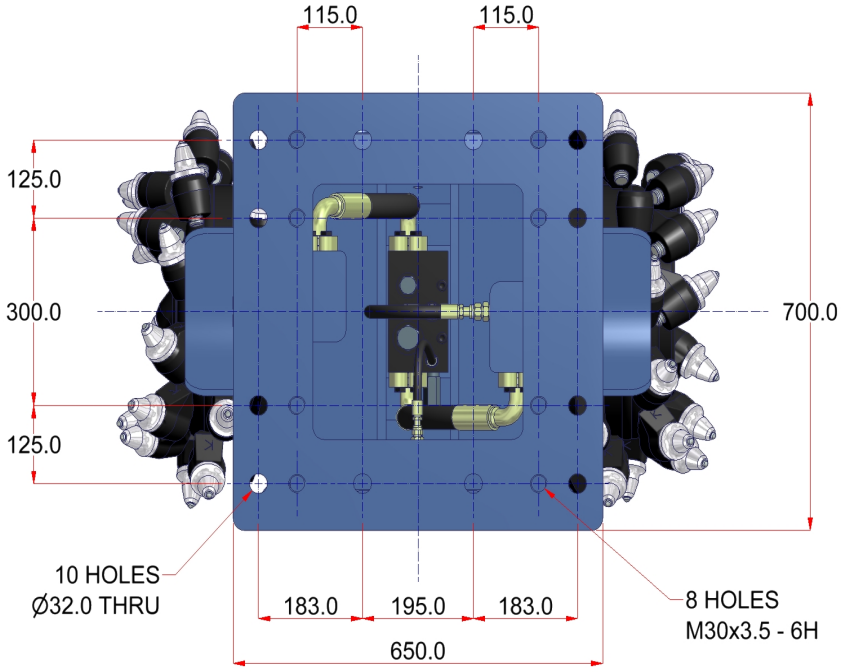
Gesamtbreite / Width (mm)	650
Gesamthöhe / Height (mm)	700
Anzahl Bohrungen / No. of holes	12
Stärke Adapterplatte/ thickness adapter bracket	30mm
Durchmesser / Diameter (mm)	32

Required bolts and nuts (holes in bracket)

Schrauben / Bolt Type	Stück/pcs
Inbus/Caphead M30x110 10.9	12
Scheiben / Washer Type	
Nordlock Scheiben/Washer M30	24
Muttern / Nuts	
Mutter/Nut M30	12

Required bolts and nuts (threads in bracket)

Schrauben / Bolt Type	Stück/pcs
Inbus/Caphead M30x70 10.9	12
Scheiben / Washer Type	
Nordlock Scheiben/Washer M30	12



6.1 Emissions

6.1.1 Air-borne sound

In free ranging operation the A-rated sound power level is below 75 dBA. Depending on the type of material the machine is used for, the sound power level may be above this value.

6.2 Type plate

Figure 9 Type plate

7 Servicing

7.1 Qualification of personnel

The machine must only be serviced by persons who have receive safety-related technical instructions and are authorized by the operator.

7.2 Activities prior to servicing work (main switch, compressed air, ...)

- Shut down the machine in accordance with this operating manual and secure it against accidental re-start.
- Lock the cabin and remove the key and/or attach a warning sign at the main switch.
- For servicing work cordon off a large area.
- Inform the operating staff, appoint a supervisor.

7.3 Activities subsequent to servicing work

7.3.1 Cleaning the Rockwheel

➢ Free the Rockwheel from dirt and soil using a water jet at regular intervals.

7.3.2 Checking the functions

➢ Check that the bits are not stuck

7.4 Tools / special equipment for maintenance

- Wedge, installation- /disassembly tool, reaming tool

7.5 Cleaning

Attention	
	**Property damage due to improper cleaning work** Incorrect cleaning agent or unsuitable cleaning methods may cause damage at the machine. ➢ Only use the recommended cleaning agents.

7.5.1 Advice on cleaning agents

- Please heed the marking and notes on the packaging of the cleaning agents.
- After cleaning, inspect all supply lines and connections for leaks, loosened connections or fittings, scour marks and damage. Any identified defects or deficiencies must be remedied immediately.
- For normal soiling: water (water jet).
- For tenacious soiling: use non-flammable solvents.

7.5.2 Maintenance and replacement of warning signs

- Immediately replace any damaged or lost warning signs.
- Clean and warning signs using a mild detergent and water. Do not use solvent-containing detergents.

7.6 Maintenance overview

7.6.1 Maintenance schedule

The specified maintenance intervals are intended as guidelines and must be complied with. Shorter maintenance intervals may result due to local operating conditions.

Notice!

The maintenance intervals have been calculated for single-shift operation (8h/day, 20 days/month, 12 months/year). If the machine is operated in multiple shifts, the maintenance intervals must be reduced accordingly.

⚠ Caution

Hazard due to substances hazardous to the environment

Leaking oil may pollute the environment.

- ➢ Wear protective clothing when handling oils.
- ➢ Use oil must be collected and correctly disposed of.

Maintenance interval for single-shift operation	Activity	Sequence
Daily prior to starting work	• Check external components for leakage. • Make sure that the cutting heads are securely fastened. • Check all screw connections. • Check hoses for tightness and any damage. • Check all bits and bit holders for wear and replace them as required.	Visual inspection Visual inspection Visual inspection Visual inspection 47
Every 100 hours / 2 weeks	• Check all screw connections. • Check for internal leakage. • Check torque setting at the bolts of the cutting drums.	Visual inspection Visual inspection 50
Every 1000 hours / 1x per year	• Check condition of hydraulic motor. • Disassemble cutting drums. Check seals and gaskets for leakage. Check screw connections. • Check condition of the slide ring packing.	51 50 49

Table 8 Maintenance schedule

7.7 Description of maintenance and servicing work for persons without specific training (operating staff)

The servicing measures listed below must be performed by the operator (without special qualification/knowledge) during operation.

7.7.1 Replacement of bits at the cutting drums

The instructions below must be carefully and thoroughly read. Non-compliance with these instructions may render the warranty null and void. In cases of doubt, please contact your competent vendor.

Disassembly of bits

⚠ Caution
 **Property damage at the Rockwheel** Damage due to incorrect repair. ➢ Only have repair work performed by trained customer service staff.

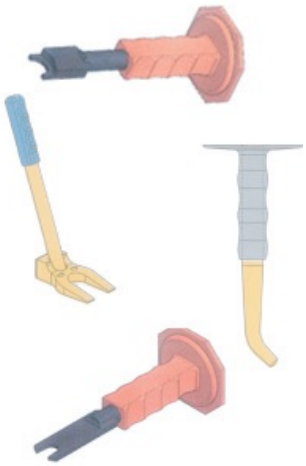
- Thoroughly clean the rotary hoe prior to repair work.

⚠ Warning
 **Crushing hazard** Crushing hazard due to the Rockwheel ➢ Secure the Rockwheel against sliding and falling.

- Position the Rockwheel so that the cutting drums can be easily rotated.

⚠ Warning
 **Hazard due to projecting parts** Projecting parts occurring during repair work may cause severe injuries of the eyes up to loss of eyesight. ➢ Wear goggles or use any other suitably type of eye protection.

Disassembly of a bit with retaining ring



Installation and disassembly tools

1 Wedge

2 Installation / disassembly tool

3 Reaming tool

- Break up the C-retaining ring using a hammer. For this purpose use the installation tool for the securing ring.

- Knock the bit out of the bit holder using a hammer and a reaming tool.

- Loosen any stuck bits by driving the wedge into the gap between the bit and the bit holder.

- Disassemble all other bits.

Installation of bits

Slide the bit into the bit holder of the Rockwheel drum (Fig. 30).

Before installing a new bit, clean the tool insertion hole in the bit holder.

Notice!

Before installing used bits, clean the shank.

Notice!

Install the bits without using any lubricant (grease or oil).

Disassembly of a bit with C-retaining ring

Insert the C-retaining ring into the bit slot.

Insert the securing ring installation tool into the groove and subsequently knock in the C-retaining ring using a hammer until it is fix.

For the remaining bits, proceed in the same order.

Notice!

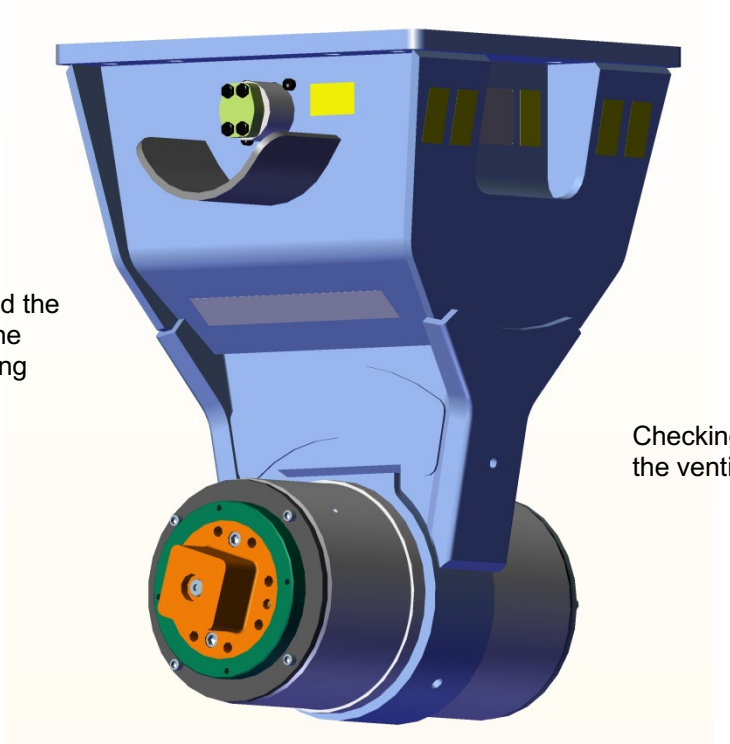
Before performing any cutting work, correct fit of all bits and C-rings must be verified. The bits must rotate freely within the bit holders.

7.7.2 Checking the slide ring packing

To avoid compromising the warranty, please contact the service department before checking for leakage or performing the steps listed below.

- Shut down the excavator.
- Remove the cutting drums
- Remove the end plate
- At the removed end plate, check if the slide ring packing is damaged or leaking.
- Check the housing for leakage.
- Check if appropriate venting port is present.
- Check the tightening torque of the M16 hexagon socket head screws. The torque value must be 330 Nm.
- In case of leakage or if the tightening torque is not reached, please contact the service department.

Removing the end plate and the packing carrier, checking the slide ring packing. Tightening torque of the M16 hexagon socket head screws



Checking for leakage at the venting port

Checking for leakage

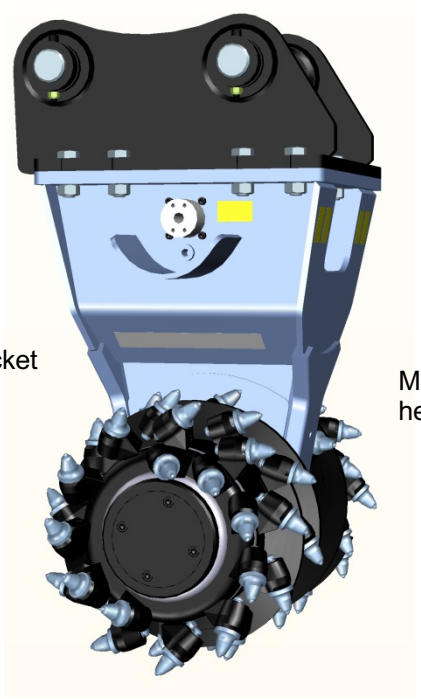
7.7.3 Removal / installation of the cutting drum

To avoid compromising the warranty, please contact the service department before removing / installing the cutting drum or performing the steps listed below.

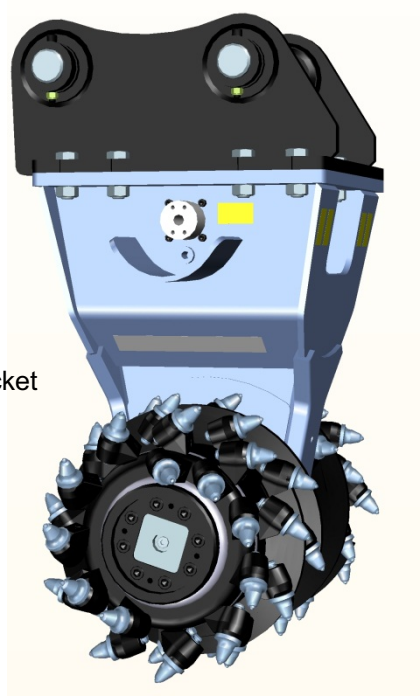
- Shut down the excavator.
- Remove the four M16 x 40 hexagon socket head screws, in order to disassemble the cover of the cutting drum.
- Remove the eight M20 x 90 hexagon socket head screws.
- If required, mount a suitable spacer unit to the end of the shaft using four M16 bolts and position the cutting drum on the ground.
- The center of gravity of the cutting drum is approximately at bit number seven.
- Every sling or chain (for transport) must be placed around this point.
- Carefully lift the cutting drum. Make sure that the drive is not damaged.
- For installation of the cutting drum, new M20 x 90 hexagon socket head screws must be used.
- Tighten these screws with a tightening torque of 650 Nm.
- This must be ensured, since otherwise damage at the square socket head screw may result.

Center of gravity

M16 hexagon socket head



M20 hexagon socket head



7.7.4 Flushing / filling the hydraulic motor

This process must only be performed by qualified personnel, who are familiar with the operating principles of hydraulic systems.

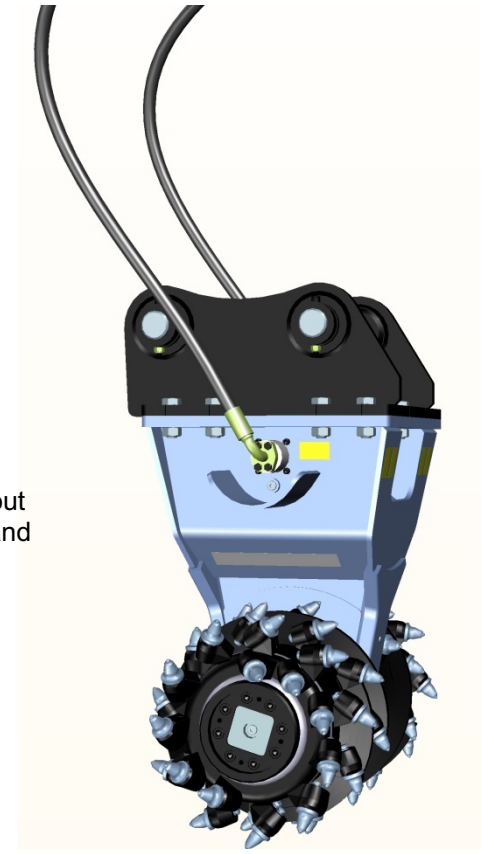
To avoid compromising the warranty, please contact the service department before flushing / filling the hydraulic motor or performing the steps listed below.

The D20 Rockwheel has been filled with oil prior to delivery and thus must not be re-filled. In case of leakage, the D20 Rockwheel must be re-filled.

- Shut down the excavator.
- Remove the cover on both sides to expose the ½ inch BSP connectors.
- Remove the two connectors.
- Disconnect the return line from the excavator and remove the quick coupler if used.
- Connect a hose to the RH drum by the ½“BSP connector.
- Fill in oil into the Rockwheel until oil runs out of the BSP connector at the opposite side. Please check if the oil running out is clean.
- Clean the connection.
- The oil quantity in the rotary hoe is sufficient if oil flows back through the return line or the discharge line.
- The Rockwheel is now filled with oil.

Return

Fill in oil until it runs out at the opposite side and through the return



7.7.5 Check condition of hydraulic motor

This process must only be performed by qualified personnel, who are familiar with the operating principles of hydraulic systems.

To avoid compromising the warranty, please contact the service department before checking the motor or performing the steps listed below.

- Shut down the excavator.
- Make sure that the hydraulic oil sufficiently cooled down.
- Remove the cover on both sides to expose the ½ inch BSP connectors.
- Remove the connector and connect a suitable hose. Lead the hose into a bucket with a scale or use a similar container.
- Set the cutting head to a blocked condition by shutting down the return.
- Start up the rotary hoe.
- Pay attention to the flow rate of the oil from through the discharge line; it should not be higher than 5 lpm.
- If a leak oil line is used, the condition can be checked using a measuring device.

½ inch BSP connector

7.8 In case of leakage or if the tightening torque is not reached, please contact the spare parts supply department

Contact information for spare parts procurement and technical help and advice:

TRAMAC
S.A. TRAMAC BENELUX N.V.
Avenue de l'Energie 11, B - 4432 Alleur
Tel.: +32 4 263 99 84 Fax: +32 4 263 99 85
Mail: tramac@tramac.be www.tramac.be

7.8.1 Spare parts list

See separate spare parts list.

8 Troubleshooting

In case of questions with regard to troubleshooting, please contact the customer service, stating the serial number, at:

TRAMAC
S.A. TRAMAC BENELUX N.V.
Avenue de l'Energie 11, B - 4432 Alleur
Tel.: +32 4 263 99 84 Fax: +32 4 263 99 85
Mail: tramac@tramac.be www.tramac.be

8.1 Description of faults, including consequences, causes and remedial measures

Inspection point	Diagnose	Remedy
Cutting performance declines		
Check all bits and bit holders for wear and replace them as required.	A bit must be replaced if the hard metal insert has been lost or damaged. The bit holders must be replaced if they are damaged.	Bits and/or bit holders must be replaced/repaired if the cutting head holder is worn.
Check the hydraulic circuit at the excavator	The Rockwheel output depends on correct functioning of the hydraulic circuit of the excavator.	Remove the Rockwheel rotary hoe from the hydraulic circuit. Check the flow, overpressure and hydraulic pressure (see provisions for hydraulic hoses / tubes, molded parts and quick couplers). The higher the main pressure connection, the better the cutting output. The ideal setting is 320 bar.
Tightness of the external supply line	Oil leaks into the atmosphere if the pressure in the return line is higher than 50 bar. For optimum performance, the Rockwheel rotary hoe requires a direct return into the reservoir	Make sure that the return line is not clogged.
Check that the pressure between supply and return is not higher than 50 bar.	Excessive pressure may result in mechanical problems.	Remove the cutting drums, remove the hoses and quick couplers. Try to rotate the drive shaft using a suitable lever. If the shaft blocks, the rotary hoe must be disassembled for inspection.
Check the speed of the cutting heads in connection with the flow (10 rpm = 28.2 lpm).	The correct flow rate may be lost due to a defective valve or a worn hydraulic motor.	Check the condition of the hydraulic motor. If the leakage of the motor is within the limit range, it is likely due to a defective start-up valve.
Check the hydraulic motor	With the motor worn, oil may leak at the pistons, which reduces the cutting output. Contaminated oil and/or low viscosity of the oil and too high flow rates are the main reasons for motor failure.	The hydraulic motor must be replaced. Please return the motor to ROCK.ZONE for analysis.
Cutting drums do not rotate		
Check the hydraulic circuit of the excavator	The Rockwheel output depends on correct functioning of the hydraulic circuit of the excavator.	Remove the Rockwheel rotary hoe from the hydraulic circuit; check the flow, overpressure and hydraulic pressure (see provisions for hydraulic settings). Also check all hydraulic hoses / tubes, molded parts and quick couplers.
Check the pressure in the supply line	Excessive pressure may result in mechanical problems.	Remove the cutting heads and remove all hoses and quick couplers. Try to rotate the drive shaft using a suitable lever. If the shaft blocks, the rotary hoe must be disassembled for inspection.
Oil leakage at external components		

Inspection point	Diagnose	Remedy
Check the hydraulic circuit of the excavator	Oil leaks into the atmosphere if the pressure in the return line is higher than 50 bar. For optimum performance, the Rockwheel rotary hoe requires a direct return into the reservoir	Remove the Rockwheel rotary hoe from the hydraulic circuit; check the flow, overpressure and hydraulic pressure (see provisions for hydraulic settings). Also check all hydraulic hoses / tubes, molded parts and quick couplers.
Check condition of hydraulic motor.	With the motor worn, oil may leak at the pistons, which reduces the cutting output. Contaminated oil and / or low viscosity of the oil and too high flow rates are the main reasons for motor failure.	The hydraulic motor must be replaced. Please return the motor to ROCK.ZONE for analysis.
Oil leakage		
Oil leaks out of the area between the adapter plate and the Rockwheel fastening surface	In this area, a number of hoses and fittings are installed which may be damaged.	Remove the adapter plate to obtain access to the leakage area.
Oil leaks out between the cutting head and the housing	Oil may leak in the following points: 1. Fastening screws 2. Mounting surface between housing and bearing housing. 3. Venting port	Remove the cutting head. Determine the leakage point In case of 1.) Leakage is caused by loose screws. Remove the 4 M12x25 screws and the end plate to obtain access to the M12x180 or M12x220 screws. Check that the tightening torque is 135 Nm. In case of 2.) The bearing housing must be removed, since it is likely that the O-ringis defective. In case of 3.) A defect at the shaft gasket is likely.
Only one cutting head is rotating		
Only one cutting head is rotating or one head is rotating faster than the other	Fault at the internal shaft.	The Rockwheel rotary hoe must not be used. Complete disassembly is required.

8.2 Returning into service after a fault

- Fault has been remedied.
- Visual inspection of the Rockwheel for other faults and damage.
- Start-up the Rockwheel.

9 Annex

9.1 List of figures

9.2 List of tables

9.3 Warranty conditions

(provided they are not specified in a separate document)

9.3.1 Warranty

ROCK.ZONE GmbH assume a warranty for their products of type D20 as well as all accessories to be free of defects in material and workmanship for the period of 12 months starting with the date of receipt.

9.3.2 Disclaimer of warranty

The warranty does not cover any faults and defects that occur due to:

- incorrect or insufficient maintenance by the customer;
- unauthorized structural modifications or improper use;
- Parts that are subject to natural wear, such as bits;
- application of D20 beyond its admissible maximum load.

9.3.3 Liability

ROCK.ZONE GmbH, in their capacity as the manufacturer of the machine, are not liable for any damage if:

- D20 is handled incorrectly;
- repair / maintenance or assembly is not performed by authorized persons;
- D20 is not used in compliance with this operating manual;
- Parts of D20 are disassembled.

TRAMAC
S.A. TRAMAC BENELUX N.V.
Avenue de l'Energie 11, B - 4432 Alleur
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