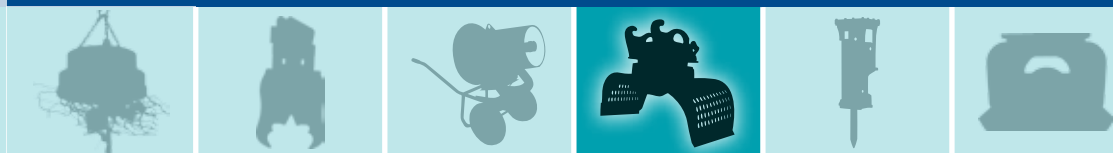


Operation and maintenance manual



DSG

Hydraulic demolition and sorting grabs



FOREWORD

Thank you for choosing for a demolition and sorting grab from Dehaco!

Dehaco was established in 1985 and has since gained a leading position in the European demolition industry. With our complete product range, we are the ideal complete supplier for the demolition, recycling and asbestos remediation industry in the Benelux.

We are not only leading in the field of selling all imaginable requirements for these markets, our large rental fleet and modern test centre for equipment items and asbestos tools also contribute to Dehaco's unique market position. Dehaco is a market leader in the Benelux in the field of asbestos remediation products, dust control products and hydraulic equipment units for the demolition sector.

Dealers

Dehaco works with a network of European dealers for the sale of demolition equipment, asbestos removal and dust control products. These dealers are also qualified to service and maintain your equipment.

Demolition and sorting grabs

Dehaco demolition and sorting grabs include a CE mark and comply with all relevant European safety regulations. Safety instructions provided in the maintenance and user manual must be followed. The safety and operating instructions for the excavator as well as regulations in the vicinity of where the demolition and sorting grab is used, maintained or repaired must also be observed.

Modifications to the demolition and sorting grab may only be performed with written permission of the manufacturer! Only then shall the warranty conditions and CE liability apply.

Operation and maintenance manual

The purpose of this operation and maintenance manual is to familiarise you with the safe and effective operation of the demolition and sorting grab. Maintenance instructions are also included in this document.

Read these instructions carefully before attaching and using the demolition and sorting grab.

Any comments, requests or omissions may be directed to Dehaco B.V. Contributions to improve this manual are always welcome. We hope you enjoy your purchase.



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1. PRECAUTIONS AND SAFETY INSTRUCTIONS

This chapter describes the safety regulations. These must be observed before installing, using or maintaining the demolition and sorting grab.

Retain this operation and maintenance manual carefully for the entire life of the demolition and sorting grab.

Any person transporting, installing, removing, operating, maintaining, repairing, storing or disposing of this demolition and sorting grab must read this operation and maintenance manual.

Following these safety instructions will:

- ◇ prevent the risk of injury and fatal accidents.
- ◇ protect the demolition and sorting grab from physical damage.
- ◇ protect the environment against environmental damage.

All safety instructions in this manual comply with the laws and regulations of the European Union. Additional national/regional regulations must also be observed.

Outside the European Union, the demolition and sorting grab must be used in accordance with the laws and regulations of the relevant country. Observe any other more stringent regional regulations and legislation.

1.1 Signal Words

This manual includes safety indicators that can be identified as follows:

DANGER

Indicates a hazardous situation where the user can (seriously) injure himself or (severely) damage the product.

WARNING!

Indicates potential damage to the product should the user not perform the procedures carefully.

CAUTION!

Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

ATTENTION

The signal word *ATTENTION* is used to provide additional information and alert the user to potential problems.

1.2 Qualification

Transport of the demolition and sorting grab is only permitted when carried out by persons who:

- ◇ are authorised to operate a forklift in accordance with applicable federal laws;
- ◇ are familiar with all relevant national/regional safety and accident prevention regulations.
- ◇ have read this operation and maintenance manual.

Installation, maintenance, storage and disposal of demolition and sorting grab is only permitted when carried out by persons who:

- ◇ are familiar with all relevant national/regional safety and accident prevention regulations.
- ◇ have read this operation and maintenance manual.

Operation of the demolition and sorting grab is only permitted when carried out by qualified excavator machinists. Machinists are qualified if they:

- ◇ have been trained in accordance with federal regulations to operate an excavator.
- ◇ are familiar with all relevant national/regional safety and accident prevention regulations.
- ◇ have read this operation and maintenance manual.

Testing the installation of the demolition and sorting grab is only permitted when carried out by persons authorised to do so.

Repair of the demolition and sorting grab is only permitted when carried out by persons under the instruction of Dehaco.

1.3 Intended use

The demolition and sorting grab should only be attached to an excavator with a capacity suitable for use with the demolition and sorting grab. Read the manual from the excavator manufacturer thoroughly before installing and using the grab. Follow all instructions closely.

The demolition and sorting grab may only be used for the following activities:

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

1.4 Use other than specified

Never use the demolition and sorting grab to:

- ◇ pull on/demolish girders, brackets, walls and partitions. This may cause damage to the demolition and sorting grab and slewing ring and may also cause the excavator to lose its stability.
- ◇ hit or hack.
- ◇ plough debris.
- ◇ move the excavator.
- ◇ lift or transport loads with attachments.
- ◇ work underwater.
- ◇ work in explosive environments.

1.5 Protective equipment

The personal protective equipment must comply with applicable health and safety regulations.

Always wear the following personal protective equipment:

- ◇ safety helmet
- ◇ safety goggles with side shields

- ◇ safety gloves
- ◇ safety shoes
- ◇ warning vest

1.6 Transport, precautions

⚠ WARNING!

- FALLING SUPPORT

If the load-bearing capacity of the excavator is not sufficient, it will not be stable when using the demolition and sorting grab. The excavator could tip over and cause injury.

Using an excavator with excessive load capacity will cause excessive load on the demolition and sorting grab resulting in increased wear.

- Only attach the demolition and sorting grab to an excavator with suitable capacity.
- The excavator must always remain stable.
- Read this manual thoroughly before attaching and using the demolition and sorting grab.

1.7 Hydraulic equipment, precautions

⚠ WARNING!

- EXCESSIVE HYDRAULIC PRESSURE

Excessive hydraulic pressure overloads the components of the demolition and sorting grabs. This may cause components to break or crack resulting in serious injury.

- Insert the discharge tube of the pressure relief valve directly in the tank to ensure safe operation!
- The pressure relief valve must be set to the maximum static pressure.
- The settings for the pressure relief valve must be checked to ensure the maximum static pressure of the hydraulic system (see *Technical Specifications* section) is never exceeded. Apply a lead seal to the pressure relief valve.
- Prior to the first use, the safety devices on the hydraulic system must be inspected for their quality, suitability and performance by a professional/approved inspection agency (CE marking, etc.)
- When any significant changes are made to the hydraulic system, an acceptance inspection must be carried out in accordance with the relevant national safety regulations.

⚠ WARNING!

- DISCHARGE OF HOT HYDRAULIC OIL

The hydraulic system is under high pressure. Hydraulic lines may leak or burst. Discharge of hydraulic oil can cause serious injury.

- When attaching the demolition and sorting grabs, no hydraulic lines are to be laid through the excavator cabin.
- Only use hydraulic lines that meet with the following quality requirements:
 - For the **Open** and **Close** functions:
 - Hydraulic hoses with 4 reinforcing steel cables in accordance with DIN EN 8566 4SH.
 - Hydraulic tubes; seamless cold drawn steel tubes in accordance with DIN EN 10305.
 - For the **Rotate** function:
 - Hydraulic hoses with two steel braids in accordance with

DIN EN 853 2SN.

- Hydraulic tubes; seamless cold drawn steel tubes in accordance with DIN EN 10305.

1.8 Consumables, precautions

⚠ WARNING!

- HOT, HIGH PRESSURE HYDRAULIC FLUID

A leak in the hydraulic system will cause hydraulic oil to spray out under high pressure. The oil stream can penetrate human skin and cause permanent injury. Hot hydraulic oil can cause burns.

- Never use your hands to locate leaks.
- Always keep your face away from a potential leak.
- If hydraulic oil has penetrated your skin, always consult a physician immediately.

⚠ WARNING!

- SPILLED HYDRAULIC OIL

Spilled hydraulic oil can make the floor slippery causing people to slip and resulting in injury. Hydraulic oil is harmful to the environment and must not penetrate the soil or reach the water table/ground water supplies.

- Ensure no hydraulic oil is spilled.
- When hydraulic oil has spilled, clean the floor immediately.
- Observe all regulations regarding safety and environmental protection when using hydraulic oil.

⚠ WARNING!

- SKIN INFECTIONS/DISEASES CAUSED BY OIL AND GREASE
Hydraulic oil and grease can cause skin rashes (or even eczema) if they come into contact with the skin.

- Avoid skin contact with hydraulic oil and grease.
- Use a suitable product to protect the skin.
- Always wear safety gloves when working with hydraulic oil or grease.
- Wash contaminated skin immediately with soap and water.

1.9 Explosion and fire, precautions

⚠ DANGER!

- EXPLOSION AND FIRE

Explosions cause serious injury or can result in death. Explosives touched by the demolition and sorting grab could cause an explosion.

- Never use the demolition and sorting grab in the immediate vicinity of explosives.
- Ensure no explosives are hidden in the concrete.
- Identify the location of the gas lines on drawings of the entire construction zone.

⚠ DANGER!

- EXPLOSION AND FIRE

The use of the demolition and sorting grab may cause sparking which could ignite highly flammable gases. This may result in fire or explosion.

- Never work in an environment with highly flammable substances.
- Ensure there are no hidden gas sources in the work area.
- Inspect the gas line drawings for the work area.

⚠ DANGER!

- EXPLOSION AND FIRE

Dust rich air can form an explosive atmosphere which can ignite when using the demolition and sorting grab. This can lead to fire or explosion.

- Never use the demolition and sorting grab in an explosive atmosphere.
- Always ensure adequate ventilation is provided when working in buildings or in an enclosed area.

1.10 Electric shock, precautions

⚠ DANGER!

- ELECTRIC SHOCK

Any contact between the demolition and sorting grapple and electrical circuits or other power sources will cause an electric shock which could result in serious injury or death. The demolition and sorting grab is not electrically insulated.

- Never work near electrical circuits or other power sources.
- Ensure there are no hidden electrical circuits in the work zone.
- Consult wiring diagrams.

1.11 Falling rocks, precautions

⚠ WARNING!

- AIRBORNE FRAGMENTS

Material which breaks free can be thrown and cause serious injury. Even small objects falling from a great height can cause serious damage.

While using the demolition and sorting grab, the danger zone is considerably greater than during regular excavation work. The danger zone must therefore be enlarged or secured in a suitable manner.

- Safeguard the danger zone.
- Stop the works immediately when someone enters the danger zone.
- Close the windscreen and side windows of the excavator cabin.

1.12 Emissions, precautions

⚠ WARNING!

- LUNG DISEASES CAUSED BY DUST

Using the demolition and sorting grab may release dust. Dust produced during the demolition/moving/sorting of rocks, concrete and asphalt or other similar materials can lead to silicosis (also called black lung disease) by inhalation. Silicosis is a chronic condition that can lead to cancer and death.

- Wear suitable respiratory protection.

1.13 Operating machines, precautions

⚠ WARNING!

- NARCOTICS, ALCOHOL AND DRUGS

Narcotics, alcohol and drugs make the user less attentive and affect the ability to concentrate. Carelessness and incorrect assessment of a situation may result in serious injury or death.

- Never work with the excavator and hydraulic work tool when under the influence of narcotics, alcohol or drugs that affect concentration.
- Never allow other people under the influence of narcotics,

alcohol or drugs that affect concentration work with the excavator and the demolition and sorting grab.

1.14 Modification or changes, precautions

⚠ WARNING!

- MODIFICATIONS OR CHANGES

Modifications to the demolition and sorting grab or the adapter plate can lead to serious injury.

- Never modify the demolition and sorting grab.
- Use only original parts or accessories approved by Dehaco B.V.

1.15 Environmental contamination, precautions

ATTENTION

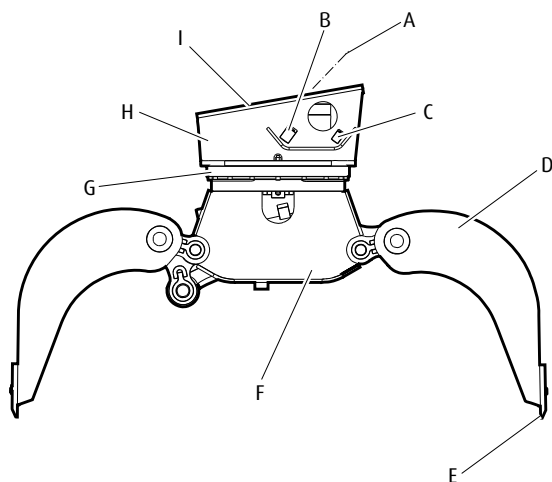
- ENVIRONMENTAL CONTAMINATION BY HYDRAULIC OIL

Hydraulic oil is harmful to the environment. When hydraulic oil is released (e.g. by leakage) the groundwater and soil may become contaminated causing organisms to die.

- Collect all spilled hydraulic oil to prevent environmental contamination. For small amounts, use absorbent material. Ensure it does not make its way into the soil, groundwater or water lines.
- Collect the contaminated absorbent material in an airtight container and seal it well.
- Contact a licensed waste disposal company.
- Remove all contaminated materials in accordance with current environmental regulations.

2. OVERVIEW

2.1 Description of the equipment



- A) Port »A« function »Open« (standard)
- B) Port »B« function »Close« (standard)
- C) Port »R« function »Rotate«
- D) Shell
- E) Replaceable tooth
- F) Frame
- G) Slewing ring
- H) Head assembly
- I) Plate with hole pattern for adapter plate

2.2 Operation

Below is a simplified explanation for operating the demolition and sorting grab.

Close

The demolition and sorting grab is closed by operating a foot pedal or joystick in the excavator cabin which operates line »B« (function Close). The cylinders slide over the piston rod and the shells close allowing the material to be grasped.

Open

The demolition and sorting grab is opened by operating a foot pedal or joystick in the excavator cabin. Oil is brought to the cylinders through line »A« causing the piston rod to retract and the shells to open.

Rotate

Activate the function »Rotate grab«. This carries hydraulic oil to the demolition and sorting grab motor and activates the rotation function.

To achieve infinite rotation, the demolition and sorting grab is fitted with a rotation transmission. The oil flows for the »Open« and »Close« functions are carried through the rotation transmission.






2.3 Nameplate

⚠ WARNING!

- MISSING INFORMATION

The nameplate contains important information about the demolition and sorting grab. A missing nameplate may lead to misinterpretation of potential risks and may pose personal risks. The nameplate must always be clearly legible.

- Replace a damaged nameplate immediately.
- Use the parts list to order a new nameplate.

   	TYPE	<input type="text"/>	
	SERIAL No.	<input type="text"/>	
	YEAR	<input type="text"/>	
	PRESSURE	<input type="text"/>	bar
	AIR/OIL FLOW	<input type="text"/>	l/m
	WEIGHT	<input type="text"/>	Kg
		DEHACO B.V. LISSERBROEK - HOLLAND www.dehaco.nl	

2.4 Applications

General: sorting and loading work.

Demolition: masonry and timber structures.

2.5 Warranty

The following shall render the warranty void:

- ◇ Any use not in accordance with this manual.
- ◇ Maintenance which is not performed or is performed incorrectly.
- ◇ Use of incorrect materials.
- ◇ Use of unapproved components.
- ◇ Damage caused by wear.
- ◇ Damage caused by improper storage.
- ◇ Changes implemented without consulting the manufacturer.

2.6 Removing the packaging

- 1) Remove all packaging material.
- 2) Dispose of the packaging material in accordance with applicable regulations.
- 3) Check that the delivery is complete.
- 4) Inspect the delivery for any visible damage.
- 5) Contact Dehaco B.V. or your dealer if any defects are identified.

2.7 Scope and content of the delivery

The demolition and sorting grab is delivered with the following:

- ◇ Demolition and sorting grab.
- ◇ Operation and maintenance manual.
- ◇ Parts list.
- ◇ EC declaration of conformity.
- ◇ Any ordered accessories such as hoses and couplings.

3. TRANSPORT

⚠ WARNING!

- TIPPING FORK-LIFT TRUCK AND/OR FALLING DEMOLITION AND SORTING GRAB

A falling demolition and sorting grab and/or tipping fork-lift truck can cause serious injury and property damage.

- Only use machines with suitable capacity to transport the demolition and sorting grab.
- Ensure no persons are in the vicinity of the demolition and sorting grab.

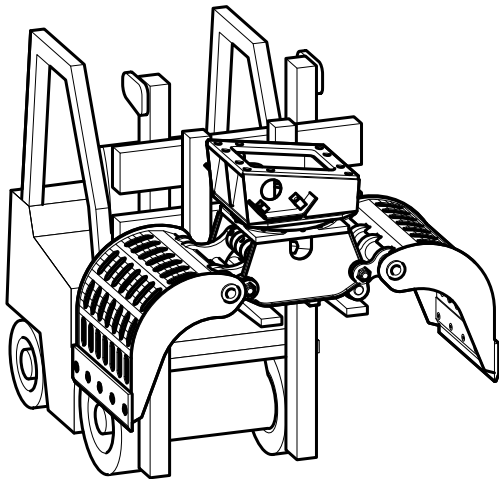
Transport the demolition and sorting grab with the shells open.

The demolition and sorting grab is more stable when being transported with the shells open. There is also less oil in the demolition and sorting grab when the shells are open. As a result, less oil loss and less oil in the environment will occur should an unexpected leak be detected.

- ◇ Open the shells of the demolition and sorting grab for transport. Proceed as follows to ensure the shells remain open:
 - Seal all hose ports and connections with the supplied plugs and cap nuts when the hydraulic hoses are removed.
 - If the hoses remain attached to the demolition and sorting grab for transport, ensure the hoses are inserted in the demolition and sorting grab.

3.2 Transporting with a fork-lift truck

- Place the fork-lift truck under the housing to prevent the demolition and sorting grab from tipping or falling.



- Lift the demolition and sorting grab slowly.
- Transport the demolition and sorting grab to its intended location.

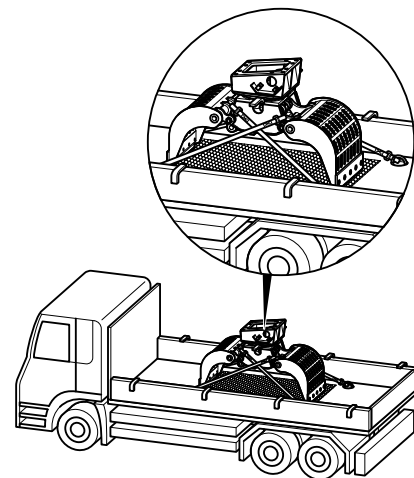
3.3 Transport by lorry

⚠ WARNING!

- DEMOLITION AND SORTING GRAB CAN SLIP OR TIP

If the demolition and sorting grab slips or tips over and falls from the lorry, it can cause serious injury and property damage.

- Place the demolition and sorting grab on an anti-slip mat.
- Secure the demolition and sorting grab with straps or chains.
- ◇ Secure the demolition and sorting grab on the loading surface as shown in figure below.
- ◇ Observe all national/regional regulations regarding the securing of loads.



4. INSTALLATION

⚠ WARNING!

- DISCHARGE OF HOT HYDRAULIC OIL

The hydraulic system is under high pressure. If the hydraulic connections loosen or become disconnected, the hydraulic oil will spray out under high pressure. This can lead to serious injury.

- Ensure the pressure in the hydraulic system is released before connecting or disconnecting the demolition and sorting grab.

ATTENTION

- ENVIRONMENTAL CONTAMINATION BY HYDRAULIC OIL

Hydraulic oil is harmful to the environment. When hydraulic oil is released (e.g. by leakage) the groundwater and soil may become contaminated causing organisms to die.

- Collect all spilled hydraulic oil to prevent environmental contamination. For small amounts, use absorbent material. Ensure it does not make its way into the soil, groundwater or water lines.
- Collect the contaminated absorbent material in an airtight container and seal it well.
- Contact a licensed waste disposal company.
- Remove all contaminated materials in accordance with current environmental regulations.

4.1 Hydraulic fluids

The following fluids must be used for the demolition and sorting grab.

4.1.1 Mineral hydraulic oil

All hydraulic oils indicated by the excavator manufacturer can also be used for the demolition and sorting grab.

- ◇ The oil must meet viscosity class HLP 32 or higher.
- ◇ In the summer and in hot climates, oils with viscosity class HLP 68 or higher must be used.
- ◇ In all other cases, the specifications of the excavator manufacturer must be taken into account.

Optimum viscosity range	30 - 60 cSt
Max. initial viscosity	2000 cSt
Max. oil temperature	80°C

Other conditions apply when used at lower ambient temperatures. More information is provided in the section entitled *Low ambient temperatures*.

- ◇ Inspect the oil filter regularly!

An oil filter must be fitted in the return line of the hydraulic system. The maximum allowable mesh size is 50 microns. It must also be fitted with a magnetic separator.

4.1.2 Non-mineral hydraulic oil

ATTENTION

- MIXED HYDRAULIC OIL

Never mix mineral oil with non-mineral oil. Even small traces of mineral

oil mixed with non-mineral oil may result in damage to both the demolition and sorting grab as well as the excavator. Non-mineral oil loses its biodegradability.

- Use only one type of hydraulic oil.

If non-mineral oil is used, the brand must be indicated when the demolition and sorting grab is brought in for repair.

To protect the environment, or for technical reasons, the hydraulic oils currently used are not classified as HLP mineral oils.

In principle, the demolition and sorting grabs from Dehaco B.V. are designed for use with mineral oils. Contact Dehaco B.V. before deciding to change to non-mineral hydraulic oil.

4.1.3 Grease

- ◇ Observe the safety regulations before working with oils and greases.

Description	Article number
Grease Q8 Ruysdael CL2	9210.0007

4.2 Attaching to the excavator

A colleague's help is required to attach the demolition and sorting grab to the excavator.

- ◇ Agree on hand signals to use with your colleague to enable them to assist in correctly positioning the excavator on the demolition and sorting grab.
- ◇ Lower the arm of the excavator to position it in the adapter plate holder.

⚠ WARNING!

- INJURY FROM SUDDEN MOVEMENTS OF THE EXCAVATOR ARM

A sudden movement by the excavator can strike your colleague and cause serious injury.

- Move the excavator arm carefully and in a controlled manner when someone is in the danger zone.
- Ensure your colleague always remains visible.

⚠ WARNING!

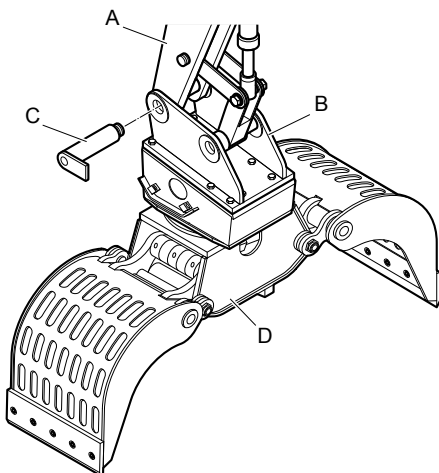
- CUTS OR INJURIES TO HANDS AND FINGERS

Drilled holes and surfaces may be razor sharp and cause serious injury.

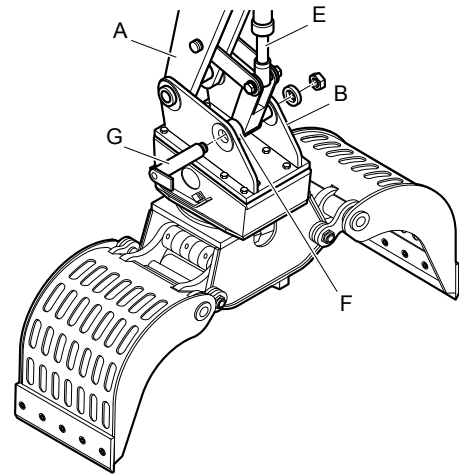
- Never use your fingers to inspect holes or mounting surfaces.

If a pin and bushing system, follow the procedure outlined below. If another (quick change) system is being used, we recommend consulting the manufacturer's manual.

- ◇ Follow the directions provided by a colleague to properly align the holes in the adapter plate (B) and the excavator arm (A).
- ◇ Install and secure the hinge pin (C).



- ◇ Raise the demolition and sorting grab.



- ◇ Extend the bucket cylinder (E) until the securing hole in the coupling (F) aligns with the securing hole in the adapter plate (B).
- ◇ Install and secure the coupling pin (G).
- ◇ Carefully move the bucket cylinder (E) to both end positions.

4.2.1 Making the hydraulic connections

ATTENTION

- INCORRECT HYDRAULIC SYSTEM

The excavator must have a suitable hydraulic system to operate the demolition and sorting grab. Improperly installed piping and incorrectly calculated dimensions may lead to excessive oil temperatures and damage to the demolition and sorting grab.

- Only use lines with the dimensions specified in the chapter *Technical Specifications*.
- Verify the specified dimensions of the hydraulic lines on existing hydraulic systems. All supply and return lines for the hydraulic oil must have a sufficient internal diameter and wall thickness.
- Ensure the hydraulic hoses cannot be pinched.
- ◇ Switch the excavator off.
- ◇ Relieve the pressure of the hydraulic system by releasing the pressure in the hydraulic tank.
- ◇ Close all valves if quick connects are not used.

ATTENTION

- DAMAGE TO HYDRAULIC COMPONENTS

Sand and dirt can enter the hydraulic lines and cause damage.

- Clean all hydraulic lines and connections before connecting the hydraulic hoses.
- ◇ Contaminated hydraulic pipes must be cleaned by a specialist company.
- ◇ Clean contaminated hydraulic pipe connections with a suitable universal degreaser/cleanser.
- ◇ Refer to information from the cleaning agent manufacturer regarding safety and use.

4.2.2 Connecting the hydraulic hoses for the »Open« and »Close« functions

- ◇ Remove the caps/blank flanges from ports »A« and »B« and store in a safe place.
- ◇ Inspect for damage.
- ◇ Replace any damaged connections.
- ◇ If the two input lines from the excavator arm have the same working pressure, connect the lines to the »Open« and »Close« ports being careful not to cause pinching (see figure page 10).
- ◇ If the pressure in the two input lines differ, connect the hose with the higher operating pressure to the »Close« port and the hose with the lower pressure to the »Open« port being careful not to pinch the hoses.

4.2.3 Connecting the hydraulic hoses for the »Rotate« function

- ◇ Remove the cap nuts and plugs from the connections for the »Rotate« function and store them for future use.
- ◇ Inspect the connections for damage.
- ◇ Replace damaged connections.
- ◇ Attach the hoses to the connector for the »Rotate« function.
- ◇ Connect both hoses for the »Rotate« function to the arm carefully to prevent pinching.

⚠ WARNING!

- THRASHING HYDRAULIC HOSES

Hydraulic hoses under pressure will thrash about if a bolt connection becomes loose or detached. This can cause serious injury.

- Tighten the mounting screws to the correct torque.

4.3 Detaching the demolition and sorting grab from the excavator

⚠ WARNING!

- UNEXPECTED MOVEMENTS

Sudden movements by the excavator can cause injury.

- Secure the excavator to prevent unexpected movement.
- Follow the instructions from the excavator manufacturer.

⚠ WARNING!

- THRASHING HYDRAULIC HOSES

Hydraulic hoses under pressure will thrash about if a bolt connection becomes loose or detached. This can cause serious injury.

- Relieve the pressure in the hydraulic system before disconnecting the hydraulic hose.

⚠ WARNING!

- HOT COMPONENTS

The hydraulic cylinder, hoses, tubes and fittings become very hot during operation. Contact with these components can cause burns.

- Never touch hot components.
- If works need to be completed on or near hot components, wait for them to cool down first.
- ◇ Close all shut-off valves in the excavator arm system if quick connects are not used.
- ◇ Disconnect the hoses to and from the demolition and sorting grab on the side of the excavator arm.
- ◇ Seal all open hose ends.

4.3.1 Mechanical detachment

Note: If a pin and bushing system, follow the procedure outlined below. If another (quick change) system is being used, we recommend consulting the manufacturer's manual.

- ◇ Request help from a colleague when detaching the demolition and sorting grab.
- ◇ Agree on clear hand signals for moving the excavator arm.

⚠ WARNING!

- INJURIES CAUSED BY THE EXCAVATOR ARM OR DEMOLITION AND SORTING GRAB

Sudden movements by the excavator can cause the excavator or the demolition and sorting grab to strike your colleague.

- Move the excavator arm very slow and in a controlled manner when a colleague is in the danger zone.
- Ensure your colleague always remains visible.

⚠ WARNING!

- METAL SPLINTERS

Hammering bolts out can cause splinters to fly off which can cause serious damage to the eyes.

- Wear safety goggles when hammering out bolts.

- ◇ Remove the bolt clips from the shank.
- ◇ Remove the connecting bolt with a steel pin and a hammer.
- ◇ Switch the excavator on.
- ◇ Retract the bucket cylinder.
- ◇ Remove the hinge pin with a steel pin and a hammer.
- ◇ Remove the excavator arm from the adapter plate.

4.4 Detaching the adapter plate

- ◇ Loosen the fastening screws for the adapter plate.
- ◇ Lift the adapter plate using suitable lifting equipment and place it on wooden support blocks.
- ◇ Store the mounting screws and washers for future use.

5. OPERATION

⚠ WARNING!

- DISCHARGE OF HOT HYDRAULIC OIL

The hydraulic system is under high pressure. If the hydraulic connections loosen, the hydraulic oil will spray out under high pressure. This can lead to serious injury.

- Switch the excavator and demolition and sorting grab off immediately if a leak is detected.
- Release the pressure in the hydraulic system.
- Repair any leaks before using the demolition and sorting grab again.

⚠ WARNING!

- HOT COMPONENTS

The hydraulic cylinder, hoses, tubes and fittings become very hot during operation. Contact with these components can cause burns.

- Never touch hot components.
- If works need to be completed on or near hot components, wait for them to cool down first.

ATTENTION

- ENVIRONMENTAL CONTAMINATION BY HYDRAULIC OIL

Hydraulic oil is harmful to the environment. When hydraulic oil is released (e.g. by leakage) the groundwater and soil may become contaminated causing organisms to die.

- Collect all spilled hydraulic oil to prevent environmental contamination. For small amounts, use absorbent material. Ensure it does not make its way into the soil, groundwater or water lines.
- Collect the contaminated absorbent material in an airtight container and seal it well.
- Contact a licensed waste disposal company.
- Remove all contaminated materials in accordance with current environmental regulations.

ATTENTION

- EXCESSIVE HYDRAULIC OIL TEMPERATURE

The temperature of the hydraulic oil must not exceed 80°C. Higher temperatures will damage the seals of the hydraulic components.

- Always monitor the oil temperature.
- Turn the excavator and demolition and sorting grab off when the monitor indicates an increased oil temperature.
- Inspect the hydraulic system and the pressure relief valve.

5.1 Preparations for starting

⚠ WARNING!

- TIPPING THE EXCAVATOR OVER

An excavator that falls or tips over because it is placed on an uneven surface can cause serious injury and property damage.

- Always move the excavator with the greatest caution.
- Do not use the demolition and sorting grab before the excavator is stable.

⚠ WARNING!

- AIRBORNE FRAGMENTS

Fragments of materials that are released when using the demolition and sorting grab can be thrown and cause serious injury to people if struck.

Even small objects falling from a great height can cause serious damage.

The danger zone while using the demolition and sorting grab is significantly larger than for excavation work.

- Safeguard the danger zone.
 - Stop working with excavator soon as someone enters the danger zone.
 - Close the windscreen and side windows of the excavator cabin.
-
- ◇ Precautions for starting the demolition and sorting grab:
 - Ensure the demolition and sorting grab is complete.
 - Inspect the demolition and sorting grab and adapter plate for cracks.
 - Ensure there are no leaks from the hydraulic lines.

The preparations required prior to starting the demolition and sorting grab depend on the ambient temperature:

- Ambient temperatures below 0°C (see *Low ambient temperature*).
- Ambient temperature higher than 30°C (see *High ambient temperature*).

While working with the demolition and sorting grab, the oil temperature must remain between 0°C and +80°C. The full capacity of the demolition and sorting grab can be utilised at an oil temperature of approximately +60°C.

- 1) Ensure no persons are in the danger zone.
- 2) Start the excavator according to the instructions provided by the excavator manufacturer.
- 3) Allow the excavator to warm up until the specified operating temperature is reached.
- 4) Place the excavator in the desired position.

5.2 Switching the demolition and sorting grab on and off

After attaching the demolition and sorting grab to the excavator, the grab can be operated by the excavator's hydraulic system. All the functions for controlling the excavator remain unchanged. The demolition and sorting grab is switched on and off by electrical and hydraulic signals.

- ◇ Switch the demolition and sorting grab on and off according to the specified operating instructions.
- ◇ Leaving the excavator cabin? Switch the safety switch for the demolition and sorting grab to "off".

Perform the actions described above to avoid unintentional starting of the demolition and sorting grab.

5.3 Function test

Always perform a function test before using the demolition and sorting grab. Ensure all hydraulic lines and connections are tight and that the demolition and sorting grab operates smoothly.

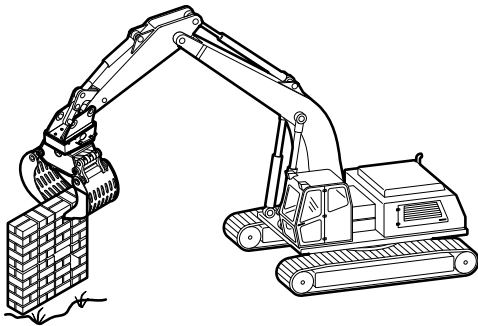
- ◇ Prepare the demolition and sorting grab to allow proper use (see *Preparations for starting*).
- ◇ Raise the demolition and sorting grab using the arm of the excavator until it hangs vertically.

- ◇ Close and open the shells.
- ◇ Rotate the demolition and sorting grab to the left and right using the **»Rotate grab«** function.
- ◇ Verify the hydraulic lines of the demolition and sorting grab work properly.
- ◇ Switch the demolition and sorting grab off immediately if oil leaks from the hydraulic lines or other malfunctions are identified.
- ◇ Relieve the pressure of the hydraulic system by releasing the pressure in the hydraulic tank.
- ◇ Only use the demolition and sorting grab again after all leaks and malfunctions have been corrected.

5.4 Proper use

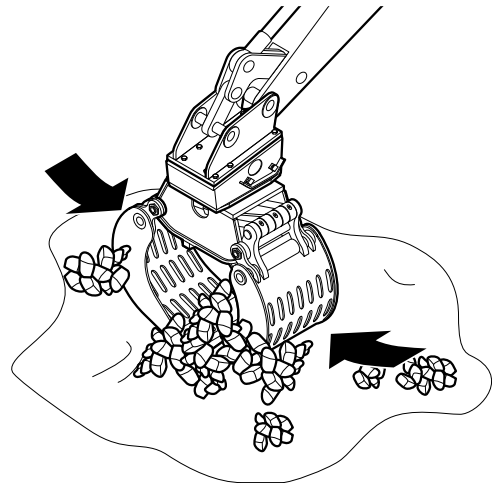
5.4.1 Masonry demolition

Grasp the masonry with the shells of the demolition and sorting grab and break the structure.



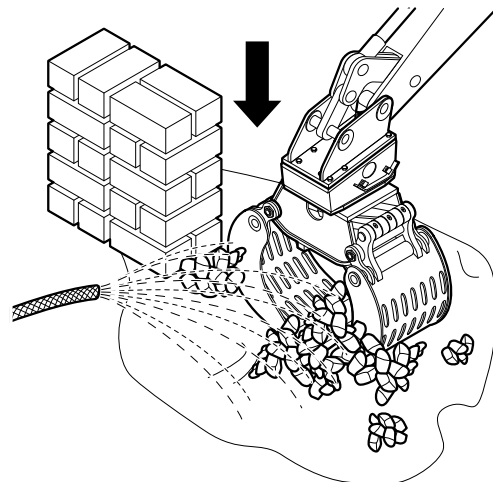
5.4.2 Sorting and loading

Use the shells for sorting and loading material.



5.4.3 Dust Control

Keep the work area humid by continuously spraying water. This reduces dust levels to a minimum. Dehaco B.V. offers various solutions for dust control in the form of misters and mist sprayers. Visit www.dehaco.nl for more information.



5.4.4 High ambient temperature

- ◇ Only use hydraulic oils with sufficient viscosity.

In summer and in tropical climates, hydraulic oil type HLP 68 meets the minimum requirements.

5.4.5 Low ambient temperature

For ambient temperatures below -20°C

Before working with the demolition and sorting grab in ambient temperatures below -20°C, ensure the excavator is sufficiently warmed up.

Preferably, the excavator and the demolition and sorting grab should be parked in a heated, covered area when not in use.

ATTENTION

- INSUFFICIENT HYDRAULIC OIL TEMPERATURE

Working with the demolition and sorting grab while the hydraulic oil is still cold seals will damage the hydraulic component seals.

- Do not use the demolition and sorting grab until the oil temperature is at least 0°C..
- ◇ Start the excavator according to the instructions provided by the excavator manufacturer.
- ◇ Allow the excavator warm up until the operating temperature specified by the excavator manufacturer is reached.
- ◇ Raise the demolition and sorting grab using the arm of the excavator until it hangs vertically.
- ◇ Close, open and rotate the demolition and sorting grab while the excavator is warming up.

ATTENTION

- DAMAGE TO HYDRAULIC COMPONENTS

Hot hydraulic oil will damage a cold hydraulic demolition and sorting grab.

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

The temperature of the hydraulic oil from the excavator must be at least 0°C.

- ◇ Start the demolition and sorting grab when the temperature reaches 0°C.
- ◇ Perform a function test and ensure all hydraulic lines and connections are tight and that the demolition and sorting grab operates smoothly.
- ◇ Allow the engine of the excavator and the pumps to remain in operation, even during breaks.

5.5 Prohibited Use

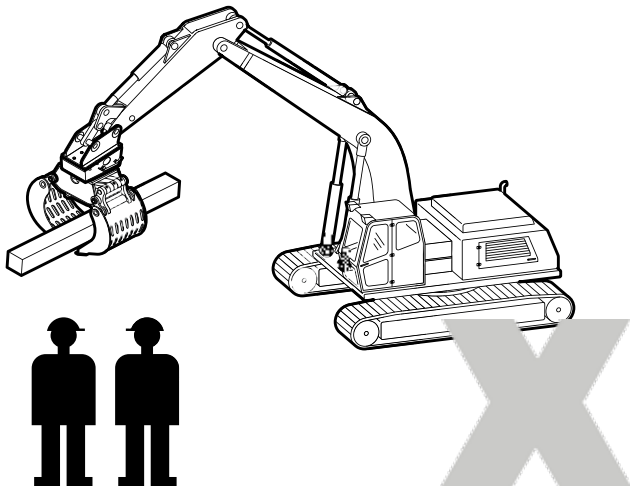
5.5.1 Transporting suspended objects

⚠ WARNING!

- RISK OF FALLING OBJECTS

Falling objects can cause serious injury.

- Never operate the demolition and sorting grab above the cabin, other persons or other machines.



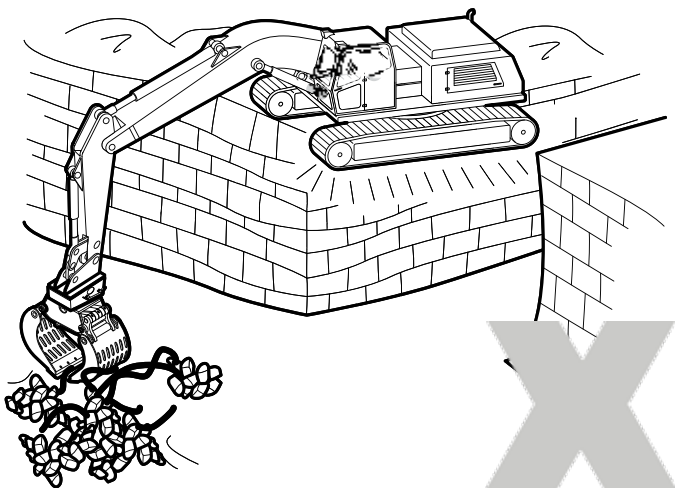
5.5.2 Unsafe surface

⚠ WARNING!

- RISK OF TIPPING

The excavator can tip over and cause injury and damage.

- Only operate the demolition and sorting grab when the excavator is on a safe, stable surface.



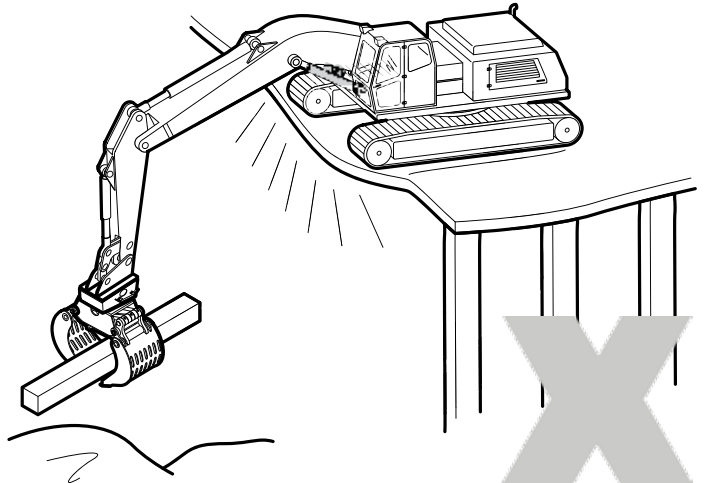
5.5.3 Non-load bearing, suspended ceilings

⚠ WARNING!

- RISK OF COLLAPSE

The excavator can crash down and cause injury and damage.

- Only operate the demolition and sorting grabs when the excavator is on a load-bearing ceiling.



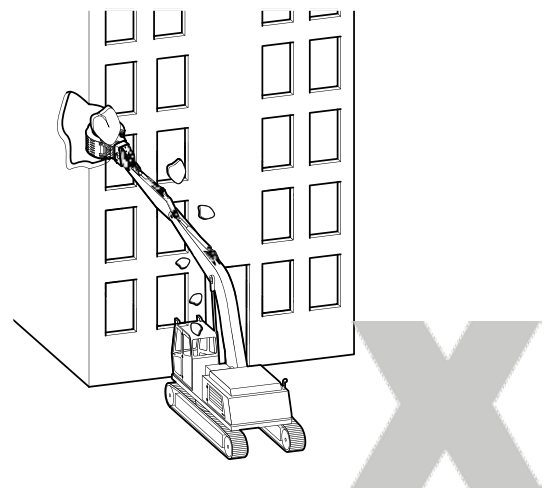
5.5.4 Working position

⚠ WARNING!

- FALLING DEBRIS

Large pieces of falling debris can cause injury and damage.

- Never begin demolition works from the bottom or the middle of a structure.



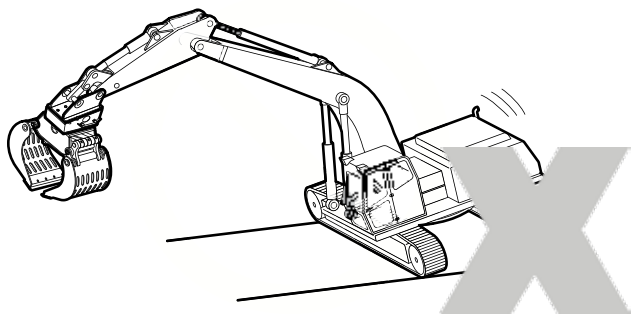
5.5.5 Using the chain

⚠ WARNING!

- RISK OF TIPPING

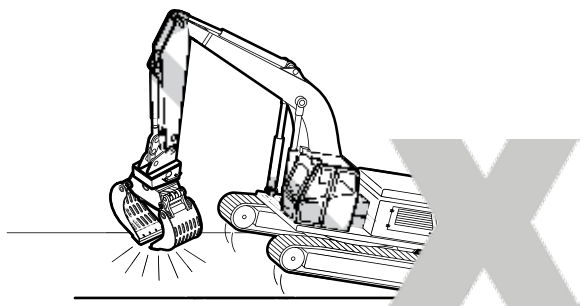
The excavator can tip over and cause injury and damage.

- Only operate the demolition and sorting grab when the excavator is on a safe, stable surface.



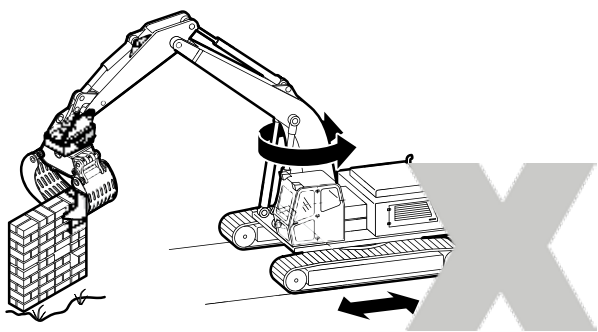
5.5.6 Moving the excavator

Never move the excavator sideways by placing the demolition and sorting grab on the ground to lift the excavator. This can cause severe damage to the demolition and sorting grab.



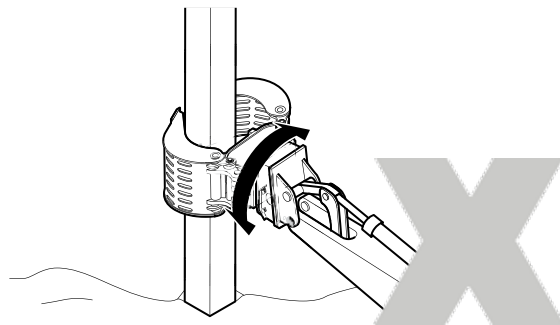
5.5.7 Moving the arm

Never move the excavator or arm while working with the demolition and sorting grab.



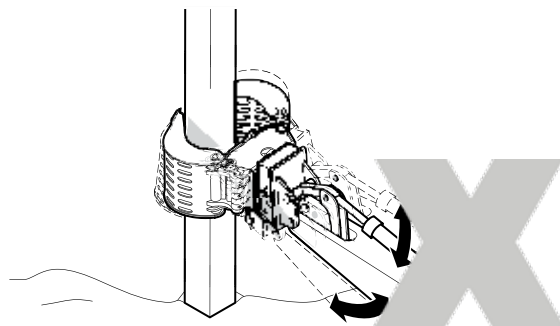
5.5.8 Rotating the demolition and sorting grab

Never rotate the demolition and sorting grab while operating the grab. This can cause severe damage to the demolition and sorting grab.



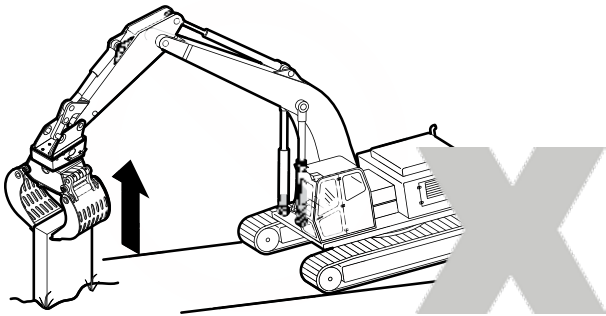
5.5.9 Extending the bucket cylinder

Never extend the cylinder while operating the grab. This action will make the demolition and sorting grab unusable.



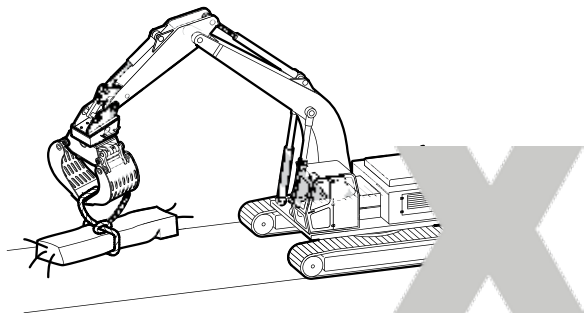
5.5.10 Pulling

Never use the demolition and sorting grab to pull on support beams, supports or walls. This could result in severe damage. Moreover, the excavator could lose stability and tip over.



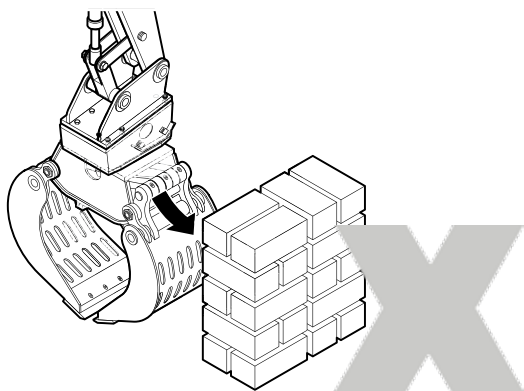
5.5.11 Lifting/transporting

Never use the demolition and sorting grab to lift or transport material. The tool is not designed for this and such use may result in severe damage.



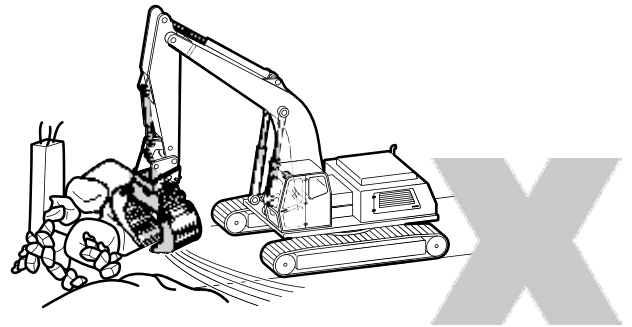
5.5.12 Hammering

Never use the demolition and sorting grab to hammer on or against the structure to be demolished. This can cause severe damage to the demolition and sorting grab.



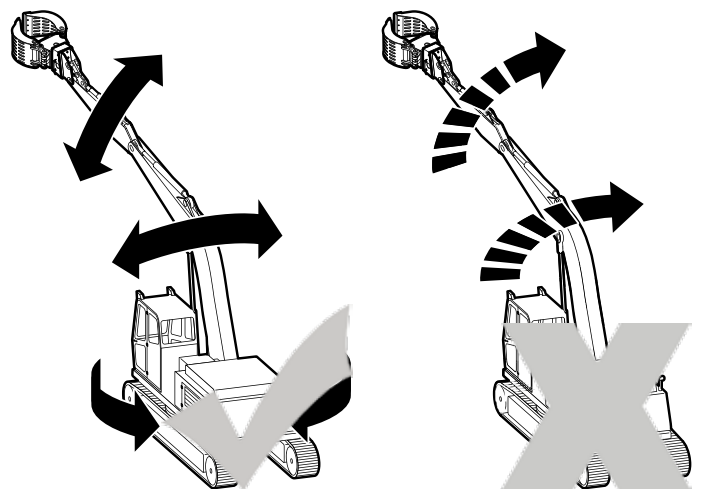
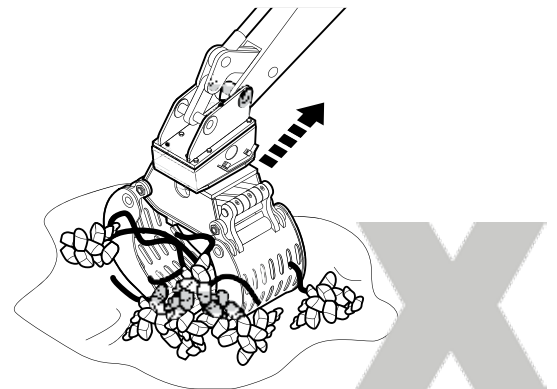
5.5.13 Pushing debris

Never use the demolition and sorting grab to push debris.



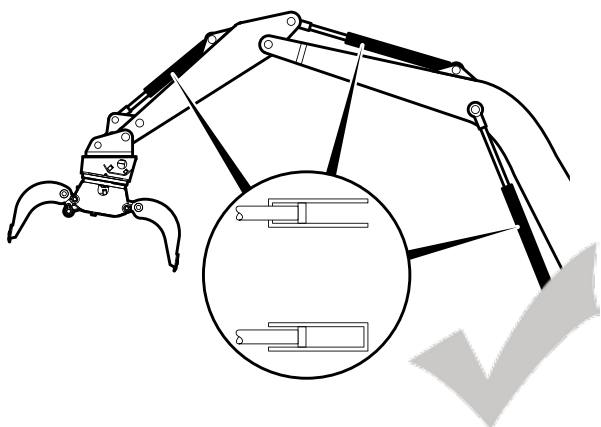
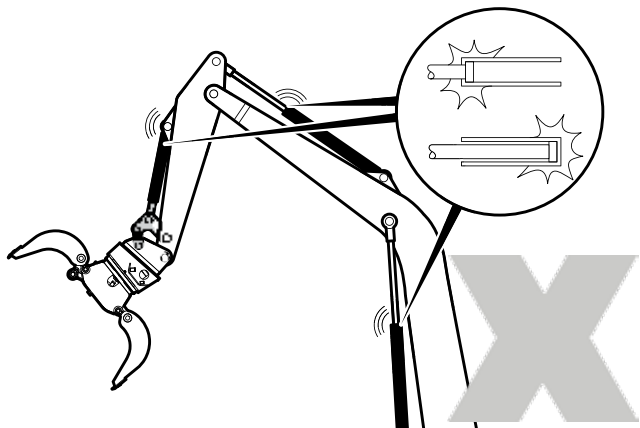
5.5.14 Abrupt movements

Never make sudden movements with the demolition and sorting grab in an attempt to release it when stuck in a construction.



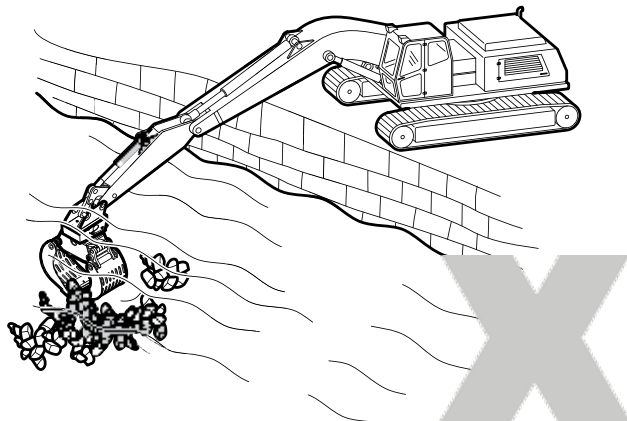
5.5.15 Extreme cylinder positions

Ensure the cylinders of the excavator arm never reach their extreme positions. If necessary, move the excavator to allow easy operation of the demolition and sorting grab.



5.5.16 Underwater use

Never use the demolition and sorting grab underwater. Water can severely damage both the demolition and sorting grab as well as the hydraulic system of the excavator.



6. MAINTENANCE

Maintenance work must be performed by the excavator operator regularly.

WARNING!

- DISCHARGE OF HOT HYDRAULIC OIL

The hydraulic system is under high pressure. If the hydraulic connections loosen, the hydraulic oil will spray out under high pressure. This can lead to serious injury.

- Switch the excavator and demolition and sorting grab off immediately if a leak is detected.
- Release the pressure in the hydraulic system.
- Repair any leaks before using the demolition and sorting grab again.

WARNING!

- HOT COMPONENTS

The hydraulic cylinder, hoses, tubes and fittings become very hot during operation. Contact with these components can cause burns.

- Never touch hot components.
- If works need to be completed on or near hot components, wait for them to cool down first.

WARNING!

- UNINTENTIONAL STARTING

Unintentional starting of the excavator/demolition and sorting grab can lead to serious injury.

- Follow the instructions to avoid unintentional starting.

WARNING!

- UNEXPECTED MOVEMENTS

Sudden movements by the excavator can cause injury.

- Secure the excavator to prevent unexpected movement.
- Follow the instructions from the excavator manufacturer.

WARNING!

- SERIOUS BODILY INJURY

The shells of the demolition and sorting grab may close unexpectedly and cause serious bodily injury.

- Ensure no one is present between the shells.

ATTENTION

- ENVIRONMENTAL CONTAMINATION BY HYDRAULIC OIL

Hydraulic oil is harmful to the environment. When hydraulic oil is released (e.g. by leakage) the groundwater and soil may become contaminated causing organisms to die.

- Collect all spilled hydraulic oil to prevent environmental contamination. For small amounts, use absorbent material. Ensure it does not make its way into the soil, groundwater or water lines.
- Collect the contaminated absorbent material in an airtight container and seal it well.
- Contact a licensed waste disposal company.
- Remove all contaminated materials in accordance with current environmental regulations.

6.1 Daily maintenance

- 1) For maintenance work, always place the grab in open position on a flat and stable surface and ensure the excavator cannot move.
- 2) When servicing the hydraulic system, the hydraulic hoses should be disconnected. Prior to disconnecting the hoses, ensure no pressure remains on the hoses. See the operating instructions of the excavator for more information.
- 3) The grab must be lubricated once per every 8 operating hours using the same type of grease specified for the excavator.
- 4) When the interchangeable wear blades on the grab shells have worn away to that extent that the grab can no longer fully close, work must be discontinued and the interchangeable wear blades must be changed or replaced. *(NOTE The interchangeable wear blades also serve as the end stop for the cylinders.)*

Prior to every use

- Inspect the demolition and sorting grab and adapter plate for cracks.
- Inspect hydraulic lines for leaks and damage.
- Inspect the attachment of the tube clamp on the excavator.
- Inspect the teeth for damage and replace if necessary.
- Inspect the bolt connections at the adapter plate and tighten if necessary.
- Inspect the bolts on the hydraulic lines and tighten if necessary.
- Inspect the fastening bolts for the replaceable teeth, if necessary, tighten or replace.
- Inspect the locking feature of the hinge pin.
- Grease all grease nipples for the demolition and sorting grab.

Weekly

- Re-tighten the screws on the frame of the rotating mechanism.

After the first 50 operating hours

- Replace the oil filter element on the excavator.

Every 100 operating hours

- Re-tighten the screws on the frame of the rotating mechanism.

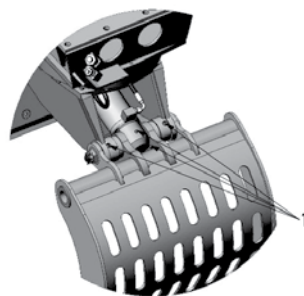
Every 500 operating hours

- Inspect the oil filter element, replace if necessary.

If necessary

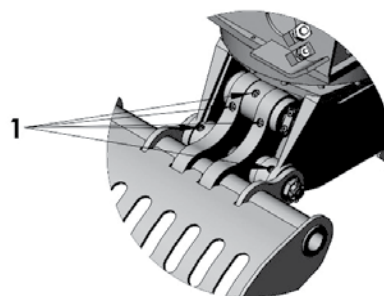
- Replace bent and damaged pipes.
- Replace damaged hoses.
- Inspect the adapter plate bolts for wear.

6.1.1 Lubrication schedule



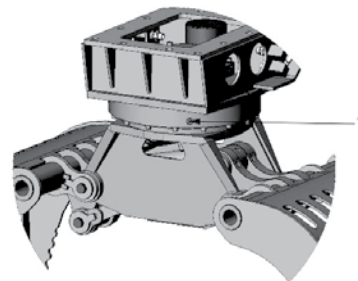
1) Lubricating pivot points

1 = 1x per 8 operating hours



2) Lubricating pivot points

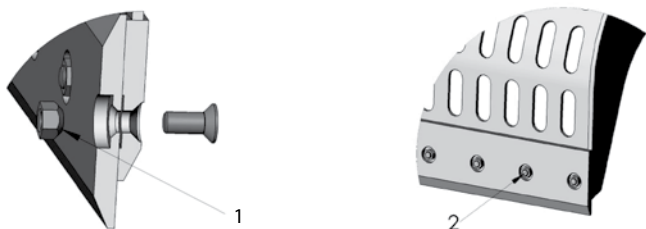
1 = 1x per 8 operating hours



3) Lubricating slewing ring

1 = 1x per 8 operating hours

6.1.2 Changing / replacing wear blades



- 1) Ensure the nut is installed with the conical side on the inside of the shell.
- 2) Bolts must be tightened to the torque indicated on the table on page 27.

To ensure the wear blades remain securely fastened to the shell during shock and tearing loads, it is recommended to tack weld the interchangeable wear blade to the fixed blade.

6.1.3 Torque

The table on this page provides a summary of the torque required for the nuts and bolts on the slewing ring, blades and other components of the DSG demolition and sorting grab.

Bolt size	Torque (Nm)	Torque (kg·m)	Torque (ft·lb)	Comments
	Bolt 10.9	Bolt 10.9		
M8	40 Nm	4 kg·m	29 ft·lb	
M10	80 Nm	8 kg·m	60 ft·lb	
M12	130 Nm	13 kg·m	94 ft·lb	
M12 x 1.25	110 Nm	11 kg·m	80 ft·lb	Caution! Fine thread
M14	200 Nm	20 kg·m	145 ft·lb	
M16	300 Nm	30 kg·m	217 ft·lb	
M20	600 Nm	60 kg·m	434 ft·lb	
M24	1000 Nm	100 kg·m	723 ft·lb	
M27	1500 Nm	150 kg·m	1106 ft·lb	
M30	2000 Nm	200 kg·m	1475 ft·lb	
M36	3600 Nm	360 kg·m	2655 ft·lb	
M39	4600 Nm	460 kg·m	3393 ft·lb	

6.2 Releasing the pressure in the hydraulic system

Always release the pressure in the hydraulic system before performing maintenance activities.

Proceed as follows:

- ◇ Switch the engine off, but leave the ignition switched on.
- ◇ Open, close, and rotate the demolition and sorting grab repeatedly.

6.3 Lubrication

Lubrication interval: prior to every use.

- ◇ Place the demolition and sorting grab on the ground.
- ◇ Secure the excavator to prevent unexpected movement.
- ◇ Only use Q8 Ruysdael CL2 grease for lubrication.
- ◇ Place the grease gun on the grease nipples.

7. TROUBLESHOOTING

7.1 The demolition and sorting grab does not work

Cause	Solution	By who?
Ensure the valve in the Open of Close pipe is <u>closed</u> .	Open the return valve.	Machinist
Broken connector blocking Open/Close pipes.	Replace the defective coupling components.	Workshop / Dehaco service technician
Electrical equipment in the system is faulty.	Inspect the faulty electrical equipment and repair if necessary.	Workshop
The toggle switch is faulty.	inspect the toggle switch and replace if necessary.	Workshop
The magnet on the switch on valve is damaged.	Replace the magnet.	Workshop

7.2 Insufficient closing force

Cause	Solution	By who?
The pipes for Open and Close are swapped.	Connect the cables as required.	Machinist
The operating pressure is too low.	Correct the operating pressure.	Workshop / Dehaco service technician

7.3 The rotate function does not work

Cause	Solution	By who?
Rotary motor/gear unit/slewing ring/rotation transmission defect.	Inspect the rotary motor/gear unit/slewing ring/rotation transmission and replace the defective parts.	Dehaco service technician or an authorised Dehaco dealer.

7.4 The operating temperature is too high

Cause	Solution	By who?
The oil level in the tank is too low.	Check the oil level and top up if necessary.	Machinist or workshop
The pumping volume of the excavator is too high; there is a constant amount of oil spraying from the pressure reducing valve.	Check the speed of the excavator motor and correct. Switch the pump on.	Dehaco service technician or an authorised Dehaco dealer.
The pressure reducing valve is faulty or there is a defect in the valve.	Fit a new pressure reducing manager or a more accurate pressure relief valve.	Dehaco service technician or an authorised Dehaco dealer.

7.5 Oil leaks at hydraulic connections

Cause	Solution	By who?
Cap nuts are loose.	Inspect the cap nuts and tighten.	Machinist
Hose connections are loose.	Inspect the connections and tighten.	Machinist

7.6 Insufficient lubrication

Cause	Solution	By who?
Interval between lubrication is too long.	Check lubrication and lubricate.	Machinist.

8. REPAIR

⚠ WARNING!

- RISK OF PERSONAL INJURY

Improper repair of the demolition and sorting grab can cause serious injury and damage.

- Repairs may only be carried out by Dehaco B.V. or an authorised Dehaco dealer.
- ◇ For technical support, please contact Dehaco B.V. or a Dehaco dealer in your area.

8.1 Repair service for the demolition and sorting grab

ATTENTION

- MIXED HYDRAULIC OIL

Never mix mineral oil with non-mineral oil. Even small traces of mineral oil mixed with non-mineral oil may result in damage to both the demolition and sorting grab as well as the excavator. Non-mineral oil loses its biodegradability.

- Use only one type of hydraulic oil.
- ◇ Always indicate which hydraulic oil is used when sending the demolition and sorting grab for repair.

9. STORAGE

9.1 Demolition and sorting grab

WARNING!

- RISK OF TIPPING

If the demolition and sorting grab tips over while stored, this can lead to serious injury and property damage.

- Preferably, position the demolition and sorting grab on square wooden beams or a pallet. Ensure the horizontal surface is level.

9.1.1 Procedure for storage

- 1) Open the shells of the demolition and sorting grab.
The demolition and sorting grab is more stable when it is stored with the shells open. There is also less oil in the demolition and sorting grab when the shells are open. As a result, less oil loss and less oil in the environment will occur should an unexpected leak be detected.
- 2) Remove the demolition and sorting grab from the excavator.
- 3) Store the demolition and sorting grab in a dry, well ventilated area.
- 4) If the only possibility for storage is in the open, the demolition and sorting grab must be protected from the weather. For example, by using plastic foil or protective covers.

9.2 Grease cartridges

WARNING!

- FIRE AND HARMFUL GASES

Burning grease releases harmful gases.

- Never store grease cartridges near flammable or self-igniting substances.
- Do not expose grease cartridges to direct sunlight.
- ◇ Store grease cartridges in a cool, well-ventilated area.

10. DISPOSAL

ATTENTION

- ENVIRONMENTAL DAMAGE BY CONSUMABLES

Hydraulic oil and grease are harmful to the environment and may not penetrate the soil, nor end up in the water table or water supplies.

- Ensure no oil or grease run off.
- Dispose of oil and grease according to applicable environmental regulations.

10.1 Demolition and sorting grab

- ◇ Remove the demolition and sorting grab from the excavator.
- ◇ Remove the adapter plate.
- ◇ Remove the hydraulic hoses from the demolition and sorting grab.
- ◇ Dispose of the demolition and sorting grab according to applicable regulations or consult a certified specialist company.

10.2 Hydraulic hoses

- ◇ Drain and collect the oil from the hydraulic hoses.
- ◇ Dispose of the hydraulic hoses in accordance with applicable regulations and avoid risks to the environment.

10.3 Hydraulic oil

- ◇ Collect any spilled hydraulic oil.
- ◇ Dispose of it in accordance with environmental regulations.

10.4 Grease and grease cartridges

- ◇ Dispose of grease and partially empty grease cartridges in accordance with applicable regulations.
- ◇ Only completely empty grease cartridges can be recycled.

11. TECHNICAL SPECIFICATIONS

		DSG 70	DSG 150	DSG 250	DSG 400	DSG 450	DSG 452	DSG 502	DSG 600	DSG 802	DSG 902	DSG 1002
Excavator weight	(tonne)	0.7-1.2	1.2-3	2.5-4	4-6	5-9	7-11	8-12	10-16	12-20	13-20	16-20
Excavator weight with demolition and sorting grab excl. slewing ring	(tonne)	0.7-1.2	1.2-3	2.5-4	4-7	5-8	N.A.	8-12	10-16	12-18	13-20	15-20
Weight incl. head plate and wear blades	(kg)	75	140	240	350	400	470	600	840	1,000	1,050	1,170
Weight excl. slewing ring	(kg)	50	90	200	285	335	N.A.	530	605	775	810	850
Cylinders		1	1	1	1	1	1	1	1	2	2	2
Operating pressure	(bar)	300	300	300	300	300	320	350	350	350	350	350
Rotation motors		1	1	1	1	1	1	1	2	2	2	2
Rotation operating pressure	(bar)	170-210	170-210	170-210	190-210	190-210	190-210	190-210	190-210	190-210	190-210	190-210
Oil flow	(l/min.)	15	25	35	40	50	70	90	100	120	120	120
Rotating oil flow	(l/min.)	5	10	10	12	12	15	15	25	25	25	25
Shell width	(mm)	300	450	500	600	700	700	600	800	800	900	1,000
Jaw opening	(mm)	600	750	1,160	1,400	1,500	1,550	1,800	1,800	1,950	1,950	1,950
Height	(mm)	600	700	850	950	1,000	1,100	1,150	1,200	1,300	1,300	1,300
Capacity	(l)	30	70	100	150	200	200	300	400	500	600	700
Closing force	(kN)	6	15	20	23	24	24	30	35	46	46	46

		DSG 1102	DSG 1202	DSG 1402	DSG 1702	DSG 1900	DSG 2500	DSG 2700	DSG 3000	DSG 5000	DSG 13000
Excavator weight	(tonne)	16-25	17-28	20-28	23-30	25-38	28-40	30-50	35-50	45-100	100-200
Excavator weight with demolition and sorting grab excl. slewing ring	(tonne)	16-25	17-25	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Weight incl. head plate and wear blades	(kg)	1,400	1,500	1,600	1,750	1,900	2,500	2,700	3,000	5,000	13,000
Weight excl. slewing ring	(tonne)	950	1,040	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Cylinders		2	2	2	2	2	2	2	2	2	2
Operating pressure	(bar)	350	350	350	350	350	350	350	350	350	350
Rotation motors		2	2	2	2	2	2	2	2	2	2
Rotation operating pressure	(bar)	190-210	190-210	190-210	190-210	190-210	190-210	190-210	190-210	190-250	190-250
Oil flow	(l/min.)	150	160	170	170	180	200	200	200	300	350
Rotating oil flow	(l/min.)	35	35	35	35	35	35	35	35	60	100
Shell width	(mm)	900	1,000	1,200	1,200	1,200	1,200	1,360	1,500	1,500	1,800
Jaw opening	(mm)	2,100	2,100	2,100	2,250	2,200	2,200	2,200	2,400	3,000	4,400
Height	(mm)	1,500	1,500	1,500	1,500	1,650	1,700	1,750	1,800	2,000	3,000
Capacity	(l)	750	800	850	900	900	1,000	1,100	1,300	1,600	4,600
Closing force	(kN)	55	68	68	80	80	90	90	90	130	180



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