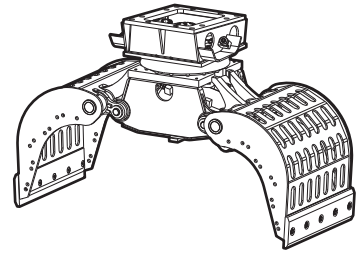


Safety and operating instructions

Multi grapple



Interactive and updated spare part catalogues go to:
www.epiroc.com/technicaldocumentation

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1 Introduction

Epiroc is a leading productivity partner for the mining, infrastructure and natural resources industries. With cutting-edge technology, Epiroc develops and produces innovative drill rigs, rock excavation and construction equipment, and provides world-class service and consumables.

The company was founded in Stockholm, Sweden, and has passionate people supporting and collaborating with customers in more than 150 countries.

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1.1 About these Safety and Operating Instructions



The aim of these Instructions is to familiarise you with the safe and effective operation of the hydraulic attachment. You will also find instructions for regular maintenance activities for the hydraulic attachment in this document.

Please read these Instructions carefully prior to the first attachment and use of the hydraulic attachment.



The different designation of the texts means as follows:

| | |
|-------------|--|
| ▶ | Action step in a safety instruction |
| ◆ | Action step |
| 1. 2. | Established operation process |
| A B C | Explanation of the elements of a drawing |
| • • • | Listing |

Symbols used in illustrations have the following meanings:

| | |
|---|----------------------|
|  | permitted operation |
|  | prohibited operation |

2 Safety instructions

| | |
|---|--|
|  | This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death. |
|  | Read these Safety and operating instructions and specifically all safety instructions before using the hydraulic attachment. This will: <ul style="list-style-type: none">• prevent the risk of injuries and fatal accidents for yourself and others,• protect the environment against environmental damage.• protect the hydraulic attachment and other property against material damage, |

Follow all instructions in these Safety and operating instructions.

Store these Safety and operating instructions in the document compartment of the carrier cab.

Anyone

- transporting,
- installing or removing,
- operating,
- maintaining,
- repairing,
- storing or
- disposing of

the hydraulic attachment must have read and understood these Safety and operating instructions.

These Safety and operating instructions belong to the hydraulic attachment. Keep it for the life of the product. Ensure, if applicable, that any received amendment is incorporated in the instructions. Hand over the Safety and operating instructions if ever you lend, rent out or sell the hydraulic attachment.

All safety regulations listed in this manual comply with the laws and regulations of the European Union. Also observe the additional national/regional regulations.

Hydraulic attachment operation outside the European Union is subject to the laws and regulations valid in the country of use. Please observe any other, more stringent regional regulations and legislation.

Read the carrier manufacturer's Safety and operating Instructions before attaching the hydraulic attachment to the carrier and operating it. Observe all instructions.

2.1 Signal words

The signal words Danger, Warning, Caution, and Notice are used as follows in these Safety and operating instructions:

| | |
|----------------|---|
| DANGER | indicates a hazardous situation which, if not avoided, will result in death or serious injury. |
| WARNING | indicates a hazardous situation which, if not avoided, could result in death or serious injury. |
| CAUTION | indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. |
| NOTICE | The signal word NOTICE is used to address practices related to possible property damage but not related to personal injury. |

2.2 Qualification

Transporting the hydraulic attachment is only permitted if carried out by people who:

- are authorised to operate a crane or a forklift truck according to the applicable national provisions,
- know all the relevant national/regional safety provisions and accident prevention rules,
- have read and understood the safety and transport chapter of these Safety and operating instructions.

Installing, maintaining, storing and disposing of the hydraulic attachment are only permitted if carried out by people who:

- know all the relevant national/regional safety provisions and accident prevention rules,
- have read and understood these Safety and operating instructions.

Operating the hydraulic attachment is only permitted if carried out by qualified carrier drivers. Carrier drivers are qualified if they:

- have been trained to operate a carrier according to the national regulations,
- know all the relevant national/regional safety provisions and accident prevention rules,
- have read and understood these Safety and operating instructions.

Testing the hydraulic installation is only permitted if carried out by professionals. Professionals are people who are authorised to approve a hydraulic installation for operation according to the national regulations.

Repairing the hydraulic attachment is only permitted if carried out by professionals trained by Construction Tools GmbH. These professionals must have read and understood these Safety and operating instructions. They must follow all safety instructions and guidelines for repair. Otherwise the operational safety of the hydraulic attachment is not guaranteed.

2.3 Intended use

Only attach the multi grapple to a hydraulic carrier of a suitable load-bearing capacity. Read the carrier manufacturer's Safety and operating instructions before attaching the multi grapple to the carrier and operating it. Observe all instructions.

Only use the multi grapple for following operations:

- Demolition of timber structures
- Demolition of masonry
- Sorting
- Loading work

Intended use also implies observing all instructions in these Safety and operating instructions.

2.4 Use other than intended

Never use the multi grapple:

- to pull/tear at girders, braces and walls.

This damages the multi grapple and adapter plate. The carrier may lose stability.

- to hit or chop

This destroys the multi grapple.

- to push debris aside

This destroys the multi grapple.

- to move the carrier supported by the multi grapple

This damages the multi grapple.

- to lift or transport loads with attachments

This damages the multi grapple.

- under water

This destroys the multi grapple.

- in explosion-hazard environments

Explosions cause serious injury or death.

2.5 Protective equipment

Personal protective equipment must comply with the applicable health and safety regulations.

Always wear the following personal protective equipment:

- protective helmet
- safety glasses with side protectors
- protective gloves
- protective shoes
- warning vest

2.6 Carrier, precautions

▲ WARNING Falling carrier

If the load-bearing capacity of the carrier used is insufficient, the carrier will not be stable. It can topple over and cause injuries and damage.

Using a carrier whose load-bearing capacity is too high will greatly burden the hydraulic attachment causing it to wear faster.

- ▶ Only attach the hydraulic attachment to a hydraulic carrier of a suitable load-bearing capacity.
- ▶ The carrier must remain stable at all times.
- ▶ Read the carrier manufacturer's Safety and operating Instructions before attaching the hydraulic attachment to the carrier and operating it. Observe all instructions.

NOTICE Damage to the hydraulic attachment

Working with a hydraulic attachment mounted to a long reach boom may cause damage to the hydraulic attachment.

- ▶ Before working with a hydraulic attachment mounted to a long reach boom consult the Epiroc Customer Center / Dealer in your area.

2.7 Transport, precautions

▲ WARNING Risk of death due to suspended loads

When lifting loads these can swing out and fall. This can result in serious injuries or even death.

- ▶ Never stand underneath or in the swinging range of suspended loads.
- ▶ Only move loads under supervision.
- ▶ Only use approved lifting equipment and lifting gear with sufficient load bearing capacity.
- ▶ Do not use worn lifting gear (ropes, belts, chains, shackles etc.).
- ▶ Do not place lifting gear such as ropes and belts on sharp edges or corners, do not knot these or twist them.
- ▶ When leaving the workplace, set down the load.

▲ WARNING Injury due to swivelling load

When transporting the load by crane it can swivel and cause severe injuries and considerable damage to property.

- ▶ Ensure that no personnel, objects or obstacles are located in the swivel range of the load.

NOTICE Air freight restrictions

HATCON contains an activated SIM card (radio transmitting device) and an encased lithium ion battery after activation step has been finalized. Both parts are regulated for air transport.

- ▶ Consult your forwarder or local customer center/ dealer about any restrictions for air freight.

2.8 Hydraulic installation, precautions

▲ WARNING Hydraulic pressure too high

If the hydraulic pressure is too high, the parts of the hydraulic attachment will be exposed to excessively high loads. Parts can break loose or burst causing serious injuries.

- ▶ Lay the drain line of the pressure relief valve directly in the tank to ensure the safe functioning of the pressure relief valve!
- ▶ The pressure relief valve must be set at the maximum static pressure.
- ▶ The pressure relief valve setting must be checked to ensure that the maximum static pressure (see chapter **Technical specifications**) of the hydraulic installation is not exceeded at any time. Attach a lead seal to the pressure relief valve.
- ▶ Prior to their first use, the safety facilities on the hydraulic installation must be checked by a professional/authorised monitoring body for their quality (CE mark etc.), suitability and proper functioning.
- ▶ If any significant changes are made to the hydraulic installation, a new acceptance inspection is to be carried out in accordance with the relevant national safety provisions.

▲ WARNING Hot hydraulic oil squirting out

The hydraulic system is under high pressure. Hydraulic lines may spring a leak or burst. Hydraulic oil squirting out can lead to serious injury.

- ▶ When attaching the hydraulic attachment do not lay any hydraulic lines through the carrier's cab.
- ▶ Only use hydraulic lines which comply with the following quality requirements:
 - For the function open and close
 - Hydraulic hoses with 4 reinforcement steel wires according to DIN EN 856 4SH,
 - Hydraulic pipes, seamless cold-drawn steel pipes according to DIN EN 10305
 - For the function turn
 - Hydraulic hoses with 2 steel plaitings according to DIN EN 853 2SN,
 - Hydraulic pipes, seamless cold-drawn steel pipes according to DIN EN 10305.

2.9 Media/consumables, precautions

▲ WARNING Hot hydraulic oil under high pressure

Hydraulic oil will squirt out under high pressure if there is a leakage. The jet of oil might penetrate people's skin and cause permanent damage. Hot hydraulic oil can cause burns.

- ▶ Never use your hands to find leaks.
- ▶ Always keep your face away from a possible leak.
- ▶ If hydraulic oil has penetrated your skin consult a doctor immediately.

▲ WARNING Hydraulic oil spills

Spilt hydraulic oil can make a floor slippery. If people slip they can be injured. Hydraulic oil is environmentally harmful and must not penetrate the ground or enter the water table or water supplies.

- ▶ Make sure not to spill any hydraulic oil.
- ▶ Immediately clean the floor if you have spilt hydraulic oil.
- ▶ Observe all safety and environmental protection provisions when handling hydraulic oil.

▲ WARNING Skin infections/diseases due to oil and grease

Hydraulic oil and grease can cause rashes (or even eczema) if they come into contact with the skin.

- ▶ Avoid all skin contact with hydraulic oil and grease.
- ▶ Use a suitable skin protection product.
- ▶ Always wear safety gloves when working with hydraulic oil or grease.
- ▶ Immediately clean any skin that has been contaminated by oil or grease with water and soap.

2.10 Explosion and fire, precautions

▲ DANGER Explosion and fire

Explosions cause serious injury or death. Explosives being cut by the hydraulic attachment may lead to an explosion.

- ▶ Never operate the hydraulic attachment in the direct vicinity of explosives.
- ▶ Make sure that no explosives are hidden in the concrete.
- ▶ Check gas line position plans of the complete construction area.

▲ DANGER Explosion and fire

Operating the hydraulic attachment may create sparks which ignite highly flammable gases.

This may lead to fire or an explosion.

- ▶ Never work in an environment with highly flammable substances.
- ▶ Make sure that there are no hidden sources of gas in the work area.
- ▶ Check gas line position plans of the complete construction area.

▲ DANGER Explosion and fire

Dust-rich air can form an explosive atmosphere which may ignite when operating the hydraulic attachment.

This may lead to fire or an explosion.

- ▶ Never operate the hydraulic attachment in an explosion-hazard atmosphere.
- ▶ Always provide sufficient ventilation when working in buildings or in a confined area.

▲ WARNING Risk of explosion

If the hydraulic attachment is equipped with HATCON explosion may occur when the contained lithium batteries are penetrated by pieces of steel or reinforcing bars.

- ▶ Avoid impact of reinforcement, flying rocks or even explosives on HATCON.
- ▶ Check the HATCON before operating.

2.11 Electrical shock, precautions

▲ DANGER Electrical shock

Any contact of the hydraulic attachment with electric circuits or other sources of electricity will lead to an electric shock, resulting in serious injury or death. The hydraulic attachment is not electrically insulated.

- ▶ Never work in the vicinity of electric circuits or other sources of electricity.
- ▶ Make sure that there are no hidden circuits in the work area.
- ▶ Check wiring diagrams.

2.12 Falling stones, precautions

▲ WARNING Fragments flying around

Fragments of material which come loose while operating the hydraulic attachment may be flung away and can cause serious injury if people are hit by them. Small objects falling from a great height can also cause serious damage.

During hydraulic attachment operation the danger zone is considerably greater than during the excavation operation due to fragments of stone and pieces of steel flying around, and for this reason the danger zone must, depending on the type of material to be worked on, be enlarged correspondingly, or secured in a suitable manner through corresponding measures.

- ▶ Secure the danger zone.
- ▶ Stop the hydraulic attachment immediately if anyone enters the danger zone.
- ▶ Close the windscreen and the side windows of the driver's cab.

2.13 Emissions, precautions

▲ WARNING Lung disease

Dust may be generated when operating the hydraulic attachment. If dust from rocks or silica dust, produced when operating the hydraulic attachment on rocks, concrete, asphalt or other such materials, is inhaled this may lead to silicosis (dust lungs, a severe lung disease). Silicosis is a chronic disease which may lead cancer and death.

- ▶ Wear a suitable breathing mask.

2.14 Handling machines, precautions

▲ WARNING Narcotics, alcohol and drugs

Narcotics, alcohol and medicinal drugs make their users less alert and affect their ability to concentrate. Negligence and incorrectly assessing a situation can result in serious injury or death.

- ▶ Never work on or with the hydraulic attachment when under the influence of narcotics, alcohol or drugs which affect your alertness.
- ▶ Never allow other people who are under the influence of narcotics, alcohol or drugs which affect their alertness to work on or with the hydraulic attachment.

2.15 Changes to the hydraulic attachment, precautions

▲ WARNING Changes to the hydraulic attachment

Changes to the hydraulic attachment or the adapter plate may lead to serious injury.

- ▶ Never carry out any changes to the hydraulic attachment or the adapter plate.
- ▶ Only use original parts or accessories approved by Epiroc.
- ▶ Modifications that entail new hazards may require a new procedure for assessing conformity.

2.16 Environmental pollution, precautions

NOTICE Environmental pollution due to hydraulic oil

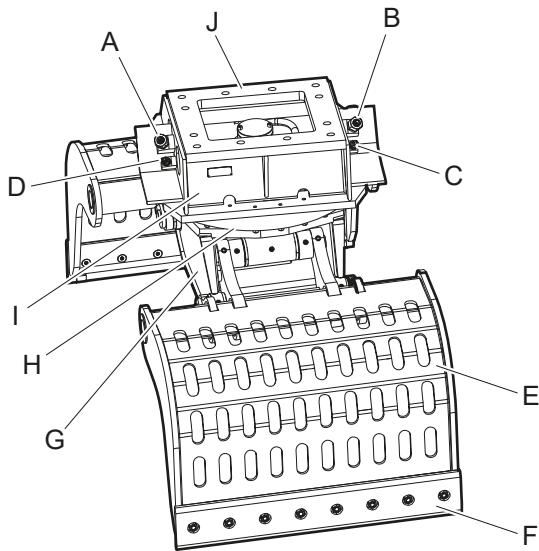
Hydraulic oil is permanently environmentally harmful. Escaped hydraulic oil will lead to groundwater and soil contamination. Organisms may die.

- ▶ Collect any hydraulic oil which escapes to avoid environmental pollution. For minor volumes use an absorbing medium (in case of an emergency use soil). In case of major leakages contain the hydraulic oil. It must not drain off and penetrate the ground or enter the water table or water supplies.
- ▶ Collect contaminated absorbing medium or soil in a watertight box/container and close it tight.
- ▶ Contact an authorized waste management company.
- ▶ Dispose of all contaminated material in accordance with the applicable environmental regulations.

3 Overview

3.1 Equipment description

The illustration gives an overview of the main parts and components of the hydraulic attachment. Actual details may differ.



- A. Port »A« function »Open«
- B. Port »B« function »Close«
- C. Port »C« function »Turn (conterclockwise)«
- D. Port »D« function »Turn (clockwise)«
- E. Grapple leaf
- F. Wear blade
- G. Housing
- H. Live ring
- I. Rotation mechanism housing
- J. Connecting plate for adapter plate

3.2 Function

The operation of a multi grapple is described in a simplified version below:

Closing the multi grapple

The carrier driver operates the multi grapple, via a switch on the floor or via a joystick in the carrier, for the function »Close«. Line »B« is connected to the hydraulic cylinder. The hydraulic cylinder extend the piston rod. The grapple leaves grip the material.

Opening the multi grapple

The carrier driver operates the multi grapple, via a switch on the floor or via a joystick in the carrier, for the function »Open«. Oil is fed to the hydraulic cylinder via line »A«. The piston rod retracts. The grapple leaves opens.

Hydraulically turning the multi grapple

The carrier driver activates the carrier function »Turn«. Oil is fed to the hydraulic motor. The hydraulic motor, located in the rotation mechanism housing of the multi grapple, causes the rotation. To achieve endless turning of the housing, there is a rotary transmission. The oil flows for the functions »Open« and »Close« are transmitted through the rotary transmission.

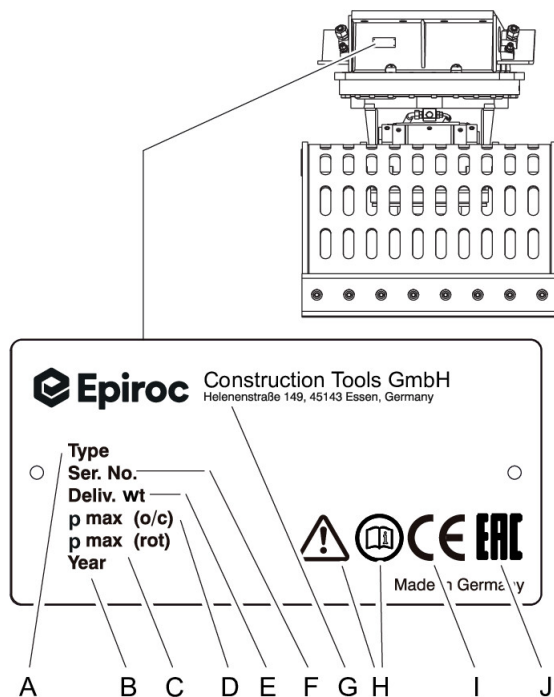
3.3 Signs / labels

▲ WARNING Missing warnings

The name plate and the labels on the hydraulic attachment contain important information about the hydraulic attachment and for personal safety. A missing warning can lead to overlooking or misinterpretation of possible risks and cause personal hazards. The signs and labels must always be clearly legible.

- Immediately replace any defective name plates and labels.
- Use the spare parts list to order new name plates and labels.

3.3.1 Name plate



- A. Model
- B. Year of construction of hydraulic attachment
- C. Max. permissible operating pressure »Turn«
- D. Max. permissible operating pressure »Open / Close«
- E. Weight of hydraulic attachment
- F. Serial number
- G. Name and address of manufacturer
- H. The warning symbol and the book symbol indicate that the Safety and Operating Instructions must be read prior to use of the hydraulic tool and in particular the chapter on Safety.
- I. The CE symbol indicates that the hydraulic attachment was produced in conformity with the CE. You can find further information about this in the enclosed EC Declaration of Conformity.
- J. The EAC symbol means that the machine is EAC approved.

3.4 Applications

| Field | Type of application |
|-----------------|---------------------|
| General | sorting |
| | loading work |
| Demolition work | masonry |
| | timber structures |

3.5 Guarantee

The guarantee or product liability will be invalidated by the following:

- Use other than intended
- Maintenance work not being carried out or being carried out incorrectly
- The use of incorrect consumables
- The use of non-approved parts
- Damage due to wear
- Damage due to improper storage
- Changes not carried out by or in consultation with the manufacturer

3.6 Removing the packaging

- Remove all the packaging material.
- Dispose of it in accordance with the applicable provisions.
- Check that the delivery is complete.
- Check the delivery for visual damage.
- If any defects are found, consult the Epiroc Customer Center / dealer in your area.

3.7 Scope of delivery

The multi grapple is delivered complete with:

- Multi grapple
- Safety and operating instructions
- EC Declaration of Conformity

Accessories as ordered:

- Hoses

Special accessories as ordered:

- e.g. adapter plate with Allen screws and pairs of lock washers
- e.g. base plate to construct an adapter plate with Allen screws and pairs of lock washers
- e.g. hydraulic fittings for the carrier

4 Transport

▲ **WARNING Hoist tipping over / hydraulic attachment falling**

The hydraulic attachment is heavy. The hoist/lifting equipment and/or hydraulic attachment tipping over or falling may cause serious injury and material damage.

- ▶ Only transport the hydraulic attachment with lifting equipment with the right load-bearing capacity for the weight of the hydraulic attachment.
- ▶ Only lift and secure the hydraulic attachment with lifting gear (ropes, chains, shackles etc.) with the right load-bearing capacity for the weight to be lifted.
- ▶ Make sure that there is nobody near or under the suspended hydraulic attachment.
- Transport the multi grapple with the grapple leaves open.

There is less oil in the multi grapple if transported with open grapple leaves. In the event of a leak, less oil is lost and the environmental damage is less.

- Open the multi grapple before transporting it. Proceed as follows to ensure the grapple leaves stay open:
- Seal all hose ports and connections on the multi grapple with the enclosed plug fittings and cap nuts if the hydraulic hoses are removed.
- If the hydraulic hoses have been attached to the multi grapple, plug the hoses.

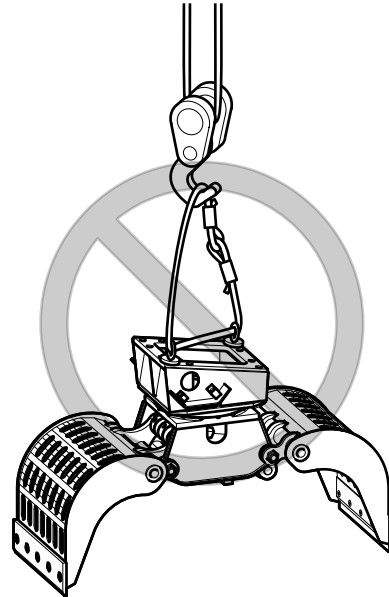
4.1 Transport using a crane

You are not allowed to transport the multi grapple with a crane.

▲ **WARNING Multi grapple falling**

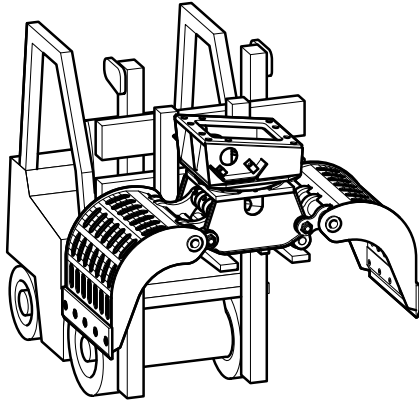
The multi grapple is not designed for crane transport. Lifting equipment can fail and cause the multi grapple to fall.

- ▶ Transport the multi grapple only with a fork lift truck or truck.



4.2 Transport using a forklift truck

- Move the fork of the forklift truck under the housing so that the hydraulic attachment cannot tip over.



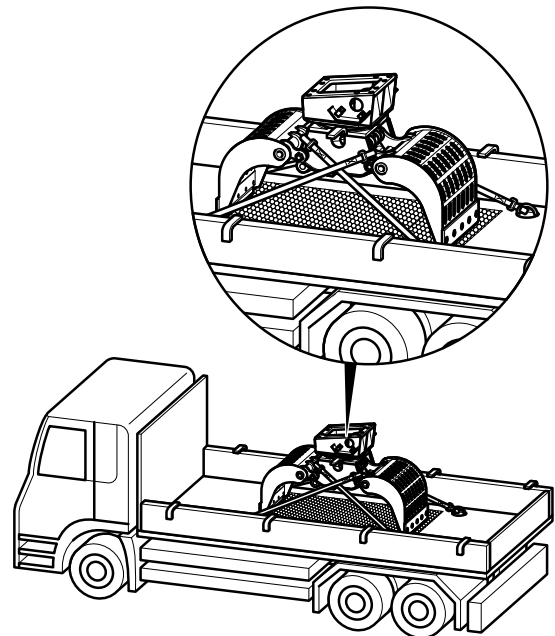
- Slowly lift the hydraulic attachment.
- Transport the hydraulic attachment to the location provided for.

4.3 Transport using a truck

▲ WARNING Hydraulic attachment tipping over / slipping

The hydraulic attachment slipping or tipping over and falling from the loading area of a lorry may cause serious injury.

- ▶ Place the hydraulic attachment on an anti-slip mat.
- ▶ Secure the hydraulic attachment to the loading area with ropes or chains.
- Secure the hydraulic attachment on the loading surface as shown in the following illustration.
- Observe all the applicable national/regional regulations on securing loads.



5 Installation

▲ **WARNING Hot hydraulic oil squirting out**

The hydraulic system is under high pressure. If hydraulic connections come loose or are disconnected, hydraulic oil will squirt out under high pressure. Hydraulic oil squirting out can lead to serious injury.

- ▶ Depressurise the hydraulic system before connecting or disconnecting the hydraulic circuits of the hydraulic attachment (see chapter **Depressurising the hydraulic system**).

NOTICE Environmental damage due to hydraulic oil

Hydraulic oil is environmentally harmful and must not penetrate the ground or enter the water table or water supplies.

- ▶ Collect any hydraulic oil which escapes.
- ▶ Dispose of it in accordance with the applicable environmental regulations.

NOTICE Damage to the hydraulic attachment

Working with a hydraulic attachment mounted to a long reach boom may cause damage to the hydraulic attachment.

- ▶ Before working with a hydraulic attachment mounted to a long reach boom consult the Epiroc Customer Center / Dealer in your area.

5.1 Media/consumables

The following consumables are used when operating the hydraulic attachment:

5.1.1 Mineral hydraulic oil

All hydraulic oil brands prescribed by the carrier manufacturer are also suitable for use when operating the hydraulic attachment.

However, the oil should comply with viscosity class HLP 32 or higher.

In summer and in hot climates, oils of viscosity class HLP 68 or higher should be used.

In all other respects the regulations of the carrier manufacturer are to be taken into consideration.

| | |
|-------------------------|---------------|
| Optimum viscosity range | = 30 - 60 cSt |
| Max. start viscosity | = 2000 cSt |
| Max. oil temperature | = 80 °C |

Special conditions apply to using the hydraulic attachment at low temperatures (see chapter **Low ambient temperature**).

■ Check the oil filter!

An oil filter must be integrated in the tank line of the hydraulic system. The maximum mesh width allowed for the oil filter is 50 microns; it must have a magnetic separator.

5.1.2 Non-mineral hydraulic oil

NOTICE Mixed hydraulic oil

Never mix mineral and non-mineral hydraulic oils! Even small traces of mineral oil mixed in with non-mineral oil can result in damage to both the hydraulic attachment and the carrier. Non-mineral oil loses its biodegradability.

- ▶ Only use one type of hydraulic oil.

If you are using non-mineral oil it is imperative that the name of the oil in use be indicated when returning the hydraulic attachment for repair.

In order to protect the environment or on technical grounds, hydraulic oils are currently being used which are not classified as HLP mineral oils.

Before using hydraulic oils of this kind it is imperative to ask the carrier manufacturer whether operations with such fluids are possible.

Our hydraulic attachments are basically designed for use with mineral oils. Consult the Epiroc Customer Center / Dealer in your area before using other hydraulic oils approved by the carrier manufacturer. Following initial assembly and after any workshop repairs, our hydraulic attachments are subjected to a test run on a test bed powered by **mineral oil**.

5.1.3 Grease

- When handling oils and greases observe the safety instructions that apply to these products.

| Media /consumables | Part number |
|--------------------|--------------|
| Cutter grease | 3363 0949 14 |

5.2 Manufacturing the adapter plate

Construction Tools GmbH also supplies base plates to manufacture adapter plates alternatively to the adapter plates supplied.

NOTICE Adapter plate cracking

The adapter plate may crack if it is not designed for the high load.

- ▶ Take not only the weight of the hydraulic attachment but also the crowd force of the carrier, possible vibration etc. into account when dimensioning the adapter plate.
- ▶ Ensure that the design conforms to the state of the art.
- ▶ Have the web plates welded to the adapter plate base plate by a qualified welding specialist.

The base plate is made of the material EN10025-S355 J2G3.

- Have the web plates designed and manufactured or procure web plates to fit your carrier.
- Ensure that the web plates are welded to the base plate side marked "TOP".

The adapter plate must not strike in any position during operation of the hydraulic attachment.

Construction Tools GmbH does not design, manufacture or sell web plates for adapter plates.

5.3 Installing the adapter plate

NOTICE The adapter plate can come loose

The adapter plate can come loose if the fastening screws are not designed for local high loads.

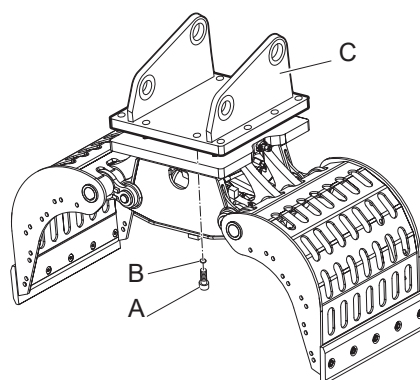
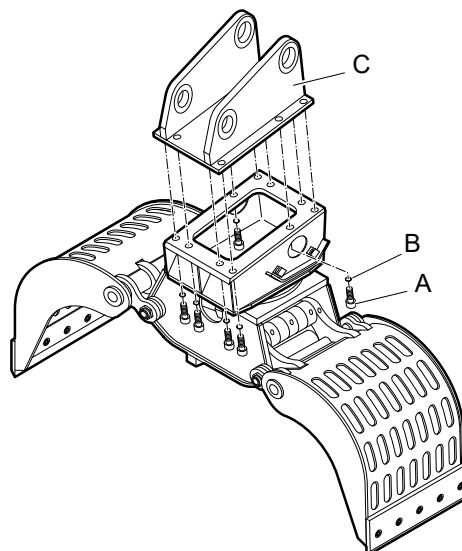
- ▶ Only use the Allen screws of strength category 8.8 and the pairs of lock washers included in the delivery to attach the adapter plate or the base plate.
- Place the hydraulic attachment within the range of the carrier.
- Apply anti-seize compound to the Allen screw threads (A) before inserting them.

The contact faces of the screw head and the lock washers (B) must not be lubricated.

▲ WARNING Hands and fingers being cut off or hurt

Bores and surfaces can act like a pair of scissors and cut off or hurt parts of your body.

- ▶ Never use your fingers to check bores or fitting surfaces.
- Align the adapter plate (C) on the connecting plate of the multi grapple.



- Fit a pair of lock washers (B) onto every screw.
- Tighten the Allen screws (A) with an Allen key.
- Tighten the Allen screws (A) with the required tightening torque.

| Type | Key size | Tightening torque |
|--------|------------------|---------------------|
| MG 100 | 14 mm (0.55 in.) | 200 Nm (148 ft lbs) |
| MG 200 | 14 mm (0.55 in.) | 200 Nm (148 ft lbs) |

| Type | Key size | Tightening torque |
|---------|------------------|-----------------------|
| MG 300 | 14 mm (0.55 in.) | 200 Nm (148 ft lbs) |
| MG 400 | 14 mm (0.55 in.) | 200 Nm (148 ft lbs) |
| MG 500 | 14 mm (0.55 in.) | 200 Nm (148 ft lbs) |
| MG 800 | 17 mm (0.67 in.) | 390 Nm (288 ft lbs) |
| MG 1000 | 22 mm (0.87 in.) | 1500 Nm (1106 ft lbs) |
| MG 1500 | 22 mm (0.87 in.) | 1500 Nm (1106 ft lbs) |
| MG 1800 | 22 mm (0.87 in.) | 1500 Nm (1106 ft lbs) |
| MG 2300 | 22 mm (0.87 in.) | 1500 Nm (1106 ft lbs) |
| MG 2700 | 22 mm (0.87 in.) | 1500 Nm (1106 ft lbs) |

5.4 Attaching the hydraulic attachment to the carrier

5.4.1 Mechanical mounting aspects

You need an assistant to attach the hydraulic attachment to the carrier.

- Agree on hand signals with your assistant, to enable him to help you place the carrier in the proper position to attach the hydraulic attachment.
- Lower the stick of the carrier into the holder provided on the adapter plate.

▲ WARNING Injury by impacts

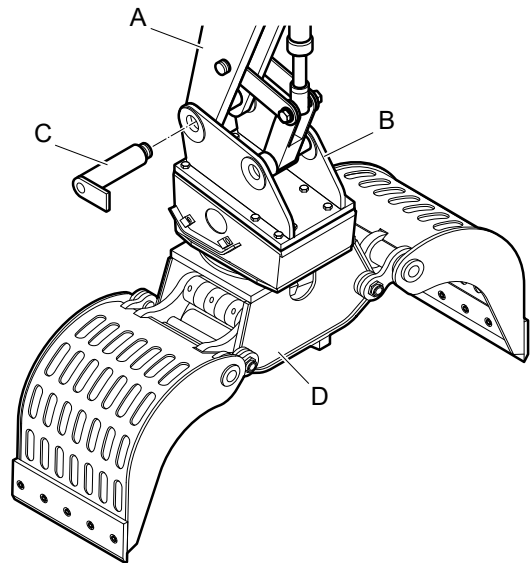
A sudden movement of the carrier may cause your assistant to be hit and injured by the boom or the hydraulic attachment.

- ▶ Only move the boom very slowly and in a controlled manner while an assistant is within the danger zone.
- ▶ Always keep sight of your assistant.

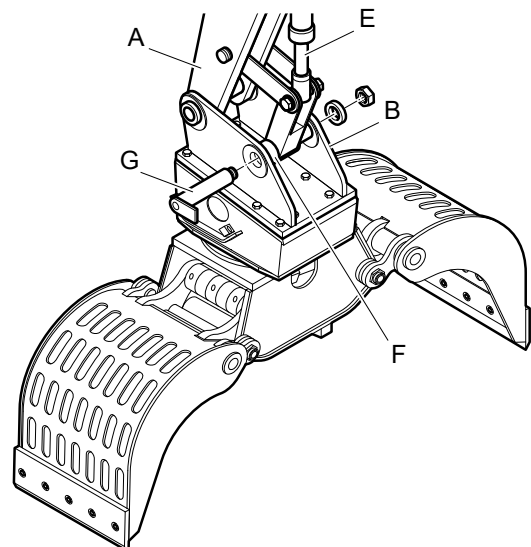
▲ WARNING Hands and fingers being cut off or hurt

Bores and surfaces can act like a pair of scissors and cut off or hurt parts of your body.

- ▶ Never use your fingers to check bores or fitting surfaces.
- Let your assistant instruct you until the bores in the adapter plate (B) and in the stick (A) are properly aligned.
- Install the stick bolt (C) and lock it.



- Lift the hydraulic attachment (D).



- Extend the bucket cylinder (E) until the bore in the linkage (F) aligns with the bore in the adapter plate (B).
- Install the linkage bolt (G) and lock it.
- Carefully move the bucket cylinder (E) into both end positions.

The adapter plate must not be stopped by the mechanical stops in either position. Consult the Epiroc Customer Center / Dealer in your area if the adapter plate is stopped by a mechanical stop.

5.4.2 Making the hydraulic connections

NOTICE Faulty hydraulic installation

The carrier must have a suitable hydraulic installation to operate the hydraulic attachment. Improperly installed lines and incorrectly rated sizes may cause the oil to heat up and the hydraulic attachment to be damaged.

- ▶ Only use hydraulic lines of the rated sizes as instructed (see chapter **Technical Specifications**).
- ▶ Check the rated size of the hydraulic lines on existing hydraulic installations! All supply and return lines for the hydraulic oil must have a sufficient inside diameter and wall thickness.
- ▶ Route all hydraulic hoses in a torsion-free manner.
- Switch off the carrier.
- Depressurise the hydraulic system according to the manufacturer's safety and operating instructions for the carrier.
- Close all shut-off valves in the installation at the boom, if no quick couplings are used.

NOTICE Damage to hydraulic parts

Polluted hydraulic lines and connections may enable sand, fragments of material and dirt to penetrate the hydraulic attachment and damage the hydraulic parts.

- ▶ Clean the hydraulic lines and connections prior to connecting the hydraulic lines.
- Have dirty hydraulic lines rinsed through by a specialist company.
- Clean dirty hydraulic line connections with a suitable grease-dissolving universal cleaner.
- Observe the cleaner manufacturer's information on safety and use.

Connecting hydraulic hoses for the functions

»Open / Close«

- Remove the caps/blank flange from port »A« and »B« and keep them in a safe place.
The connection of function »Open« is marked with an »A«, the connection of function »Close« with a »B«.
- Check that the connections are not damaged.
- Change any damaged connections.
- If the two input lines of the boom have the same operating pressure, connect them to port »A« and »B« in a torsion-free manner.

- If the two input lines of the boom have different operating pressures, connect the hose with the higher operating pressure to port »B« in a torsion-free manner, connect the hose with the lower operating pressure to port »A« in a torsion-free manner.

▲ WARNING Hydraulic hose flailing about

Pressurised hydraulic hoses will flail about if a bolted connection comes loose or becomes loosened. A hydraulic hose flailing about may cause serious injuries.

- ▶ Tighten the fastening screws with the right tightening torque.

Connecting hydraulic hoses for the function »Turn counterclockwise / Turn clockwise«

- Remove the caps/blank flange from port »C« and »D« and keep them in a safe place.

The connection of function »Turn counterclockwise« is marked with an »C«, the connection of function »Turn clockwise« with a »D«.

- Check that the connections are not damaged.
- Replace damaged connections.
- Fix the hoses to the connection for function »Turn«.
- Connect both hoses for the function »Turn« to the boom in a torsion-free manner.

▲ WARNING Hydraulic hose flailing about

Pressurised hydraulic hoses will flail about if a bolted connection comes loose or becomes loosened. A hydraulic hose flailing about may cause serious injuries.

- ▶ Tighten the fastening screws with the right tightening torque.

5.5 Removing the hydraulic attachment from the carrier

- Place the hydraulic attachment on timber support blocks.

5.5.1 Dismantling the hydraulic connections

▲ WARNING Unexpected movement

Sudden movements of the carrier may cause serious injury.

- ▶ Secure the carrier such that it cannot move unexpectedly.
- ▶ Observe the carrier manufacturer's instructions.

▲ WARNING Hydraulic hose flailing about

Pressurised hydraulic hoses will flail about when bolted connections have come loose or have been loosened. A hydraulic hose flailing about may cause serious injuries.

- ▶ Depressurise the hydraulic system before disconnecting a hydraulic hose (see chapter **Depressurising the hydraulic system**).

▲ WARNING Hot parts

The hydraulic cylinder, hoses, pipes and fittings become very hot during operation. Touching them may lead to burns.

- ▶ Never touch hot parts.
- ▶ If you have to carry out activities where you have to touch the parts, wait for them to cool down first.
- Close all shut-off valves in the installation at the boom if no quick couplings are used.
- Disconnect the hose lines to and from the hydraulic attachment at the boom side.
- Close off all open hose ends.

5.5.2 Mechanical disassembly

- You need an assistant to remove the hydraulic attachment.
- Agree on hand signals with your assistant, to enable him to help you move the boom.

▲ WARNING Injury by impacts

A sudden movement of the carrier may cause your assistant to be hit and injured by the boom or the hydraulic attachment.

- ▶ Only move the boom very slowly and in a controlled manner while an assistant is within the danger zone.
- ▶ Always keep sight of your assistant.

▲ WARNING Metal chips shooting off

When hammering out bolts, chips may shoot off and cause serious eye injuries.

- ▶ Wear safety glasses when hammering out the bolts.
- Remove the bolt locks from the stick and linkage bolts.
- Drive out the linkage bolt with a steel arbor and a hammer.
- Switch on the carrier.
- Retract the bucket cylinder.
- Drive out the stick bolt with a steel arbor and a hammer.
- Move the carrier stick out of the adapter plate.

5.6 Removing the adapter plate

- Loosen the fastening screws of the adapter plate.
- Lift the adapter plate with a suitable lifting equipment and put it down on timber support blocks.
- Save the fastening screws and the pairs of lock washers for future use.

6 Operation

▲ WARNING Hot hydraulic oil squirting out

The hydraulic system is under high pressure. If hydraulic connections come loose, hydraulic oil will squirt out under high pressure. Hydraulic oil squirting out can lead to serious injury.

- ▶ Immediately switch off the hydraulic attachment and the carrier if you detect any leaks in the hydraulic circuits.
- ▶ Depressurise the hydraulic system (see chapter **Depressurising the hydraulic system**).
- ▶ Repair any leaks before operating the hydraulic attachment again.

▲ WARNING Hot parts

The hydraulic cylinder, hoses, pipes and fittings become very hot during operation. Touching them may lead to burns.

- ▶ Never touch hot parts.
- ▶ If you have to carry out activities where you have to touch the parts, wait for them to cool down first.

▲ WARNING Risk of explosion

If the hydraulic attachment is equipped with HATCON explosion may occur when the contained lithium batteries are penetrated by pieces of steel or reinforcing bars.

- ▶ Avoid impact of reinforcement, flying rocks or even explosives on HATCON.
- ▶ Check the HATCON before operating.

NOTICE Environmental damage due to hydraulic oil

Hydraulic oil is environmentally harmful and must not penetrate the ground or enter the water table or water supplies.

- ▶ Collect any hydraulic oil which escapes.
- ▶ Dispose of it in accordance with the applicable environmental regulations.

NOTICE Hydraulic oil too hot

The temperature of the hydraulic oil must not exceed 80 °C (176 °F). Higher temperature will damage the seals of the hydraulic parts.

- ▶ Monitor the oil temperature.
- ▶ Shut off the hydraulic attachment and the carrier if you measure an increased temperature in the tank.
- ▶ Check the hydraulic installation and the pressure relief valve.

6.1 Preparations before starting

▲ WARNING Falling carrier

A carrier falling or tipping over due to the surface not being level may cause serious injury and material damage.

- ▶ Always observe great care when moving the carrier.
- ▶ Do not use the hydraulic attachment until the carrier is positioned stably.

▲ WARNING Fragments flying around

Fragments of material which come loose while operating the hydraulic attachment may be flung away and can cause serious injury if people are hit by them. Small objects falling from a great height can also cause serious damage.

During hydraulic attachment operation the danger zone is considerably greater than during the excavation operation due to fragments of stone and pieces of steel flying around, and for this reason the danger zone must, depending on the type of material to be worked on, be enlarged correspondingly, or secured in a suitable manner through corresponding measures.

- ▶ Secure the danger zone.
- ▶ Stop the hydraulic attachment immediately if anyone enters the danger zone.
- ▶ Close the windscreen and the side windows of the driver's cab.

■ Before starting the multi grapple, ensure that

- the multi grapple is complete,
- the multi grapple and adapter plate do not have any cracks,
- and none of the hydraulic line connections leak.

The preparations required prior to starting the multi grapple depend on the ambient temperature:

- Ambient temperature below 0 °C (32 °F) (see chapter **Low ambient temperature**).
- Ambient temperature above 30 °C (86 °F) (see chapter **High ambient temperature**).

The oil temperature in the multi grapple must be between 0 °C (32 °F) and +80 °C (176 °F) during operation.

The full capacity of the multi grapple can be achieved when the oil temperature is approx. 60 °C (140 °F).

- Make sure that there are no people in the danger zone.
- Start the carrier as instructed by the carrier manufacturer.

- Let the carrier warm up until the operating temperature prescribed by the carrier manufacturer has been reached.
- Put the carrier in its working position.

6.2 Switching the hydraulic attachment on and off

After properly attaching the hydraulic attachment to the carrier, the hydraulic attachment can be operated using the carrier's hydraulic system. All functions for normal carrier operation remain intact.

The hydraulic attachment is switched on and off using electrical and hydraulic signals. If you have any questions about electric/hydraulic commands, consult the carrier manufacturer and/or the Epiroc Customer Center / Dealer in your area.

- Switch the hydraulic attachment on and off, as described in the carrier's operating instructions.
- When leaving the driver's cab, set the safety switch/lever for the electrical/hydraulic attachment installation to the "OFF" position.

Carry out the above actions to prevent any unintended start-up of the hydraulic attachment.

6.3 Functional test

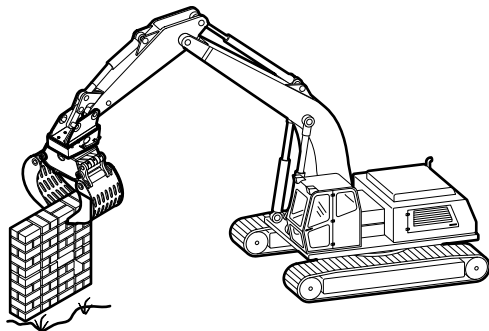
Always carry out a functional test before putting the multi grapple into use. Check that all hydraulic lines and connections are tight and that the multi grapple works without any problem.

- Prepare the multi grapple so that you can start using it (see chapter **Preparations before to starting**).
- Lift the multi grapple with the carrier boom function so that it hangs vertically.
- Close and open the grapple leaves.
- Turn the multi grapple via the connected carrier function »**Turn**« left and right.
- Observe the hydraulic lines and whether the multi grapple works properly.
- Switch the multi grapple off immediately if oil leaks from the hydraulic lines or other malfunctions occur.
- Depressurise the hydraulic system (see chapter **Depressurising the hydraulic system**).
- Only take the multi grapple back into operation once all leaks or malfunctions have been remedied.

6.4 Correct operation

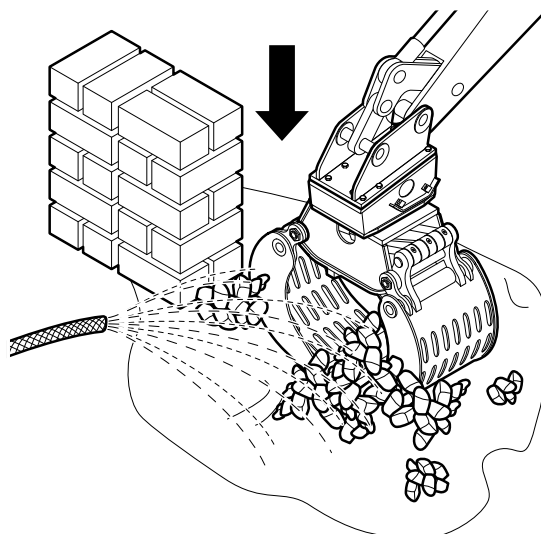
6.4.1 Demolishing masonry

- Encompass the masonry with the grapple leaves.
- Break the masonry structure with the grapple leaves.



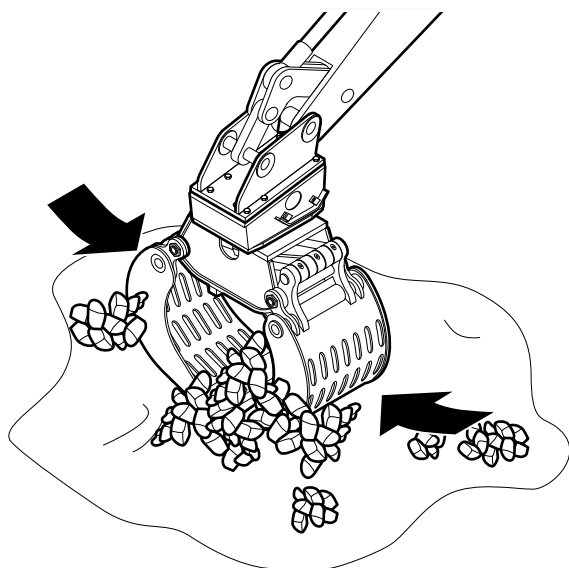
6.4.3 Continuous water spraying

- Keep the work area moist by continuously spraying water to avoid excessive dust.



6.4.2 Sorting and loading

- Use the grapple leaves for sorting and loading.



6.4.4 High ambient temperature

- Only use hydraulic oils of sufficient viscosity.

In summer and in tropical climates, the minimum requirement is a hydraulic oil of type HLP 68.

6.4.5 Low ambient temperature

Ambient temperature below -20 °C (-4 °F):

You must heat up the hydraulic attachment and the carrier when working in ambient temperatures of below -20 °C (-4 °F).

Preferably park the carrier and the hydraulic attachment in a heated, sheltered space while not using it.

NOTICE Hydraulic oil too cold

Operating the hydraulic attachment while hydraulic oil is still cold will damage the seals of the hydraulic parts.

- ▶ Do not operate the hydraulic attachment until the temperature of the hydraulic oil is at least 0 °C (32 °F).
- Start the carrier as instructed by the carrier manufacturer.
- Let the carrier warm up until the operating temperature required by the manufacturer has been reached.
- Lift the hydraulic attachment using the boom function so that it hangs vertically.
- Close, open and turn the hydraulic attachment during the carrier warming-up phase.

NOTICE Damage to hydraulic parts

Hot hydraulic oil causes damage to subcooled hydraulic attachments.

- ▶ Do not fill the hydraulic system with hot hydraulic oil.

The temperature of the hydraulic oil of the carrier must be at least 0 °C (32 °F).

- Start the hydraulic attachment, once the temperature has reached 0 °C (32 °F).
- During operations, leave the carrier engine and pumps running even during breaks.

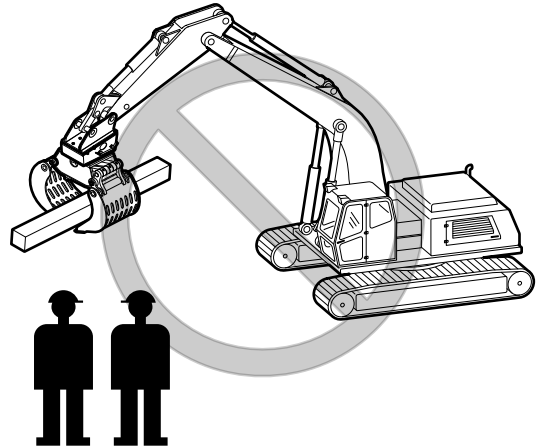
6.5 Prohibited operation

6.5.1 Suspended load

▲ WARNING Danger of falling parts

Falling parts may cause serious injuries.

- ▶ Never operate the hydraulic attachment over the cab, other people or other machines.

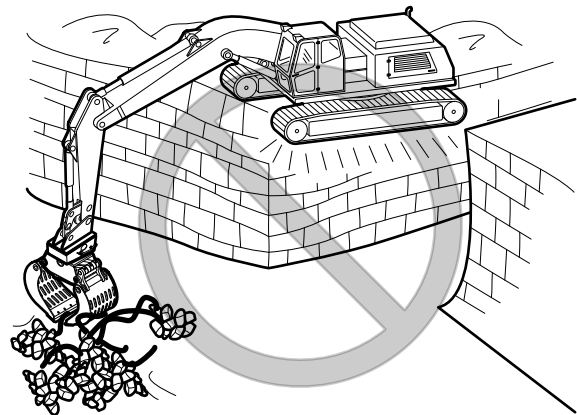


6.5.2 Unsafe base

▲ WARNING Danger of tipping

The carrier can topple over and cause injuries and damage.

- ▶ Only work with the hydraulic attachment when the carrier is on a safe base.

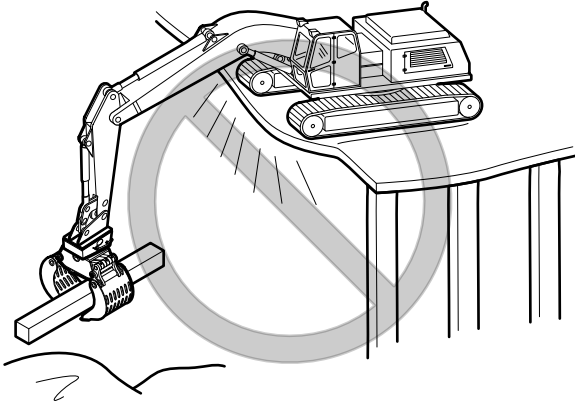


6.5.3 Non-load bearing suspended ceilings

▲ WARNING Danger of collapse

The carrier can collapse and cause injuries and damage.

- Only work with the hydraulic attachment when the carrier is on a load-bearing suspended ceiling.

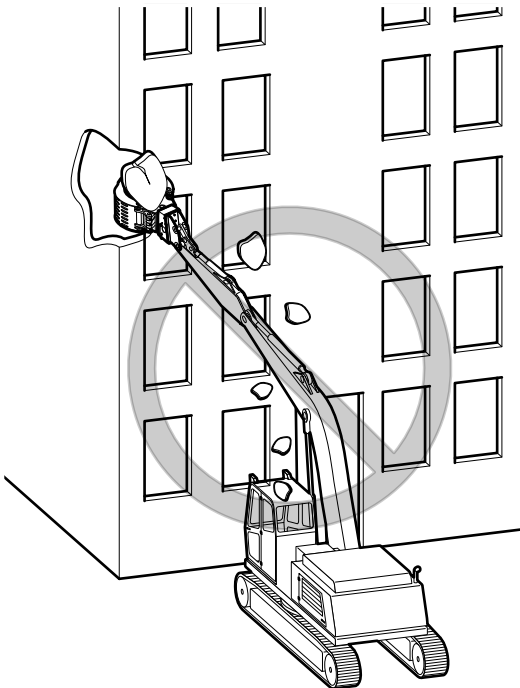


6.5.4 Working position

▲ WARNING Falling debris

Large pieces of debris falling may cause injury and damage.

- Never start demolishing pillars, supports and walls from below or the middle.

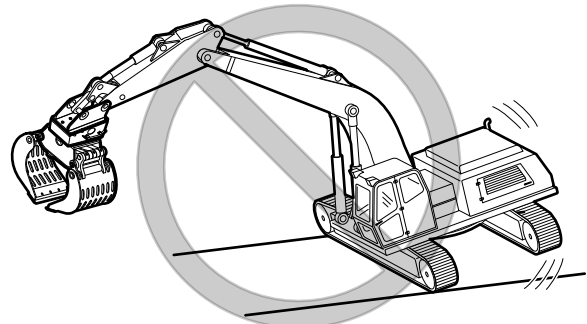


6.5.5 Use over the chain

▲ WARNING Danger of tipping

The carrier can topple over and cause injuries and damage.

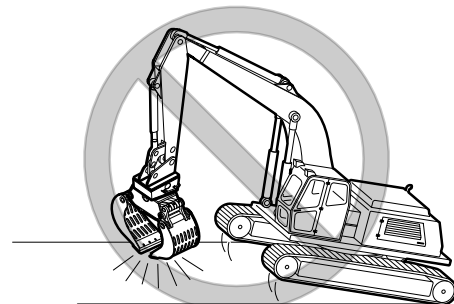
- Never work with full delivery sideways in the direction of movement.



6.5.6 Moving the carrier

- Never relocate the carrier sideways by placing the hydraulic attachment on the ground to lift the carrier.

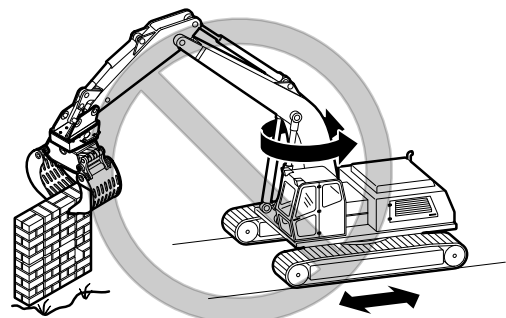
This would seriously damage the hydraulic attachment.



6.5.7 Moving the boom

- Never move the boom or the carrier while carrying out the gripping action.

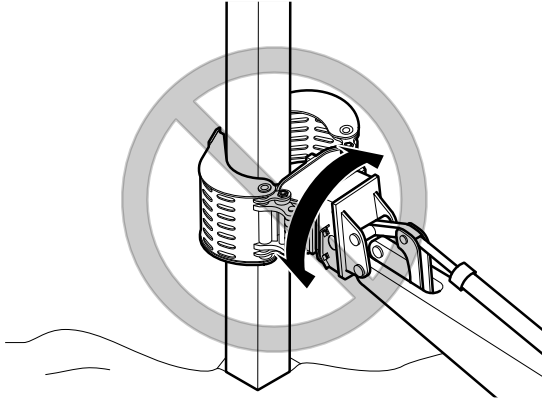
This would seriously damage the hydraulic attachment.



6.5.8 Turning the hydraulic attachment

- Never turn the hydraulic attachment while carrying out the gripping action.

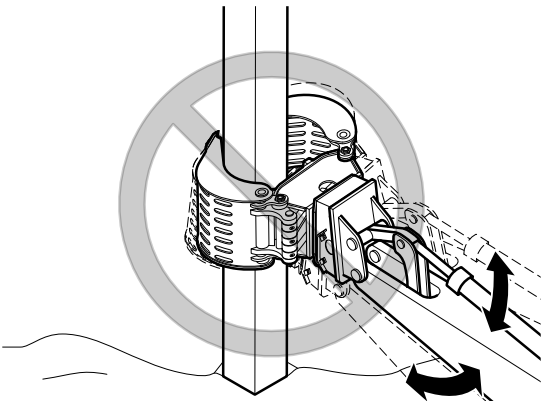
This would seriously damage the hydraulic attachment.



6.5.9 Extending the bucket cylinder

- Never extend the bucket cylinder while carrying out the gripping action.

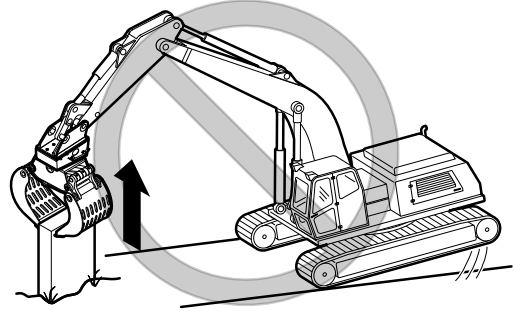
This bending action would destroy the hydraulic attachment.



6.5.10 Pulling

- Never pull at girders, supports or walls with the hydraulic attachment.

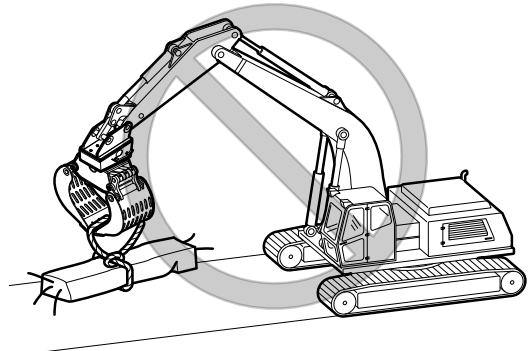
This would damage the hydraulic attachment and the adapter plate. The carrier may lose stability. It can topple over and cause injuries.



6.5.11 Lifting/Transporting with lifting gear

- Never use the hydraulic attachment to lift or transport loads with lifting gears (ropes, chains, shackles etc.).

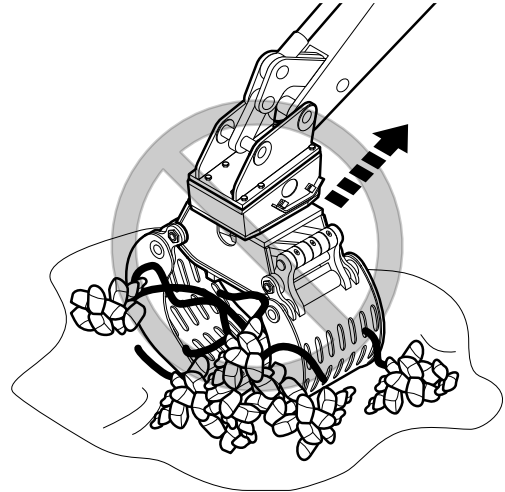
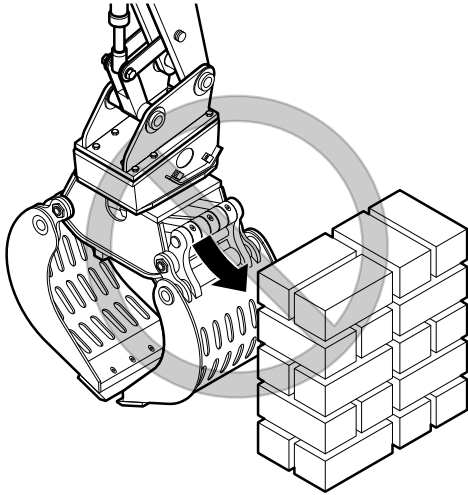
The hydraulic attachment was not constructed to lift or transport loads with lifting gears (ropes, chains, shackles etc.). This would damage the hydraulic attachment.



6.5.12 Hammering

- Do not use the hydraulic attachment for hammering on the structure to be demolished.

This would seriously damage the hydraulic attachment.



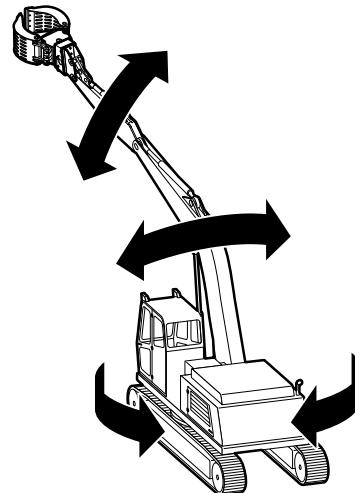
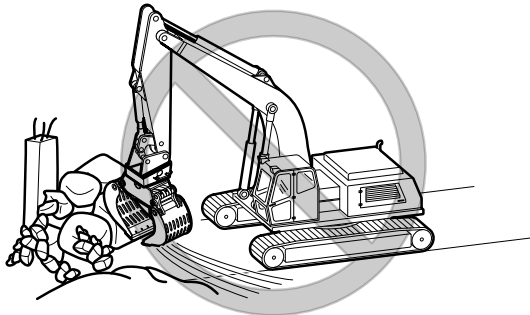
- The boom must be steered securely, slowly and accurately.

Never make abrupt movements this would damage the hydraulic attachment.

6.5.13 Moving objects

- Never use the hydraulic attachment to move debris.

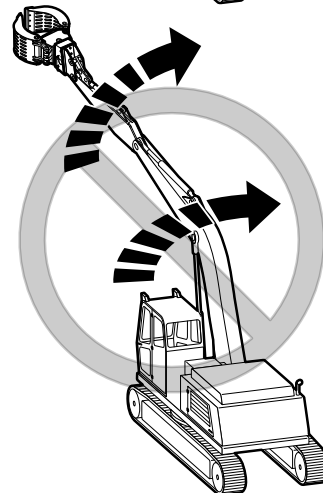
This would damage the hydraulic attachment.



6.5.14 Abrupt movements

- Never make abrupt movements to free the hydraulic attachment if it is jammed in the structure to be demolished.

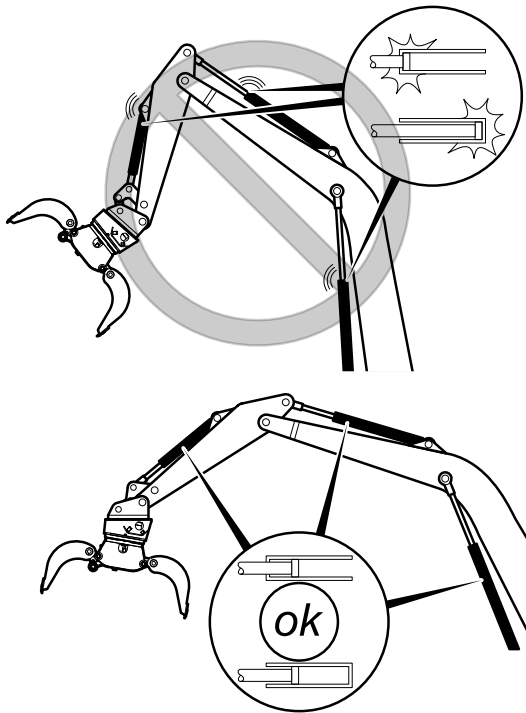
This would damage the hydraulic attachment.



6.5.15 Cylinder end positions

- Reposition the carrier to avoid working with the cylinders at their end positions.

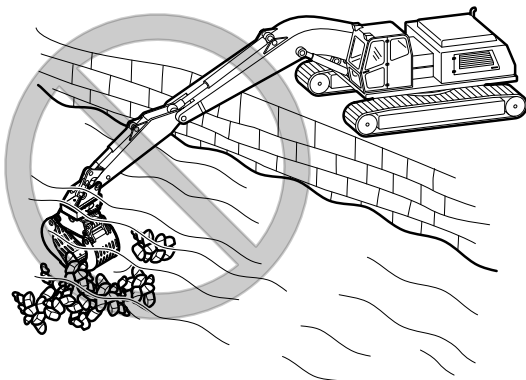
Avoid operating the hydraulic attachment when the carrier stick and bucket cylinder are in one of their end positions. These end positions have damping facilities; the hydraulic cylinder may be damaged by prolonged use while in its end positions.



6.5.16 Use under water

- Never use the hydraulic attachment under water.

This would seriously damage the hydraulic attachment and may damage the whole hydraulic installation.



7 Maintenance

The maintenance activities are carried out by the carrier driver.

▲ **WARNING Hot hydraulic oil squirting out**

The hydraulic system is under high pressure. If hydraulic connections come loose, hydraulic oil will squirt out under high pressure. Hydraulic oil squirting out can lead to serious injury.

- ▶ Immediately switch off the hydraulic attachment and the carrier if you detect any leaks in the hydraulic circuits.
- ▶ Depressurise the hydraulic system (see chapter **Depressurising the hydraulic system**).
- ▶ Repair any leaks before operating the hydraulic attachment again.

▲ **WARNING Hot hydraulic oil squirting out**

The hydraulic system is under high pressure. Hydraulic oil escaping out can lead to serious injury.

- ▶ Immediately switch off the hydraulic attachment and the carrier if you detect any leaks in the hydraulic circuits.
- ▶ Do not inspect for possible leaks with your fingers or other parts of the body, but use a piece of cardboard instead, holding it up to the suspected leakage site.
- ▶ Examine the cardboard for traces of liquid.
- ▶ Depressurise the hydraulic system (see chapter **Depressurising the hydraulic system**).
- ▶ Repair any leaks before operating the hydraulic attachment again.

▲ **WARNING Hot parts**

The hydraulic cylinder, hoses, pipes and fittings become very hot during operation. Touching them may lead to burns.

- ▶ Never touch hot parts.
- ▶ If you have to carry out activities where you have to touch the parts, wait for them to cool down first.

▲ **WARNING Accidental start**

If the hydraulic attachment is started by accident this may lead to serious injury.

- ▶ Follow the instructions in the Operating Instructions of the carrier to prevent the hydraulic attachment starting by accident.

▲ **WARNING Unexpected movement**

Sudden movements of the carrier may cause serious injury.

- ▶ Secure the carrier such that it cannot move unexpectedly.
- ▶ Observe the carrier manufacturer's instructions.

▲ **WARNING Parts of the body or the whole body may be sheared or crushed**

The grapple leaves may close unexpectedly and shear or crush parts of the body or the whole body.

- ▶ Ensure that there is nobody between the grapple leaves.

NOTICE Environmental damage due to hydraulic oil

Hydraulic oil is environmentally harmful and must not penetrate the ground or enter the water table or water supplies.

- ▶ Collect any hydraulic oil which escapes.
- ▶ Dispose of it in accordance with the applicable environmental regulations.

7.1 Maintenance schedule

| | |
|------------------------------------|---|
| prior to shift | <p>Check the multi grapple and adapter plate for cracks.</p> <p>Check hydraulic lines for leaks and damage.</p> <p>Check that the pipe clamps on the carrier are tight.</p> <p>Check wear blades for wear; if necessary turn or replace wear blades.</p> <p>Check the bolted connections at the adapter plate and tighten as required.</p> <p>Check the bolted connections at the hydraulic lines and tighten as required.</p> <p>Check fixing bolts at the wear blades, if necessary tighten or replace.</p> <p>Check the hinge pin locking facilities.</p> <p>Lubricate all lubrication nipples of the multi grapple.</p> |
| weekly | <p>MG 1800, MG 2300, MG 2700:</p> <p>Retighten the screws on the rotation mechanism housing and live ring.</p> |
| after the first 50 operating hours | Change hydraulic oil filter cartridge of the carrier. |
| every 100 operating hours | <p>MG 100 to MG 1500:</p> <p>Retighten the screws on the rotation mechanism housing.</p> |
| every 500 operating hours | Check oil filter cartridge, replace if necessary. |
| if necessary | <p>Replace bent and damaged pipes.</p> <p>Replace damaged hoses.</p> |

7.2 Depressurising the hydraulic system

Even when you have switched off the carrier, a considerable residual pressure can still be present in the hydraulic system.

A residual pressure can still be present in the hydraulic attachment even after you have disconnected the quick-release couplings or closed the shut-off valves.

The hydraulic attachment can only be depressurized using the hydraulic system of the carrier, by allowing hydraulic oil to drain to the tank via the return connection.

Depending on the type of hydraulic attachment, the internal leaks, the oil temperature, the type of hydraulic oil and the design of the hydraulic installation of the carrier, the time required to relieve the pressure can vary.

Observe the following steps in order to depressurise the hydraulic attachment:

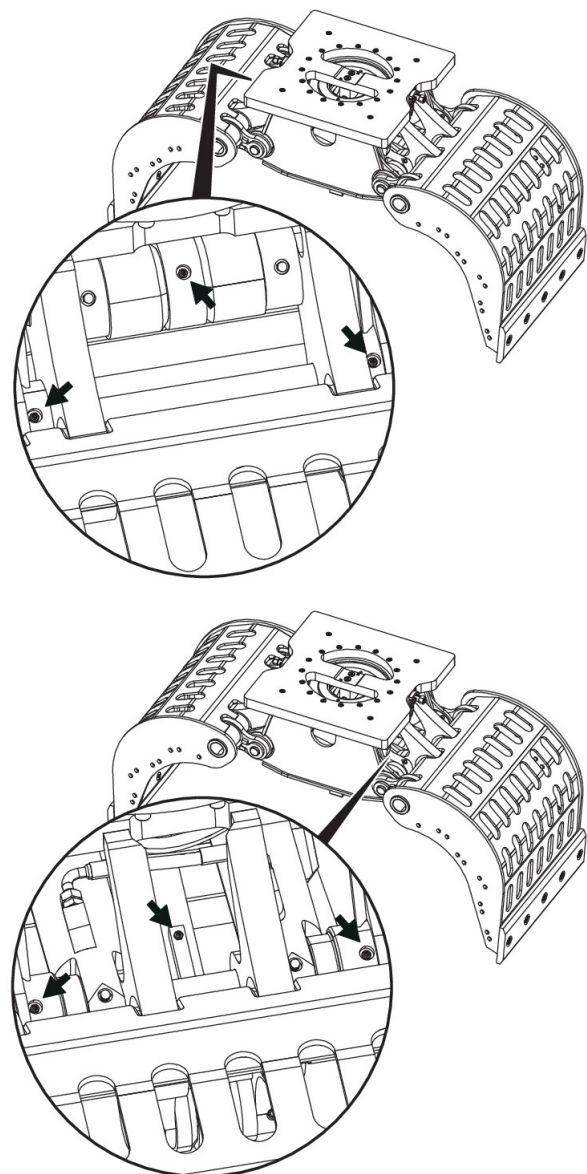
1. Ensure that the hydraulic oil in the hydraulic attachment and in the carrier has a temperature of at least 0 °C. If necessary, pre-heat it to at least 0 °C.
2. The hydraulic attachment must be connected to the hydraulic system of the carrier device, i.e. the hydraulic hoses must be connected up and the respective shut-off valves in the supply pipe and in the connection to the tank must be opened.
3. Open the grapple leaves completely.
4. Place the hydraulic attachment on the ground.
5. Depressurise the hydraulic system according to the manufacturer's safety and operating instructions for the carrier.
6. You must wait at least another 60 minutes until the pressure has been relieved through leakages.
7. When you have made sure that no more pressure is present in the hydraulic system, you must disconnect the hydraulic connection to the carrier. Close the shut-off valves or disconnect the quick-release couplings, so that no hydraulic oil can flow back from the carrier.

7.3 Lubrication

Lubrication interval: prior to every shift.

- Place the multi grapple on the ground.
- Secure the carrier so that it cannot move unexpectedly.
- Only use cutter grease for lubrication.
- Place the grease gun on all lubrication nipples.
- Inject 4 to 6 strokes of cutter grease per lubrication nipple.

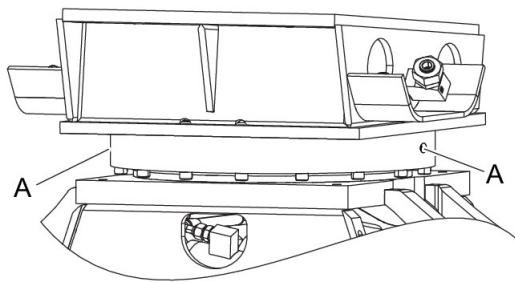
Actual details may differ.



7.3.1 Lubricating the four point bearing

Lubrication interval: every 14 days

- Place the multi grapple on the ground.
- Secure the carrier such that it cannot move unexpectedly.
- Only use cutter grease for lubrication.
- Place the grease gun on the lubrication nipple (A) of the four point bearing.
- Inject 4 strokes of cutter grease per lubrication nipple.



▲ WARNING Unexpected movement

Movements of the carrier and the hydraulic attachment may cause serious injury. Persons who are within the danger zone (within the reach of the carrier and the hydraulic attachment) can get injured or killed.

- ▶ Secure the danger zone.
- ▶ Stop the hydraulic attachment immediately if anyone enters the danger zone.
- Clear the danger zone.
- Switch the carrier on.
- Lift the hydraulic attachment and let it hang vertically.
- Turn the hydraulic attachment about 45°.
- Place the multi grapple on the ground.
- Secure the carrier such that it cannot move unexpectedly.
- Place the grease gun on the lubrication nipples (A) of the four point bearing.
- Again inject 4 strokes of cutter grease per lubrication nipple.

7.4 Checking the hydraulic attachment and adapter plate for cracks

- Secure the carrier so that it cannot move unexpectedly.
- Check all the hydraulic attachment and adapter plate load-bearing parts and welds for cracks prior to every shift.
- Ensure repair or refinishing in good time to prevent greater damage.

7.5 Checking hydraulic attachment for wear

- Secure the carrier so that it cannot move unexpectedly.

▲ WARNING Parts of the body or the whole body may be sheared or crushed

The grapple leaves may close unexpectedly and shear or crush parts of the body or the whole body.

- ▶ Ensure that there is nobody between the grapple leaves.
- Secure the carrier so that it cannot move unexpectedly.
- Prior to starting work, check the multi grapple and the wear blades for wear.
- Turn or replace the wear blades in good time to prevent greater damage.

7.6 Checking hydraulic lines

- Secure the carrier such that it cannot move unexpectedly.
- Perform a visual inspection of all lines (pipes and hoses) from the pump to the hydraulic attachment and back to the tank, before starting work.
- Tighten loose bolted connections and hose clamps to the torque required (see Chapter **Bolted connections / tightening torques**).
- Replace damaged pipes and/or hoses.

7.7 Checking bolted connections

- Secure the carrier such that it cannot move unexpectedly.
- Check all bolted connections regularly for tight fit (see Chapter **Bolted connections / Tightening torques**).
- Tighten loose bolted connections and hose clamps to the torque required (see Chapter **Bolted connections / Tightening torques**).

7.8 Checking the adapter plate bolts for wear

- Carry out this visual check whenever the hydraulic attachment has been removed from the carrier.
- Check the adapter plate bolts for excessive wear such as cracks, pitting or severe erosion.
- Rework or replace worn bolts.

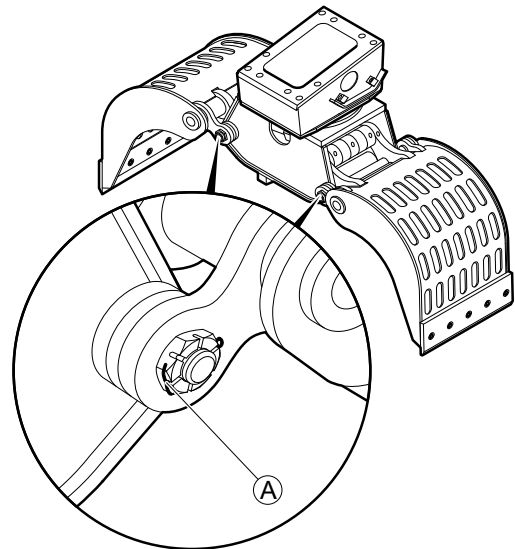
7.9 Checking and cleaning the hydraulic oil filter of the carrier

An oil filter must be integrated in the return circuit of the hydraulic system. The maximum mesh width allowed for the oil filter is 50 microns; it must have a magnetic separator.

- Secure the carrier such that it cannot move unexpectedly.
- Change the oil filter cartridge after the first 50 operating hours.
- Check the oil filter **every** 500 operating hours and replace if it is necessary.

7.10 Checking the hinge pin locking facilities

- Check the hinge pin locking facilities (A) once a day.



- Replace damaged castle nuts and splint pins.

7.11 Retightening the screws on the rotation mechanism housing and live ring

MG 100 to MG 1500:

- Retightening the screws on the rotation mechanism housing and live ring every 100 operating hours. Tightening torques (see chapter **Bolt connections/ Tightening torques**)

MG 1800, MG 2300 and MG 2700:

- Weekly check for axial or radial clearance in the live ring.
- Unscrew and remove the screws from the rotating mechanism housing.
- Remove the upper part from the multi grapple.
- Check all live ring screws to see if they are stretched or loosened.
- Replace stretched screws and retighten all screws on the live ring with the required tightening torque.
- Tightening torques (see chapter **Bolt connections/ Tightening torques**)
- Check the condition of the live ring and replace it if defective.
- Fit the upper part on the multi grapple.
- Fix the screws of the rotating mechanism housing and tighten with the required tightening torque.
- Tightening torques (see chapter **Bolt connections/ Tightening torques**)

7.12 Bolt connections / Tightening torques

The bolt connections of the multi grapple are subjected to very high loads.

- Tighten any loose connections without exceeding the recommended tightening torques.

| Connection point | | Interval | MG 100 | MG 200 | MG 300 |
|----------------------------|---|---------------------------|------------------------------|------------------------------|----------------------------------|
| | | | Tightening torques | | |
| Adapter plate* | A | daily | 200 Nm (148 ft lbs) | 200 Nm (148 ft lbs) | 200 Nm (148 ft lbs) |
| Rotation mechanism housing | B | every 100 operating hours | 36 + 3 Nm (27 + 2 ft lbs) | 36 + 3 Nm (27 + 2 ft lbs) | 70 + 7 Nm (52 + 5 ft lbs) |
| Live ring | C | every 100 operating hours | 70 + 7 Nm (52 + 5 ft lbs) | 70 + 7 Nm (52 + 5 ft lbs) | 70 + 7 Nm (52 + 5 ft lbs) |
| Wear blade | D | if necessary | - | - | 300 + 38 Nm (221 + 28 ft lbs) |

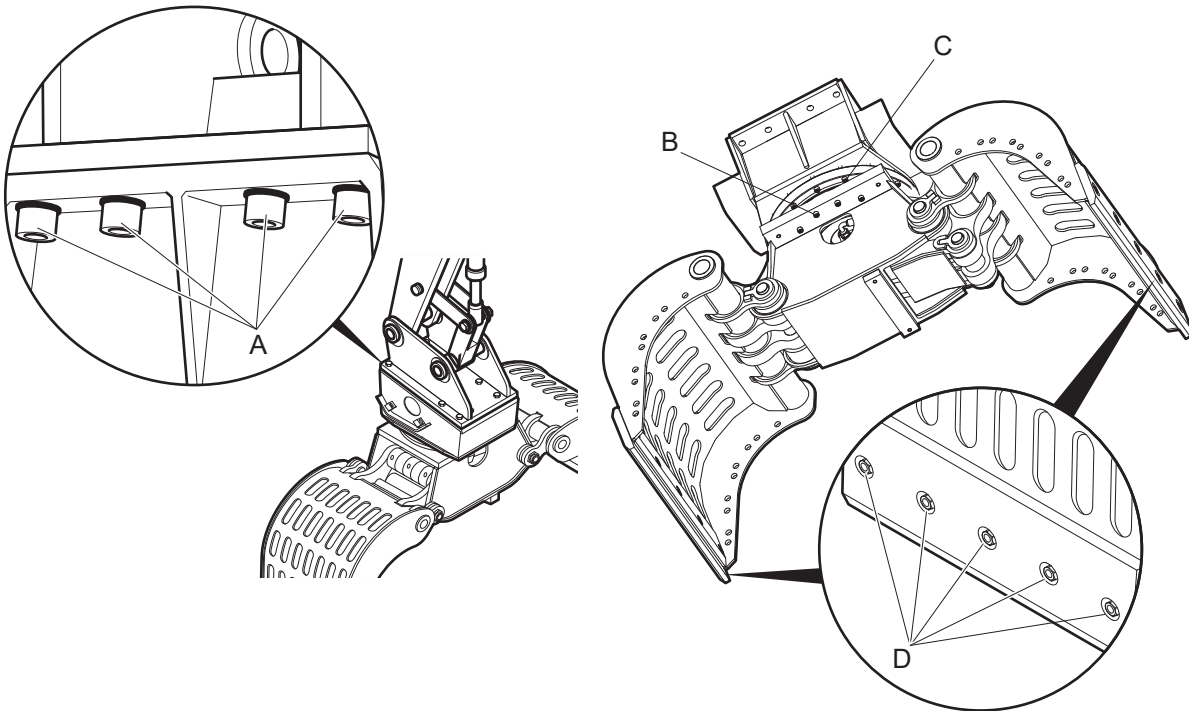
| Connection point | | Interval | MG 400 | MG 500 | MG 800 |
|----------------------------|---|---------------------------|----------------------------------|----------------------------------|----------------------------------|
| | | | Tightening torques | | |
| Adapter plate* | A | daily | 200 Nm (148 ft lbs) | 200 Nm (148 ft lbs) | 390 Nm (288 ft lbs) |
| Rotation mechanism housing | B | every 100 operating hours | 300 + 30 Nm (221 + 22 ft lbs) | 300 + 30 Nm (221 + 22 ft lbs) | 110 + 25 Nm (81 + 18 ft lbs) |
| Live ring | C | every 100 operating hours | 110 + 25 Nm (81 + 18 ft lbs) | 110 + 25 Nm (81 + 18 ft lbs) | 110 + 25 Nm (81 + 18 ft lbs) |
| Wear blade | D | if necessary | 300 + 38 Nm (221 + 28 ft lbs) | 300 + 38 Nm (221 + 28 ft lbs) | 530 + 30 Nm (391 + 22 ft lbs) |

| Connection point | | Interval | MG 1000 | MG 1500 | |
|----------------------------|---|---------------------------|----------------------------------|----------------------------------|--|
| | | | Tightening torques | | |
| Adapter plate* | A | daily | 1500 Nm (1106 ft lbs) | 1500 Nm (1106 ft lbs) | |
| Rotation mechanism housing | B | every 100 operating hours | 190 + 20 Nm (140 + 15 ft lbs) | 300 + 30 Nm (221 + 22 ft lbs) | |
| Live ring | C | every 100 operating hours | 190 + 20 Nm (140 + 15 ft lbs) | 190 + 20 Nm (140 + 15 ft lbs) | |
| Wear blade | D | if necessary | 530 + 30 Nm (391 + 22 ft lbs) | 530 + 30 Nm (391 + 22 ft lbs) | |

| Connection point | | Interval | MG 1800 | MG 2300 | MG 2700 |
|----------------------------|---|--------------|----------------------------------|----------------------------------|----------------------------------|
| | | | Tightening torques | | |
| Adapter plate* | A | daily | 1500 Nm (1106 ft lbs) | 1500 Nm (1106 ft lbs) | 1500 Nm (1106 ft lbs) |
| Rotation mechanism housing | B | weekly | 190 + 20 Nm (140 + 15 ft lbs) | 300 + 30 Nm (221 + 22 ft lbs) | 300 + 30 Nm (221 + 22 ft lbs) |
| Live ring | C | weekly | 300 + 30 Nm (221 + 22 ft lbs) | 300 + 30 Nm (221 + 22 ft lbs) | 300 + 30 Nm (221 + 22 ft lbs) |
| Wear blade | D | if necessary | 530 + 30 Nm (391 + 22 ft lbs) | 530 + 30 Nm (391 + 22 ft lbs) | 530 + 30 Nm (391 + 22 ft lbs) |

* Apply anti-seize compound to the Allen screw threads before inserting them. The contact faces of the screw head and the lock washers must not be lubricated.

Actual details may differ.



8 Troubleshooting

8.1 The multi grapple does not work

| Cause | Remedy | By |
|--|--|----------------|
| Check valve in line Opening or Closing closed | Open the check valve | Carrier driver |
| Defective couplings blocking lines Opening / Closing | Replace defective coupling parts | Workshop |
| Electrical equipment in the system defective | Check the electrical equipment and repair as necessary | Workshop |
| Rocker switch defective | Check the rocker switch and replace as necessary | Workshop |
| Magnet on switch-on valve damaged | Replace the magnet | Workshop |

8.2 The closing power of the multi grapple is insufficient

| Cause | Remedy | By |
|--|---|---|
| Opening and Closing lines have been mixed up | Properly connect the Opening and Closing lines. Only in case of different pressure settings of the Opening and Closing lines, i.e. existing system is also suitable for multi grapple operation. | Carrier driver |
| Operating pressure too low | Correct the operating pressure | Workshop / Epiroc Customer Center / Dealer in your area |

8.3 The multi grapple cannot be rotated

| Cause | Remedy | By |
|--|--|--|
| Rotation motor / gear unit / rotary transmission defective | Check rotation motor / gear unit / rotary transmission and replace defective parts | Epiroc Customer Center / Dealer in your area |

8.4 Operating temperature too high

| Cause | Remedy | By |
|---|--|--|
| Oil level in tank too low | Check oil level and top up oil | Carrier driver or workshop |
| Carrier pump delivery too high; a constant volume of oil is squirted out of the pressure relief valve | Check and correct motor speed of carrier Drive the pump | Epiroc Customer Center / Dealer in your area |
| Pressure relief valve defective or valve with poor characteristics | Fit new type-tested pressure relief cartridges or a more precise pressure-limiting valve | Workshop or Epiroc Customer Center / Dealer in your area |

8.5 Oil leaks from hydraulic ports

| Cause | Remedy | By |
|--------------------|--|----------------|
| Cap nuts are loose | Check and tighten cap nuts (see chapter Bolt connections / Tightening torques) | Carrier driver |

8.6 Insufficient lubrication

| Cause | Remedy | By |
|--|---|----------------|
| Intervals between lubrication too long | Check lubrication and lubricate (see chapter Lubrication) | Carrier driver |

9 Repair

▲ **WARNING Hydraulic system under high pressure**

Carrying out repairs on the pressurised hydraulic attachment may lead to serious injury. Connections may come loose unexpectedly, parts may move suddenly and hydraulic oil may squirt out.

- ▶ Depressurise the hydraulic system before carrying out repairs to the hydraulic attachment or the carrier (see chapter **Depressurising the hydraulic system**).
- For technical support contact the Epiroc Customer Center / Dealer in your area.

9.1 Sending in the hydraulic attachment for repairs

NOTICE Mixed hydraulic oil

Never mix mineral and non-mineral hydraulic oils! Even small traces of mineral oil mixed in with non-mineral oil can result in damage to both the hydraulic attachment and the carrier. Non-mineral oil loses its biodegradability.

- ▶ Only use one type of hydraulic oil.
- Always specify which hydraulic oil has been used when sending in the hydraulic attachment to have it repaired.

10 Storage

10.1 Multi grapple

▲ **WARNING** Falling multi grapple

The multi grapple is heavy. If it topples over where it is stored, it may cause injury.

- ▶ Store the multi grapple on squared timbers or a pallet on a horizontal base.

The following procedure applies to storage:

- Open the grapple leaves.
There is less oil in the multi grapple if the grapple leaves are open. In the event of a leak, less oil is lost and the environmental damage is less.
- Remove the multi grapple from the carrier (see chapter **Removing the hydraulic attachment from the carrier**).
- Store the multi grapple in a dry, well-ventilated room.
- If storage is only possible outdoors, then the multi grapple is to be protected from the weather with plastic film or tarpaulins.

10.2 Grease cartridges

▲ **WARNING** Fire and harmful vapors

Cutter grease can burn and cause serious fire. Harmful vapors are generated when cutter grease is burnt.

- ▶ Never store grease cartridges near fire-propagating or self-igniting substances.
- ▶ Do not expose the grease cartridges to direct sunlight.
- Store the grease cartridges in a cool, properly ventilated room.

11 Disposal

NOTICE Environmental damage due to consumables

Hydraulic oil and cutter grease are environmentally harmful and must not penetrate the ground or enter the water table or water supplies.

- ▶ Collect any such consumables which may escape.
- ▶ Dispose of them in accordance with the applicable environmental regulations.

11.1 Multi grapple

- Remove the multi grapple from the carrier (see chapter **Removing the hydraulic attachment from the carrier**).
- Remove the adapter plate (see chapter **Removing the adapter plate**).
- Remove the hydraulic hoses from the multi grapple.
- Dispose of the multi grapple in accordance with all applicable regulations or consult an authorised and specialised recycling company.

11.2 Hydraulic hoses

- Drain the hydraulic oil from the hydraulic hoses and collect it.
- Dispose of the hydraulic hoses in accordance with the applicable regulations to avoid environmental hazards.

11.3 Hydraulic oil

- Collect any hydraulic oil that escapes.
- Dispose of it in accordance with the applicable environmental regulations.

11.4 Cutter grease and grease cartridges

- Dispose of cutter grease and not completely emptied grease cartridges in accordance with the applicable regulations.
- Completely emptied grease cartridges can be recycled.

12 Technical specifications

12.1 MG 100, MG 200, MG 300

| Type | MG 100 R | MG 200 R | MG 300 R |
|--|---|-------------------------------------|-------------------------------------|
| Carrier weight class | 0.7 – 1.8 t (1500 - 4000 lbs) | 1.2 – 4.0 t (2500 - 9000 lbs) | 2 – 6 t (4500 - 13000 lbs) |
| Service weight ¹ | 108 kg (240 lbs) | 216 kg (480 lbs) | 324 kg (700 lbs) |
| Weight without adapter | 90 kg (198 lbs) | 180 kg (397 lbs) | 270 kg (595 lbs) |
| Dimensions | | | |
| Length | 605 mm (28.82 in.) | 874 mm (34.41 in.) | 1219 mm (47.99 in.) |
| Leaf width | 312 mm (12.28 in.) | 450 mm (17.72 in.) | 500 mm (19.69 in.) |
| Height | 600 mm (23.62 in.) | 651 mm (25.63 in.) | 750 mm (29.53 in.) |
| Depth | 205 mm (8.07 in.) | 241 mm (9.49 in.) | 307 mm (12.09 in.) |
| Jaw opening / max. | 580 mm (22.83 in.) | 841 mm (33.11 in.) | 1157 mm (45.55 in.) |
| Max. closing force | 0.6 t (1323 lbs) | 1.5 t (3307 lbs) | 2.0 t (4409 lbs) |
| Capacity _(SAE) | 16.4 l (4.3 gal) | 50.9 l (13.5 gal) | 108.2 l (28.6 gal) |
| Operating pressure | 300 bar (4350 psi) 150 - 170 bar (2175 - 2465 psi) | | |
| Open / Close | | | |
| Turn | | | |
| Oil flow | | | |
| Open / Close | 15 l/min (4.0 gal/min) | 25 l/min (6.6 gal/min) | 35 l/min (9.2 gal/min) |
| Turn | 3 - 5 l/min (0.8 - 1.3 gal/min) | 5 - 10 l/min (1.3 - 2.6 gal/min) | 5 - 10 l/min (1.3 - 2.6 gal/min) |
| Hydraulic connections ² | | | |
| Open / Close | M 16 x 1.5 | M 20 x 1.5 | |
| Turn | M 16 x 1.5 | M 16 x 1.5 | |
| Hose lines (inside diameter) | 8 mm (0.32 in.) 8 mm (0.32 in.) | | |
| Open / Close | | | |
| Turn | | | |
| Pipework (diameter and wall thickness) | | | |
| Open / Close | 10 x 1.5 mm (0.39 x 0.06 in.) | 12 x 1.5 mm (0.47 x 0.06 in.) | |
| Turn | 10 x 1.5 mm (0.39 x 0.06 in.) | 10 x 1.5 mm (0.39 x 0.06 in.) | |
| Hole pattern (group) | 1 | 3 | |

¹Multi grapple including adapter plate of medium size

Please note that the working weight can be considerably higher, depending on the adapter plate.

²Sealing cone with 24°

12.2 MG 400, MG 500

| Type | MG 400 | MG 500 |
|---|--|--|
| Carrier weight class | 4 – 8 t (9000 - 17500 lbs) | 5 – 10 t (11000 - 22000 lbs) |
| Service weight ¹ | R: 516 kg (1150 lbs) N/R: 450 kg (992 lbs) | R: 588 kg (1300 lbs) N/R: 480 kg (1058 lbs) |
| Weight without adapter | R: 430 kg (948 lbs) N/R: 375 kg (827 lbs) | R: 490 kg (1080 lbs) N/R: 400 kg (882 lbs) |
| Dimensions | | |
| Length | 1605 mm (58.27 in.) | 1605 mm (63.19 in.) |
| Leaf width | 603 mm (23.62 in.) | 705 mm (27.76 in.) |
| Height | R: 892 mm (34.65 in.) N/R: 755 mm (34.65 in.) | R: 892 mm (35.12 in.) N/R: 755 mm (30 in.) |
| Depth | 383 mm (14.69 in.) | 383 mm (15.08 in.) |
| Jaw opening / max. | 1480 mm (14.69 in.) | 1585 mm (62.40 in.) |
| Max. closing force | 2.3 t (5071 lbs) | 2.4 t (5291 lbs) |
| Capacity _(SAE) | 212.9 l (56.2 gal) | 247.8 l (65.5 gal) |
| Operating pressure | 300 bar (4350 psi) 150 - 170 bar (2176 - 2466 psi) | |
| Open / Close | | |
| Turn | | |
| Oil flow | 40 l/min (10.6 gal/min) 10 - 15 l/min (2.6 - 4.0 gal/min) | |
| Open / Close | | |
| Turn | | |
| Hydraulic connections ² | M 20 x 1.5 M 16 x 1.5 | |
| Open / Close | | |
| Turn | | |
| Hose lines (inside diameter) | 8 mm (0.32 in.) 8 mm (0.32 in.) | |
| Open / Close | | |
| Turn | | |
| Pipework (diameter and wall thickness) | 12 x 1.5 mm (0.47 x 0.06 in.) 10 x 1.5 mm (0.39 x 0.06 in.) | |
| Open / Close | | |
| Turn | | |
| Hole pattern (group) | 5 | |

¹Multi grapple including adapter plate of medium size

Please note that the working weight can be considerably higher, depending on the adapter plate.

²Sealing cone with 24°

12.3 MG 800, MG 1000, MG 1500

| Type | MG 800 | MG 1000 | MG 1500 |
|--|--|--|--|
| Carrier weight class | 10 – 16 t (22000 - 35500 lbs) | 12 – 20 t (26500 - 44000 lbs) | 16 – 24 t (35500 - 53000 lbs) |
| Service weight ¹ | R: 985 kg (2150 lbs) N/R: 838 kg (1847 lbs) | R: 1214 kg (2700 lbs) N/R: 1086 kg (2494 lbs) | R: 1776 kg (3900 lbs) N/R: 1430 kg (3153 lbs) |
| Weight without adapter | R: 821 kg (1810 lbs) N/R: 698 kg (1539 lbs) | R: 1014 kg (2235 lbs) N/R: 905 kg (1995 lbs) | R: 1480 kg (3263 lbs) N/R: 1336 kg (2945 lbs) |
| Dimensions | | | |
| Length | 1810 mm (71.26 in.) | 1950 mm (76.77 in.) | 2108 mm (82.99 in.) |
| Leaf width | 800 mm (31.50 in.) | 810 mm (31.89 in.) | 1030 mm (40.55 in.) |
| Height | R: 1130 mm (44.49 in.) N/R: 842 mm (33 in.) | R: 1275 mm (50.20 in.) N/R: 991 mm (39 in.) | R: 1478 mm (58.19 in.) N/R: 1130 mm (44 in.) |
| Depth | 382 mm (15.04 in.) | 524 mm (20.63 in.) | 594 mm (23.39 in.) |
| Jaw opening / max. | 1747 mm (68.78 in.) | 1900 mm (74.80 in.) | 2014 mm (79.29 in.) |
| Max. closing force | 3.8 t (8377 lbs) | 4.6 t (10141 lbs) | 6.8 t (14991 lbs) |
| Capacity _(SAE) | 352.8 l (93.2 gal) | 485.6 l (128.3 gal) | 732 l (193.4 gal) |
| Operating pressure | 350 bar (5075 psi) 150 - 170 bar (2176 - 2466 psi) | | |
| Open / Close | | | |
| Turn | | | |
| Oil flow | | | |
| Open / Close | 70 - 100 l/min (18.5 - 26.4 gal/min) | 85 - 120 l/min (22.5 - 31.7 gal/min) | 120 - 170 l/min (31.7 - 44.9 gal/min) |
| Turn | 20 - 25 l/min (5.3 - 6.6 gal/min) | 20 - 25 l/min (5.3 - 6.6 gal/min) | 30 - 35 l/min (7.9 - 9.2 gal/min) |
| Hydraulic connections ² | M 36 x 2 M 20 x 1.5 | | |
| Open / Close | | | |
| Turn | | | |
| Hose lines (inside diameter) | 20 mm (0.79 in.) 8 mm (0.32 in.) | | |
| Open / Close | | | |
| Turn | | | |
| Pipework (diameter and wall thickness) | 25 x 4 mm (0.98 x 0.16 in.) 12 x 1.5 mm (0.47 x 0.06 in.) | | |
| Open / Close | | | |
| Turn | | | |
| Hole pattern (group) | 8 | 9 | |

¹Multi grapple including adapter plate of medium size

Please note that the working weight can be considerably higher, depending on the adapter plate.

²Sealing cone with 24°

12.4 MG 1800, MG 2300, MG 2700

| Type | MG 1800 | MG 2300 | MG 2700 |
|--|--|--|--|
| Carrier weight class | 20 – 28 t (44000 - 61500 lbs) | 25 – 38 t (55000 - 84000 lbs) | 28 – 50 t (61500 - 110000 lbs) |
| Service weight ¹ | 1965 kg (4350 lbs) | 2496 kg (5500 lbs) | 3045 kg (6700 lbs) |
| Weight without adapter | 1633 kg (3600 lbs) | 2080 kg (4586 lbs) | 2538 kg (5595 lbs) |
| Dimensions | | | |
| Length | 2108 mm (82.99 in.) | 2317 mm (91.22 in.) | 2156 mm (84.88 in.) |
| Leaf width | 1210 mm (47.64 in.) | 1210 mm (47.64 in.) | 1220 mm (48.03 in.) |
| Height | 1478 mm (58.19 in.) | 1448 mm (57.01 in.) | 1651 mm (65.00 in.) |
| Depth | 594 mm (23.39 in.) | 522 mm (20.55 in.) | 656 mm (25.83 in.) |
| Jaw opening / max. | 2014 mm (79.29 in.) | 2255 mm (88.78 in.) | 2246 mm (88.43 in.) |
| Max. closing force | 6.8 t (14991 lbs) | 8.0 t (17637 lbs) | 9.0 t (19841 lbs) |
| Capacity _(SAE) | 854.9 l (225.8 gal) | 874.8 l (231.1 gal) | 918.7 l (242.7 gal) |
| Operating pressure Open / Close Turn | 350 bar (5075 psi) 150 - 170 bar (2175 - 2465 psi) | | |
| Oil flow Open / Close Turn | 150 - 170 l/min (39.6 - 44.9 gal/min) 30 - 35 l/min (7.9 - 9.3 gal/min) | 160 - 180 l/min (42.3 - 47.6 gal/min) 30 - 35 l/min (7.9 - 9.3 gal/min) | 180 - 200 l/min (47.6 - 52.8 gal/min) 30 - 35 l/min (7.9 - 9.3 gal/min) |
| Hydraulic connections ² Open / Close Turn | M 36 x 2 M 20 x 1.5 | M 42 x 2 M 20 x 1.5 | |
| Hose lines (inside diameter) Open / Close Turn | 20 mm (0.79 in.) 8 mm (0.32 in.) | 25 mm (0.98 in.) 8 mm (0.32 in.) | |
| Pipework (diameter and wall thickness) Open / Close Turn | 25 x 4 mm (0.98 x 0.16 in.) 12 x 1.5 mm (0.47 x 0.06 in.) | 30 x 5 mm (1.18 x 0.20 in.) 12 x 1.5 mm (0.47 x 0.06 in.) | |
| Hole pattern (group) | 9 | 10 | |

¹Multi grapple including adapter plate of medium size

Please note that the working weight can be considerably higher, depending on the adapter plate.

²Sealing cone with 24°

13 EC Declaration of Conformity (EC Directive 2006/42/EC)

We, Construction Tools GmbH, hereby declare that the machines listed below conform to the provisions of EC Directive 2006/42/EC (Machinery Directive), and the harmonised standards mentioned below.

Multi grapple

MG 100 R

MG 200 R

MG 300 R

MG 400 N/R

MG 400 R

MG 500 N/R

MG 500 R

MG 800 N/R

MG 800 R

MG 1000 N/R

MG 1000 R

MG 1500 N/R

MG 1500 R

MG 1800 R

MG 2300 R

MG 2700 R

Following harmonised standards were applied:

- EN ISO 12100

Technical Documentation authorised representative:

Stephan Schröer

Construction Tools GmbH

45143 Essen

Germany

Authorised Representative:

see respective separate original EC declaration of conformity

Manufacturer:

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