Original instructions

ENG 3/23

SERVICE MANUAL

SM2577ESENG.323

HYDRAULIC HAMMER

RAMMER 2577E

STD

RAMMER HITS HARDER

OPERATION

1. FOREWORD

1.1 THIS MANUAL

This manual is arranged to give you a good understanding of the equipment and its safe operation. It also contains maintenance information and technical specifications. Read this manual from front to back before installing, operating or maintaining the attachment for the first time.

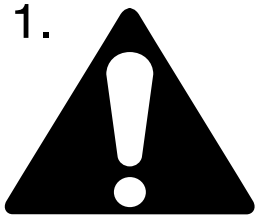
In this manual, the units of measurement are metric. For example, weights are given in kilograms (kg). In some cases the other unit follows in parenthesis (). For example 28 litres (7.4 US gal).

The specifications and designs presented in this manual are subject to change without prior notice.

SYMBOLS USED IN THIS MANUAL

This symbol identifies important safety messages within this manual. Carefully read the message that follows. Failure to understand and obey this safety warning could result in injury to you or others, and could also cause damage to equipment. See illustration 1.

1.



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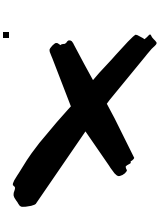
This symbol identifies a prohibited action or a hazardous location. Failure to understand and obey this safety warning could result in injury to you or others, and could also cause damage to equipment. See illustration 2.

2.



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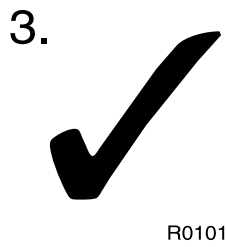
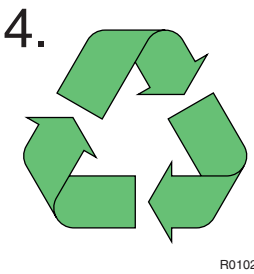
This symbol identifies correct and recommended action. See illustration 3.



This symbol identifies environmental and recycling matter. See illustration 4.



1.2 IMPORTANT SAFETY INFORMATION

Basic safety precautions are outlined in the "Safety" section of this manual and in the description of operations where hazards exist. Warning labels have also been put on the machine to provide instructions and to identify specific hazards which if not observed could cause bodily injury or death to you or other persons. These warnings in the guide and on the machine labels are identified by the warning symbol.

To use the attachment correctly, you must also be a competent operator of the carrier machine. Do not use or install it if you cannot use the carrier machine properly. The attachment is a powerful tool. If used without proper care, it can cause damage.

Do not rush when you are learning to use the product. Take your time and most importantly, take it safely. Do not guess. If there is anything you do not understand, ask your local dealer.

Improper operation, lubrication or maintenance of this machine can be dangerous and could result in injury.

Do not operate this machine until you have read and understood the instructions in this manual.

Do not perform any lubrication and maintenance on this machine until you have read and understood the instructions in this manual.

1.3 WARRANTY

Check that a separate warranty sheet explaining the export warranty terms is delivered with the attachment. If not, contact your local dealer immediately.

WARRANTY REGISTRATION

After the installation inspection, the dealer completes a warranty registration form online in the Distributor Portal and sends it to the manufacturer. This form is very important because warranty claims will not be handled without it. Make sure that you get a copy of the warranty registration form after the installation inspection and that it has been correctly filled out.

INSTALLATION INSPECTION

An installation inspection must be carried out after the product has been installed on the carrier. In the installation inspection certain specifications (such as operating pressure and oil flow) are checked so that they are within given limits. See “Hammer specifications” on page 82.

1.4 SPARE PART ORDERS

When you need spare parts or some information concerning maintenance to your machinery, please contact your local dealer. Quick deliveries are ensured by exact orders.

Required information:

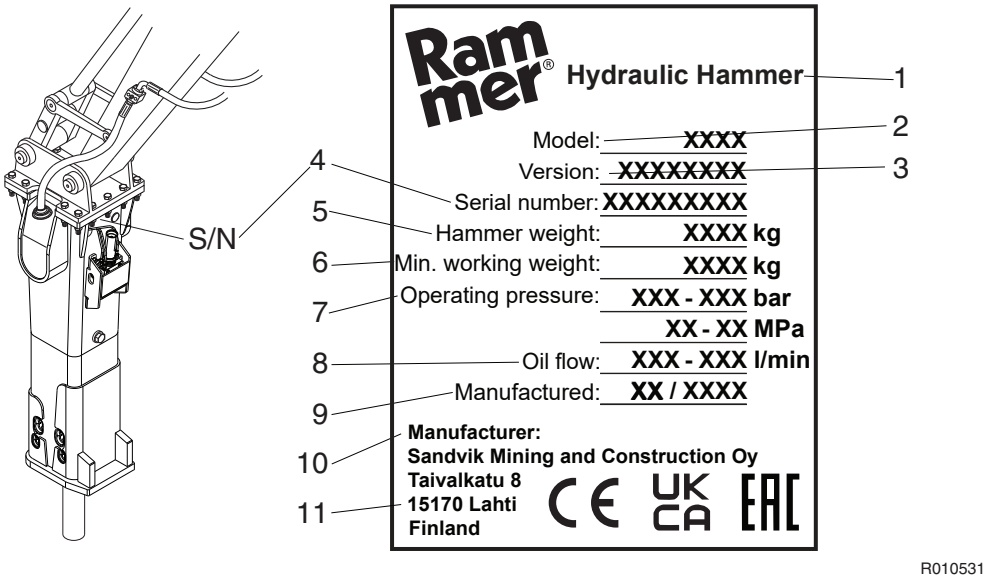
- Name of customer and contact person
- Order number (when available)
- Delivery address
- Mode of delivery (air mail etc.)
- Required delivery date
- Invoicing address
- Model and serial number of product
- Name, number and required amount of spare parts

2. PRODUCT NUMBERS

2.1 MODEL AND SERIAL NUMBER

The product serial number is stamped on the valve body. Both the model and serial number are located on the product identification plate. Check that the model corresponds to the one given on the cover of this manual.

It is important to make correct reference to the serial number of the attachment when making repairs or ordering spare parts. Identification of the serial number is the only proper means of maintaining and identifying parts for a specific product.



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CONTENT OF THE PRODUCT IDENTIFICATION PLATE

1	Hydraulic Hammer
2	Model
3	Version
4	Serial Number
5	Hammer weight (kg)
6	Min working weight (kg)
7	Operating pressure (bar)
8	Oil flow (l/min)
9	Manufactured or Manufacturing date
10	Manufacturer
11	Address

3. PRODUCT INTRODUCTION

3.1 OVERVIEW

The product is a hydraulically operated hammer. It can be used on any carrier which meets the necessary hydraulic and mechanical installation requirements. The unit functions by repeatedly raising a steel piston and driving it down onto the head of a removable breaking tool.

No additional pressure accumulators are necessary since the integrated pressure accumulator absorbs hydraulic pressure peaks. The impact energy of the hammer is almost constant and independent of the carrier's hydraulic system.

3.2 REMOVAL FROM PACKAGE

Remove all the steel belts from the package. Open the package and remove all plastics covering the product.

Recycle all package materials (steel, plastic, wood) properly.

Check that the product is in good condition and that there is no visible damage. Check that all ordered parts and accessories have been enclosed with the product. Some options may be provided by your local dealer like installation kits; including hoses and mounting bracket.

3.3 LIFTING INSTRUCTIONS

Use a hoist when lifting components which weigh 23 kg (51 lb) or more, to avoid back injury. Make sure all lifting equipment is in good condition and are in the correct capacity. Be sure hooks are positioned correctly. Lifting eyes are not to be side loaded during a lifting operation. Do not use the hammer's tools for lifting.

PROVIDED LIFTING POINTS

Use the lifting eyes located on the product housing only to lift or handle the product itself. The lifting capacity calculation is based on the product's working weight including a normal working tool and an average sized mounting bracket.

Warning! To avoid falling objects, do not use the product to lift other products. Use the lifting eyes located on the product housing only to lift or handle the product itself.

The maximum allowed total weight is shown on the product's CE-plate and specification page. See “Hammer specifications” on page 82. If the weight exceeds the maximum allowed total weight shown on the CE-plate and specification page, you have to use other lifting points/methods than originally provided on the product.

The other threaded holes on the product (for example on the hammer impact unit) are intended for handling single parts only. It is forbidden to lift the entire assembly by using these threaded holes (for example on the cylinder outer surfaces). For handling the parts, see product workshop documentation for suitable lifting methods and lifting adapters.

LIFTING EYE SCREWS

Tighten the lifting eye screws completely. Put a burden on the lifting eye only if the screw is properly tightened to the housing.

Failure to properly tighten the screw before allowing load pressure on the lifting eye may cause lifting eye to break and free fall of the product.

If you use mechanical tools for tightening, make sure not to overstrain the shank. Before lifting make sure that the chain and/or hook is stretched.

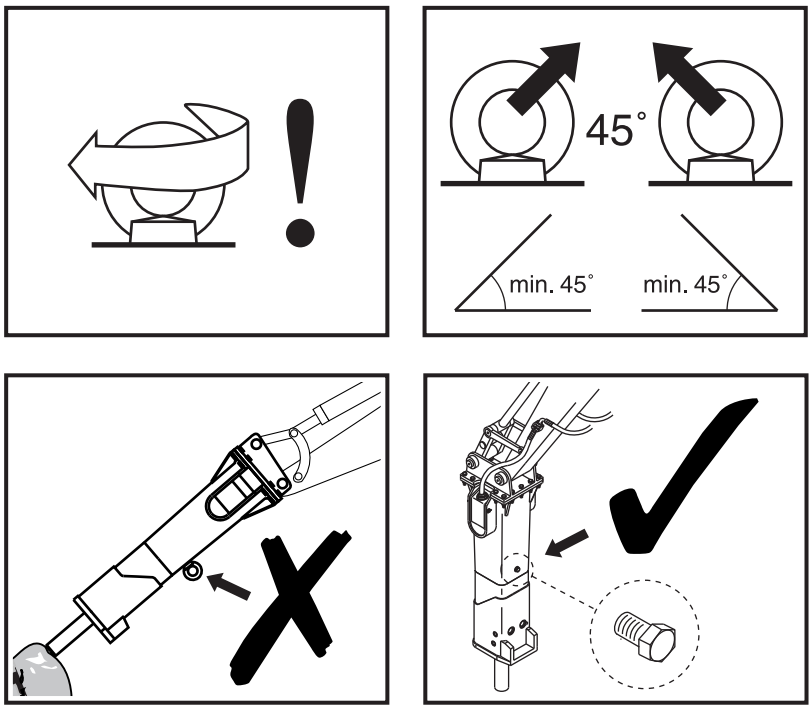
When two lifting eye screws are used, the lifting capacity depends on the angle of the lifting chains. The angle should not be less than 45°, as shown in the illustration. When the lifting eye screws are tightened, both rings should be aligned.

The loading capacity calculation applies to temperatures between -10 °C (14 °F) and 40 °C (104 °F).

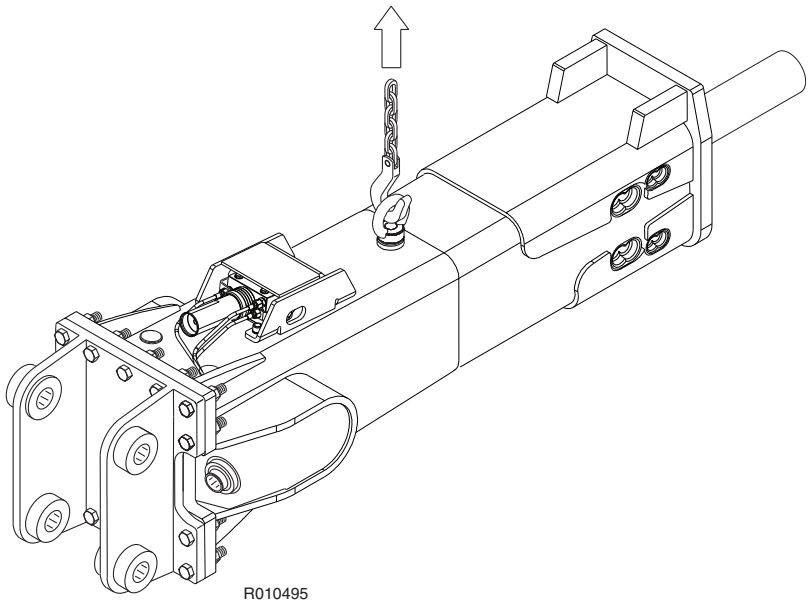
Before reuse of lifting eye screws make sure there are no surface flaws (for example rust, pits, voids, folds and seams, deformation of the ring, or missing or broken threads).

The local, national safety standards for machines and lifting-equipments must always be strictly observed.

Note: Before starting to operate the hammer, always replace the lifting eye with a blanking screw.



Lifting devices must safely carry the working weight of the product. See “Hammer specifications” on page 82. Place chains or slings, as shown by the illustration, to lift the product.



Note: Before starting to operate the hammer, always replace the lifting eye with a blanking screw.

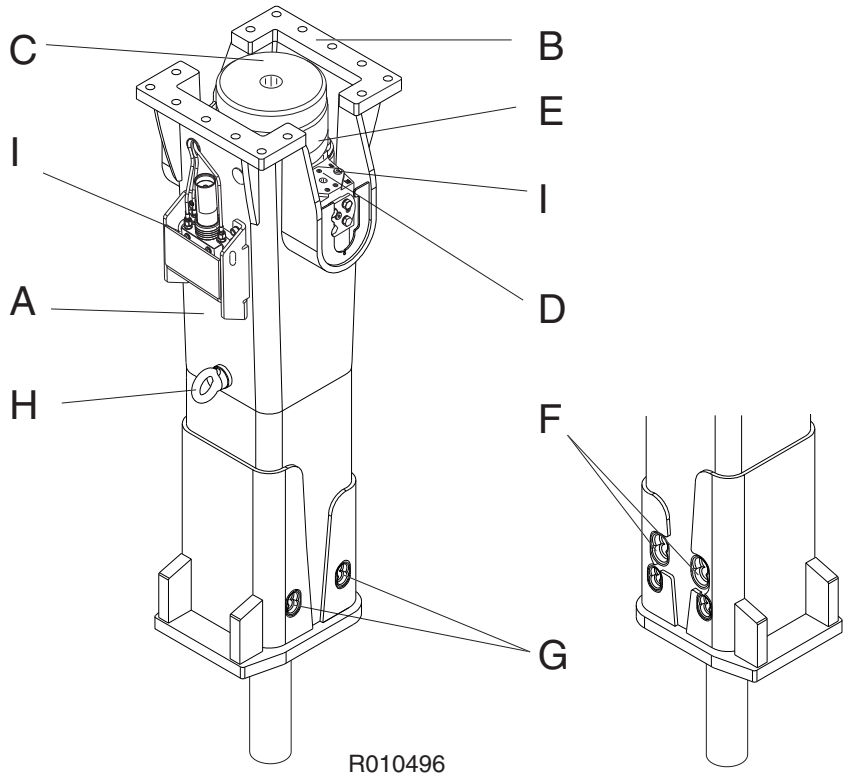
SAFETY INSTRUCTIONS FOR LIFTING

Below are some common safety instructions concerning lifting operations. In addition to this, the local, national standards for machines and lifting-equipments must always be strictly observed. Please note that the list below is not all inclusive, you must always ensure the procedure you choose is safe for you and others. For more information, see "! Large hammer workshop safety alert!, Publ. no. A000140E" in Bulletins.

- Do not lift load over people. No one shall be under the hoisted load.
- Do not lift people and never ride the hoisted load.
- Keep people clear from lift area.
- Avoid side pull of the load. Make sure you take up the slack slowly. Start and stop carefully.
- Lift the load a few centimeters and verify it before proceeding. Make sure the load is well balanced. Check for any loose items.
- Never leave the suspended load unattended. Maintain load control at all times.
- Never lift the load over the rated capacity (see product's operating weight from specification page).
- Inspect all lifting equipment before use. Do not use twisted or damaged lifting equipment. Protect lifting equipment from sharp corners.
- Obey all local safety instructions.

3.4 MAIN PARTS

The main parts of the hammer are shown below.



A. Housing

B. Mounting flange

C. Vibration dampening elements

D. Hose connections (pressure and return lines, automatic lubrication and pressurized air)

E. Pressure accumulator

F. Tool retaining mechanism

G. Lower tool bushing retaining mechanism

H. Lifting eye

I. Greasing device/Grease nipples

3.5 RAMVALVE

The hammer is equipped with a built-in Ramvalve.

The Ramvalve is designed to decrease oil flow remarkably to the hammer when oil flow from the carrier is too high.

If the impact rate of the hammer decreases suddenly when operating the hammer, contact your local carrier dealer to decrease the carrier's oil flow.

3.6 GREASING DEVICE

The hammer can be equipped with an automatic greasing device. The tool grease is supplied from the greasing device into the hammer by the grease lines. See “Automatic greasing” on page 47.

Advantages of the automatic lubrication system are:

- Longer service life for wear parts
- Higher utilization rate of the hammer
- Possibility to grease manually
- Reduced grease waste

Note: Some hammer models are equipped with an adapter kit for manual greasing and do not include an automatic greasing device.

3.7 RD3 REMOTE MONITORING DEVICE

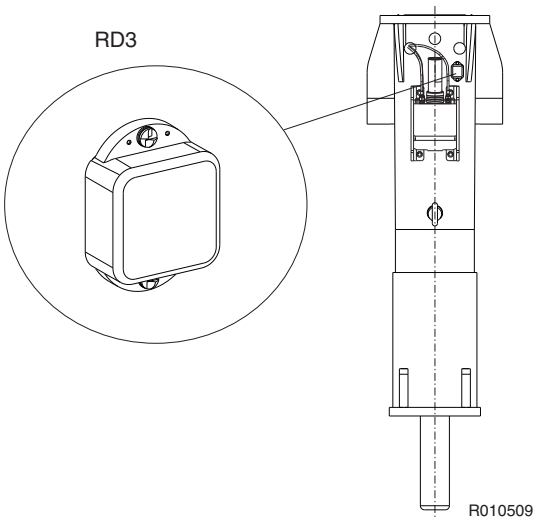
RD3 is a hammer-mounted device that enables remote monitoring of hammer units. During hammer operation, RD3 collects and transmits operating and location information. This information is available through an online service and can be used, for example, to view hammer work history, manage service schedules, optimize hammer performance, plan operator training and conduct fleet management.

See the "RD3 remote monitoring device" guide for technical specifications and installation instructions.

For more information, contact your local Rammer dealer.

Note: The RD3 data can be viewed in the online service, SAM. To access SAM, go to https://sam.rockprocessing.sandvik/ .

Note: See “RD3 and data privacy” on page 88.



Warning! RD3 contains a SIM card to enable remote connections and an encased lithium metal battery. Both items are regulated for air transport. Consult your forwarder about any restrictions for air freight.

Warning! Lithium is a highly flammable substance. Store damaged lithium batteries in a fire proof container. Never transport a damaged or unprotected lithium battery. Follow local laws and regulations on proper disposal of damaged lithium batteries.

Warning! Inhalation, skin contact and eye contact can occur when the battery is opened. Upon exposure to internal contents, the corrosive fumes will be very irritating to the skin, eyes and mucous membranes. Overexposure can cause symptoms of non-fibrotic lung injury and membrane irritation.

3.8 ENVIRONMENTAL PROTECTION AND RECYCLING POLICY

Rammer products contribute to the recycling of materials to help customers achieve their environmental objectives. During the manufacturing, all the necessary precautions are taken to make sure that no harm is done to the environment.

Every effort is made to foresee and minimize the risks that might be associated with the operation and maintenance of Rammer products, and which could pose danger to humans or the environment. We support customers in their efforts to consider environmental protection in their everyday work.

When working with a Rammer product, follow these guidelines:

- Dispose of packaging materials properly. Wood and plastic can be burned or recycled. Deliver the steel belts to a metal recycling center.
- Protect the environment from oil spills.

  In case of hydraulic oil leaks, the equipment should be serviced immediately.

  Follow the product's greasing instructions and avoid excessive greasing.

  Be careful when handling, storing and transporting oils.

  Dispose of empty oil or grease containers appropriately.

  Consult local authorities for detailed instructions.
- All metal parts of the product can be recycled by delivering them to an authorized scrap metal collection facility.
- Comply with local waste classification rules when disposing of used rubber or plastic parts (buffers, wear plates, seals).
- When scrapping the whole product or pressure accumulator, consult your local Rammer dealer for instructions on depressurizing the accumulator.
- Do not take the product or accumulator to a scrap metal collection center without depressurizing the accumulator first.
- Dispose of batteries in accordance with applicable federal, state and local regulations. As a safety precaution, properly insulate batteries for disposal. Cover both terminals of the battery with tape, wrap the battery in an insulated bag, or pack the battery in its original packaging in order to prevent ignition due to short-circuit.

Consult with your local dealer for more information.

4. SAFETY

4.1 GENERAL SAFETY

All mechanical equipment can be hazardous if operated without due care or correct maintenance. Most accidents involving machine operation and maintenance are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs.

Because it is impossible to anticipate every possible circumstance that might involve a potential hazard, the warnings in this guide and on the machine are not all inclusive. If a procedure, tool, working method or operating technique not specifically recommended by manufacturer is used, you must satisfy yourself that it is safe for you and others. You should also ensure that the product will not be damaged or made unsafe by the method of operation or maintenance procedures you choose.

Safety is not just a matter of responding to the warnings. All the time you are working with your attachment you must pay attention to what hazards there might be and how to avoid them. Do not work with the product until you are sure that you control it. Do not start any job until you are sure that you and those around you will be safe.

Warning! Read the following warning messages carefully. They tell you of different hazards and how to avoid them. If proper precautions are not taken you or others could be seriously injured.

4.2 SAFETY INSTRUCTIONS

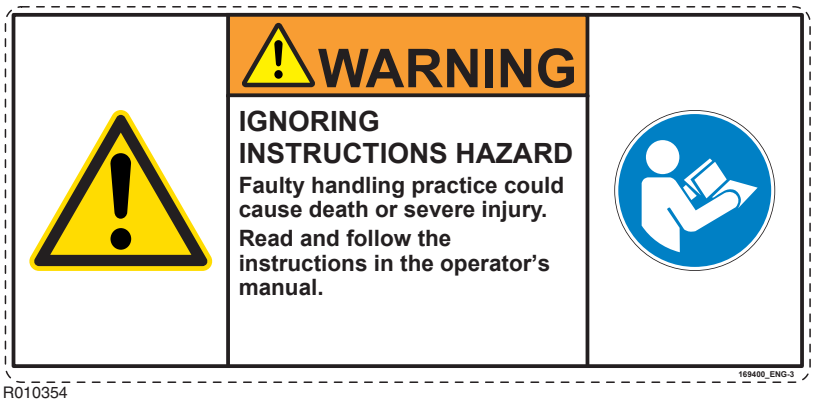
MANUALS

Study this manual before installing, operating or maintaining the product. If there is anything you don't understand, ask your employer or your local dealer to explain it. Keep this manual clean and in good condition.

"IGNORING INSTRUCTIONS HAZARD

Faulty handling practice could cause death or severe injury.

Read and follow the instructions in the operator's manual."



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CARE AND ALERTNESS

All the time you are working with the product, take care and stay alert. Always be alert for hazards. The possibility of a serious or even fatal accident is increased when you are intoxicated.

CLOTHING

You can be injured if you do not wear proper clothing. Loose clothing can get caught in the machinery. Wear protective clothing to suit the job.

Examples are: a safety helmet, safety shoes, safety glasses, well-fitting overalls, ear-protectors and industrial gloves. Keep cuffs fastened. Do not wear a necktie or scarf. Keep long hair restrained.

PRACTICE

You and others can be killed or injured if you perform unfamiliar operations without practising them first. Practice away from the job site, in a clear area.

Keep other people away. Do not perform new operations until you are sure you can do them safely.

REGULATIONS AND LAWS

Obey all laws, work site and local regulations which affect you and your equipment.

COMMUNICATIONS

Bad communications can cause accidents. Keep people around you informed of what you will be doing. If you will be working with other people make sure they understand any hand signals you will be using.

Work sites can be noisy. Do not rely only on spoken commands.

WORK SITE

Work sites can be hazardous. Inspect the site before working on it.

Check for potholes, weak ground, hidden rocks and other possible hazards on the ground. Check for utilities (such as electric cables, gas and water pipes). Mark the positions of underground cables and pipes if you will be breaking the ground.

Poor visibility can cause accidents and damage. Make sure that visibility and lighting of the working area are adequate.

BANKS AND TRENCHES

Banked material and trenches can collapse. Do not work too close to banks and trenches where there is a danger of collapse.

SAFETY BARRIERS

Unguarded equipment in public places can be dangerous. Place barriers around the machine to keep people away.

AIRBORNE POLLUTANTS

The related safety label on the hammer and the text on the label are shown below.

"DUST HAZARD

Breathing dust will cause death or severe injury.

Always wear approved respirator."

R010356

Airborne pollutants are microscopic particles, which will damage your health, when inhaled. Airborne pollutants on construction sites can be, for example, silica dust, oil fumes or diesel exhaust particles, visible or invisible. Especially in demolition sites, there may be other dangerous substances, such as asbestos or lead paints or other chemical substances.

The effect of airborne pollutants may be immediate if the substance is poisonous. The main danger with airborne pollutants comes from long term exposure, where particles are inhaled but not removed from the lungs. The disease is called silicosis, asbestosis or other, and will result in death or serious injury.

To protect yourself from airborne pollutants, always keep excavator doors and windows closed during operation. Excavators with pressurized cabins should be utilized in hammer operation. Proper maintenance of fresh air filters of the excavator is essential. Where pressurized cabins are not available, proper respirators must be utilized.

Stop working, when bystanders are in the area of airborne pollutants and make sure they have proper respirators. Respirators are as important for bystanders as hard hats.

Respirators for both operator and bystanders must be approved by the respirator manufacturer for the application in question. It is essential that the respirators protect from the tiny dust particles which cause silicosis and which may cause other serious lung diseases. You should not use the equipment until you are sure the respirators are working properly. This means the respirators must be checked to make sure that it is clean, that its filter has been changed, and to otherwise make sure the respirator will protect in the way it is meant to.

Always make sure dust has been cleaned off your boots and clothes when you leave your shift. The smallest particles of dust are the most harmful. They may be so fine that you cannot see them. Remember, you MUST protect yourself and bystanders from the danger of breathing or inhaling dust.

Always follow local laws and regulations for airborne pollutants in the working environment.

FLYING CHIPS OF ROCK

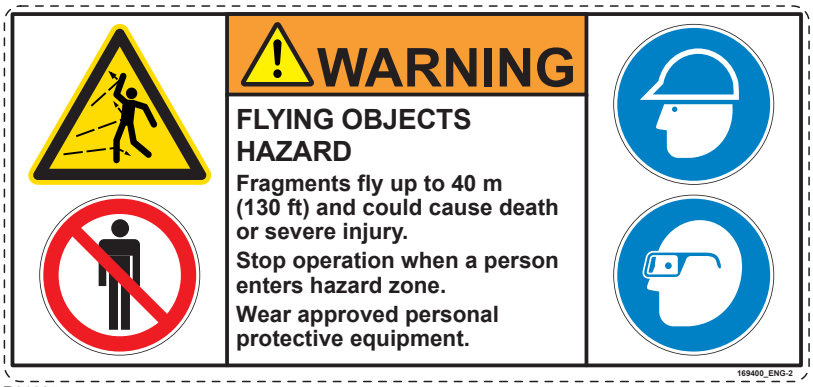
The safety label on the hammer is shown below:

"FLYING OBJECTS HAZARD

Fragments fly up to 40 m (130 ft) and could cause death or severe injury.

Stop operation when a person enters hazard zone.

Wear approved personal protective equipment."



R010355

Protect yourself and your neighbourhood against flying chips of rock. Do not operate the product or carrier if someone is too close.

The European standard EN 474-1 on safety of earth-moving machinery requires that adequate operator's protection, such as bullet proof glass, mesh guard or an equivalent protection is used.

Keep the cabin windows and doors closed during operation. Window bars are recommended to protect the windows from flying chips of rock.

HIGH NOISE LEVEL

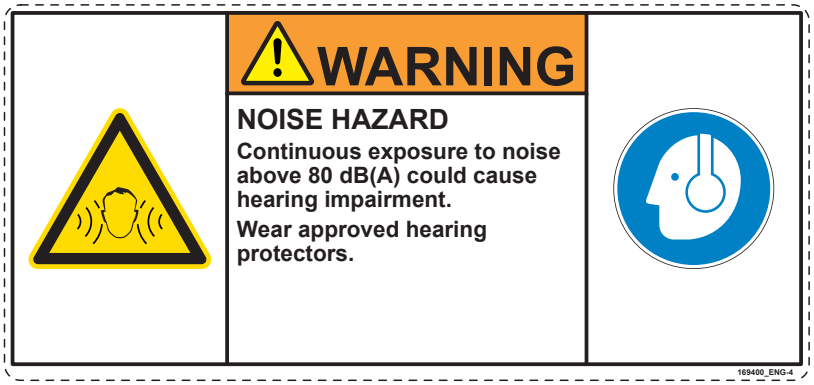
A hammer in operation creates a high noise level. Always wear ear protection to prevent personal injury.

The safety label on the hammer is shown below:

"NOISE HAZARD

Continuous exposure to noise above 80 dB(A) will cause hearing impairment.

Wear approved hearing protectors."



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EQUIPMENT LIMITS

Operating the product beyond its design limits can cause damage. It can also be dangerous. See “Hammer specifications” on page 82.

Do not try to enhance the product's performance by unapproved modifications.

HYDRAULIC FLUID

Fine jets of hydraulic fluid at high pressure can penetrate the skin. Do not use your fingers to check for hydraulic fluid leaks. Do not put your face close to suspected leaks. Hold a piece of cardboard close to suspected leaks and then inspect the cardboard for signs of hydraulic fluid. If hydraulic fluid penetrates your skin seek medical help immediately.

Hot hydraulic fluid can cause severe injuries.

HYDRAULIC HOSES AND FITTINGS

Ensure all hydraulic components will withstand maximum pressure and mechanical stresses caused by operation of the attachment. Consult your local dealer for instructions.

FIRE HAZARD

Most hydraulic fluids are flammable and might ignite when contacting hot surface. Avoid spilling hydraulic fluid to hot surfaces.

Working with the product on certain materials can cause sparks and hot splinters to get loose. These can ignite flammable materials around working area.

Ensure that adequate extinguisher is available.

HYDRAULIC PRESSURE

Hydraulic fluid at system pressure can injure you. Before disconnecting or connecting hydraulic hoses, stop the carrier engine, operate the controls to release pressure trapped in the hoses and wait ten (10) minutes. During the operation, keep people away from the hydraulic hoses.

There might be pressurized oil trapped inside the product even if it is disconnected from the carrier. Be aware of possible blank firing while greasing or removing and installing hammer tools. See “Changing the tool” on page 61.

PRESSURE ACCUMULATORS

The safety label on or near the accumulator is shown below.

"HIGH PRESSURE HAZARD

Improper handling of pressurized accumulator will cause death or severe injury.

Read workshop manual before disassembly.

Release pressure before disassembly.

Recharge with nitrogen (N_2) only."

R010352

The hammer incorporates one or two pressure accumulators, depending on the model. The accumulators are pressurized even when there is no hydraulic pressure to the hammer. Attempting to dismantle the accumulators without first releasing the pressure can cause injury or death. Do not try to dismantle pressure accumulators, contact your local dealer first. See “Releasing hydraulic pressure from hammer” on page 92. See “Pressure accumulator” on page 100.

LIFTING EQUIPMENT

You can be injured if you use faulty lifting equipment. Make sure that lifting equipment is in good condition. Make sure that the lifting equipment complies with all local regulations and is suitable for the job. Make sure that the lifting equipment is strong enough for the job and that you know how to use it.

Do not use this product or any of its parts for lifting. See “Lifting instructions” on page 10. Contact your carrier dealer to find out how to lift with your carrier.

SPARE PARTS

Use only genuine spare parts. Use only genuine tools with hydraulic hammers. The use of other spare part or hammer tool brands may damage the product and void the warranty.

EQUIPMENT CONDITION

Defective equipment can injure you or others. Do not operate equipment which is defective or has missing parts.

Make sure the maintenance procedures in this manual are completed before using the product.

REPAIRS AND MAINTENANCE

Do not try to do repairs or any other maintenance work you do not understand.

MODIFICATIONS AND WELDING

Non-approved modifications can cause injury and damage. Contact your local dealer for advice before modifying the product. Before welding on the product while it is installed on the carrier, disconnect the carrier alternator and battery. Note that welding of the hammer tools will render them useless and make the warranty void.

METAL SPLINTERS

You can be injured by flying splinters when driving metal pins in and out. Use a soft-faced hammer or drifts to remove and fit metal pins, such as bucket pins. Always wear safety glasses.

LABELS ON THE PRODUCT

Safety labels communicate the following four things:

- The severity level of the risk (that is, signal word "DANGER" or "WARNING").
- The nature of the hazard (such as high pressure, or dust).
- The consequence of interaction with the hazard.
- How to avoid the hazard.

You must ALWAYS follow the instructions of the safety messages and symbols of the product safety labels and the instructions set forth in the manuals to avoid death or severe injury!

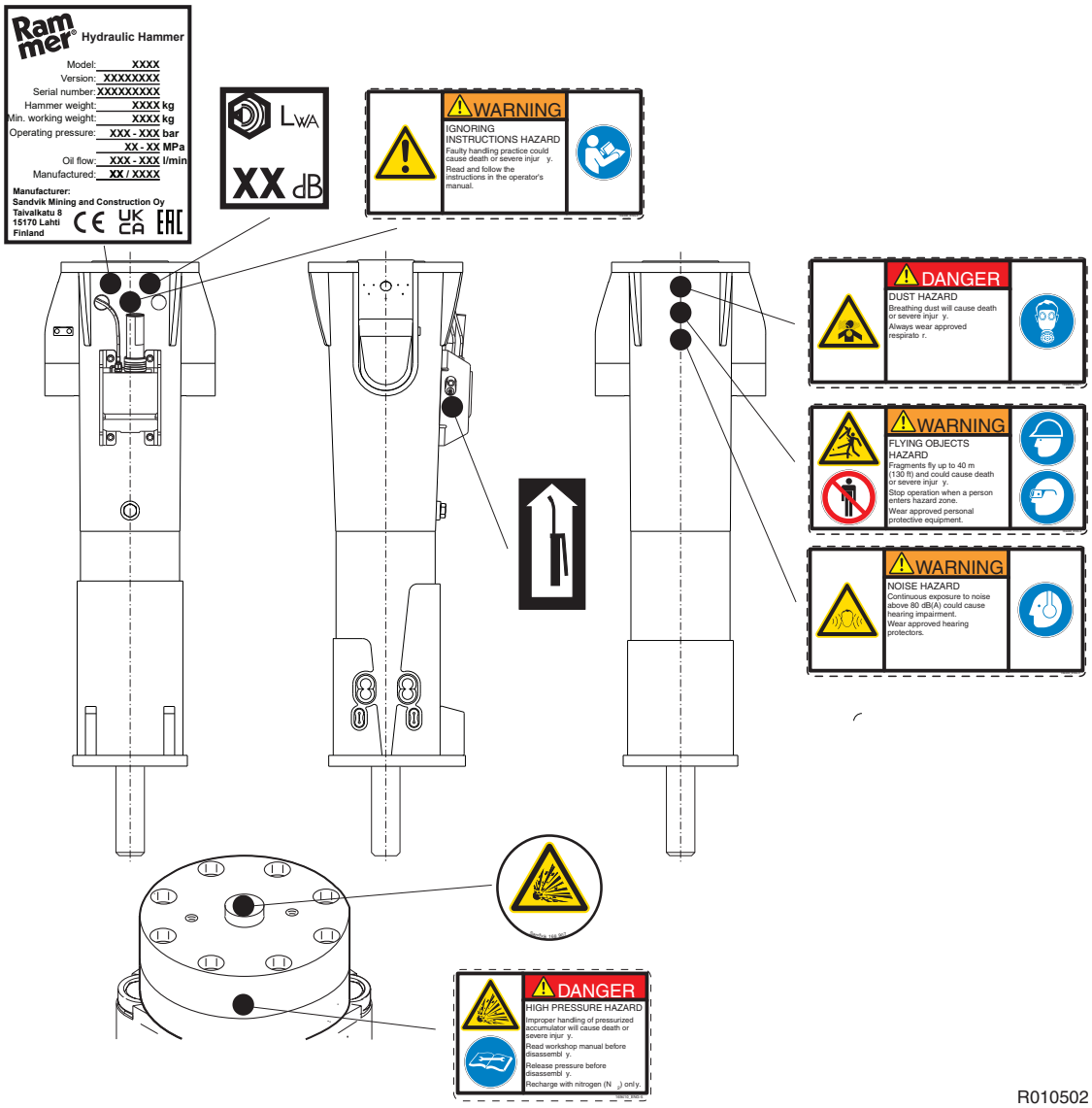
Keep the safety labels clean and visible at all times. Check the condition of safety labels daily. Safety labels and instructions which have disappeared, been damaged, painted over, come loose or do not meet the legibility requirements for safe viewing distance, must be replaced before operating the product.

If a safety label is attached to a part that is replaced, install a new safety label on the replacement part. If this manual is available in your language, then the safety labels should be available in the same language.

There are several specific safety labels on this hammer. Please become familiarized with all safety labels. The location of the safety labels is shown in the illustration below.

When you clean the safety labels, use a cloth, water and soap. Do not use solvent, gasoline or other harsh chemicals to clean the safety labels.

Solvents, gasoline or harsh chemicals could loosen the adhesive that secures the safety labels. Loose adhesive will allow the safety label to fall.


Rammer
Hydraulic Hammer
Model: XXXX
Version: XXXXXXXX
Serial number: XXXXXXXXX
Hammer weight: XXXX kg
Min. working weight: XXXX kg
Operating pressure: XXX - XXX bar
XX - XX MPa
Oil flow: XXX - XXX l/min
Manufactured: XX / XXXX
Manufacturer:
Sandvik Mining and Construction Oy
Talvalkatu 8
15170 Lahti
Finland
LWA
XX dB
WARNING
IGNORING INSTRUCTIONS HAZARD
Faulty handling practice could cause death or severe injur y.
Read and follow the instructions in the operator's manual.
DANGER
DUST HAZARD
Breathing dust will cause death or severe injur y.
Always wear approved respirato r.
WARNING
FLYING OBJECTS HAZARD
Fragments fly up to 40 m (130 ft) and could cause death or severe injur y.
Stop operation when a person enters hazard zone.
Wear approved personal protective equipment.
WARNING
NOISE HAZARD
Continuous exposure to noise above 80 dB(A) could cause hearing impairment.
Wear approved hearing protectors.
DANGER
HIGH PRESSURE HAZARD
Improper handling of pressurized accumulator will cause death or severe injur y.
Read workshop manual before disassembl y.
Release pressure before disassembl y.
Recharge with nitrogen (N) only.

R010502

5. OPERATION

5.1 OPERATING INSTRUCTIONS

RECOMMENDED USE

The hammer is designed to be used in breaking concrete, road surface or asphalt, hard or frozen ground. It can be also used in breaking moderate sized boulders as well as in demolishing reinforced structures and for major excavation and clearing work. Your local dealer will gladly give you more information.

OPERATING CONDITIONS

Principle of installation

Almost all carriers meeting mechanical and hydraulic requirements can be used to operate the attachment. See “Hammer specifications” on page 82. The product is installed on the carrier much in the same manner as installing a bucket or other attachments. A flange mounted attachment requires a separate mounting bracket.

If the carrier has already auxiliary hydraulic circuit, the installation requires only suitable hoses and fittings. If the carrier does not have suitable kit to run the attachment, one must be built. This may require installation including new piping and additional valves such as directional valve and pressure relief valve. For more information, see "Making an installation" in Dealer manual.

Suitable kits can be ordered from the local dealers, from carrier manufacturers and their dealers or from third party suppliers.

Hydraulic oil

In general the hydraulic oil originally intended for the carrier can be used with this product. See “Requirements for hydraulic oil” on page 52.

Operating temperature

The operating temperature is -20 °C (-4 °F) to 80 °C (176 °F). If the temperature is lower than -20 °C (-4 °F), the hammer and tool have to be preheated before any operations can begin, in order to avoid breaking the accumulator's membrane and the tool. During operation they will remain warm. See “Preheating the hammer” on page 32.

Note: The temperature of the hydraulic oil must be monitored. Ensure that oil grade and monitored oil temperature together guarantee correct oil viscosity. See “Oil specifications” on page 53.

Noise dampening

Operating the hammer near residential areas or other noise sensitive areas can cause noise pollution. In order to avoid unnecessary noise, please follow these basic rules:

1. When operating the hammer, keep the tool at a 90 degree angle to the material and the feed force in-line with the tool.

2. Replace or fix all parts that are worn out, damaged or loosened. This not only saves your hammer but it also decreases the noise level.

PRINCIPLES OF BREAKING

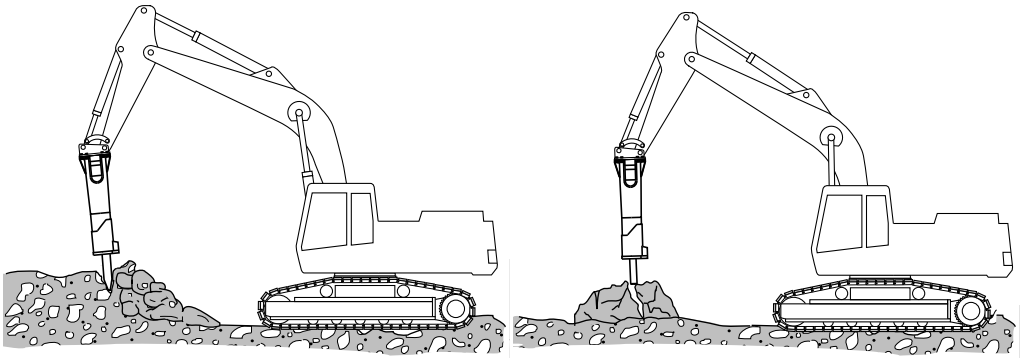
To increase the hammer's working life, pay particular attention to correct working methods and how to choose the correct tool for the job. There are essentially two ways of breaking with a hydraulic hammer.

Penetrative breaking (or cutting)

In this form of breaking a moil point or chisel tool is forced inside the material. This method is most effective in soft, layered or plastic, low abrasive material. The high impact rate of the small hammers makes them ideal for penetrative breaking.

Impact breaking

With impact breaking, the material is broken by transferring very strong mechanical stress waves from the tool into the material. Impact breaking is most effective in hard, brittle and very abrasive materials. The high impact energy of the big hammers makes them ideal for impact breaking. The best possible energy transfer between the tool and the object is achieved with a blunt tool. The use of a chisel tool in hard material will cause the sharp edge to wear very quickly.



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CHOOSING TOOLS

A selection of standard and special tools to suit each application are available. The correct type of tool must be selected to get the best possible working results and longest life time for the tool. Choosing the best tool type for an application may require some testing, please consult with your local dealer. See “Tool specifications” on page 85.

Chisel, moil point and pyramid

- For sedimentary (e.g. sandstone) and weak metamorphic rock into which the tool penetrates.
- Concrete.
- Trenching and benching.

Blunt tool

- For igneous (e.g. granite) and tough metamorphic rock (e.g. gneiss) into which the tool doesn't penetrate.
- Concrete.
- Breaking boulders.

Super blunt

- When tool wear is extensive in igneous (e.g. granite) and tough metamorphic rock (e.g. gneiss) into which the tool doesn't penetrate.
- Breaking boulders (very abrasive rock).
- **Do not use for penetrative work or in non-abrasive rock!**

It is important to choose a tool, which is suitable for your hammer and for the application you are working on. The tool selection available depend on hammer model. See “Tool specifications” on page 85.

IDLE BLOW PROTECTION

The hammer includes Idle Blow Protection as a standard feature to prevent idle strokes. Frequent idle strokes have a deteriorating effect on the hammer. Idle Blow Protection can be turned on or off by the operator.

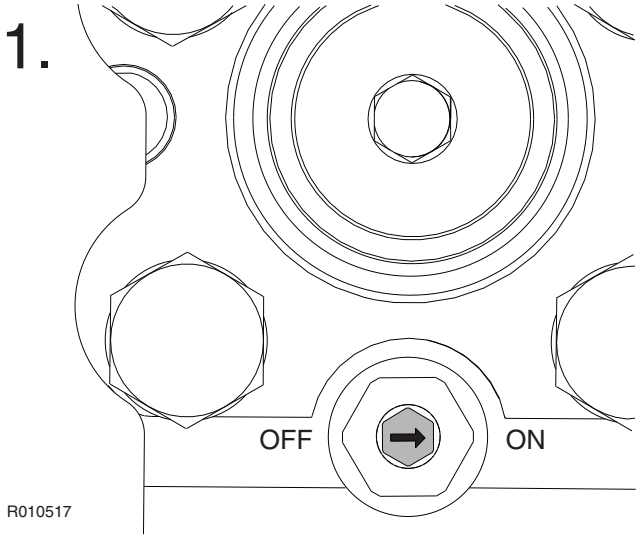
Idle Blow Protection can also be used to warm up the hammer and oil before operation. See “Operating conditions” on page 28. See “Requirements for hydraulic oil” on page 52.

Idle Blow Protection ON (factory setting)

It is recommended that you keep Idle Blow Protection on during normal hammer work. In the ON position, Idle Blow Protection is activated to prevent idle strokes. See illustration 1.

Note: When Idle Blow Protection is on, the hammer can be started only after pressing the tool against an object.

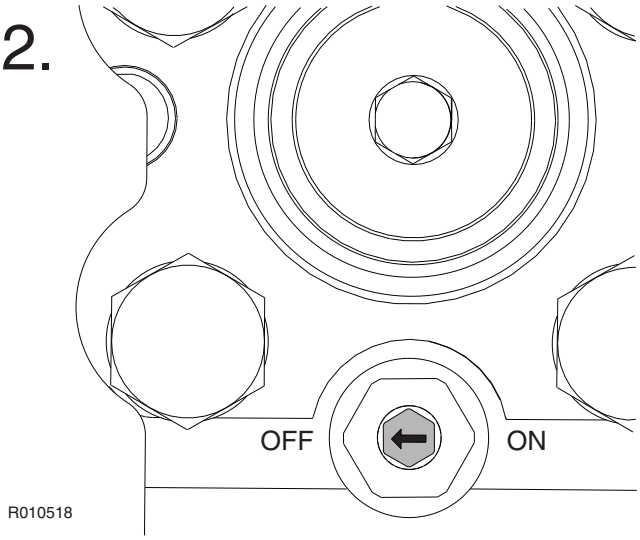
1.



Idle Blow Protection OFF

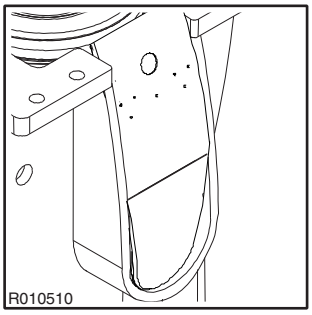
Idle Blow Protection can be turned off when breaking very soft material or in a demolition application where it is difficult to apply enough feeding force. See illustration 2.

2.

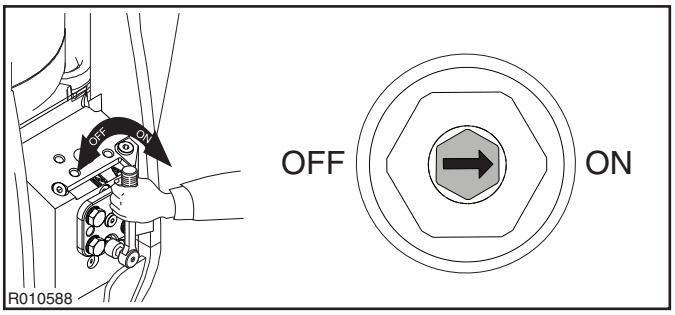


TURNING IDLE BLOW PROTECTION ON AND OFF

1. Remove the shield plate.



2. To turn Idle Blow Protection on, turn the valve clockwise with a hexagon wrench so that the arrow points to ON. To turn it off, turn to valve counterclockwise so that the arrow points to OFF.



3. Insert the shield plate.

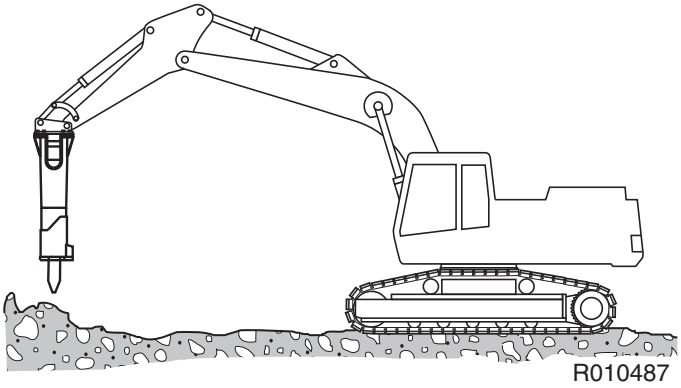
Note: Idle Blow Protection has only two positions, ON and OFF. Do not apply any other positions in between.

PREHEATING THE HAMMER

If the ambient temperature is lower than 0 °C (32 °F), it is recommended that you preheat the hammer according to these instructions:

1. Ensure that the Idle Blow Protection is turned ON.

2. Lift the hammer off the ground.

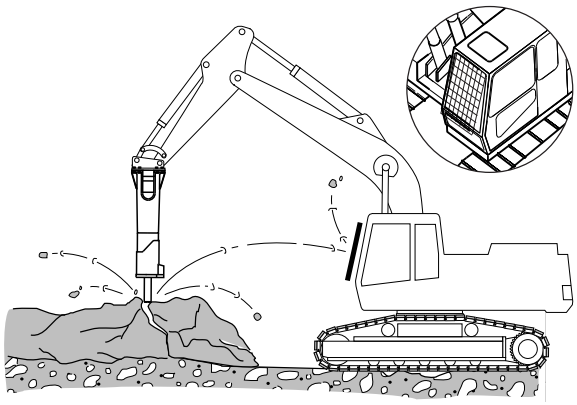


3. Press the hammer operating switch and drive oil through the hammer for a couple of minutes.

5.2 DAILY OPERATION

GENERAL GUIDELINES

- A safety screen is recommended to protect the operator from flying debris. Keep the cabin windows and doors closed during operation.



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- Keep the tool at a 90 degree angle at all times. If the object moves or its surface breaks, correct the angle immediately. Keep the feed force and tool aligned.
- Keep the tool shank well greased during operation. Regular visual inspections during operation are recommended. An unlubricated tool shank requires more frequent greasing intervals. A tool shank covered with excessive grease requires less frequent greasing intervals.

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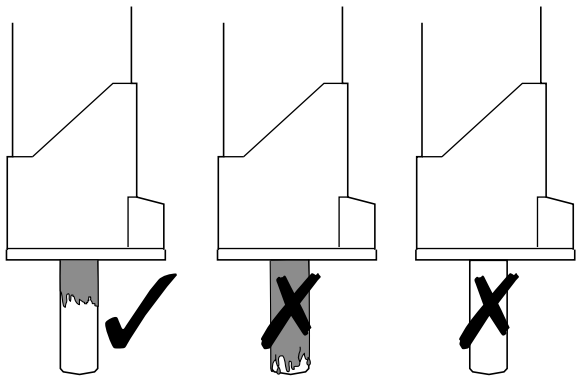
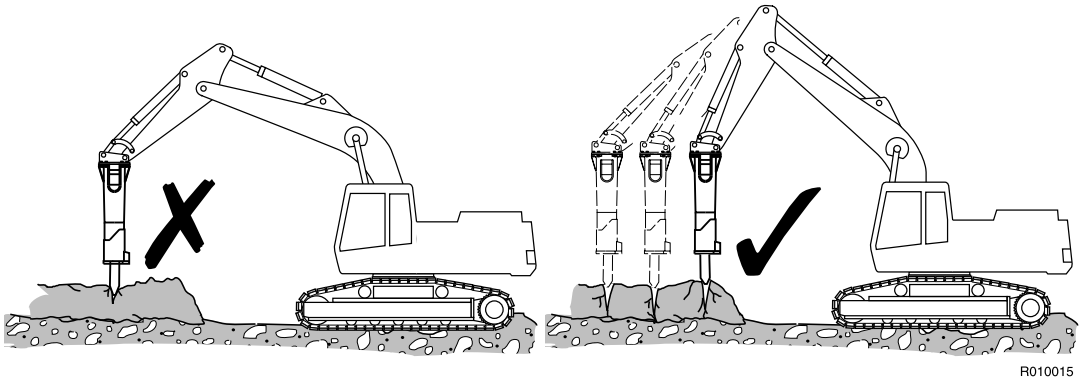
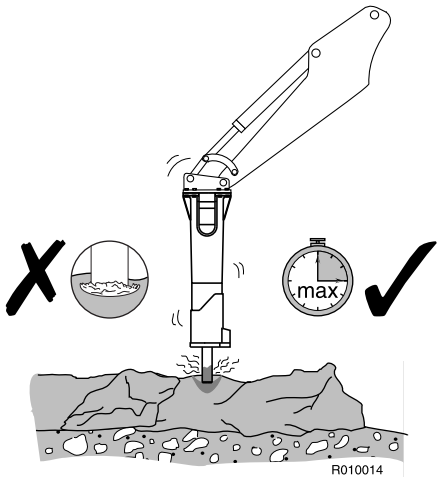


- To use the hammer most efficiently when breaking large objects, concentrate on small steps from the outer edge towards the middle.

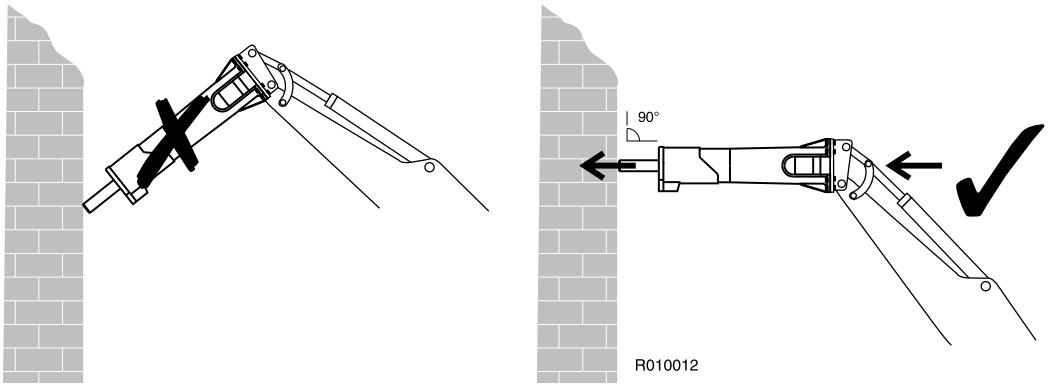


- Do not strike in one spot for more than 15 seconds at a time. If the object does not break, or if the tool does not penetrate, stop the hammer and change the position of the tool. Working too long in one spot will create stone dust under the tool. Dust dampens the impact effect and produces heat.

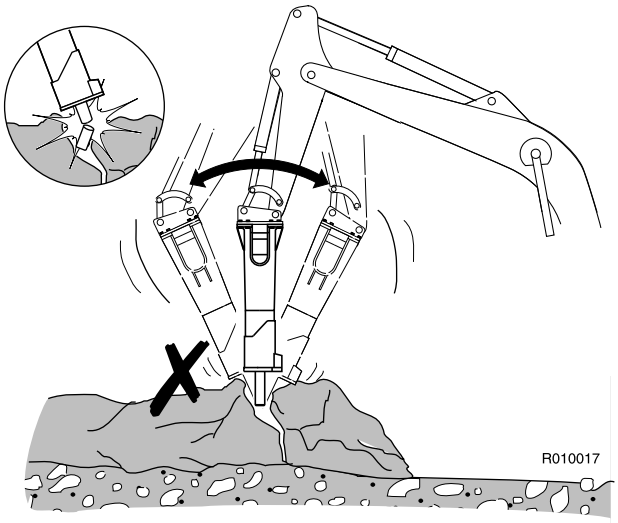


- Do not let the tool move outwards from the hammer when it penetrates. Keep the down-pressure on the hammer while breaking.
- Listen to the hammer's sound when you are using it. If the sound becomes weaker and the impact less efficient, the tool is misaligned with the material and/or there is not enough down force on the tool. Realign the tool and press the tool firmly against the material.

- When demolishing vertical structures (such as brick walls), place the tool against the wall at a 90 degree angle.

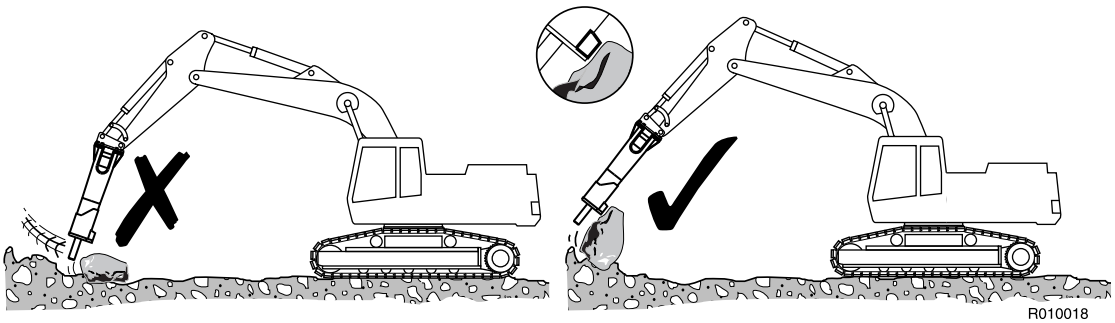


- When breaking concrete, hard or frozen ground, never strike and pry with the tool at the same time. The tool may break. Bending may be caused by stones inside hard or frozen ground. Be careful and stop striking if you find sudden resistance under the tool.

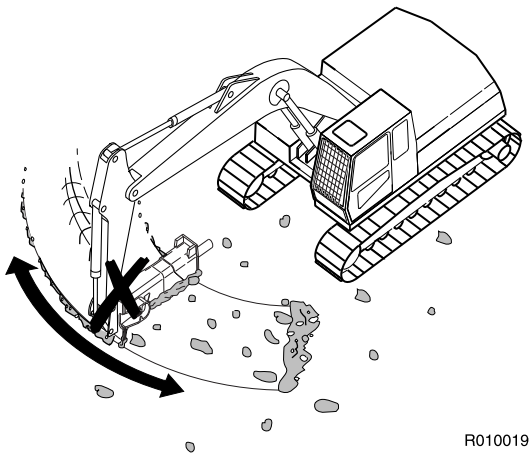


- When breaking hard or frozen ground, use the benching method. Start with clearing a small area from the edge. Then continue by breaking material towards the open area.

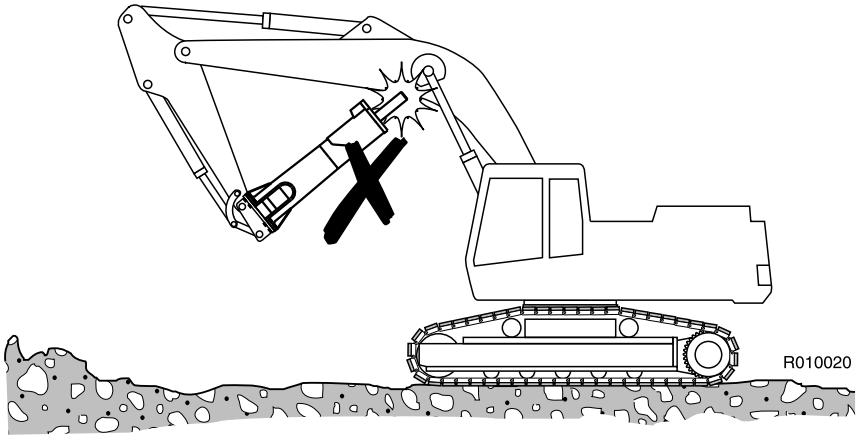
- Do not use the hammer tools to move rocks. The stone claws are designed for this purposes.



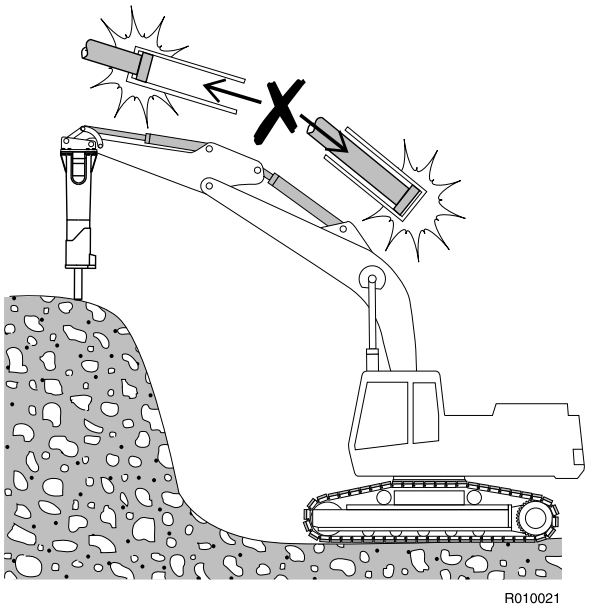
- Do not use the hammer to sweep the ground of debris. This may damage the hammer and the housing will wear out more quickly.



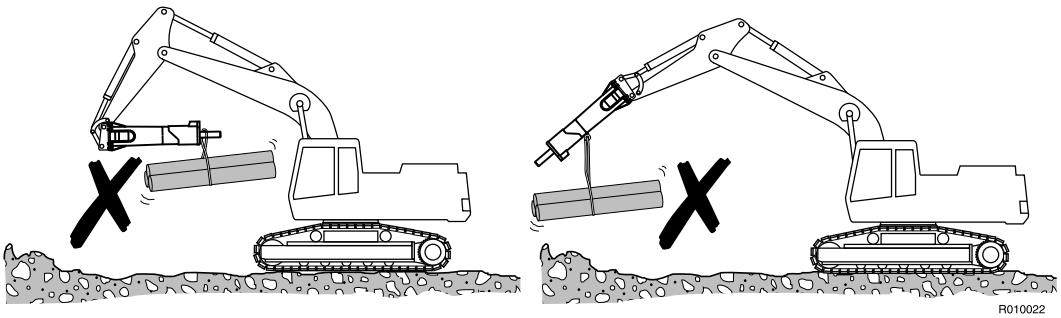
- When operating the hammer, make sure that it does not make contact with the carrier boom or hydraulic lines.



- Do not operate the hammer with the carrier's boom, stick or bucket cylinders at the end of their stroke (either fully extended or fully retracted). Damage to the carrier may result.



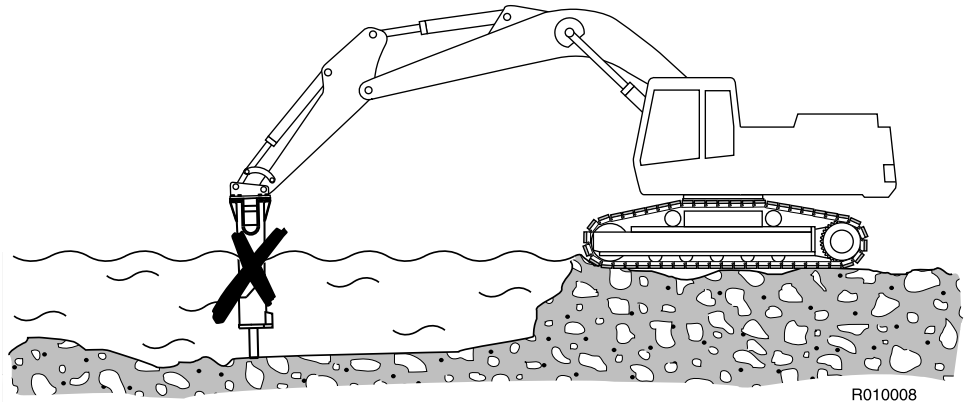
- Do not use the hammer or hammer tools for lifting. Lifting eyes on the hammer are for storage and maintenance purposes only.



WORKING PROCEDURE

Warning! Protect yourself and your neighbourhood against flying chips of rock. Do not operate the hammer or carrier if someone is too close to the hammer.

Do not use the hammer, as a standard assembly, under water. If water fills the space where the piston strikes the tool, this generates a strong pressure wave that may damage the hammer.

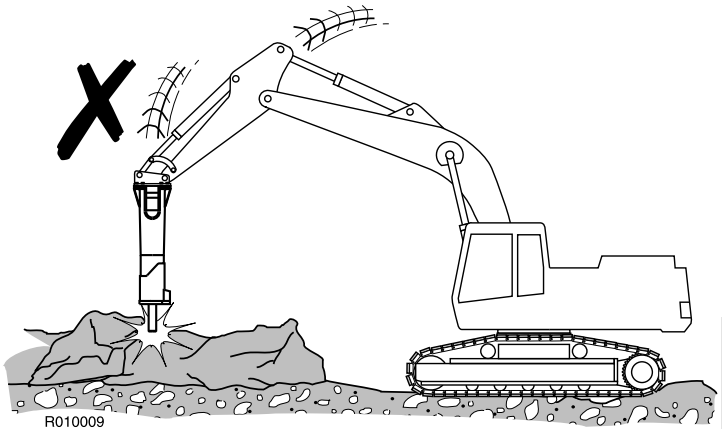


Warning! To avoid falling objects, do not use the product to lift other products. The lifting eyes located on the product housing are to be used solely to lift or handle the product itself. See “Lifting instructions” on page 10.

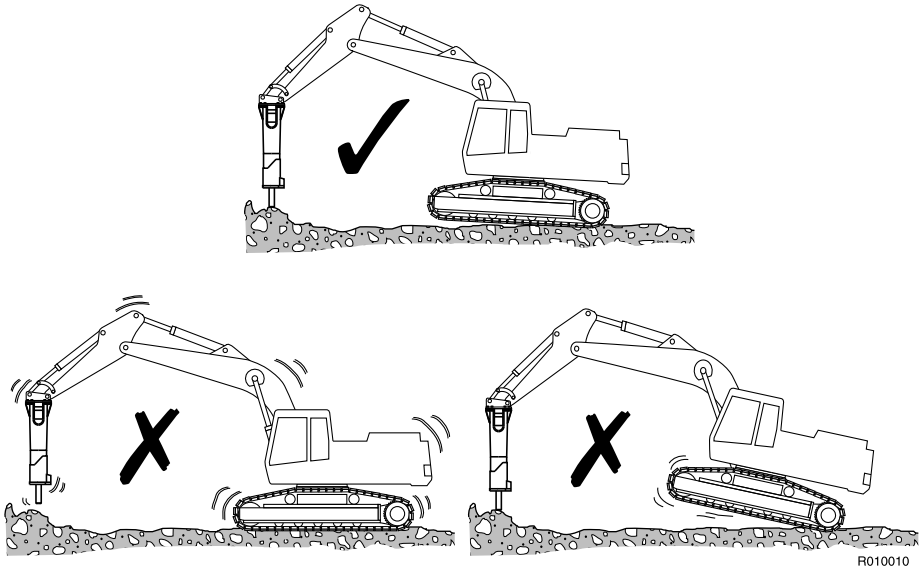
1. Prepare the carrier for normal excavation work. Move the carrier to the required position. Set the drive to neutral.

2. Set the engine speed to the recommended engine RPM for correct amount of oil supply.

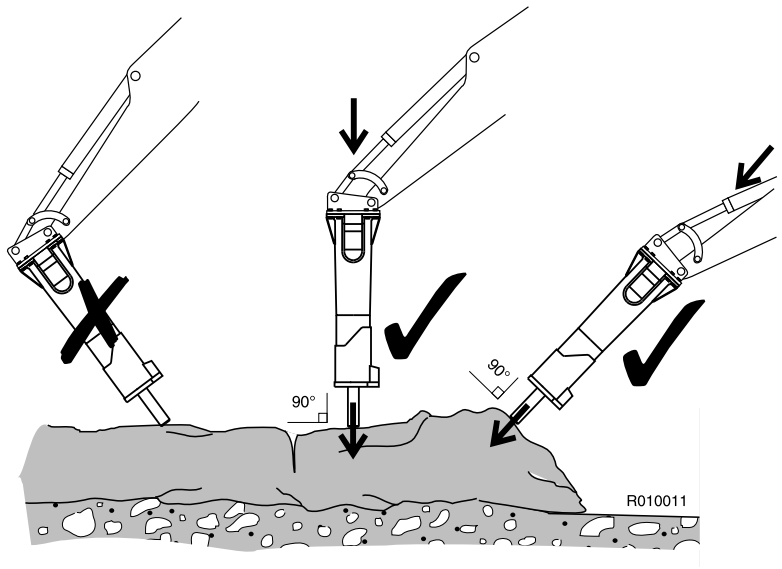
3. Carefully operate the carrier controls to place the hammer and boom into the breaking position. Quick and careless boom movements can result in damage to the hammer.



4. Use the excavator boom to press the hammer firmly against the object. Do not pry the hammer with the boom. Do not press too hard or too gently with the boom. The correct force is applied, when the tracks start to lift slightly from the ground.

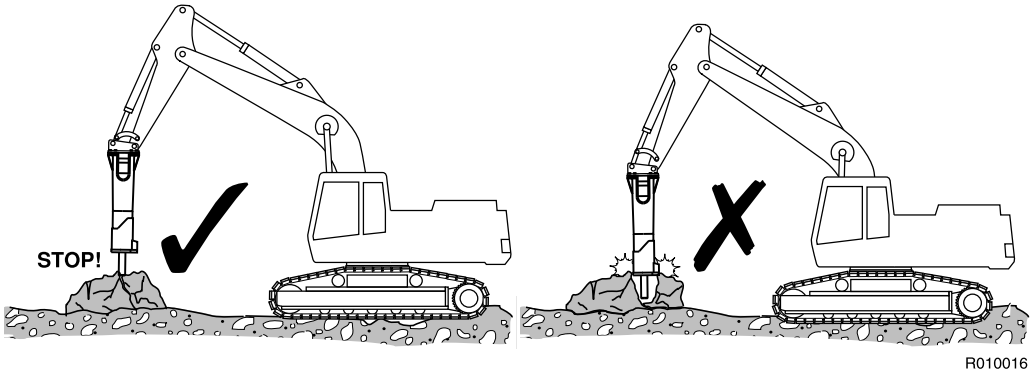


5. Place the tool against the object at a 90 degree angle. Avoid small irregularities on the object which will break easily and cause either idle strokes or an incorrect working angle.



6. Start the hammer.

7. Stop the hammer quickly. Do not allow the hammer to fall down and make idle strokes when an object breaks. Frequent idle strokes have a deteriorating effect on the hammer. If the hammer falls through, the housing wears out more quickly.



5.3 MOUNTING AND DISMOUNTING THE HAMMER

REMOVAL FROM CARRIER

Warning! The hammer must be secured from rolling over when disconnecting from the carrier. Only use a skilled operator to position the carrier for hammer removal!

Warning! Hydraulic pressure inside the hammer must always be released before opening hose connections!

Warning! Hot hydraulic fluid can cause severe injuries!

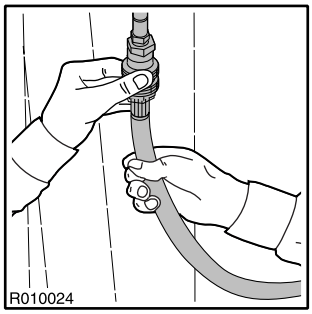
1. Position hammer horizontally on the floor. If the hammer is going to service, remove the tool.

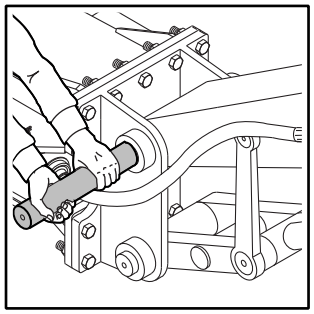
2. Stop the carrier engine. Operate boom and hammer controls to release pressure trapped inside hoses. Wait ten minutes for oil pressure to drop.

3. Close hammer inlet and outlet lines. If quick couplers are used, disconnection automatically closes hammer lines. If hammer line includes ball valves, please make sure that they are closed.

4. Disconnect hoses. **NOTICE! Protect environment from oil spills**. Plug the hoses and the hammer inlet and outlet ports to keep dirt out from hydraulic circuit.

5. Remove bucket pins and other parts.





6. The carrier can be moved aside.

INSTALLATION

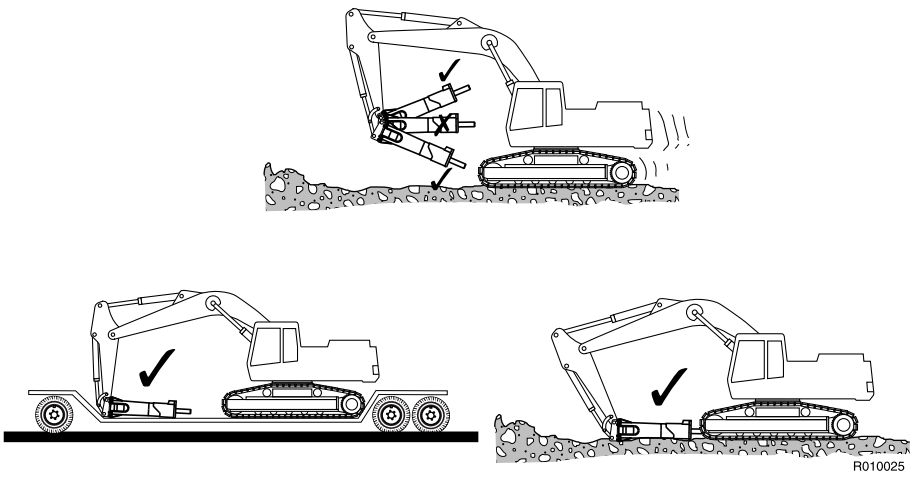
1. Install hammer in the same manner as mounting a bucket. Install bucket pins.

2. Connect hoses. Hammer inlet port is marked on the valve body with "IN" and outlet port with "OUT". An installation inspection must be carried out after the product has been mounted on the carrier. In the installation inspection certain specifications (such as operating pressure, oil flow) are checked so that they are within given limits. See “Hammer specifications” on page 82.

3. Open hammer inlet and outlet lines.

5.4 MOVEMENT

The transportation and parking positions are shown below. When moving with the hammer, ensure that it isn't too close and doesn't point at the cabin window.



5.5 SPECIAL CONDITIONS OF USE

Special conditions of use are conditions in which the hammer is used for some work other than normal breaking or demolition, such as:

- Hammer tunneling
- Foundry cleaning
- Underwater operations
- Operations in extremely low or high temperatures
- Use of special hydraulic fluids
- Hammer operations with a special carrier (e.g., an extra long boom)
- Other special conditions

Special conditions of use may require modifications to the attachment, special operating techniques, increased maintenance or special wear items. If you are planning to use the hammer under a special condition of use, please consult your local dealer for instructions.

UNDERWATER OPERATION

Use environmentally friendly oil and tool grease when you are using the hammer under water.

Warning! If you are using the hammer under water, protect yourself and your surroundings against compressed water/air spray and possible broken compressed air hoses.

Warning! If you are using the hammer under water, check the stability of the carrier and the hammer. Water gets inside the hammer, causing it to weigh more. Due to the added water weight, lift the hammer carefully out of the water.

The hammer as a standard assembly, must not be used under water. If water fills the space where the piston strikes the tool, a strong pressure wave is generated and the hammer may be damaged.

The latest hammer models can be modified for underwater operations for only short periods. The operating principle in underwater hammering is to conduct pressurized air through a built-in channel to the spaces above and below the piston. The air pressure prevents water entering the hammer. The hammer as a standard assembly, must not be used under water. If water fills the space where the piston strikes the tool, a strong pressure wave is generated and the hammer may be damaged. See “Underwater operation” on page 157.

The wear resistance of the hammer parts is considerably lower under water than in normal use. This is caused by corrosion and by the abrasive effect of mud in water. After starting underwater hammering, the hammer must be inspected regularly, for example after every half hour operation. Adapt the inspection intervals to the working conditions. See “Maintenance intervals in underwater use” on page 60.

In underwater applications, the productivity of a hydraulic hammer is considerably lower than in normal work. This is caused by:

1. The breaking object is not visible to the operator. This causes misalignment between the tool and the object and unnecessary idle strokes.

2. The hammer must be inspected and greased more often than in normal situations.

3. **The hammer must always be completely serviced after working on underwater job sites.**

5.6 STORAGE

LONG TERM STORAGE

Observe the following points when the hammer is stored. In this way the vital parts of the attachment are protected from rust and the machine is ready to be used whenever necessary.

1. The storage area must be dry.

2. The tool must be removed in hydraulic hammers.

3. The lower end of the piston, tool and tool bushings must be well protected with grease in all hydraulic hammers.

4. Connections must be sealed with clean plugs to prevent oil leakage and dirt from getting into couplings.

5. The product must be stored in the vertical position.

6. Make sure the product cannot fall.

LUBRICATION

1. HAMMER TOOL GREASING

1.1 RECOMMENDED GREASES

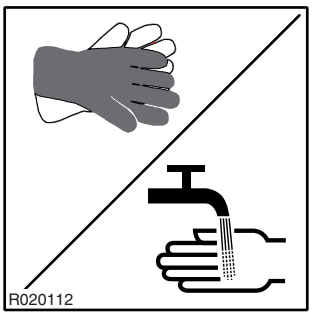
For tool lubrication use only RAMMER SPECIAL TOOL GREASE, part no. 902045 (400 g cartridge), part no. 902046 (18 kg drum), or any grease that meets the following criteria:

- No dropping point or very high, over 250 °C (480 °F).
- Maximum service temperature at least 150 °C (300 °F).
- Minimum working temperature below lowest ambient temperature.
- Additives: molybdenum disulfide (MoS_2), graphite or equivalent.
- Penetration 0 ... 2 (NLGI).
- No reaction with hydraulic oils.
- Water resistant.
- Good adhesion with steel.

AUTOMATIC GREASING

- RAMMER GREASE CARTRIDGE, part no. 951370

Wear gloves when handling the grease containers. If you get grease onto your skin, wash it away with soap and water.



1.2 AUTOMATIC GREASING

Dispose of empty grease containers appropriately.

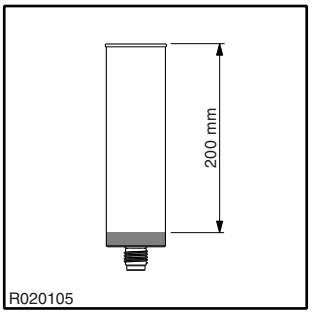
The hammer can be equipped with an automatic greasing device. See “Greasing device” on page 15.

Do not remove the grease cartridge unnecessarily. Always keep the grease cartridge in the greasing device to prevent dirt from entering the greasing device.

Note: Some hammer models are equipped with an adapter kit for manual greasing and do not include an automatic greasing device.

REPLACING THE GREASE CARTRIDGE

Measure the distance from the top of the grease cartridge. Replace the grease cartridge if the distance is more than 200 mm (7.87 in). The grease cartridge is empty and has to be replaced when the distance is 210 mm (8.27 in).

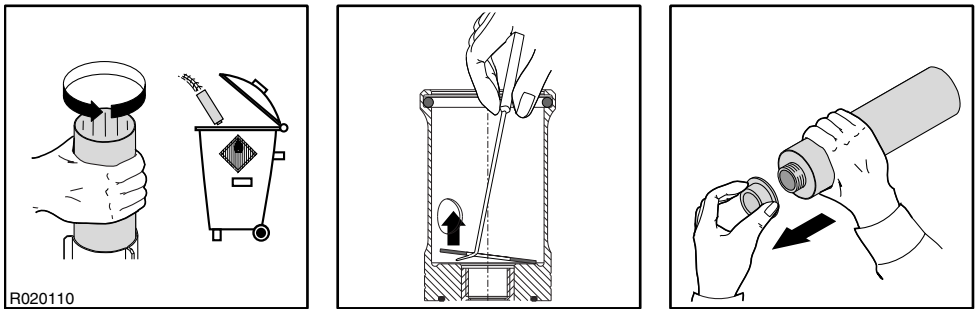


1. Unscrew and remove the grease cartridge.

2. Dispose the used cartridge appropriately. Note: The grease cartridge is disposable; it cannot be refilled.

3. Check and clean the grease cartridge seat in the cartridge holder. Remove the old grease cartridge seal.

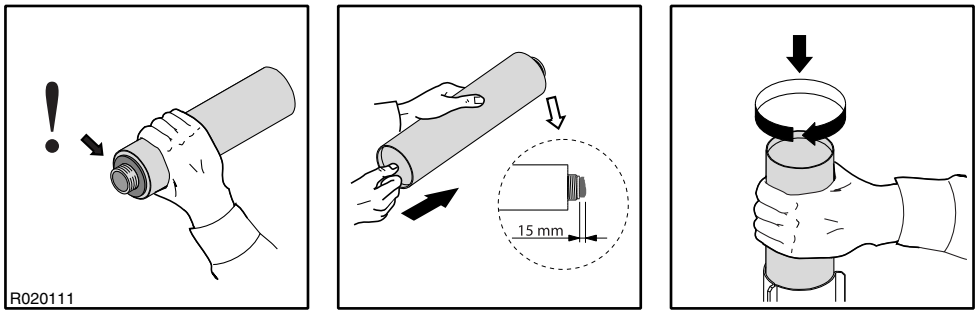
4. Remove the protective cap from the new cartridge.



5. Check the grease cartridge seal.

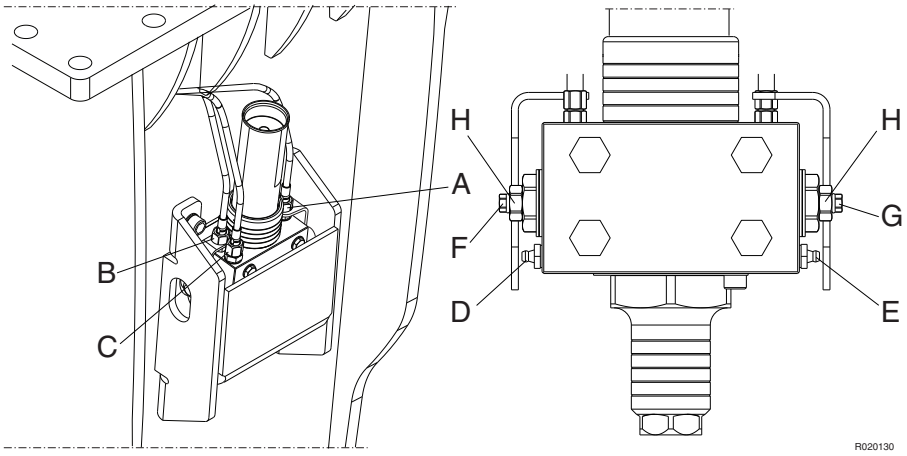
6. Push the cartridge piston with fingers until approximately 15 mm of grease comes out.

7. Insert the cartridge and tighten it.



1.3 ADJUSTING THE DOSE

Note: Some hammer models are equipped with an adapter kit for manual greasing and do not include an automatic greasing device.



A. Grease hose to upper tool bushing

B. Grease hose to lower tool bushing

C. Pressure hose

D. Grease nipple for manual greasing to lower tool bushing

E. Grease nipple for manual greasing to upper tool bushing

F. Adjusting screw for grease dosage to lower tool bushing

G. Adjusting screw for grease dosage to upper tool bushing

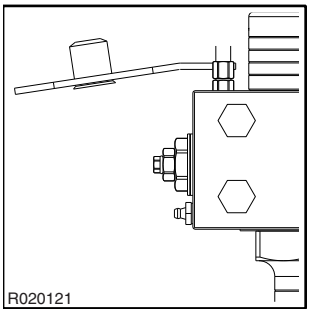
H. Locking nut for the adjusting screw

ADJUSTING THE DOSE

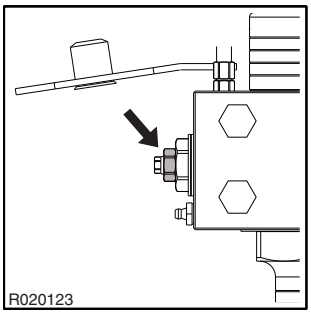
Please note that the actual amount of grease needed for proper lubrication varies according to:

- hammer size
- application: the amount of grease depends on the number of working cycles within a given time. In practice this means that, in an application where the working cycles are short but the quantity is high, a smaller dose can be used.
- wear rate of the tool shank and bushing
- condition of the tool seal
- operators working techniques
- grease quality

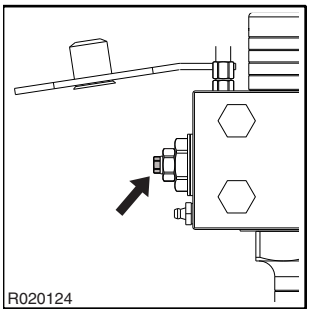
1. Turn the locking plate and plug aside.



2. Open the locking nut.



3. Turn the adjusting screw for grease dosage clockwise to close it completely.



4. Next open the adjusting screw for grease dosage by turning it counter-clockwise as needed. See table below.

5. Tighten the locking nut to the specified torque setting. See table below.

6. Turn the locking plate and plug to the correct positions.

Item	Specification/Torque
Shield screws	175 Nm (129 lbf ft)
Adjusting screw locking nut	50 Nm (37 lbf ft)
Adjusting range	Linear 0 ... 7 turns (7 mm)
Basic adjustment	4 turns open / means 0.25 g grease/ impact period
1-turn adjustment	0.053 g grease/impact period
For more information, see "Greasing device doser, Publ. no. A000192E" in Bulletins.	

1.4 MANUAL GREASING

Follow the product's greasing instructions and avoid excessive greasing. Dispose of empty grease containers appropriately.

Manual greasing is always possible even if the hammer is equipped with the automatic greasing device. Manual greasing is necessary if there is no grease available for the greasing device, greasing device has malfunction or pressure hose is damaged. Check also the grease hose conditions inside the housing.

GREASING INTERVAL ALL

1. Tool shank must be well lubricated before installing tool.

2. 5-10 strokes from grease gun to tool bushings and tool at regular intervals.

3. Adapt interval and amount of grease to wear rate of tool and working conditions. This can be anything between two hours and daily, depending on material (rock/ concrete) to be broken. See “Recommended greases” on page 46. For more information, see "Grease guide" in Dealer manual.

Insufficient greasing or improper grease may cause:

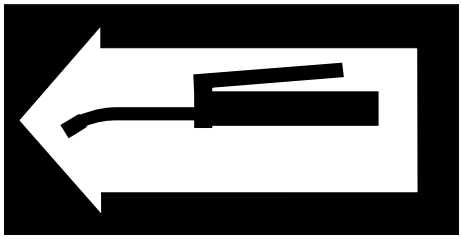
- Abnormal wear of tool bushing and tool
- Tool breakage

CORRECT GREASING

1. Position the hammer standing upright resting on the tool on firm surface.

2. Stop carrier engine and wait 10 minutes for oil pressure to drop inside hammer.

3. Apply tool grease from grease gun to greasing points marked with the following sticker.



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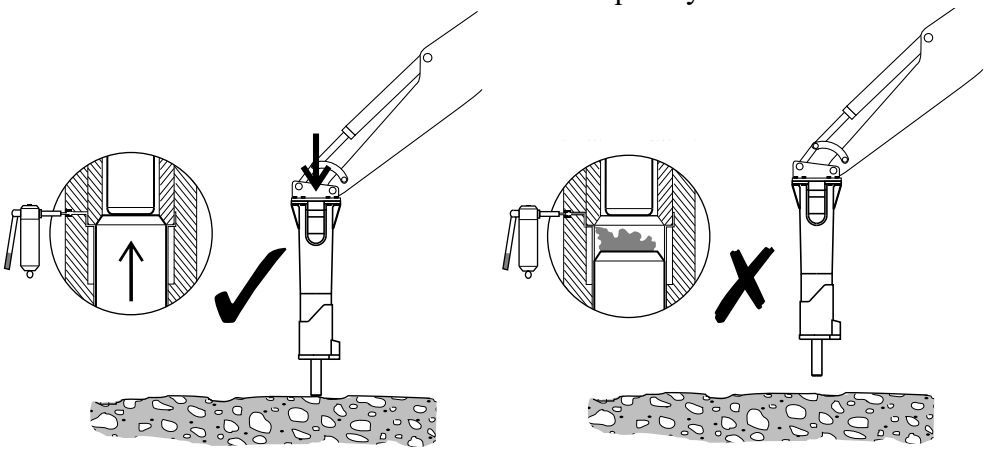
Note: The hammer must stand upright resting on the tool to ensure that the grease will penetrate downwards between the tool and the bushing.

Do not fill the space between the piston and the tool with grease. A lower piston seal failure can result and the hammer will subsequently leak oil.



R020001

2. CARRIER HYDRAULIC OIL

2.1 REQUIREMENTS FOR HYDRAULIC OIL

GENERAL REQUIREMENTS

In general the hydraulic oil originally intended for the carrier can be used with this product. However, since working with the product heats the oil more than the usual excavation work, the temperature of the oil must be monitored.

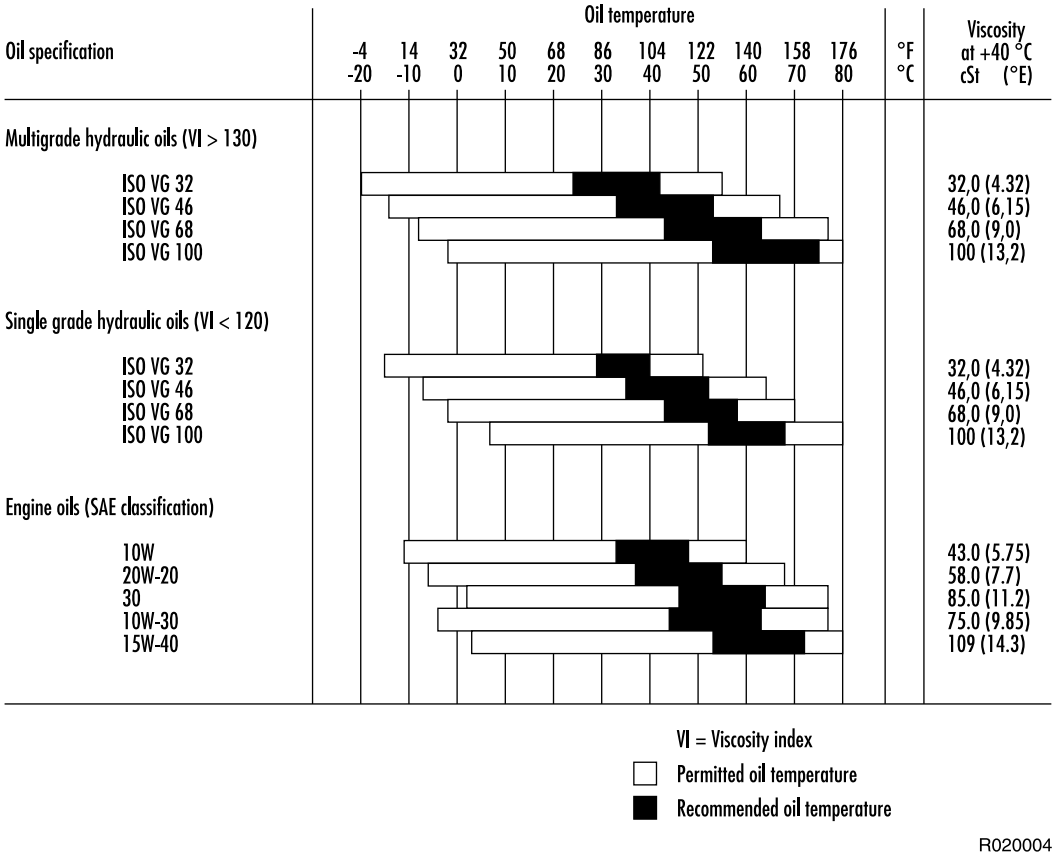
If the temperature of the hydraulic oil exceeds 80 °C (176 °F), an auxiliary oil cooler is needed. The oil viscosity must be between 20-1000 cSt while the attachment is being used.

When the product is used continuously, the temperature of the hydraulic oil normalizes at a certain level depending on conditions and on the carrier. The temperature in the tank must not exceed the maximum allowed.

The hammer must not be started if the ambient temperature is below freezing and the oil is very thick. The machine must be moved to bring the oil temperature above 0 °C (32 °F) before hammering can start (viscosity 1000 cSt or 131 °E).

OIL SPECIFICATIONS

Table below shows hydraulic oils recommended for hammer use. The most suitable oil is selected in such a way that the temperature of the hydraulic oil in continuous use is in the ideal area on the chart and the hydraulic system is used to best advantage.



Oil too thick

- Difficult start up
- Stiff operation
- Hammer strikes slowly
- Danger of cavitation in pumps and in the hydraulic hammer
- Sticky valves
- Filter bypass opens, impurities in the oil are not removed

Oil too thin

- Efficiency losses (internal leaks)
- Damage to gaskets and seals, leaks
- Accelerated wearing of parts, because of decreased lubrication efficiency
- Hammer strikes irregularly and slowly
- Danger of cavitation in pumps and in the hydraulic hammer

Note: We strongly recommend the use of different hydraulic oils in the summer and in the winter if there is an average temperature difference of more than 35 °C (63 °F). The correct hydraulic oil viscosity is thus ensured.

SPECIAL OILS

In some cases special oils (for example biological oils and non-inflammable oils) can be used with hydraulic hammers. Observe the following aspects when considering the use of special oils:

- The viscosity range in the special oil must be in the given range (20-1000 cSt)
- The lubrication properties must be sufficient
- The corrosion resistance properties must be good enough

Note: Although a special oil could be used in the carrier, always check its suitability with the hammer due to high piston speed of the hammer. Contact the oil manufacturer or your local dealer for more information about special oils.

2.2 OIL COOLER

The correct place to connect the hammer return line is between the oil cooler and the main filters. The hammer return line should not be connected before the oil cooler. Routing the hammer return flow through the cooler, might damage either the cooler, due to pulsating flow, or the hammer, due to increased back pressure.

The carrier hydraulic system must be able to maintain the temperature within an acceptable level during the hammer operation. This is for two reasons.

1. Seals, wipers, membranes and other parts manufactured from the corresponding materials can normally stand temperatures up to 80 °C (176 °F).

2. The higher the temperature is, the less viscous the oil gets thus losing its capability to lubricate.

A standard carrier, with a proper hammer circuit, meets the requirements of the necessary cooling capacity. If the oil temperature tends to be too high during the hammer operation, the following things must be checked:

- The hammer circuit pressure relief valve is not open when the hammer is operated.
- The hammer circuit pressure drops are reasonable. Less than 10 bar (145 psi) in the pressure line and less than 5 bar (75 psi) in the return line.
- Hydraulic pumps, valves, cylinders, motors etc. and hammer do not have internal leakages.

If all of the above mentioned things are in order, and the temperature of the hydraulic oil still tends to be too high, extra cooling capacity is needed. Consult the carrier manufacturer or dealer for details.

2.3 OIL FILTER

The purpose of the oil filter is to remove impurities from the hydraulic oil. Air and water are also impurities in oil. Not all impurities can be seen with the naked eye.

Impurities enter the hydraulic system:

- During hydraulic oil changes and refilling.
- When components are repaired or serviced.
- When the hammer is being installed on the carrier.
- Because of component wear.

Normally the existing main oil filters of the carrier are used as hammer circuit return line filters. Consult the carrier manufacturer or your local dealer concerning instructions for the filter change intervals.

In hydraulic hammer work the carrier oil filter must fulfil the following specifications:

- The oil filter must allow maximum particle size of 25 microns (0.025 mm).
- The oil filter material must be artificial fibre cloth or very fine gauge metallic mesh to withstand pressure fluctuations.
- The oil filter must have a nominal flow capacity of at least twice the hammer's maximum flow.

In general, oil companies guarantee new oils to have a particle count of 40 microns maximum. Filter the oil when filling the tank.

The damage caused by hydraulic oil impurities in the carrier and hammer circuits:

1. The working life of the pumps and other components is significantly shortened.

- Rapid wear of parts.
- Cavitation.

2. Wear of cylinder and gaskets.

3. Reduced hammer efficiency.

- Accelerated wear of moving parts and seals.
- Danger of piston seizing up.
- Oil leakages.

4. Shortened working life and reduced lubricating capability of oil.

- Oil overheats.
- Oil quality deteriorates.
- Electro-chemical changes in hydraulic oil.

5. Valves do not function properly.

- Spools bind.
- Rapid wear of parts.
- Blocking of small holes.

Note: Component damage is only a symptom. The trouble itself will not be cured by removing the symptom. After any component damage due to impurities in the oil, the entire hydraulic system has to be cleaned. Dismantle, clean and reassemble the hammer and change the hydraulic oil.

MAINTENANCE

1. ROUTINE MAINTENANCE

1.1 OVERVIEW

This product is a precision-made hydraulic machine. Therefore, great care and cleanliness should be taken when handling any of the hydraulic components. Dirt is the worst enemy in hydraulic systems.

Handle the parts carefully and remember to cover any cleaned and dried parts with clean lint-free cloth. Do not use anything other than purpose-designed materials for cleaning hydraulic parts. Never use water, paint thinners or carbon tetrachloride.

Components, gaskets and seals in the hydraulic system should be oiled with clean hydraulic oil before assembly.

1.2 INSPECTION AND MAINTENANCE BY THE OPERATOR

Note: Time intervals in carrier hours refer to the length of time that the carrier is operating with the hammer attached.

EVERY TWO CARRIER HOURS

- Check that the grease cartridge is not empty. Replace if necessary.
- Check that the tool has received sufficient grease.
- Grease manually if the automatic greasing device is not in use. See “Manual greasing” on page 50.
- Observe hydraulic oil temperature, all lines and connections as well as impact efficiency and evenness of operation.
- Tighten loose connections.

EVERY 10 CARRIER HOURS OR AT LEAST ONCE A WEEK

- Remove the tool retaining pin and the tool for inspection. Grind the burrs away, if necessary. See “Changing the tool” on page 61.
- Check that the tool has received sufficient greasing. Adjust greasing setting more frequently, if necessary.

EVERY 50 CARRIER HOURS OR AT LEAST ONCE A MONTH

- Check the tool shank and tool bushings for wear. See “Changing the tool” on page 61. See “Changing the lower tool bushing” on page 64.
- Check the hydraulic hoses. Replace if necessary. Do not let dirt get into the hammer or hoses.
- Check that the impact unit moves normally inside the housing and that vibration dampening elements (pads and buffers) are in good condition.
- Check the condition of the wear plates. Move the impact unit from side to side in the housing with a pry bar to check the clearance. The maximum allowed clearance is approximately ±10 mm.

1.3 INSPECTION AND MAINTENANCE BY THE DEALER

Note: The times given refer to the carrier hours while the attachment is installed.

INITIAL 50-HOUR INSPECTION

It is recommended to have the first inspection done by your local dealer after 50 to 100 operating hours. Contact your local dealer for more information about the initial 50-hour inspection.

PERIODIC OR ANNUAL SERVICE MAINTENANCE

In general, have this regular service performed every 1000 carrier operating hours or once a year, whichever comes first.

If your hammer has an RD3 device, have this regular service performed every 800 hammer work hours or once a year, whichever comes first.

Neglecting the periodic or annual service can cause severe damage to the hammer.

During this service, your local dealer will replace all seals, accumulator membranes, and any damaged safety decals. Contact your local dealer for more information about this servicing.

For this maintenance, you should also perform the following tasks:

- Check all hydraulic connections.
- Check that the hydraulic hoses do not rub against anything in any boom position.
- Inspect the hydraulic oil filters of the carrier and replace if needed.

1.4 MAINTENANCE INTERVALS IN SPECIAL APPLICATIONS

The service interval is considerably shorter in special applications. See “Special conditions of use” on page 42. In special applications, consult your local dealer for the recommended service intervals.

MAINTENANCE INTERVALS IN UNDERWATER USE

After every half hour of carrier operation

- Grease the tool shank and the tool bushings through the grease nipples.
- Check that the impact unit moves normally inside the housing and that the buffers are in good condition.
- Check all hoses and connections.
- Check the operation of the air pressure switch.

Daily maintenance

- Remove the tool retaining pin and the tool for inspection. Grind burrs away, if necessary.
- Check that the tool has received sufficient grease.
- Service the hammer after underwater jobs.

The hammer must be totally dismantled and serviced after working under water.

Neglecting a hammer service after underwater work can cause severe damage to the hammer.

The hammer, as a standard assembly, must not be used under water. If water fills the space where the piston strikes the tool, a strong pressure wave is generated and the hammer may be damaged.

1.5 OTHER MAINTENANCE PROCEDURES

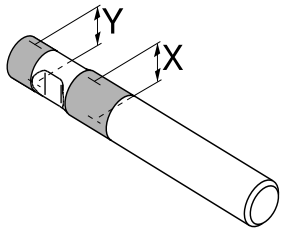
WASHING THE ATTACHMENT

When working with attachment and removing it from the carrier, dirt (mud, rock powder etc.) can become attached to it. Wash the outside of the product with a steam washer before sending it to the workshop. Dirt can cause difficulties in disassembly and assembly otherwise.

CAUTION! Plug the pressure and return line and other connections before washing the product or else dirt can enter into it and this may cause damage to the components.

2. CHANGING THE TOOL

WEAR LIMITS AND LUBRICANTS FOR TOOL REMOVAL



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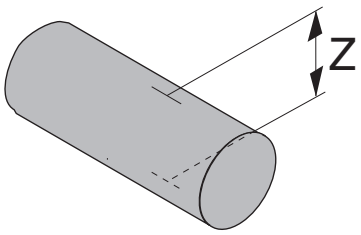
Item	Wear limit
Tool diameter X (worn out)	133 mm (5.24 in)
Tool diameter Y (worn out)	128 mm (5.04 in)



R030149

Item	Wear limit
Tool retaining pin diameter Z (worn out)	59 mm (2.32 in)

Item	Lubricant
Tool and tool retaining pins	Tool grease

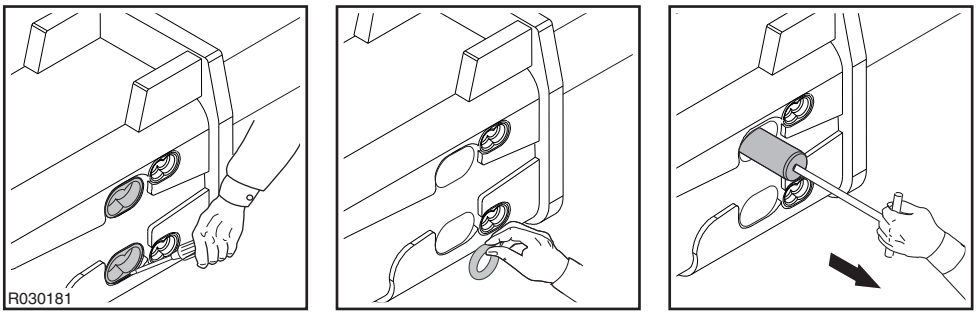
REMOVAL OF TOOL

Warning! The hydraulic pressure inside the hammer must always be released before removing the tool. After operating the hammer, wait 10 minutes for oil pressure to drop inside hammer.

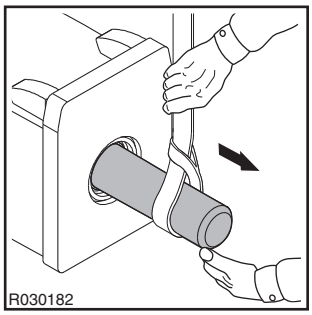
Warning! Hot tool can cause severe injuries.

Do not throw used hammer tool away at job site. Used tools can be recycled by delivering them to an authorized scrap metal collection facility.

1. Set the hammer on level ground.
2. Make sure the carrier's transmission is in neutral and the parking brake is engaged.
3. Stop the carrier engine.
4. Remove plugs.
5. Remove rubber rings.
6. Remove tool retaining pins by using t-puller.



7. Remove tool. Use lifting device if necessary. See “Tool specifications” on page 85.



Note: If hammer is still on carrier, it may be easier to stick the tool in the ground and lift the hammer off the tool. Make sure that the tool cannot fall.

INSTALLATION OF TOOL

1. Clean all parts carefully.

2. Measure the tool diameters (X and Y) from the areas marked on the illustration. Replace tool if necessary. See “Changing the tool” on page 61.

3. Measure the tool retaining pin diameter (Z). Replace tool if necessary. See “Changing the tool” on page 61.

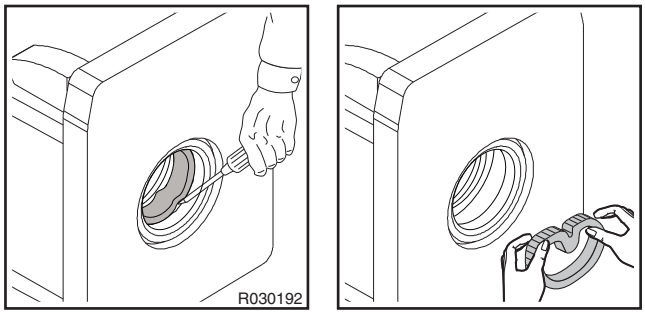
4. Check the tool seal surface condition. If seal is damaged replace it.

5. Check the shape of the seal. It should be round, not oval in shape.

6. Measure seal inner diameter from area with most wear. Replace it if not as specified.

7. If the shape developes oval, the seal should be removed from its groove and the groove cleaned thoroughly. If old seal is reinstalled, diameter needs to be checked again.

8. When seal is replaced with new, make sure surface of the tool is in good condition (on the tool sealing area). Smoothen with emery cloth (grit size P120...P150), if necessary.



9. Clean the tool and retaining pins and lubricate them with tool grease.

10. Install tool and align the grooves of the tool with the pin bores.

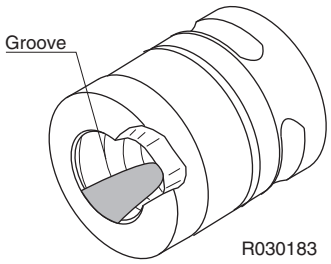
11. Install tool retaining pins.

12. Install rubber rings.

13. Install plugs.

3. CHANGING THE LOWER TOOL BUSHING

WEAR LIMITS AND LUBRICANTS FOR LOWER TOOL BUSHING



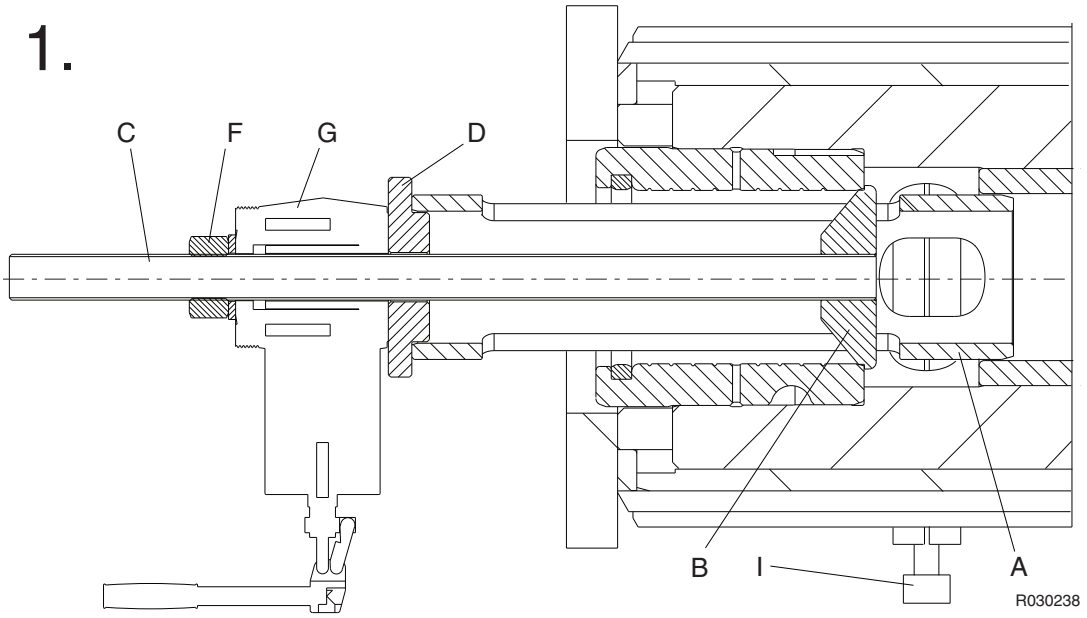
Item	Wear limit
Tool bushing (worn out)	First three grease grooves are worn out. Bushing must be replaced.

Item	Lubricant
Contact surfaces of front head and wedges	Thread grease

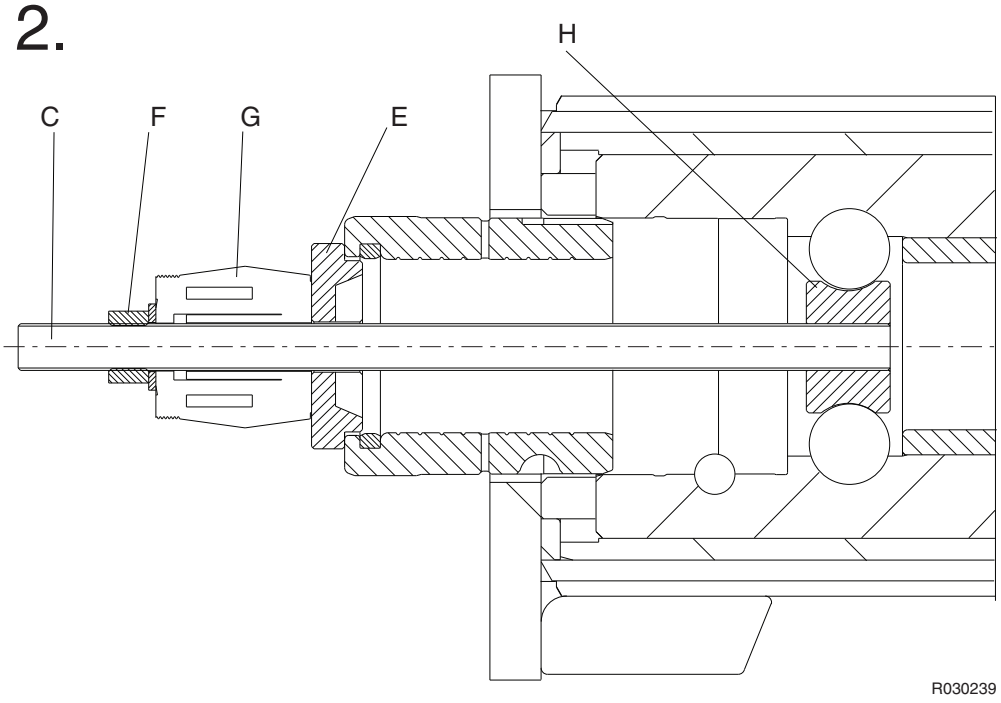
LOWER TOOL BUSHING EXTRACTION TOOL

The lower tool bushing extraction tool can be used for pulling out the lower tool bushing (Puller arrangement) or for pushing in the lower tool bushing (Pusher arrangement). See illustrations 1. for Puller arrangement and 2. for Pusher arrangement.

1.



2.



A. Puller frame

B. Puller plate

C. Screw

D. Plate

E. Plate

F. Nut

G. Hydraulic hole cylinder

H. Locking plate

I. Wedge

Note: Use only genuine Rammer parts. See “Special service tools” on page 167. in the Service manual for the part numbers.

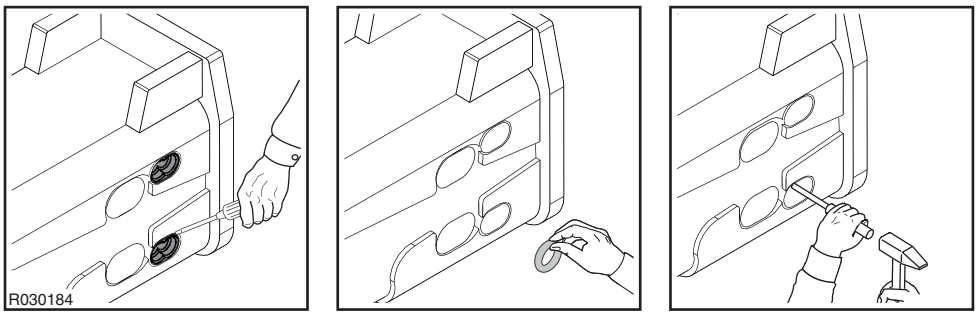
REMOVAL OF LOWER TOOL BUSHING

Do not throw used hammer tool bushing away at job site. Used tool bushings can be recycled by delivering them to an authorized scrap metal collection facility.

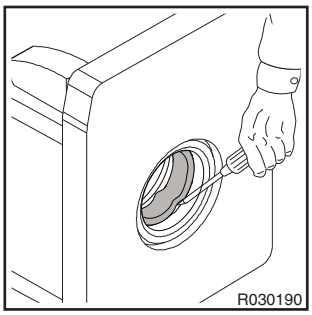
1. Remove tool.
2. Remove rubber plugs.

3. Remove rubber rings.

4. Remove retaining pins.



5. Remove tool seal.

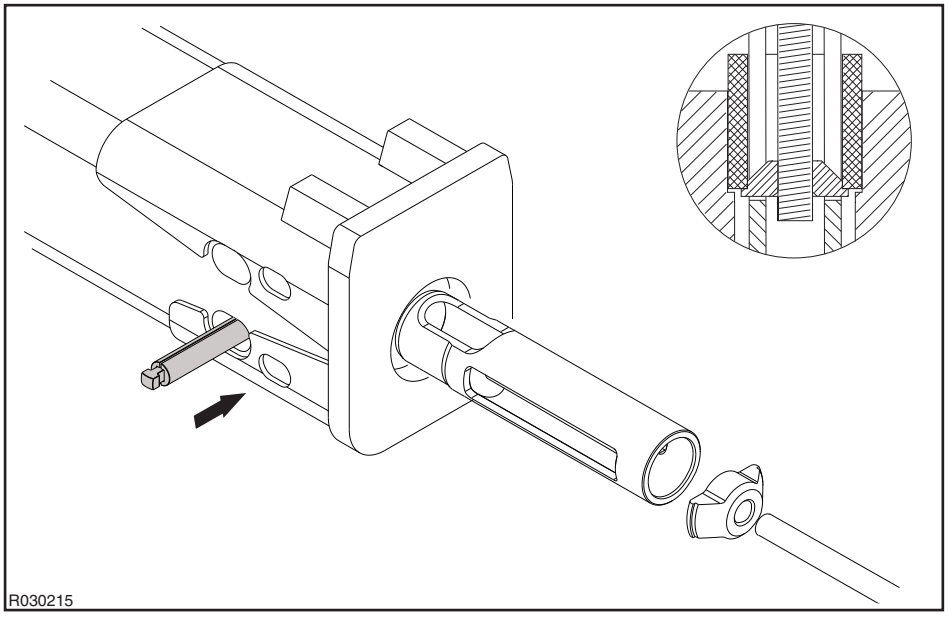


6. Install puller frame inside the lower tool bushing.

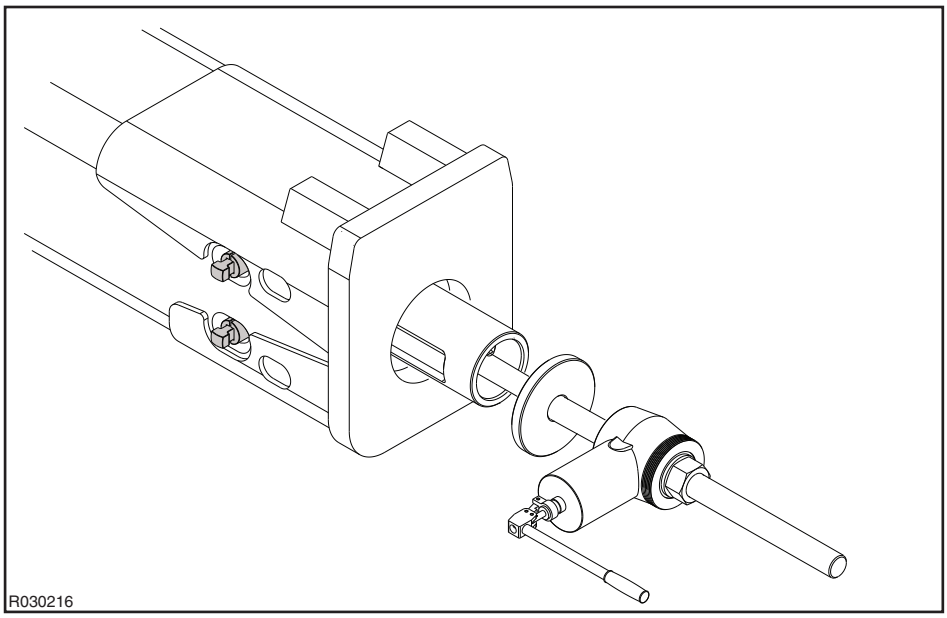
7. Install puller plate inside puller frame behind the lower tool bushing.

8. Apply thread grease on contact surfaces of wedge and lock puller frame with wedges.

9. Install screw to puller plate.



10. Install plate, hole cylinder and nut.



11. Pull lower tool bushing out by using hydraulic hole cylinder. If tool bushing is stick, loose screw and hit wedges with a sledge hammer to loose lower tool bushing and then pull lower tool bushing out.

12. Remove plate, hole cylinder and nut.

13. Remove lower tool bushing.

14. Remove wedges.

15. Remove puller frame, screw and puller plate.

INSTALLATION OF LOWER TOOL BUSHING

1. Clean and dry all parts carefully. Check all parts for cracks and excessive wear. See wear limits for thrust ring and upper tool bushing in specifications section. See “Changing the lower tool bushing” on page 64.

2. Replace or rotate the lower tool bushing. Note: If the lower tool bushing is worn out, replace it with a new one. However, if the lower tool bushing does not exceed wear limits and is still usable, you can rotate it 90 degrees and reinstall it.

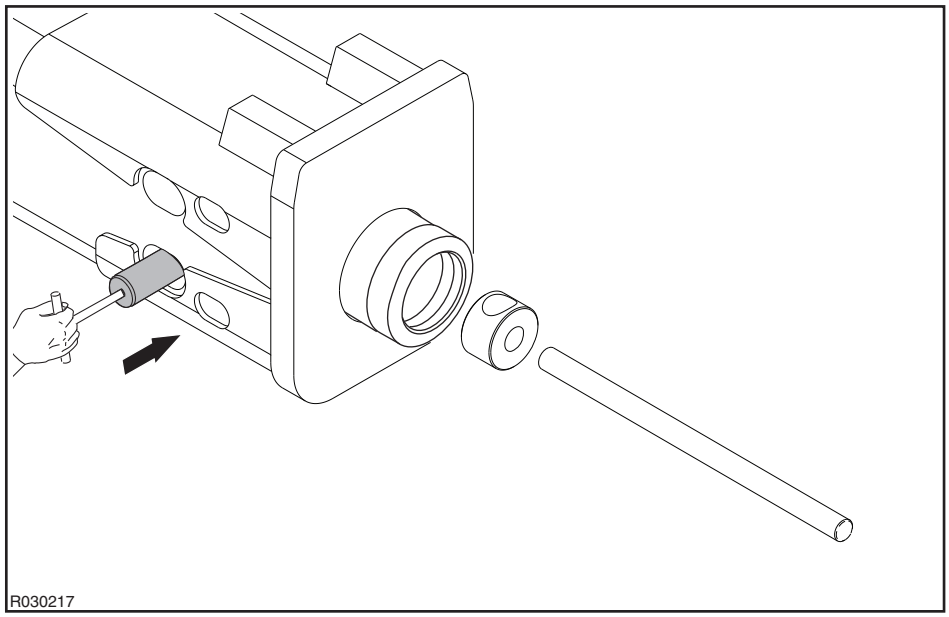
3. Apply thread grease on contact surfaces of lower tool bushing and front head.

4. Install lower tool bushing to the front head. Align grooves and screw in the front head and grooves in the lower tool bushing

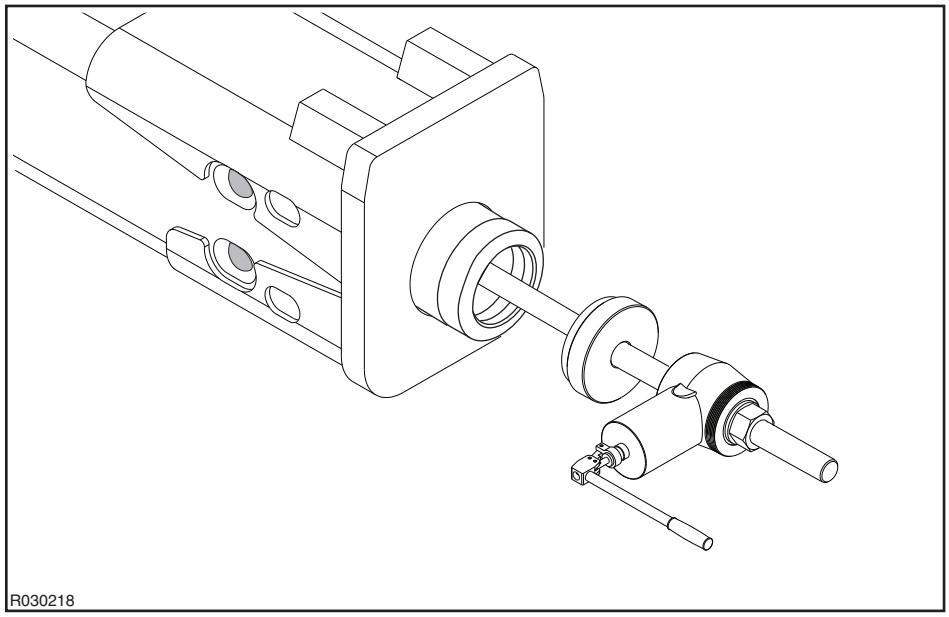
5. Install locking plate.

6. Lock locking plate with tool retaining pins.

7. Install screw.

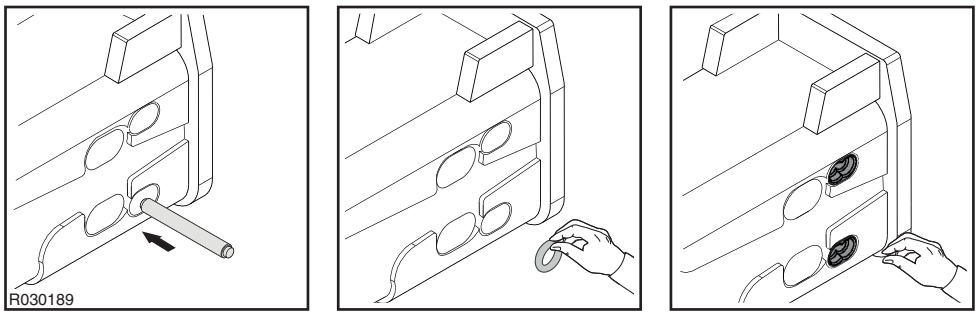


8. Install plate, hole cylinder and nut.



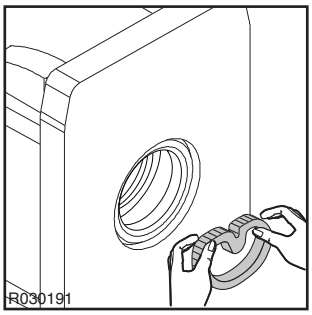
9. Push lower tool bushing in with hole cylinder.
10. Install retaining pins.
11. Install rubber rings.

12. Install rubber plugs.



13. Remove tool retaining pins and tool bushing's assembly tool.

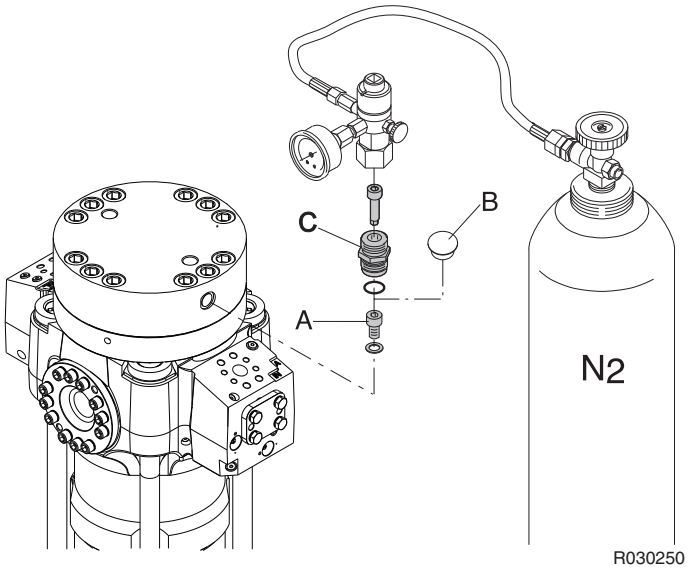
14. Install new seal. Make sure surface of the tool is in good condition (on the tool sealing area). Smoothen with emery cloth (grit size P120...P150), if necessary.



15. Install the tool.

4. CHECKING PRESSURE IN THE ACCUMULATOR

TORQUES, ADJUSTMENTS AND LUBRICANTS



Item	Tightening torque
Accumulator filling plug (A)	20 Nm (15 lbf ft)
Shield plug (B) Rubber plug no. 954323	
Adapter(C) 101635	

Item	Charging pressure
Nitrogen (N_2)	40 bar (580 psi)

CHECKING PRESSURE IN THE ACCUMULATOR

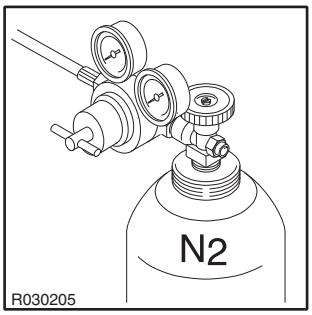
Warning! Use only nitrogen (N_2) for charging accumulator. Use of other gases may cause accumulator to explode.

Note: The pressure reducing valve must be installed to the nitrogen bottle.

1. Place the hammer in a horizontal position with the pressure accumulator recharging point faced upwards. During inspection, the piston may move unexpectedly. Make sure the tool is fully extracted and that no people or equipment are near the end of the tool.

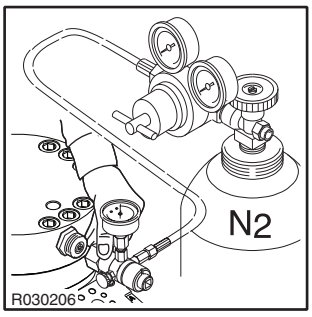
2. Remove the rubber plug from the accumulator.

3. Install pressure reducing valve to the nitrogen bottle.



4. Install charging device.

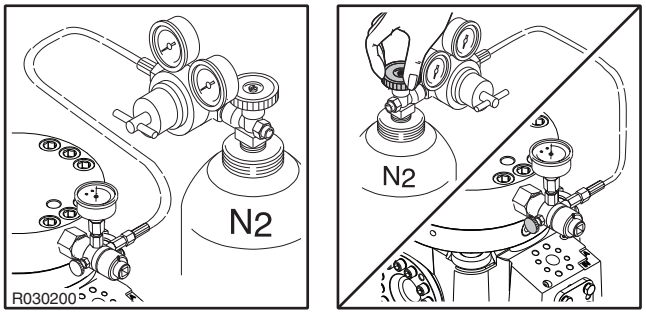
5. Connect charging system to nitrogen bottle.



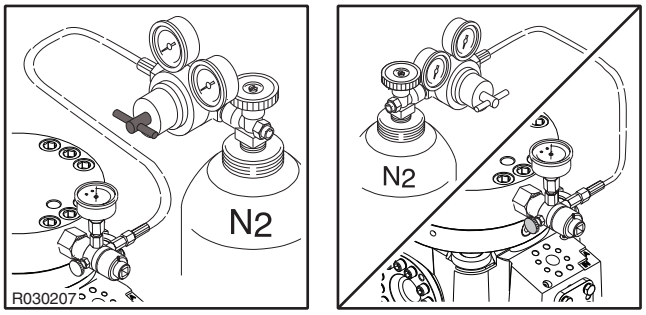
6. Adjust pressure reducing valve to 0 bar.

7. Check that the discharge valve on the charging device is closed.

8. Carefully open nitrogen gas bottle valve.

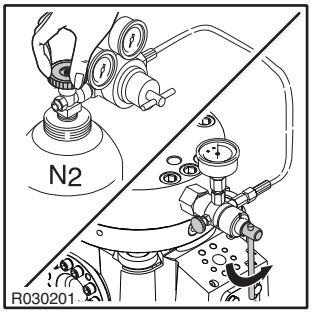


9. Carefully open the adjusting screw of the pressure reducing valve and adjust to 40 bar. If pressure go over specified, open discharge valve on charging device carefully and release pressure under specified and close discharge valve. Adjust pressure again.



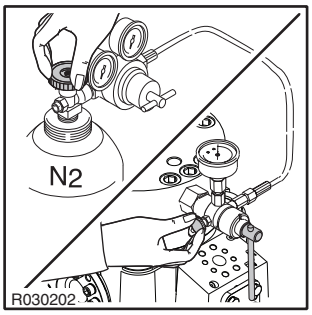
10. Shut nitrogen gas bottle valve.

11. Open filling plug carefully through charging device three (3) turns. Observe pressure gauge reading.



12. If pressure is under specified, carefully open nitrogen gas bottle valve and adjust gas flow to minimum. Open adjusting screw of pressure reducing valve and charge accumulator 2-3 bar above specified charging pressure. Observe pressure gauge reading. Shut nitrogen gas bottle valve.

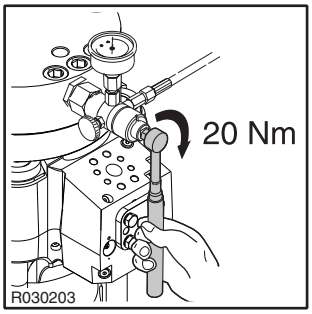
13. If pressure is over specified, Open discharge valve on charging device fully and charge accumulator 2-3 bar above specified charging pressure. Close discharge valve on charging device. Observe pressure gauge reading.



14. Wait 10 minutes for nitrogen gas pressure to stabilize inside accumulator.

15. Adjust pressure in accumulator to correct setting by carefully opening discharge valve if necessary.

16. Torque filling plug through charging device to specified setting.

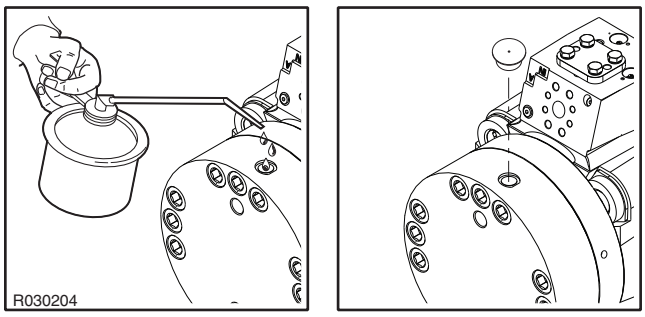


17. Release pressure from charging hose by opening discharge valve.

18. Remove charging device and adapter from accumulator.

19. Check accumulator for nitrogen leak by filling Usit-ring area with thin oil. If gas bubbles appear, discharge accumulator and replace Usit-ring.

20. Install rubber plug.



5. TROUBLESHOOTING

5.1 THE HAMMER DOES NOT START

PRESSURE OR RETURN LINES CLOSED

Check the operation of quick couplings in hammer line. Open hammer line ball valves if closed. For more information, see "Shut-off valves" in Dealer manual.

PRESSURE AND RETURN HOSES INSTALLED BACKWARDS

Swap the pressure and return hoses.

IDLE BLOW PROTECTION TURNED ON AND FEEDING FORCE IS TOO LOW

Turn Idle Blow Protection off or increase feeding force against object.

PISTON IS IN ITS LOWER HYDRAULIC BRAKE

Keep the hammer control valve open and force the tool against an object. The tool head will push the piston out of its brake area. See “Daily operation” on page 33.

GREASE BETWEEN PISTON AND TOOL CONTACT AREA

Remove the tool and wipe excessive grease off. See “Manual greasing” on page 50.

HAMMER CONTROL VALVE DOES NOT OPEN

When operating the hammer control valve, check that the pressure line pulsates (this indicates the hammer control valve is opening). If the valve does not operate, check the operating means: mechanical connections, pilot pressure and electrical control. For more information, see "Hammer control valve" in Dealer manual.

RELIEF VALVE IN HYDRAULIC CIRCUIT OPENS AT A LOW PRESSURE. HAMMER OPERATING PRESSURE IS NOT REACHED

Check the installation. Check the relief valve operation. Adjust the relief valve in hydraulic circuit. Measure the high pressure in the hammer inlet line. Contact your local dealer for more information. See “Measuring hammer circuit” on page 163. See “Measuring hammer operating pressure” on page 165. For more information, see "Pressure relief valves" in Dealer manual.

EXCESSIVE BACK PRESSURE IN RETURN LINE

Check the installation. See “Measuring hammer circuit” on page 163. Check the size of the return line. For more information, see "Correct line size" in Dealer manual.

LEAKAGE FROM PRESSURE TO RETURN IN EXCAVATOR HYDRAULIC CIRCUIT

Check the installation. Check the pump and the other hydraulic components.

FAILURE IN HAMMER VALVE OPERATION

The hammer must be serviced in an authorized Rammer service shop. See “Main valve” on page 107.

PISTON FAILURE

The hammer must be serviced in an authorized Rammer service shop. See “Body parts” on page 129.

5.2 THE HAMMER OPERATES IRREGULARLY BUT THE BLOW HAS FULL POWER

NOT ENOUGH FEED FORCE FROM EXCAVATOR

Refer to the correct working methods. See “Daily operation” on page 33.

RELIEF VALVE IN HYDRAULIC CIRCUIT OPENS AT A LOW PRESSURE. HAMMER OPERATING PRESSURE IS NOT REACHED

Check the installation. Check the relief valve operation. Adjust the relief valve in hydraulic circuit. Measure the high pressure in the hammer inlet line. Contact your local dealer for more information. See “Measuring hammer circuit” on page 163. See “Measuring hammer operating pressure” on page 165. For more information, see "Pressure relief valves" in Dealer manual.

FAILURE IN HAMMER VALVE OPERATION

The hammer must be serviced in an authorized Rammer service shop. See “Main valve” on page 107.

FAILURE IN GREASING DEVICE HYDRAULIC CIRCUIT

Oil leakage. The hammer must be serviced in an authorized Rammer service shop. See “Main valve” on page 107.

5.3 THE HAMMER OPERATES IRREGULARLY AND BLOW HAS NO POWER

THE WORKING METHOD IS NOT CORRECT

Refer to the correct working methods. See “Daily operation” on page 33.

RELIEF VALVE IN HYDRAULIC CIRCUIT OPENS AT A LOW PRESSURE. HAMMER OPERATING PRESSURE IS NOT REACHED

Check the installation. Check the relief valve operation. Adjust the relief valve in hydraulic circuit. Measure the high pressure in the hammer inlet line. Contact your local dealer for more information. See “Measuring hammer circuit” on page 163. See “Measuring hammer operating pressure” on page 165. For more information, see "Pressure relief valves" in Dealer manual.

PRESSURE CONTROL VALVE SETTING IS INCORRECT

The hammer must be serviced in an authorized Rammer service shop. See “Measuring hammer circuit” on page 163. For more information, see "Pressure relief valves" in Dealer manual.

PRESSURE LOSS IN PRESSURE ACCUMULATOR

The hammer must be serviced in an authorized Rammer service shop. See “Pressure accumulator” on page 100. See “Charging accumulator” on page 104.

FAILURE IN HAMMER VALVE OPERATION

The hammer must be serviced in an authorized Rammer service shop. See “Main valve” on page 107.

5.4 IMPACT RATE SLOWS DOWN

OIL HAS OVERHEATED (OVER +80 °C/+176 °F)

Check for a fault in the oil cooling system or an internal leak in the hammer. Check the hydraulic circuit of the carrier. See “Measuring hammer circuit” on page 163. Check the relief valve operation in the carrier. For more information, see "Pressure relief valves" in Dealer manual. Check the line size. For more information, see "Correct line size" in Dealer manual. Assemble an extra oil cooler.

HYDRAULIC OIL VISCOSITY TOO LOW

Check hydraulic oil. See “Requirements for hydraulic oil” on page 52.

EXCESSIVE BACK PRESSURE IN RETURN LINE

Check the installation. See “Measuring hammer circuit” on page 163. Check the size of the return line. For more information, see "Correct line size" in Dealer manual.

RELIEF VALVE IN HYDRAULIC CIRCUIT OPENS AT A LOW PRESSURE. HAMMER OPERATING PRESSURE IS NOT REACHED

Check the installation. Check the relief valve operation. Adjust the relief valve in hydraulic circuit. Measure the high pressure in the hammer inlet line. Contact your local dealer for more information. See “Measuring hammer circuit” on page 163. See “Measuring hammer operating pressure” on page 165. For more information, see "Pressure relief valves" in Dealer manual.

LEAKAGE FROM PRESSURE TO RETURN IN EXCAVATOR HYDRAULIC CIRCUIT

Check the installation. Check the pump and the other hydraulic components.

OIL FLOW FROM THE CARRIER IS TOO HIGH

The hammer is equipped with a built-in Ramvalve which is designed to decrease oil flow to the hammer when oil flow from the carrier is too high. If impact rate is too slow check the oil flow. Contact your local carrier dealer for more information.

PRESSURE LOSS IN PRESSURE ACCUMULATOR

The hammer must be serviced in an authorized Rammer service shop. See “Pressure accumulator” on page 100. See “Charging accumulator” on page 104.

FAILURE IN HAMMER VALVE OPERATION

The hammer must be serviced in an authorized Rammer service shop. See “Main valve” on page 107.

5.5 THE HAMMER DOES NOT STOP OR HAS RUN-ON

INTERNAL OIL LEAK IN THE HAMMER

The hammer must be serviced in an authorized Rammer service shop. See “Main valve” on page 107. See “Pressure control valve” on page 114. See “Body parts” on page 129.

FAILURE IN HAMMER CONTROL VALVE OPERATION

Check the hammer control valve in the carrier.

5.6 OIL OVERHEATS

APPLICATION NOT CORRECT FOR HAMMER

Refer to recommended use and to correct working methods. See “Daily operation” on page 33.

COOLING CAPACITY OF THE OIL COOLER IS TOO SMALL

Assemble an extra oil cooler.

RELIEF VALVE IN HYDRAULIC CIRCUIT OPENS AT A LOW PRESSURE. HAMMER OPERATING PRESSURE IS NOT REACHED

Check the installation. Check the relief valve operation. Adjust the relief valve in hydraulic circuit. Measure the high pressure in the hammer inlet line. Contact your local dealer for more information. See “Measuring hammer circuit” on page 163. See “Measuring hammer operating pressure” on page 165. For more information, see "Pressure relief valves" in Dealer manual.

HYDRAULIC OIL VISCOSITY TOO LOW

Check hydraulic oil. See “Requirements for hydraulic oil” on page 52.

LEAKAGE FROM PRESSURE TO RETURN IN EXCAVATOR HYDRAULIC CIRCUIT

Check the installation. Check the pump and the other hydraulic components.

INTERNAL OIL LEAK IN THE HAMMER

The hammer must be serviced in an authorized Rammer service shop. See “Body parts” on page 129.

EXCESSIVE BACK PRESSURE IN RETURN LINE

Check the installation. See “Measuring hammer circuit” on page 163. Check the size of the return line. For more information, see "Correct line size" in Dealer manual.

5.7 RECURRENT TOOL FAILURE

APPLICATION NOT CORRECT FOR HAMMER

Refer to recommended use and to correct working methods. See “Operating instructions” on page 28.

ROUGH OPERATING PRACTICES

Refer to recommended use and to correct working methods. See “Daily operation” on page 33.

TOOL DOES NOT GET ENOUGH LUBRICANT

Refer to recommended use and to correct working methods.

TOO LONG TOOL

Use shortest tool possible. Refer to recommended use and to correct working methods.

RAPID WEAR OF TOOL

Refer to recommended use and to correct working methods. See “Daily operation” on page 33. There is a wider selection of tools available for different applications. Consult with your local dealer for more information.

5.8 AUTOMATIC GREASING DEVICE PROBLEMS

UPPER OR LOWER TOOL BUSHING DOES NOT GET ENOUGH LUBRICANT

- Cold conditions. Apply grease from grease gun to grease nipples.
- Doser adjustment is wrong for the application. The doser must be readjusted.
- Blockage in greasing device. Contact your local dealer for more information.

UPPER OR LOWER TOOL BUSHING GETS TOO MUCH LUBRICANT

- Doser adjustment is wrong for the application. The doser must be readjusted.
- Leak in the doser. The doser must be replaced. Contact your local dealer for more information. See “Greasing device” on page 137.

TOOL DOES NOT GET LUBRICANT AT ALL

- Grease cartridge is empty or damaged. Replace the grease cartridge. See “Automatic greasing” on page 47.
- Doser defective. The doser must be replaced. Contact your local dealer for more information. See “Greasing device” on page 137.
- Leak in the grease hose or pressure hose. Inspect the hoses and replace if necessary.
- Grease and pressure hoses are installed backwards. Swap the hoses.
- To continue troubleshooting, disconnect the grease hose from the hammer valve body and operate the hammer. After 10 minutes of operation check if grease has protruded from the grease hose.

LUBRICATION DEVICE IS WORKING (WHILE THE GREASE HOSE IS DISCONNECTED)

- Leak in hammer lubrication channel. The hammer must be serviced in an authorized Rammer service shop.
- Hammer lubrication channel is blocked. The hammer must be serviced in an authorized Rammer service shop.

LUBRICATION DEVICE DOES NOT WORK (WHILE THE GREASE HOSE IS DISCONNECTED)

- Remove the lubrication device from the hammer and deliver it for service in an authorized Rammer service shop.

5.9 FURTHER ASSISTANCE

FURTHER ASSISTANCE

If further assistance is required, please prepare to answer the following questions before calling your dealer.

- Model and serial number
- Working hours and service history
- RD3 report if available
- Carrier model
- Installation: Oil flow, operating pressure and return line pressure if known
- Application
- Has the product operated normally before

SPECIFICATIONS

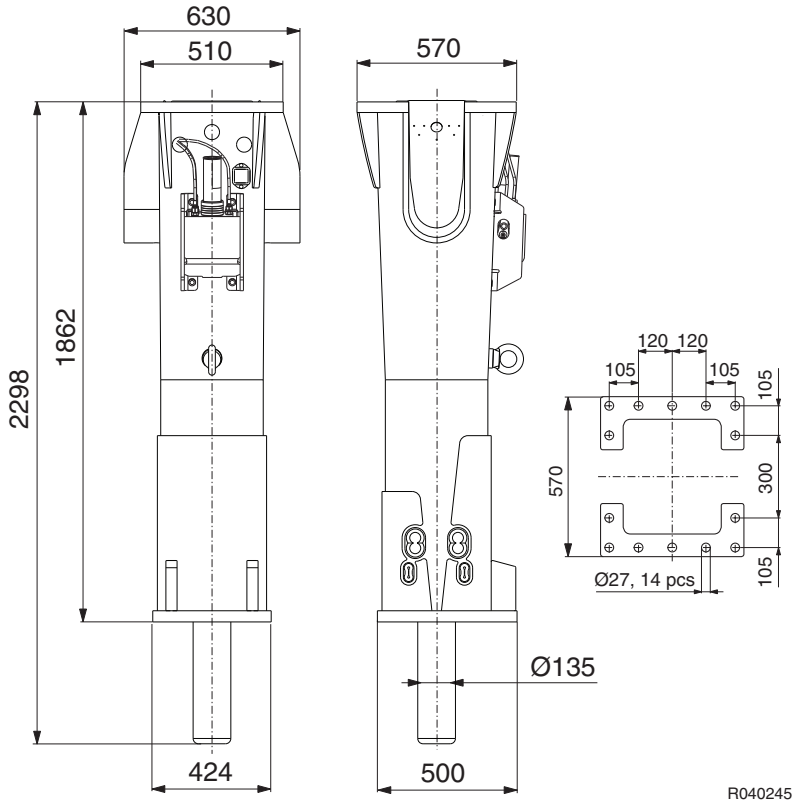
1. HAMMER SPECIFICATIONS

1.1 TECHNICAL SPECIFICATIONS

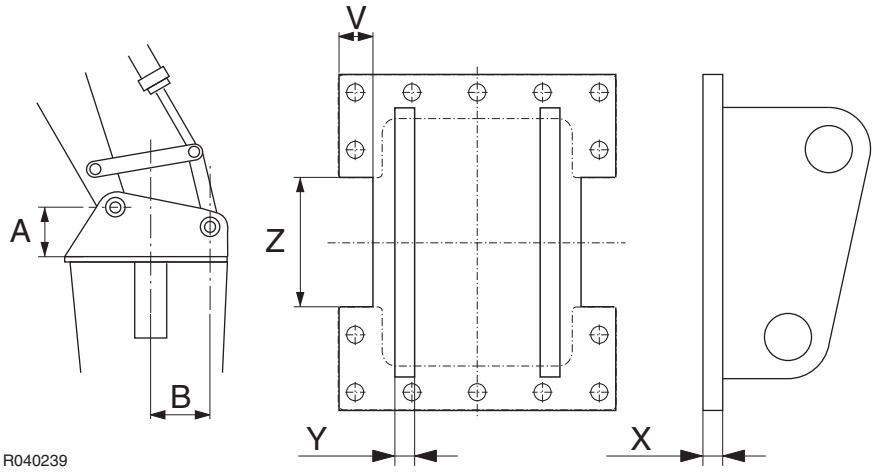
Item	Specification
Minimum working weight[1]	1670 kg (3682 lb)
Hammer weight	1410 kg (3109 lb)
Impact rate[2]	450...750 bpm
Operating pressure[3]	135...145 bar (1960...2105 psi)
Pressure relief, min[4]	190 bar (2755 psi)
Pressure relief, max	220 bar (3190 psi)
Oil flow range	140...200 l/min (37.0...52.8 gal/min)
Back pressure, max	10 bar (145 psi)
Input power	48 kW (64 hp)
Tool diameter	135 mm (5.31 in)
Pressure line connection (IN)	SAE 6000 psi 1 1/4"
Return line connection (OUT)	SAE 6000 psi 1 1/4"
Grease connection (G)[5]	BSPP-internal 3/8"
Air connection (A)[6]	BSPP-internal 3/8"
Pressure line size (minimum inner diameter)	26 mm (1.02 in)
Return line size (minimum inner diameter)	32 mm (1.26 in)
Optimum oil temperature	40...60 °C (104...140 °F)
Allowed oil temperature range	-20...80 °C (-4...176 °F)
Optimum oil viscosity at operating temperature	30...60 cSt
Allowed oil viscosity range	20...1000 cSt
Carrier weight[7]	21...32 t (46300...70500 lb)
Noise level, measured sound power level, LWA[8]	120 dB (120 dB)
Noise level, guaranteed sound power level, LWA[9]	124 dB (124 dB)

1. Includes average mounting bracket and standard tool
2. Actual impact frequency depends on oil flow, oil viscosity, temperature, and material to be broken
3. Actual pressure depends on oil flow, oil viscosity, temperature, material to be broken and back pressure
4. Minimum setting = actual operating pressure + 50 bar (730 psi)
5. Located on the same side of the valve body as the pressure line (IN) connection
6. Located on the same side of the valve body as the return line (OUT) connection
7. Check carrier's lifting capacity from carrier manufacturer
8. According to European Union DIRECTIVE 2000/14/EC
9. According to European Union DIRECTIVE 2000/14/EC

1.2 MAIN DIMENSIONS



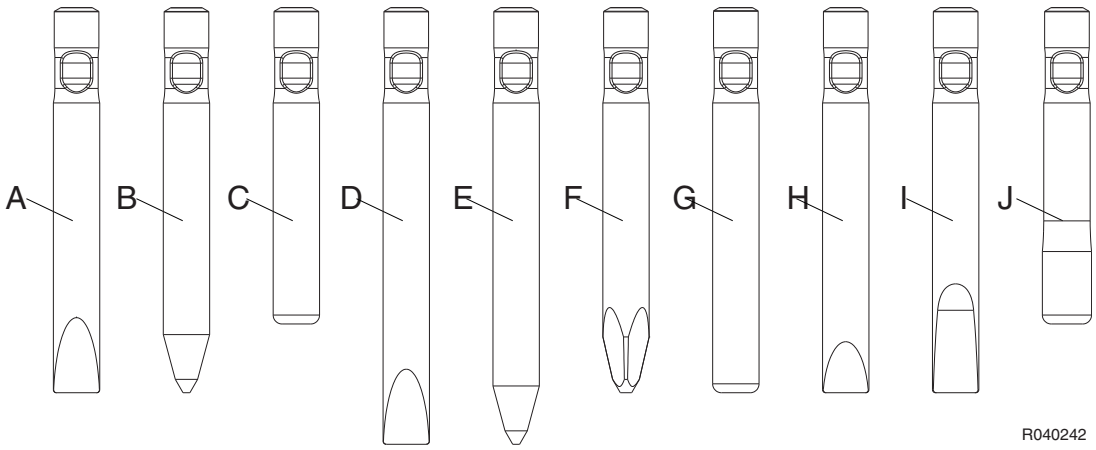
1.3 MOUNTING BRACKET SPECIFICATIONS



Item	Specification
Bottom plate, recommended minimum thickness (X)	25 mm (0.98 in)
Side plate, recommended minimum thickness (Y)	25 mm (0.98 in)
Width of the opening for pressure hose (Z)	200 mm (7.87 in)
Depth of the opening for pressure hose (V)	60 mm (2.36 in)
Note: After welding, check the flatness of the plate and mill surface as needed. The maximum acceptable deviation from flatness is 1 mm (0.04 in).	

Consider the following when designing mounting brackets
Required plate thicknesses.
Correct transport position of the hammer.
Most common hammering position, in which the bucket cylinder is in the middle position.
Mechanical stops to protect the bucket cylinder when the hammer is fully in or out
Placement of the pin holes on the mounting bracket hinges. Normally, they are placed almost symmetrically from the hammer center line.
Height of the stick's mounting bracket pin from the mounting bracket bottom plate (A). The height depends on how close the pin is to the hammer center line. The closer it is, the longer dimension (A) must be.
Effect of hammer recoil and feed force on the bucket cylinder, which should be minimized. This effect depends on distance (B). The longer distance (B) is, the smaller the effect.

2. TOOL SPECIFICATIONS



Tool	Part no.	Length	Weight	Diameter
Chisel (A)	BB86E1	1120 mm (44.09 in)	110 kg (243 lb)	135 mm (5.31 in)
Moil point (B)	BB86E3	1120 mm (44.09 in)	106 kg (234 lb)	135 mm (5.31 in)
Blunt (C)	BB86E4	920 mm (36.22 in)	98 kg (216 lb)	135 mm (5.31 in)
Long chisel (D)	BB86E2	1270 mm (50.00 in)	127 kg (280 lb)	135 mm (5.31 in)
Long moil point (E)	BB86E8	1270 mm (50.00 in)	123 kg (271 lb)	135 mm (5.31 in)
Pyramid (F)	BB86E3K3	1120 mm (44.09 in)	106 kg (234 lb)	135 mm (5.31 in)
Long blunt (G)	BB86E4C1	1120 mm (44.09 in)	119 kg (262 lb)	135 mm (5.31 in)
Limestone chisel (H)	BB86E1F3	1120 mm (44.09 in)	113 kg (249 lb)	135 mm (5.31 in)
Hard rock chisel (I)	BB86E1A2	1120 mm (44.09 in)	104 kg (229 lb)	135 mm (5.31 in)
Super blunt (J)	BB86E4T2	920 mm (36.22 in)	99 kg (218 lb)	143 mm (5.63 in)

3. COMPLIANCE

3.1 EU DECLARATION OF CONFORMITY

EU DECLARATION OF CONFORMITY

Original

(Directive 2006/42/EC, Annex II. 1. A; Directive 2000/14/EC)

Manufacturer: Sandvik Mining and Construction Oy, Breakers Lahti

Address: Taivalkatu 8, FI-15170 Lahti, Finland

Herewith declares that the Rammer hydraulic hammer

Model: 2577E

- **Is in conformity with all the relevant provisions of the Machinery Directive 2006/42/EC.**
- **Is in conformity with all the relevant provisions of the Outdoor Equipment Noise Directive 2000/14/EC.**

The procedure applied for conformity assessment is "Internal control of production" (Annex V).

Model	Serial number	Measured sound power level: LWA [dB]	Guaranteed sound power level: LWA [dB]
2577E	2577EA	120	124

- **And the following (parts/clauses of) standards have been applied:**

EN ISO 12100 - Safety of machinery, General principles for design, Risk Assessment and risk reduction

DNV GL certified quality management system according to ISO 9001, Design and manufacture of product

Technical file and manufacturing conformity

N.N., Director R&D/E, is authorized to compile the technical file and confirms the product design to conform with the essential health and safety requirements.

M.M., Director Supply, confirms compliance of the manufactured machinery with the technical file.

N.N. and M.M. are empowered to draw up this declaration of conformity.

Signed for and on behalf of Sandvik Mining and Construction Oy, Breakers Lahti

Place: Taivalkatu 8, FI-15170 Lahti, Finland

Date: dd.mm.yyyy

Signed: N.N.

Director R&D/E

Signed: M.M.

Director Supply

3.2 UK DECLARATION OF CONFORMITY

UK DECLARATION OF CONFORMITY

Original

Manufacturer: Sandvik Mining and Construction Oy, Breakers Lahti

Address: Taivalkatu 8, FI-15170 Lahti, Finland

Herewith declares that the Rammer hydraulic hammer

Model: 2577E

- **Is in conformity with the relevant provisions of the Supply of Machinery (Safety) Regulations 2008 No. 1597, as amended.**
- **Is in conformity with all the relevant provisions of the Noise Emission in the Environment by Equipment for use Outdoors Regulations 2001 No. 1701, as amended:**

Model	Serial number	Measured sound power level: LWA [dB]	Guaranteed sound power level: LWA [dB]
2577E	2577EA	120	124

- **And the following (parts/clauses of) standards have been applied:**

  EN ISO 12100 - Safety of machinery, General principles for design, Risk Assessment and risk reduction

  DNV GL certified quality management system according to ISO 9001, Design and manufacture of product

Technical file and manufacturing conformity

N.N., Director R&D/E, is authorized to compile the technical file and confirms the product design conforms with the essential health and safety requirements.

M.M., Director Operations, confirms compliance of the manufactured machinery with the technical file.

N.N. and M.M. are empowered to draw up this declaration of conformity.

Signed for and on behalf of Sandvik Mining and Construction Oy, Breakers Lahti

Place: Taivalkatu 8, FI-15170 Lahti, Finland

Date: dd.mm.yyyy

Signed: N.N.

Director R&D/E

Signed: M.M.

Director Operations

3.3 RD3 AND DATA PRIVACY

Important notice: This 2577E

Hereinafter referred to as the "Product", is equipped with a remote monitoring service device which collects location data and data of usage of the Product (including remote monitoring hardware and software installed, connected, and activated by Sandvik at the factory or otherwise) in order for Sandvik to (i) provide you and Sandvik's distributor/sub-distributor(s) involved in the sale of the Product ("Distributors") with the availability to Product data via a web managed (or similar) subscription service received following online acceptance of https://sam.rockprocessing.sandvik/ web portal terms and conditions ("Equipment Monitoring Service"); and (ii) to collect information from the Product in order to monitor the performance, reliability and to track the Product's operational efficiency as well as develop the data. Sandvik reserves the right to anonymize and/or aggregate any data which is created, generated, derived or produced by Sandvik in the Equipment Monitoring Service or otherwise created through the use of the Equipment Monitoring Service, such data never to contain any personal data with the meaning given in the General Data Protection Regulation ((EU) 2016/679), into a new set of data. By using the Product, you consent and agree that Sandvik may generate, collect, record, upload, store, analyse and process standard industry information and data relating to the activity and condition of the Product, including but not limited to location, engine, percussion and /or transmission hours. You agree and acknowledge that Sandvik may use as well as disclose such data to its affiliates or other members within the Sandvik Group, its Distributors and to third parties providing services to the Sandvik Group for optimizing the schedule of its services and parts deliveries and for improving its customer support and/or for any internal purposes, including but not limited to product development, business and marketing analyses and improvement of its products' performance and availability. In the event you wish to withdraw your consent to collect, store and process such data, please request Sandvik in writing to stop collecting and processing such data. A separate three (3) months' advance notice is needed per each unit of Product and shall state at least (i) the serial number of the Product and (ii) the end date of your consent. Please note that if you decide to withdraw your consent, it may affect the validity of the agreements in connection with Product and may lead to the termination of an agreement in accordance with the terms and conditions of the agreement (including but not limited to maintenance agreements and extended warranty agreements). For more information and in order to monitor your own Product, please visit the following web page: https://sam.rockprocessing.sandvik/.

WORKSHOP

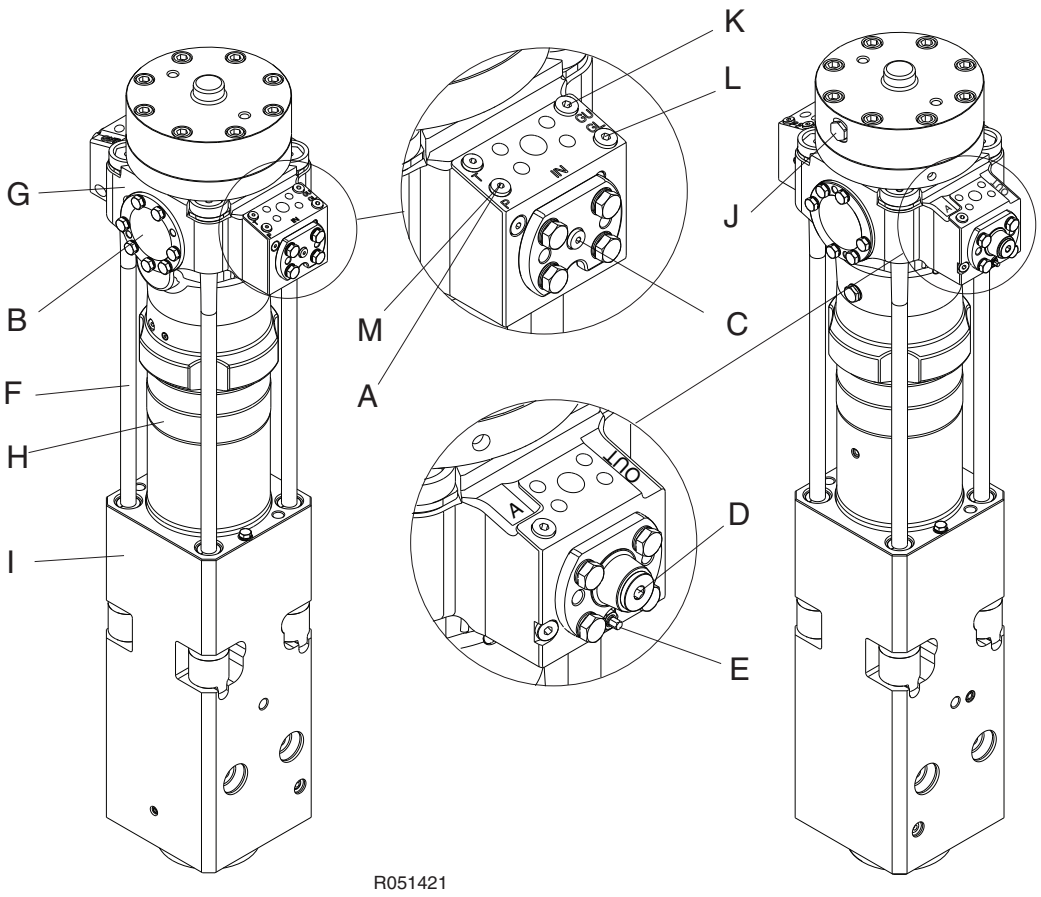
1. DISASSEMBLY AND ASSEMBLY

1.1 SAFETY

Warning! Do not perform any service/workshop instructions until you have read and understood the general product, safety, and operating information. See “General safety” on page 18.

1.2 MAIN COMPONENTS

LOCATION OF MAIN COMPONENTS



A. Pressure measuring plug

B. Main valve

C. Ramvalve

D. Pressure control valve

E. Idle selector

F. Tie rods

G. Valve body

H. Piston and cylinder

I. Front head

J. Accumulator

K. Upper tool bushing greasing channel (marked "GU")

L. Lower tool bushing greasing channel (marked "GL")

M. Pressure to greasing device

1.3 RELEASING HYDRAULIC PRESSURE FROM HAMMER

RELEASING PRESSURE

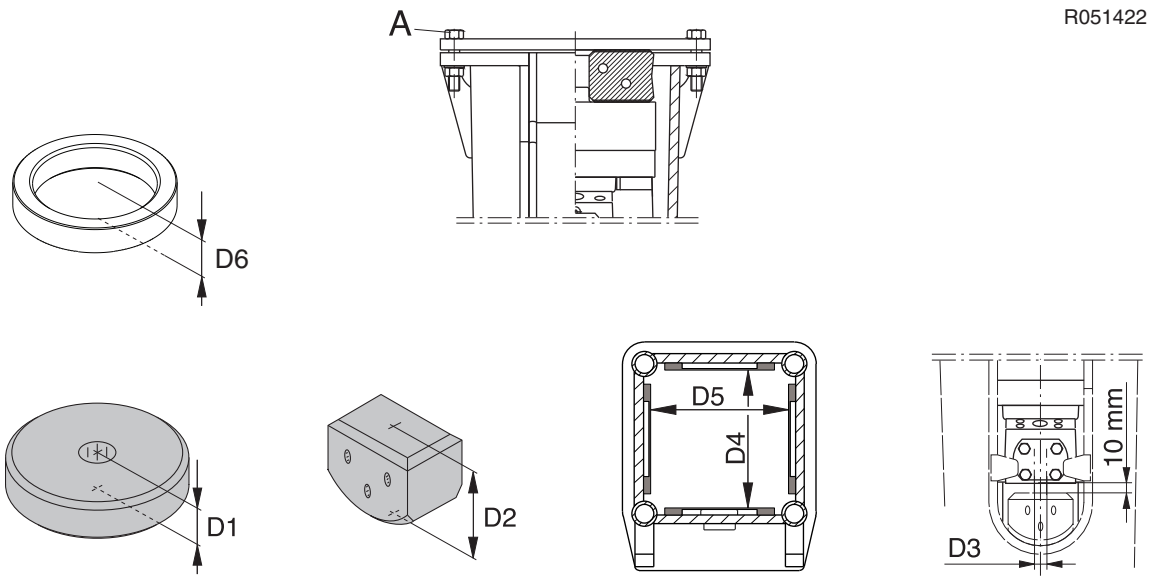
Warning! The hydraulic pressure inside the hammer must always be released before making any adjustments or repairs when the hammer is connected to the carrier. There may also be pressurized oil trapped inside the hammer even if the hammer is disconnected from the carrier. Release the hydraulic pressure according to the following instructions before opening any plugs or valve covers.

1. Stop the carrier engine.
2. Operate boom and hammer controls to release any pressure trapped inside hoses.
3. Wait at least 10 minutes for oil pressure to drop inside the hammer.

Warning! This procedure does not release the gas pressure from the pressure accumulator! Read the instructions dealing with the accumulator before disassembling the hammer.

1.4 HOUSING AND VIBRATION DAMPENING

SPECIFICATIONS FOR HOUSING AND VIBRATION DAMPENING

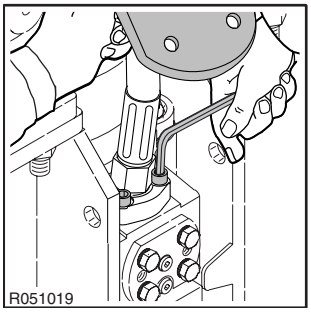


Item	Specification
Mounting bracket screws (A)	1050 Nm (774 lbf ft)
Buffer minimum thickness (D1)	70 mm (2.76 in)
Pad minimum thickness (D2)	112 mm (4.41 in)
Max. clearance between hammer and housing (D3)	-10...+10 mm (-0.39...0.39 in)
Max. distance between wear plates (D4)	304 mm (11.97 in)
Max. distance between wear plates (D5)	303 mm (11.93 in)
Seal minimum thickness (D6)	46 mm (1.81 in)
Mounting bracket screw threads and bearing surfaces	Thread grease

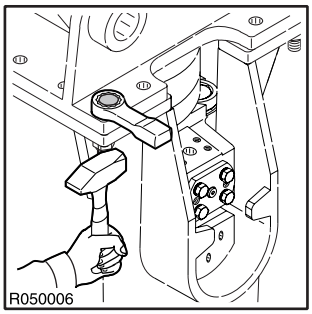
DISASSEMBLING HOUSING AND VIBRATION DAMPENING

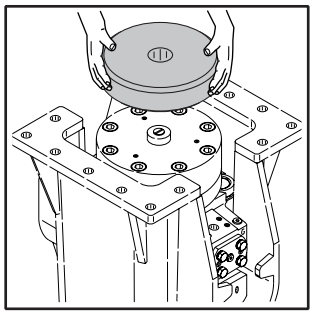
Warning! All hammer parts must be secured from falling down or tipping over in either direction when handling them. Check that the lifting capacity of the hoist you are using is sufficient for the job. See “Lifting instructions” on page 10. See “Hammer specifications” on page 82.

1. Remove the tool and disconnect the hammer from the carrier.
2. Remove greasing hoses from the hammer.
3. Remove cover out of way.
4. Disconnect hose couplings from hammer.



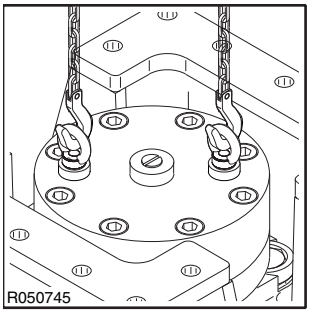
5. Open mounting bracket screws.
6. Lift mounting bracket off. For more information, see "! Large hammer workshop safety alert!, Publ. no. A000140E" in Bulletins.
7. Remove buffer.

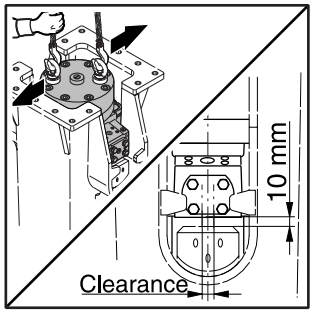




8. Install two lifting eyes. Lift hammer so there is a 10 mm gap between the valve body shoulders and pads.

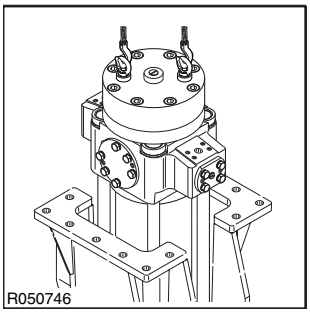
9. Move hammer from side-to-side inside housing. Measure clearance at level of valve body shoulders. If maximum clearance is exceeded, wear plates inside housing must be replaced.

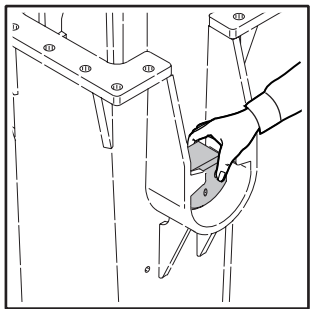




10. Lift hammer out of housing.

11. Remove pads.

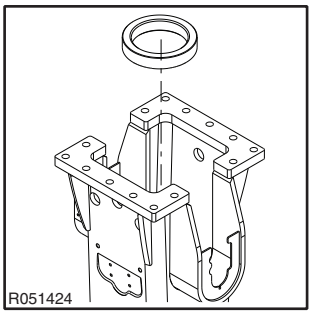




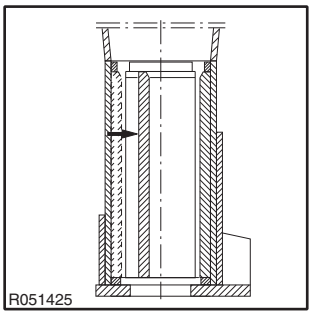
12. Secure the hammer from falling down or tipping over on the floor or assembly stand.

13. Set hammer housing horizontally on floor or on assembly stand.

14. Remove seal from the housing.

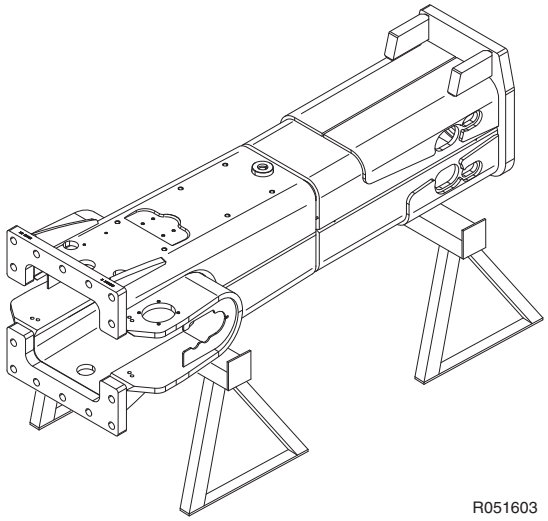


15. If necessary, remove wear plates by prying them out with a screwdriver.

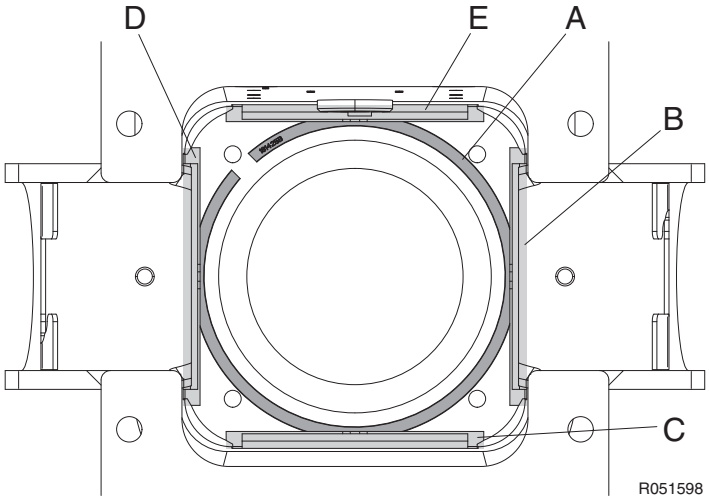


DISASSEMBLING WEAR PLATES

1. Lower the housing on the floor or on the work trestles.



2. Rotate the spring ring (A) so that the cut is towards the corner of the housing.

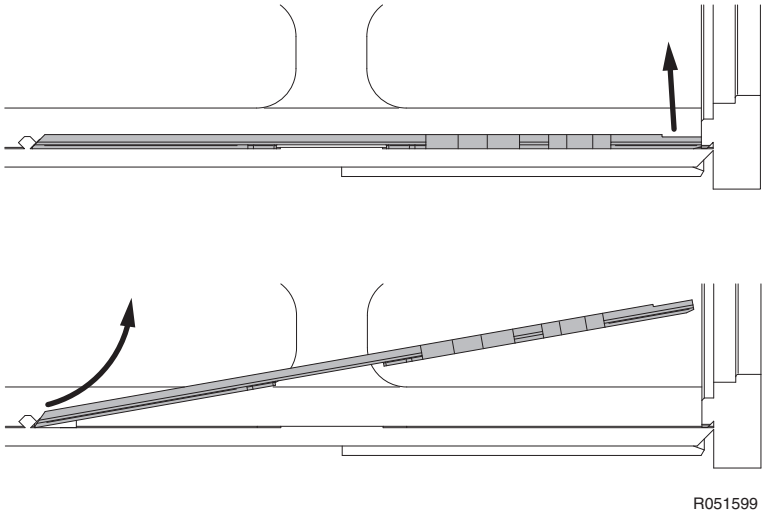


3. Pull the cut ends of the spring ring (A) closer together.
4. Remove the spring ring (A) from the groove of the wear plates (B, C, D, E).

Support the top wear plate (E) so it cannot fall uncontrollably before removing the spring ring (A).

5. Remove the spring ring (A) from the housing.

6. Remove the wear plates from the housing one by one by pulling the plate's bottom end off the housing wall and then pulling the plate's top end from under the support lip.



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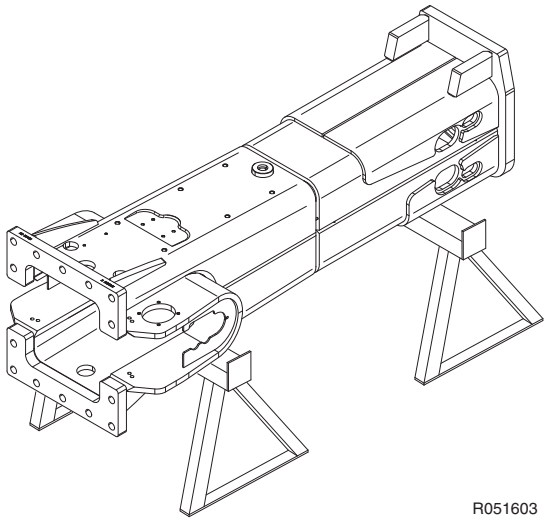
ASSEMBLING WEAR PLATES

1. Lower the housing on the floor or on the work trestles.

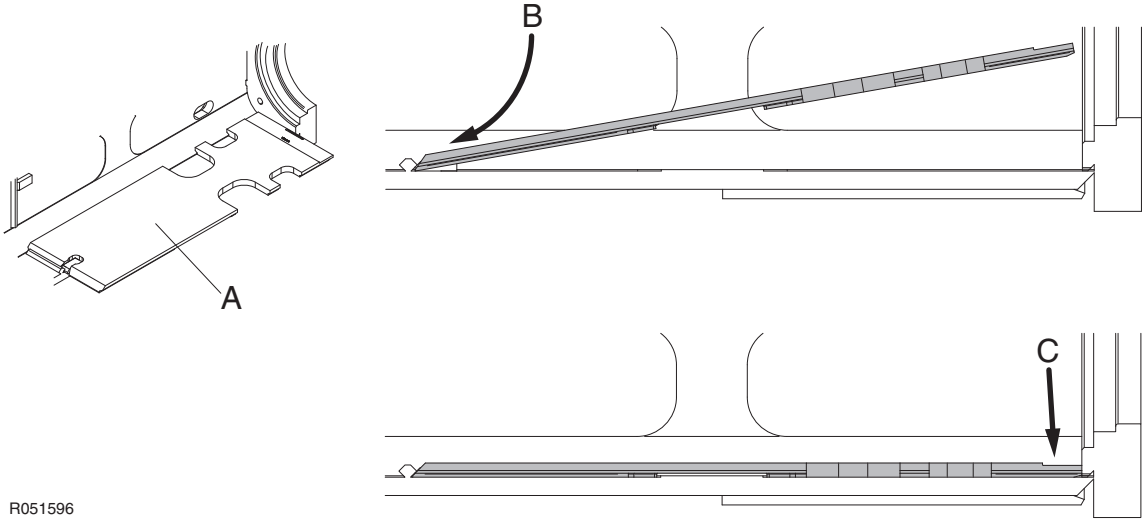


R051603

2. Make sure the place for the wear plates is clean.

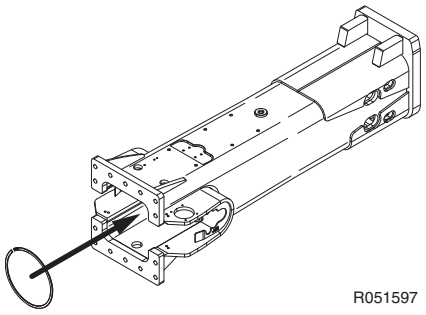
3. Install the bottom wear plate by pushing the top end (B) of the plate under the support lip then pushing the bottom end (C) against the housing wall.

NOTE! Make sure that the side (A) of the wear plate points towards the center of the housing and the plug holes are at the bottom end.



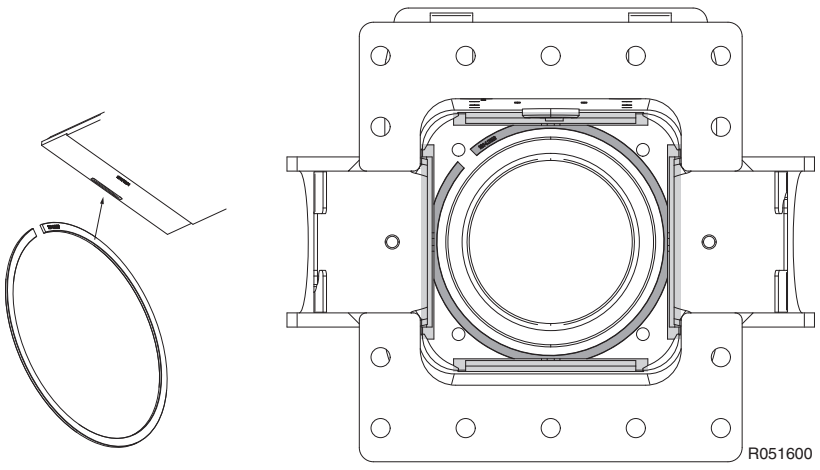
4. Install both side wear plates in the same way.

5. Move the spring ring inside the housing.



6. Install the top wear plate into its place. Keep supporting the plate so it cannot fall.

7. Install the spring ring to the top wear plate spring ring groove so that the cut of the spring ring is towards the corner of the housing.



8. Push the spring ring cut ends towards each other and slide the spring ring into the side wear plate groove.

9. Install the spring ring to the bottom plate groove and then other side wear plate groove.

10. Check that the wear plates are centered and are not over the edge of the machined groove or do not rest on the corner roundings of the housing.

11. Check that the spring ring is in its place in the groove of each wear plate and that its cut is towards the corner of the housing.

ASSEMBLING HOUSING AND VIBRATION DAMPENING

1. Check all parts for cracks and excessive wear.

2. Measure thickness of pads, buffer and seal. If measured thicknesses are smaller than specified, or any cracks are noticed, parts must be replaced. Note: Pads must be replaced as a pair.

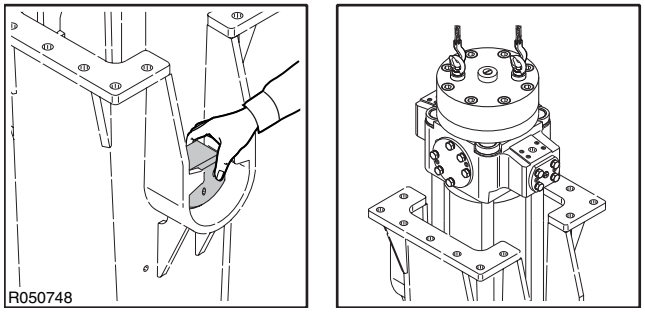
3. Install wear plates.

4. Set housing to vertical position.

5. Install seal.

6. Install pads.

7. Lower hammer into housing. Check clearance by moving hammer from side-to-side.



8. Install buffer.

9. Install mounting bracket.

10. Install mounting bracket screws. Torque them to specified setting.

11. Install hose couplings.

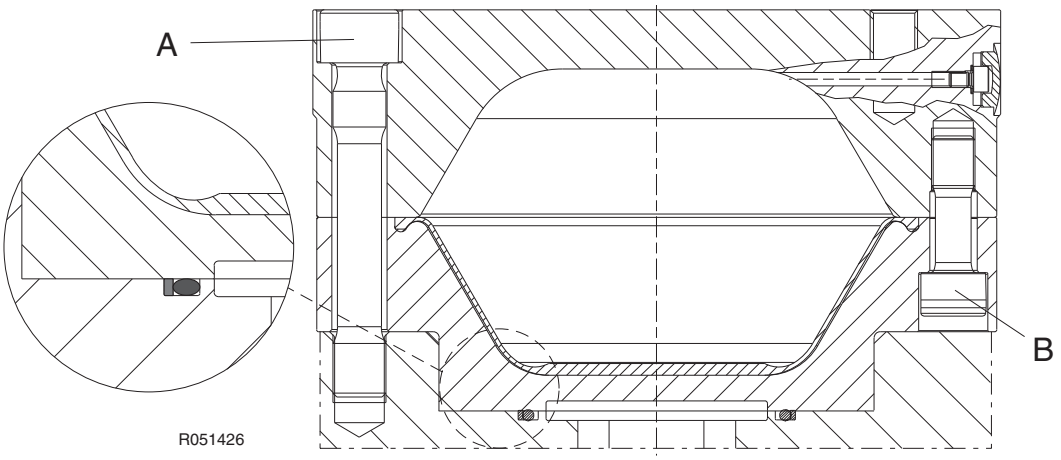
12. Connect grease hoses and install covers.

13. Prefill the hammer's grease channel by applying tool grease with a grease gun to the grease nipple. Continue until some grease appears from the tool bushing`s grease holes (use assistant if possible). This may take some time; the capacity of hammer internal grease channel is approximately 500 - 1000 grams.

14. Install hammer to carrier.

1.5 PRESSURE ACCUMULATOR

TORQUES, ADJUSTMENTS AND LUBRICANTS



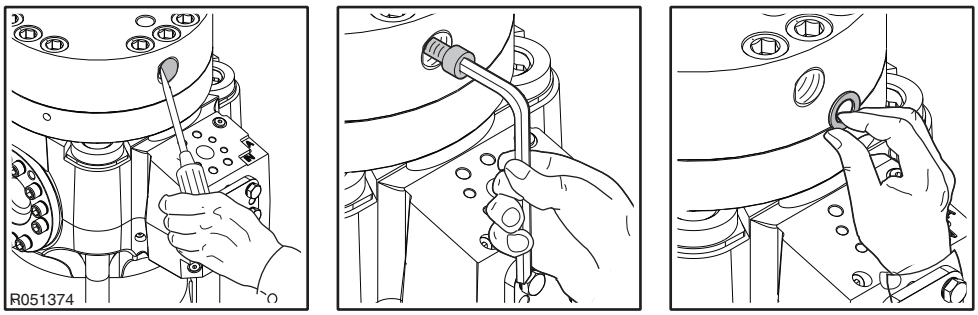
Item	Tightening torque
Accumulator mounting screws (A)	580 Nm (428 lbf ft)
Accumulator cover screws (B)	450 Nm (332 lbf ft)

Item	Lubricant
Screw threads and bearing surfaces	Thread grease
Accumulator cover (gas side)	Silicone grease
All seals and O-rings	O-ring grease
Contact surfaces of valve body and accumulator	Anticorrosive agent (e.g. CRC 3-36)

RELEASING PRESSURE FROM ACCUMULATOR

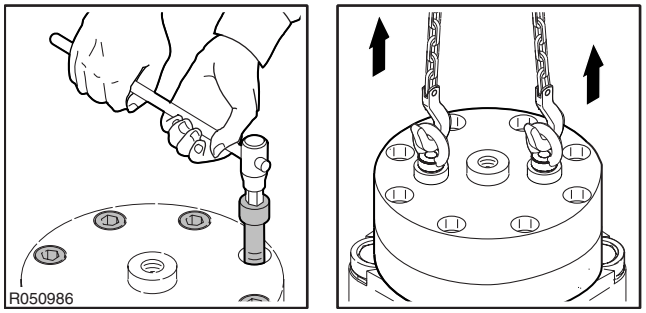
Warning! Do not disassemble hammer before releasing pressure from accumulator.

1. Remove shield plug.
2. Carefully loosen filling plug and let nitrogen gas escape.
3. When gas is completely released, remove filling plug and Usit-ring.



REMOVAL OF ACCUMULATOR

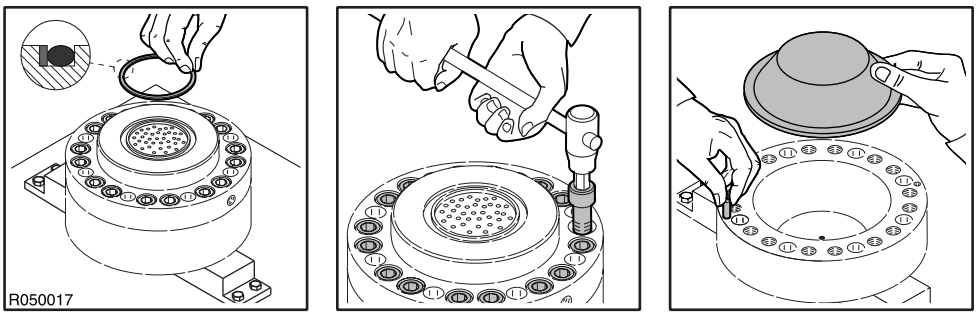
1. Remove accumulator mounting screws (8 pcs).
2. Using lifting device, lift accumulator out.



DISASSEMBLING ACCUMULATOR

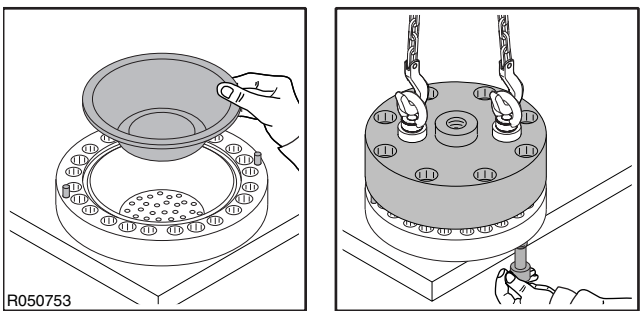
Warning! Make sure that accumulator is depressurized!

1. Set accumulator upside down on the assembly stand.
2. Remove seal.
3. Remove accumulator cover screws.
4. Remove accumulator bottom, membrane and parallel pins.



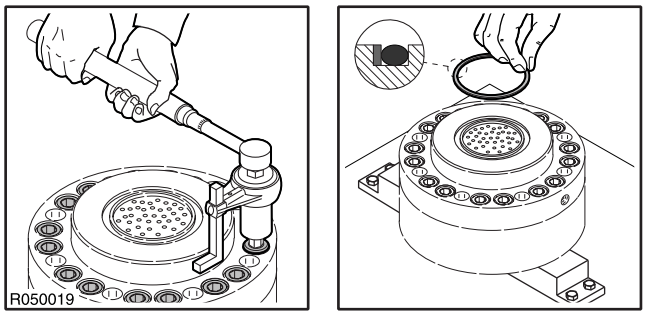
ASSEMBLING ACCUMULATOR

1. Clean and dry parts carefully.
2. Set accumulator bottom on work bench.
3. Install a new membrane. See that it fits properly in its groove.
4. Insert parallel pins.
5. Apply thin layer of silicone grease inside accumulator cover.
6. Lower accumulator cover onto accumulator bottom.
7. Grease threads and bearing surfaces of accumulator cover screws.
8. Insert accumulator cover screws.



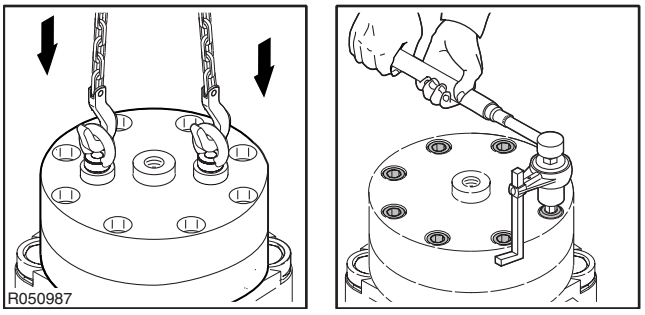
9. Set accumulator upside down on the assembly stand.
10. Torque accumulator cover screws to specified setting.

11. Insert seal. Use some grease to prevent seal from falling during accumulator installation.



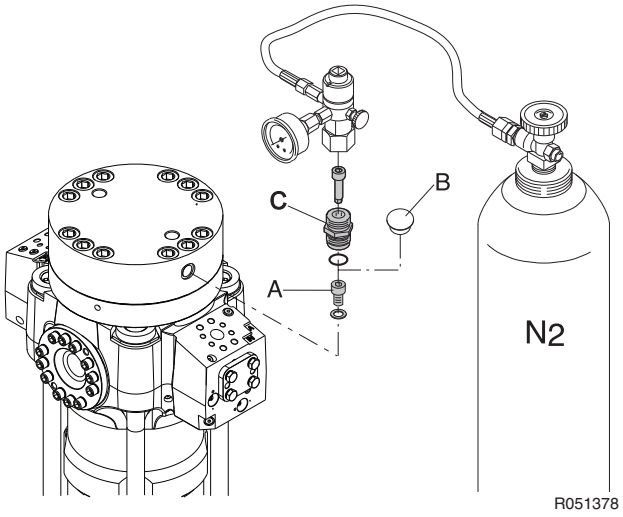
INSTALLING ACCUMULATOR

1. Apply anticorrosive agent on contact surfaces of valve body and accumulator.
2. Lower accumulator into its correct position using lifting device.
3. Grease threads and bearing surfaces of accumulator mounting screws.
4. Install accumulator mounting screws. Torque screws to specified setting.



1.6 CHARGING ACCUMULATOR

TORQUES, ADJUSTMENTS AND LUBRICANTS



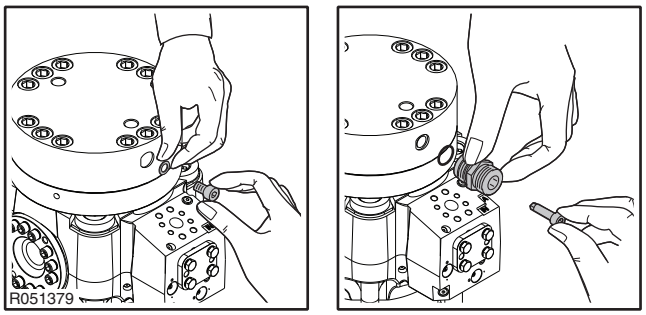
Item	Tightening torque
Accumulator filling plug (A)	20 Nm (15 lbf ft)
Shield plug (B) Rubber plug no. 954323	
Adapter(C) 101635	

Item	Charging pressure
Nitrogen (N_2)	40 bar (580 psi)

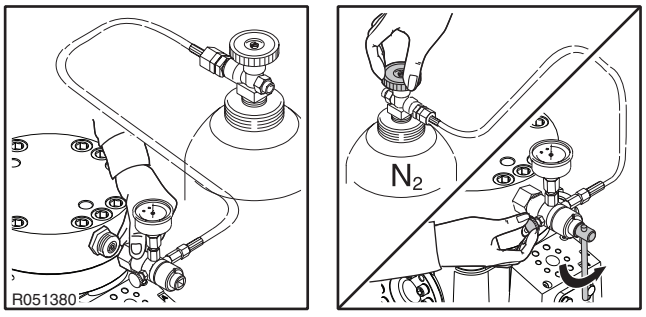
CHARGING ACCUMULATOR

Warning! Use only nitrogen (N_2) for charging accumulator. Use of other gases may cause accumulator to explode.

1. Install new usit ring.
2. Install filling plug.
3. Install adapter with O-ring.
4. Insert pin.



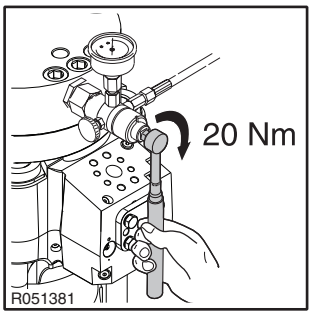
5. Install charging device.
6. Connect charging system to nitrogen bottle.
7. Tighten filling plug carefully through charging device until you feel it stop, then open it three (3) turns.
8. Open discharge valve on charging device fully.
9. Carefully open nitrogen gas bottle valve and adjust gas flow to minimum.



10. CAUTION! Charging device does not have any pressure relief valve.
11. Close discharge valve on charging device and charge accumulator 2-3 bar above specified charging pressure. Observe pressure gauge reading.
12. Shut nitrogen bottle valve.
13. Wait 10 minutes for nitrogen gas pressure to stabilize inside accumulator.

14. Adjust pressure in accumulator to correct setting by carefully opening discharge valve if necessary.

15. Torque filling plug through charging device to specified setting.

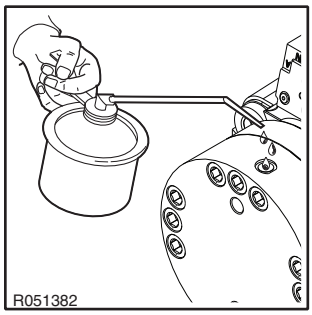


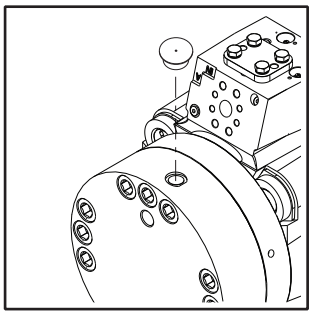
16. Release pressure from charging hose by opening discharge valve.

17. Remove charging system from accumulator.

18. Check accumulator for nitrogen leak by filling Usit-ring area with thin oil. If gas bubbles appear, discharge accumulator and replace Usit-ring.

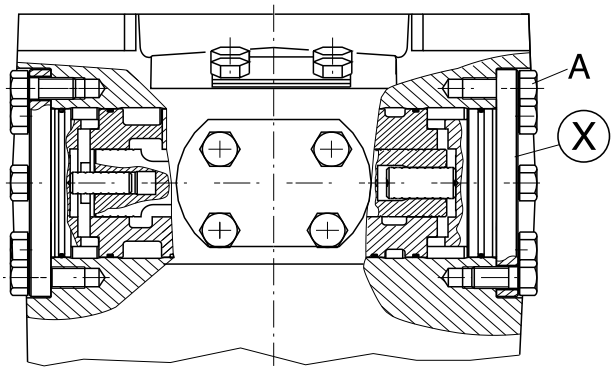
19. Install shield plug.





1.7 MAIN VALVE

TORQUES, ADJUSTMENTS AND LUBRICANTS



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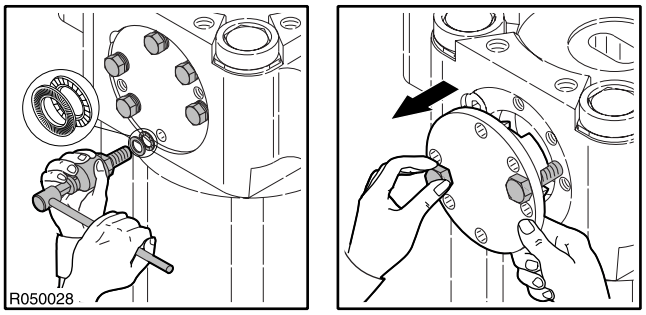
Item	Tightening torque
Main valve cover screws (A)	200 Nm (148 lbf ft)

Item	Lubricant
Screw threads and bearing surfaces, lock washers	Thread grease
All seals and O-rings	O-ring grease
All spools and guides	Hydraulic oil

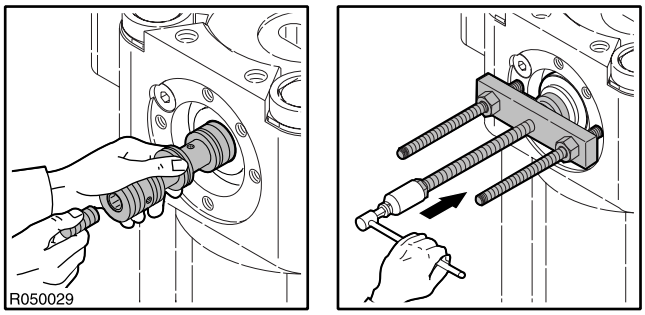
DISASSEMBLING MAIN VALVE

Warning! The hydraulic pressure inside the hammer must always be released before removing any of the plugs or valves. Read the instructions on releasing the hydraulic pressure from the hammer. See “Releasing hydraulic pressure from hammer” on page 92.

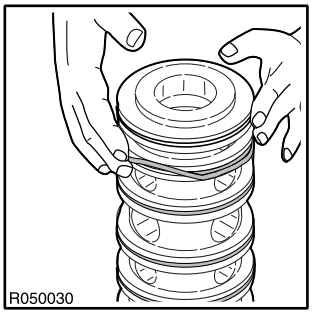
1. Remove main valve cover screws and lock washers.
2. Use two removed screws as forcing screws in covers to pull covers out.



3. Remove main spool and small spools.
4. Attach puller using cover screw holes.
5. Insert puller's flange between puller screw and main valve bushing.
6. Drive main valve bushing out from valve body.



7. Remove old seals and O-rings from main valve bushing and covers.



ASSEMBLING MAIN VALVE

1. Check all parts for wear and damage. If necessary, use fine emery cloth or grinding agent. Clean and oil all parts.

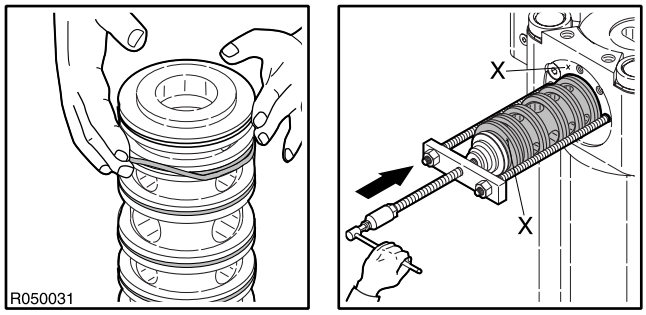
2. Install new seals on main valve bushing.

3. Attach puller to the valve body side marked with "X".

4. Install main valve bushing with "X" facing same side as valve body "X".

5. Put flange against main valve bushing.

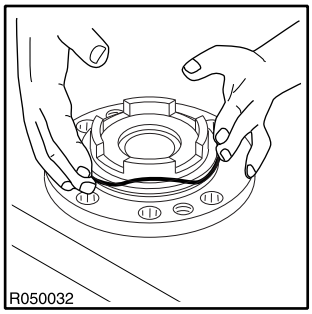
6. Drive main valve bushing in carefully.



7. Install main spool with "X" on spool facing "X" of valve body and main valve bushing.

8. Install small spools. Check that all spools move freely.

9. Install new O-rings on main valve covers. Note: Before installing covers, ensure that all "X"'s on all assembled parts appear on same side as valve body "X".



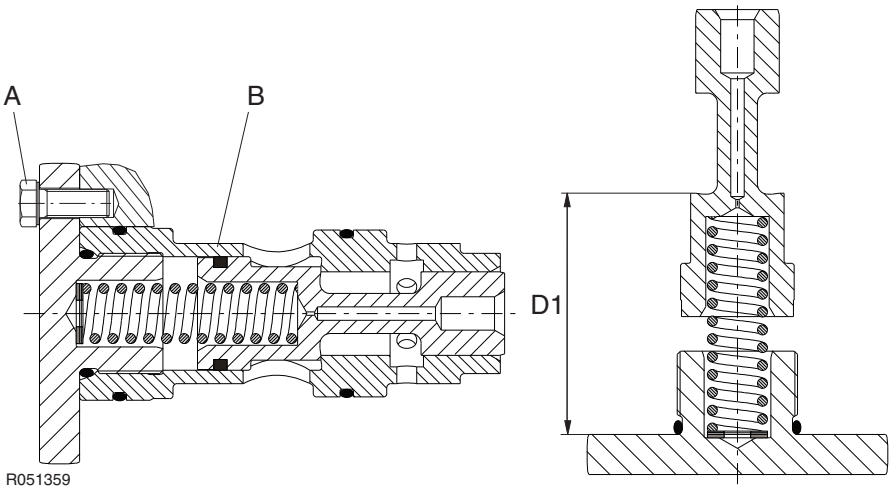
10. Install covers. Ensure that cover marked with "X" faces same side as valve body marked with "X".

11. Grease threads and bearing surfaces of screws and lock washers. Install them.

12. Torque screws to specified setting.

1.8 RAMVALVE

TORQUES, ADJUSTMENTS AND LUBRICANTS



Item	Tightening torque/Specification
Ramvalve screws (A)	200 Nm (148 lbf ft)
Valve housing (B)	approx. 300 Nm (approx. 221 lbf ft)
Free length (D1)	77.3 mm (3.04 in)

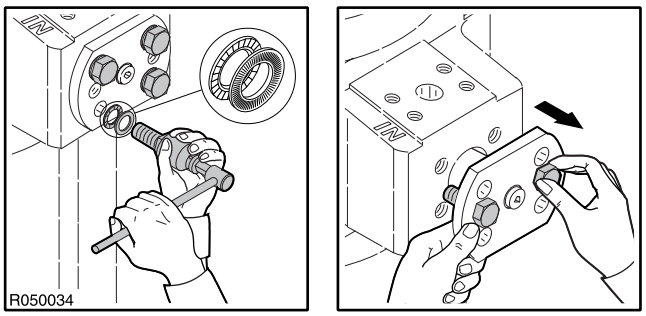
Item	Lubricant
Screw threads and bearing surfaces, lock washers	Thread grease
All seals and O-rings	O-ring grease
Spool	Hydraulic oil

DISASSEMBLING RAMVALVE

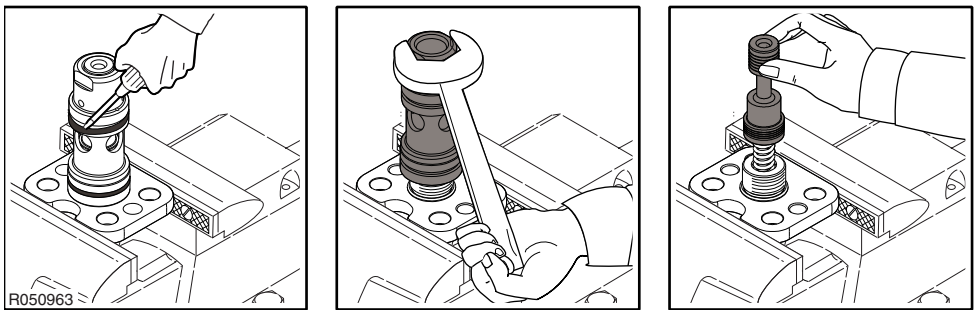
Warning! The hydraulic pressure inside the hammer must always be released before removing any of the plugs or valves. Read the instructions on releasing the hydraulic pressure from the hammer. See “Releasing hydraulic pressure from hammer” on page 92.

Note: The Ramvalve is located in the valve body on the pressure (oil inlet) side. It can also be removed without removing the hammer mechanism from the housing.

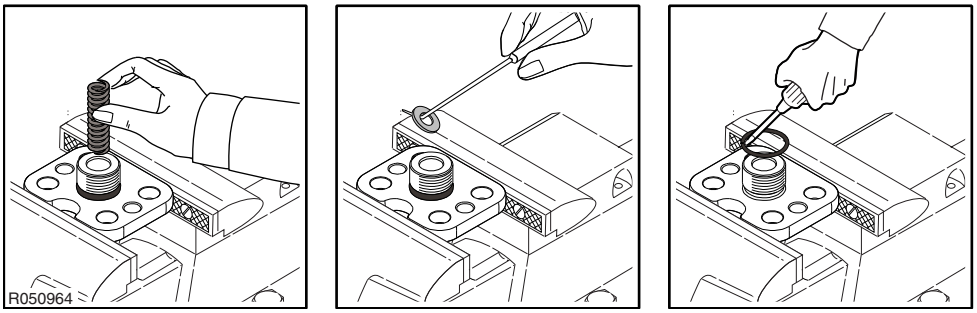
1. Remove Ramvalve screws and lock washers.
2. Use two removed screws as forcing screws in cover to pull Ramvalve out.



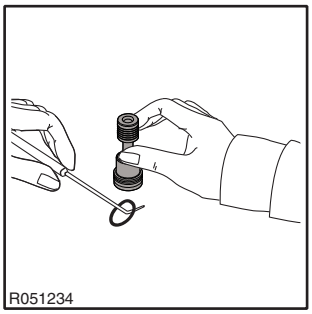
3. Clamp ramvalve in vice.
4. Remove O-rings.
5. Release spring pressure by loosening valve housing and remove valve housing and spool.



6. Remove spring, shim plates and O-ring.



7. Remove seal from spool.



ASSEMBLING RAMVALVE

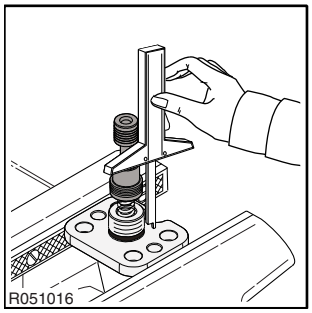
1. Check all parts for wear and damage. If necessary, use fine emery cloth or grinding agent. Clean and oil all parts.

2. Install new O-ring to the cover.

3. Install new seal to the spool.

4. Install shim plates, spring and spool. Measure free length for correct pre-loading of spring.

Always measure hammer operating pressure with a pressure gauge after pressure control valve adjustment!



5. Install valve housing. Torque parts to specified setting. Check that spool moves freely against spring force.

6. Install new O-rings to the valve housing.

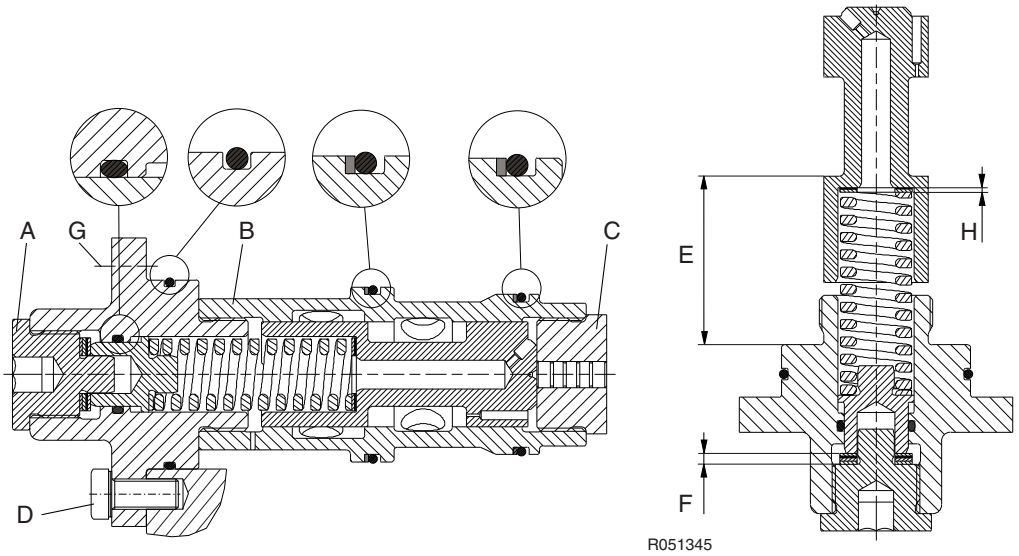
7. Install Ramvalve into valve body. Note: It will not go to the bottom until the screws are tightened.

8. Grease threads and bearing surfaces of screws and lock washers. Install them.

9. Torque screws to specified setting.

1.9 PRESSURE CONTROL VALVE

TIGHTENING TORQUES, ADJUSTMENTS AND LUBRICANTS



Item	Tightening torque/Specification
Plug (A)	220 Nm (162 lbf ft)
Valve housing (B)	300 Nm (221 lbf ft)
Guide (C)	300 Nm (221 lbf ft)
Mounting screws (D)	200 Nm (148 lbf ft)
Free length (E)	76.5±0.3 mm (3.01±0.01 in) (measure only if required, see instructions)
Shim plates preadjusting length (F)	4 mm (0.16 in)
Shim plates preadjusting length (H)	If more shim plates than 4 mm (0.16 in) is needed use this place. Depending on the spring.
Valve cover loosening screws (G)	M16 (M16)

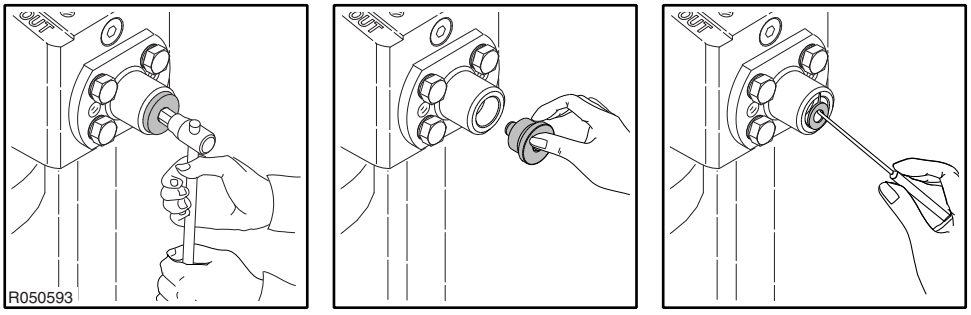
Item	Lubricant
Threads, bearing surfaces and lock washers	Thread grease
Seals and O-ring	Hydraulic oil
Valve parts	Hydraulic oil

ADJUSTING PRESSURE CONTROL VALVE

Note: The pressure control valve is located in the valve body on the return (oil outlet) side. It can also be adjusted without removing the hammer mechanism from the housing.

1. Remove pressure control valve plug.

2. Adjust pre-load to specifications by adding or removing shim plates.



3. Install pressure control valve plug.

4. Always measure hammer operating pressure with a pressure gauge after pressure control valve adjustment!

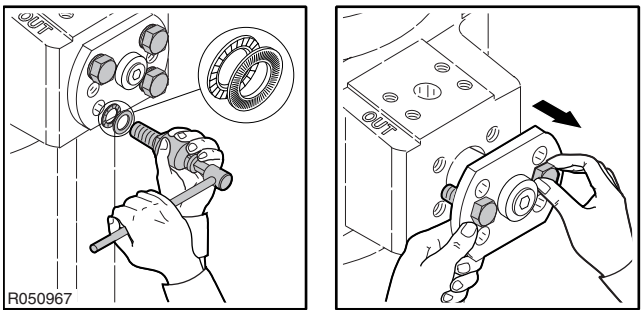
DISASSEMBLING PRESSURE CONTROL VALVE

Warning! The hydraulic pressure inside the hammer must always be released before removing any of the plugs or valves. Read the instructions on releasing the hydraulic pressure from the hammer.

Warning! Pressure control valve components are made of hardened steel. When opening the valve housing wear safety glasses to prevent injury caused by flying chips.

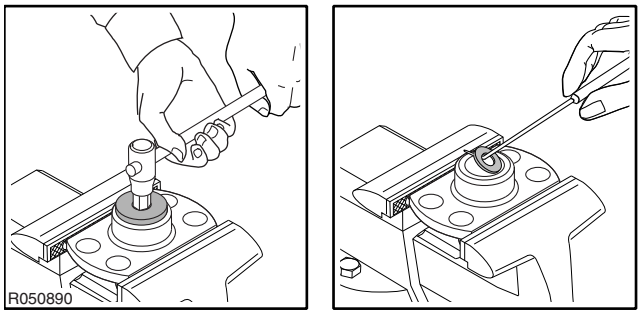
1. Remove pressure control valve screws and lock washers.

2. Use two removed screws as forcing screws in valve cover to pull pressure control valve out.



3. Clamp pressure control valve in vice.

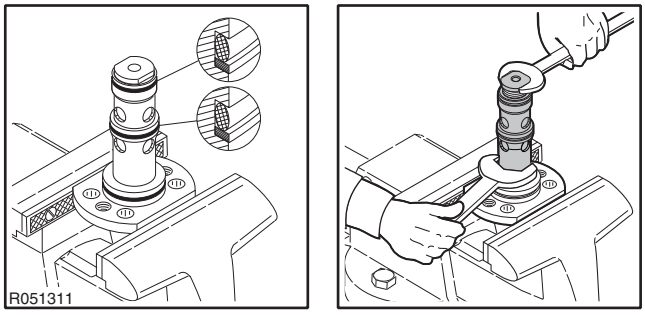
4. Remove plug and shim plates (F). **Important!** Do not lose or mixed these shim plates with shim plates (H) between spring and spool.



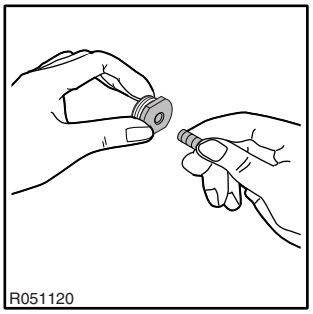
5. Clamp pressure control valve in vice.

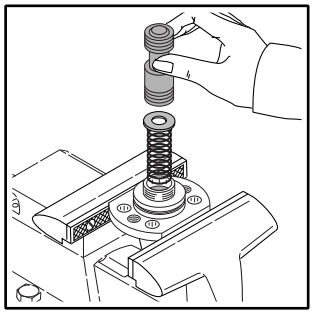
6. Remove seals and O-ring.

7. Wear safety glasses. Release the spring pressure by loosening the both guide and valve housing simultaneously using a combination spanner.

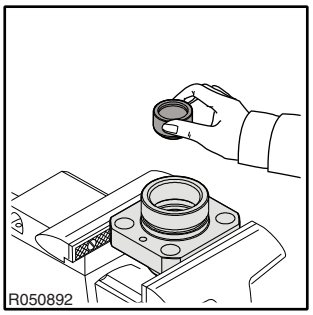


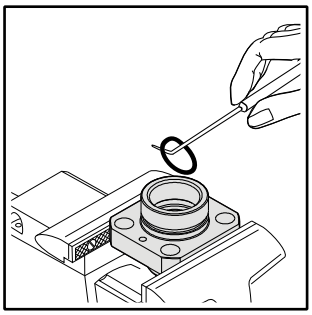
8. Remove guide and its spool. Remove valve housing. Remove spool, shim plates (H) and spring. **Important!** Do not lose or mixed these shim plates with shim plates (F) inside plug.





9. Remove spring guide and O-ring. Note: It might be easier to remove the spring guide by pushing from the other side.





ASSEMBLING PRESSURE CONTROL VALVE

1. Check all parts for wear and damage. If necessary, use fine emery cloth or grinding agent. Clean and oil all parts.

2. Install O-rings to pressure control valve cover.

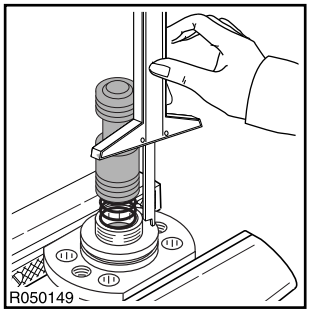
3. Spring force pre-adjustment has been done at the factory. **Important!** Use same spring and same shim plates in the same places when assembling pressure control valve. Install shim plates (F) and plug to pressure control valve cover.

4. Clamp pressure control valve cover in a vice. Torque plug to specified setting.

5. Install spring guide, spring, shim plates (H), and spool.

6. Only if you do not have original shim plates or you have to replace spring, measure free length for correct pre-loading of spring. The correct operating pressure, which is preset at factory is on the average achieved when measured height is as specified. Adjust pre-load to specifications by adding or removing shim plates.

Always measure hammer operating pressure with a pressure gauge after pressure control valve adjustment!



7. Install valve housing and guide. Torque parts to specified setting.

8. Install new seals to the valve housing. Note details in illustration for proper seal installation.

9. Install spool.

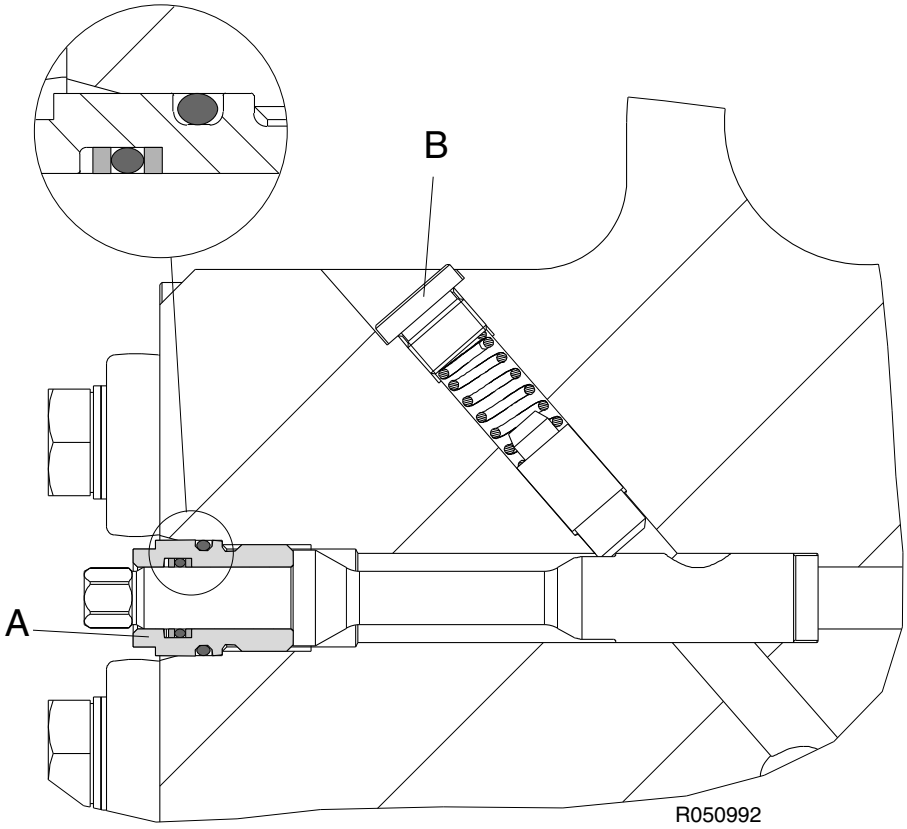
10. Install pressure control valve into valve body. Note: It will not go to the bottom until the screws are tightened.

11. Grease threads and bearing surfaces of screws and lock washers. Install them.

12. Torque screws to specified setting.

1.10 IDLE SELECTOR

TIGHTENING TORQUES AND LUBRICANTS



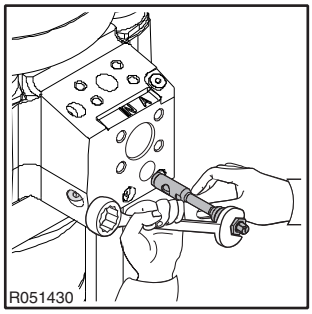
Item	Tightening torque
Cover (A)	100 Nm (74 lbf ft)
Flange plug (B)	40 Nm (30 lbf ft)

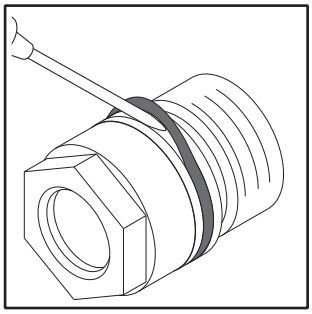
Item	Lubricant
Threads, bearing surfaces and lock washers	Thread grease
Seal and O-ring	Hydraulic oil
Valve parts	Hydraulic oil

REMOVING AND DISASSEMBLING IDLE SELECTOR

Warning! The hydraulic pressure inside the hammer must always be released before removing any of the plugs or valves. Read the instructions on releasing the hydraulic pressure from the hammer. See “Releasing hydraulic pressure from hammer” on page 92.

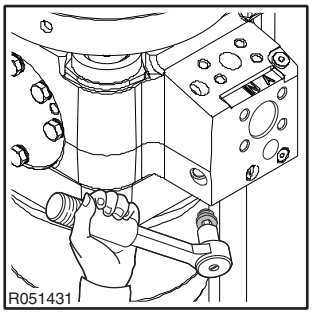
1. Remove ramvalve. See “Ramvalve” on page 110.
2. Open cover and remove idle selector.
3. Remove O-ring and seal from cover.

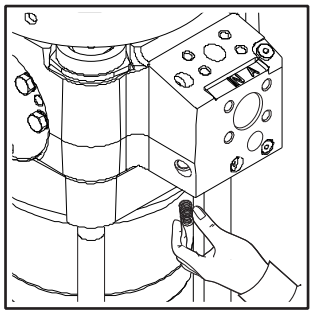


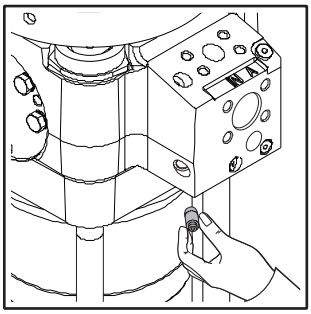


CHANGING IDLE SELECTOR LOCKING PIN AND SPRING

1. Do not disassemble locking mechanism if not necessary.
2. Remove flange plug.
3. Remove spring.
4. Remove pin using extraction screw M6x100.







5. Check condition of the pin.
6. Install the pin and new spring.
7. Install flange plug and torque it to specified setting.

ASSEMBLING AND INSTALLING IDLE SELECTOR

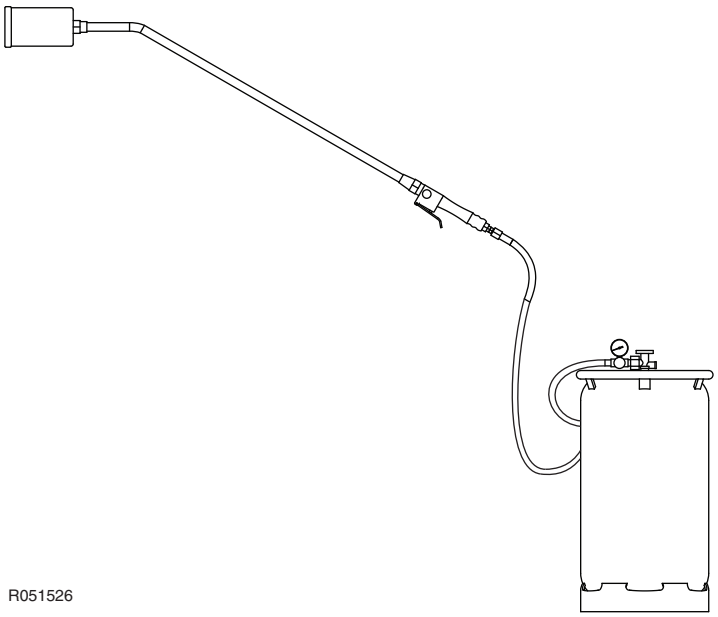
1. Install seal and O-ring to the cover. Cut the supporting rings of the seal to ease installation if necessary.

2. Install spool.

3. Install cover and torque it to specified setting.

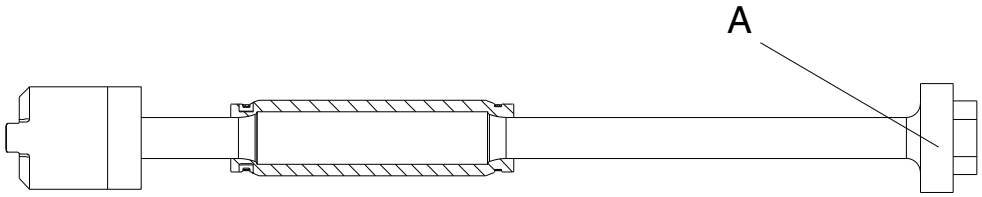
1.11 TIE RODS

SPECIFICATIONS OF THE HEATING EQUIPMENT FOR TIE ROD LOOSENING AND TIGHTENING



Specification	
Equipment	Propane torch
Pressure	3 to 5 bar
Capacity	6 to 10 kg/h

TORQUES, ADJUSTMENTS AND LUBRICANTS



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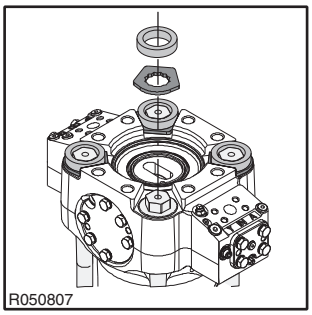
Item	Tightening torque
Tie rod (A) pre-tightening torque steps	1) 100 Nm 2) 300 Nm 3) 500 Nm (1) 74 lbf ft 2) 221 lbf ft 3) 369 lbf ft)
Additional tightening angle after heating	210°

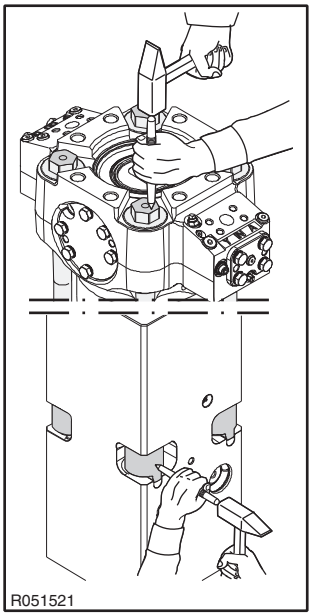
Item	Lubricant or locking fluid
Tie rod threads and bearing surfaces, tie rod nuts	Thread grease
Part of tie rod inside front head	Heat resistant paint
Outer and inner surface of the tie rod vibration dampening elements	Silicone grease
Grooves between front head and the tie rods	Sealing compound

LOOSENING TIE RODS

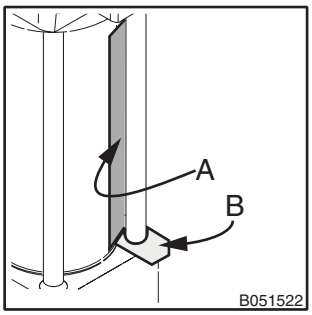
1. Remove the rubber rings and lock plates.



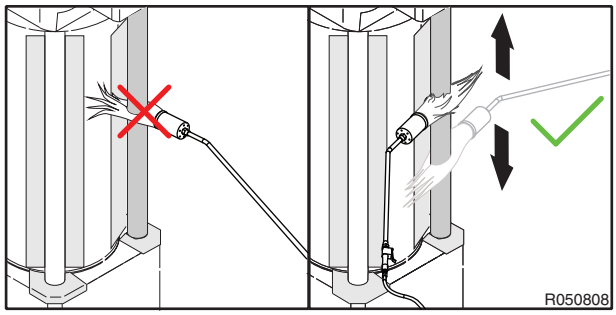
2. Check and if necessary copy the tie rod location number from the hammer front head to each tie rod. Mark each tie rod and its nut as pairs.



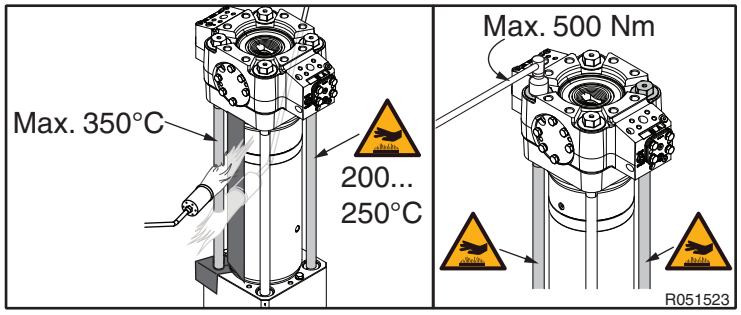
3. Place a shield plate (A) between each tie rod and cylinder and a flame-proof fabric (B) or plate over the vibration dampening elements.



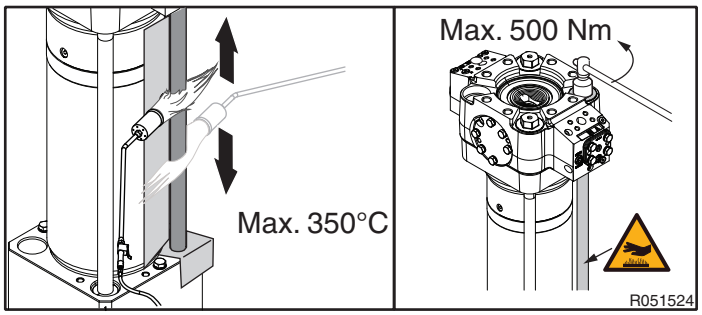
4. Heat the tie rod with a propane flame to 200...250 °C. While heating, ensure the flame only heats the tie rod, not the tie rod vibration dampening elements or the hammer body. Heat the whole visible length of the tie rod evenly. Apply heat on both sides of the tie rod equally.



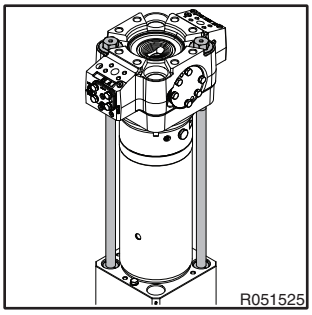
5. Heat the diagonal tie rod until it can be opened using a wrench with a maximum torque of 500 Nm. Do not exceed 350 °C.



6. Heat the first tie rod until it can be opened using a wrench with a maximum torque of 500 Nm. Do not exceed 350 °C.

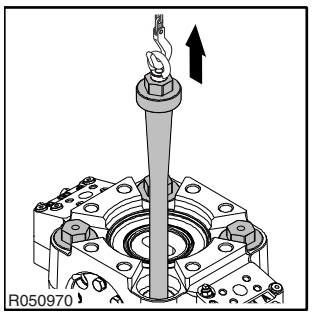


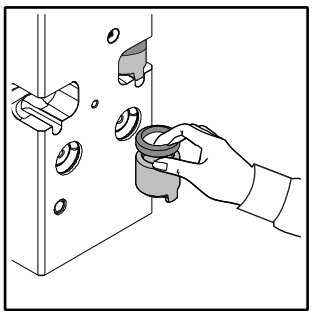
7. Repeat the steps 3 to 6 for the remaining two tie rods.



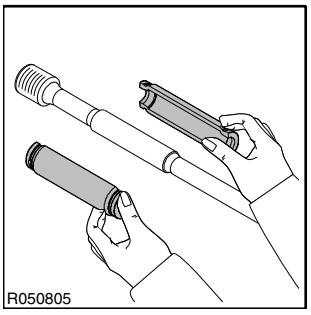
8. Lift the tie rods out with a lifting device. Be careful with hot parts.

9. Remove the nuts and spacers. Be careful with hot parts.





10. Cut the cable ties and remove the tie rod vibration dampening elements if necessary.



TIGHTENING TIE RODS

1. Clean all parts thoroughly.

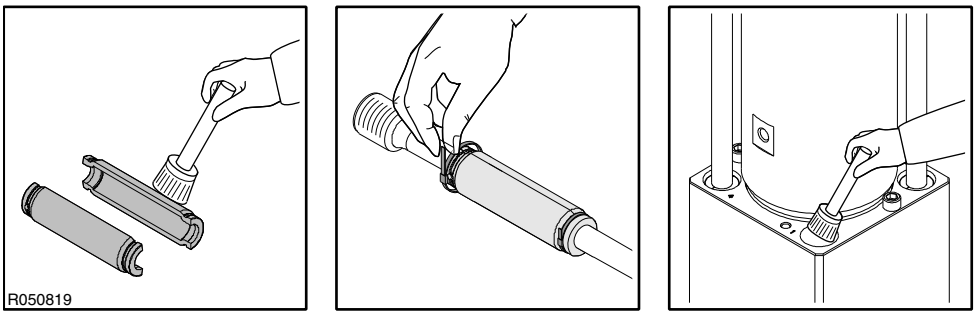
2. Use crack detecting equipment to check if there are cracks in rod threads, under head or in the shaft of rod. If cracks or other corrosion or surface damage are detected, change the tie rod, its nut and spacer. Also change the diagonal tie rod, nut and spacer.

3. Check the contact surfaces between tie rod and valve body as well as surfaces between tie rod nut and front head. Remove possible rises by grinding gently.

4. If the tie rods have been in use, apply heat resistant paint to the part of the tie rods located inside the front head. Thorough corrosion protection is required in order to avoid corrosion cracking of the tie rod.

5. Apply silicone grease on the outer and inner surfaces of the tie rod vibration dampening elements. Install the vibration dampening elements on the tie rods and insert the cable ties. Tighten the cable ties properly.

6. Apply silicone grease to the tie rod bores of the front head.



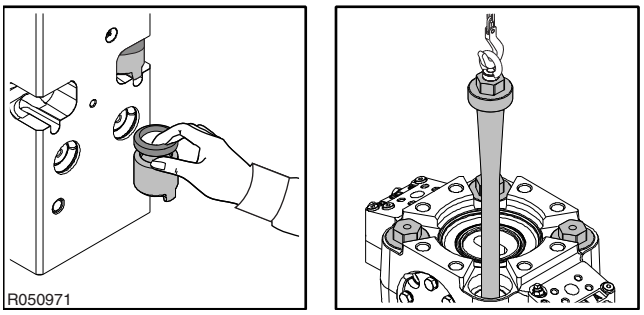
7. Ensure the threads of tie rod and tie rod nuts are free from dirt or metal chips.

8. Apply new thread grease both on the threads of tie rods and the threads of tie rod nuts.

9. Apply thread grease under the tie rod heads and on corresponding surface on valve body.

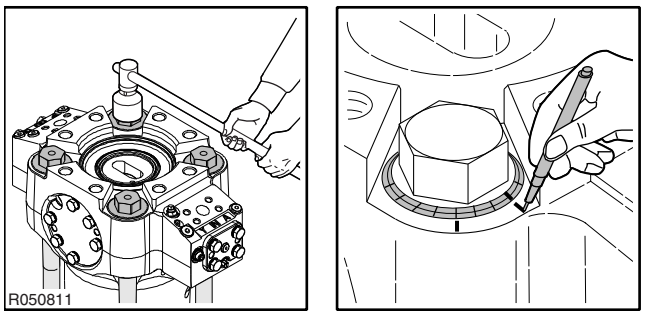
10. Apply thread grease on the tie rod nut upper surface and corresponding surface on front head.

11. Install the tie rod nuts, spacers and the tie rods. Check that each tie rod has the correct nut as its pair. Also check that the location of each tie rod in the hammer is the same as before the disassembly

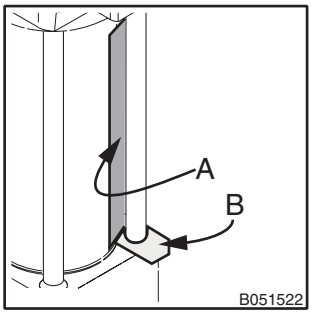


12. Use a torque wrench to tighten the tie rods in small steps crosswise to the pretightening torque.

13. Mark the additional tightening angle to the valve body and the tie rods

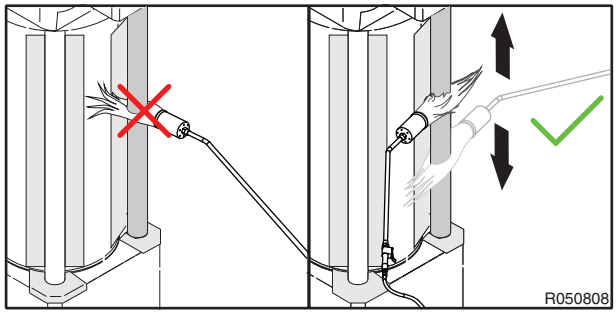


14. Place a shield plate (A) between each tie rod and cylinder and a flame-proof fabric (B) or plate over the vibration dampening elements



15. Heat the tie rod with a propane flame so that it can be tightened to the required tightening angle with a socket and a handle. The maximum allowed torque is 120 Nm (88.5 ft lbf).

Do not exceed 350 °C. While heating ensure that the flame only heats the tie rod, not the tie rod vibration dampening elements or the hammer body. Heat evenly the whole visible length of tie rod. Apply heat on both sides of the tie rod equally.



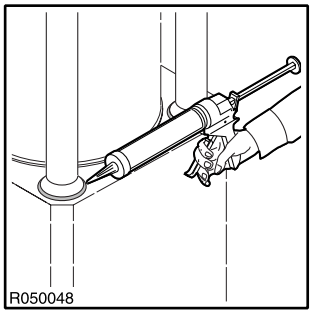
16. Install the lock plate to the tie rod. Turning the lock plate upside down may make it fit on its place.

17. Repeat the steps 15 and 16 to the diagonal tie rod. Install its lock plate.

18. Repeat the steps 15 and 16 to the remaining tie rods. Install lock plates immediately after the right angle has been achieved.

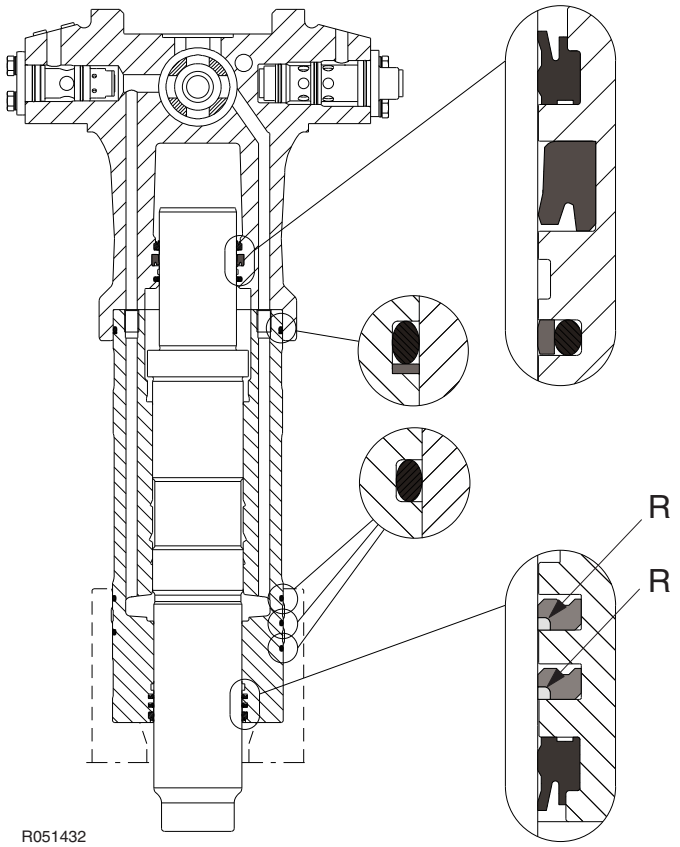
19. Install the rubber rings.

20. Fill the grooves between the tie rods and the front head with sealing compound, when the parts have sufficiently cooled.



1.12 BODY PARTS

TORQUES, ADJUSTMENTS AND LUBRICANTS



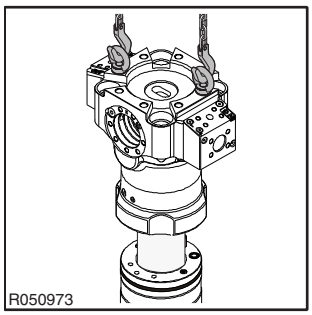
Item (located in valve body or in cylinder)	Tightening torque
Breather BSP 1/2", 1 pcs	120 Nm (89 lbf ft)
Flange plug BSP 3/4", 1 pcs	120 Nm (89 lbf ft)
Flange plug BSP 3/8", 7pcs	50 Nm (37 lbf ft)
Flange plug BSP 1/4", 4pcs	30 Nm (22 lbf ft)
Flange plug BSP 1/8", 4pcs	10 Nm (7 lbf ft)
Nozzle M10, 1 pcs	16.5 Nm (12 lbf ft)

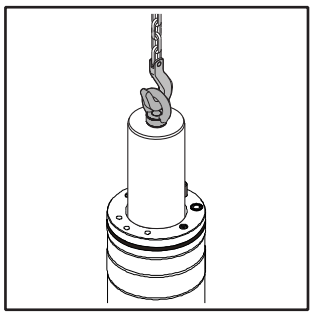
Item	Lubricant
Plugs and breathers	Locking fluid (e.g. Loctite 275)
All seals and O-rings	O-ring grease
Contact surfaces between valve body and cylinder	Anticorrosive agent (e.g. CRC 3-36)
Contact surfaces between cylinder and front head	Thread grease
All parts, especially piston	Hydraulic oil

DISASSEMBLING BODY PARTS

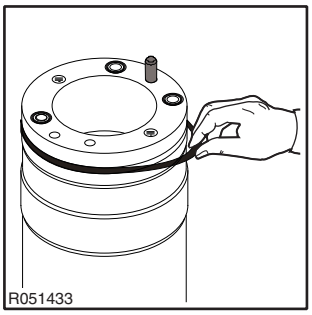
Warning! Because of seal friction, oil viscosity or misalignment of parts, parts can move together. Ensure, that parts remove separately, when you are disassembling the hammer.

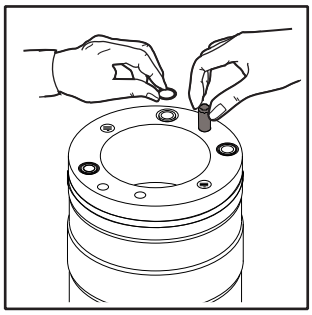
1. Screw lifting eyes in valve body and lift valve body off.
2. Lift piston out carefully.

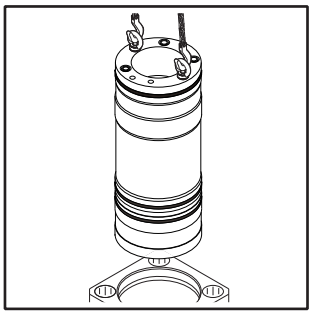




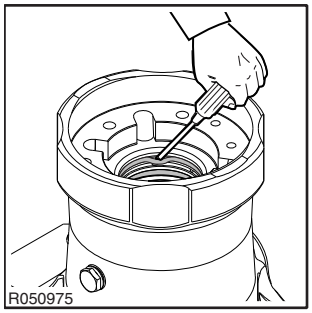
3. Remove seal, O-rings and parallel pin.
4. Lift cylinder out from front head.



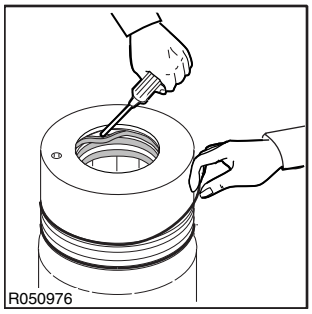




5. Remove parallel pin from front head.
6. Remove wiper and seals from valve body.



7. Remove wiper, seals and O-rings from cylinder.

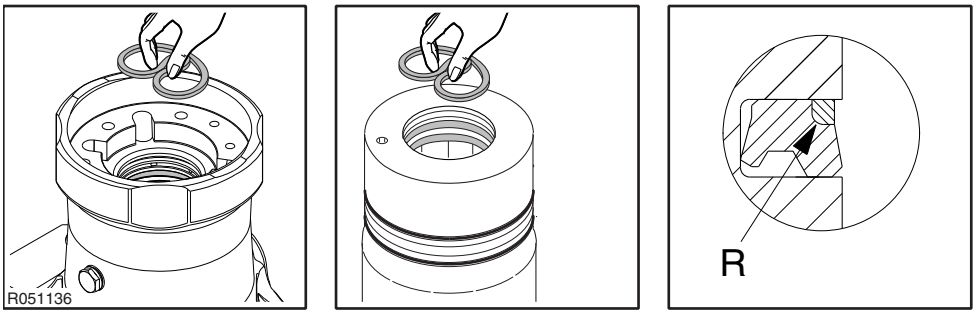


ASSEMBLING BODY PARTS

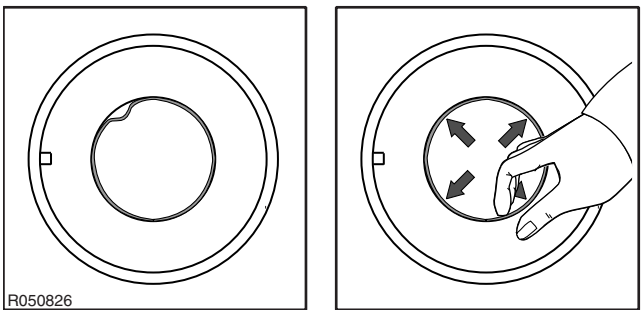
1. Check all parts for wear and damage. If necessary, use fine emery cloth or grinding agent. Clean and oil all parts.

2. Lubricate and install seals, wiper and O-rings to cylinder.

3. Lubricate and install seals and wiper to valve body. Check that the rounded edge of support ring is inside. See details.



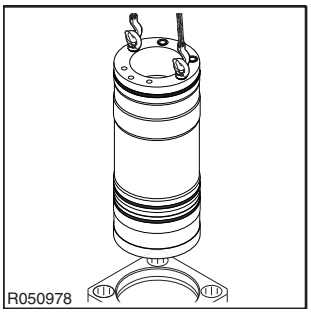
4. Make sure all seals become properly seated into their grooves. Use fingers or some suitable soft and smooth tool to accommodate the seals.



5. Apply thread grease on contact surfaces of front head and cylinder.

6. Install parallel pin to front head.

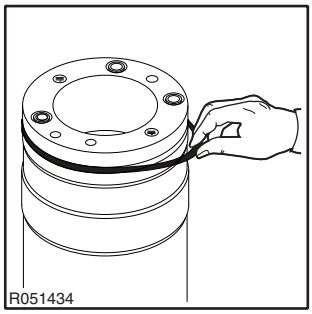
7. Install cylinder into front head.

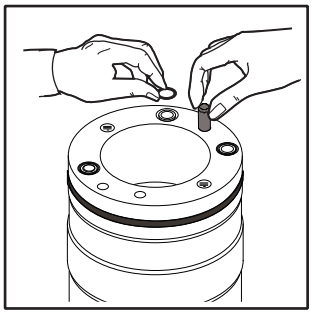


8. Oil piston and lower it into cylinder.

9. Insert seal into its groove in cylinder.

10. Insert O-rings and parallel pin to cylinder.





11. Apply anticorrosive agent on contact surfaces of valve body and cylinder. Install valve body into its place.

PREFILLING OF LARGE HAMMERS IN WORKSHOP

If the hydraulic oil flow in the initial stage of test running of large hammers after assembly is high, then it is in some cases possible that contact between piston and body parts may occur.

The contact may be avoided with a slow startup of the pump, e.g. 30 l /min to fill the hammer, before delivering full oil flow.

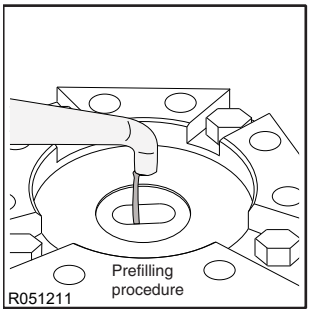
We also recommend very strongly, that you prefill the hammer / valve housing with hydraulic oil in the assembly stage as shown in the pictures.

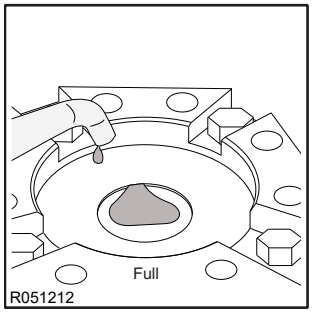
When prefilling the hammer please consider the following issues:

- Use only clean, fresh and proper oil for hydraulic hammer use, according to specification in workshop manual, including instructions to filter for 25 micron.
- When special oils (biological etc.) are used on carrier, use the same oil in prefilling and test run.
- The oil needs to be poured at slow pace, so that trapped air can exit properly from internal cavities.
- After assembly and or test run, plug in/out ports to prevent oil leakage during horizontal storage and transportation.

These recommendations are valid for all large hammers [weight 1000 kg and larger].

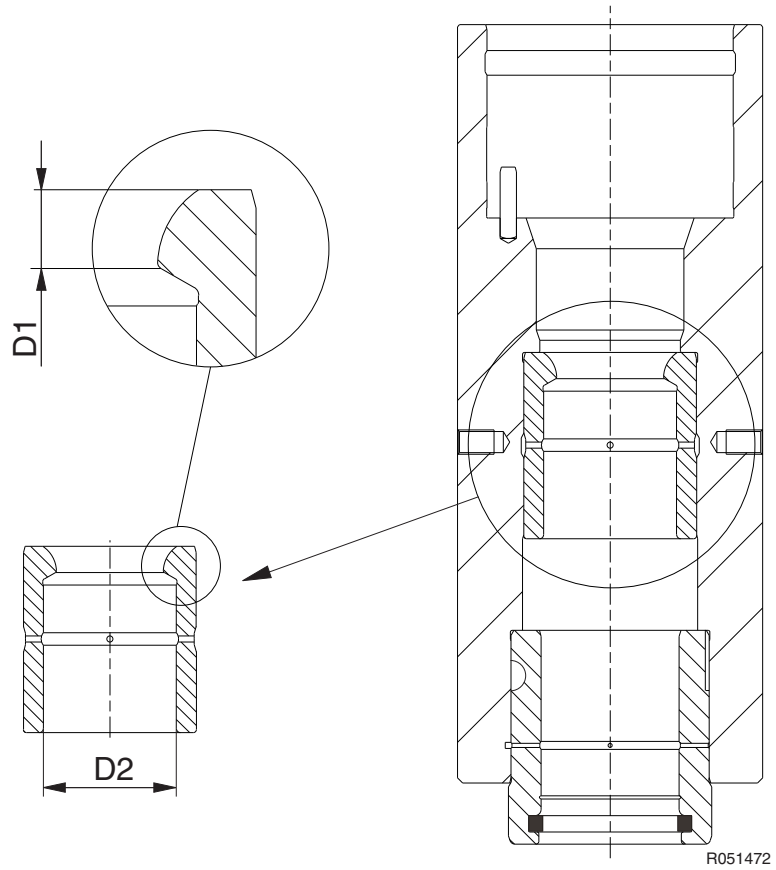
For more information, see "Prefilling of large hammers in workshop, Publ. no. A000152RE" in Bulletins.





1.13 FRONT HEAD

TORQUES, ADJUSTMENTS AND LUBRICANTS

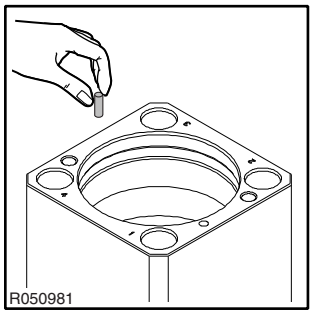


Item	Wear limit
Thrust ring, min. length (D1)	23 mm (0.91 in)
Upper tool bushing, max. diameter (D2)	132.8 mm (5.23 in)
Lower tool bushing	See “Changing the lower tool bushing” on page 64.

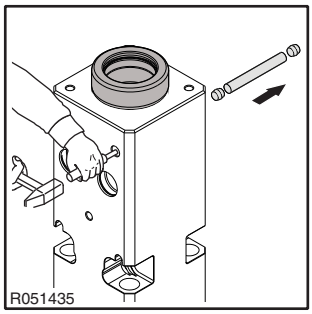
Item	Lubricant
All O-rings	O-ring grease
Contact surfaces between all parts	Thread grease
Inside tool bushings	Tool grease

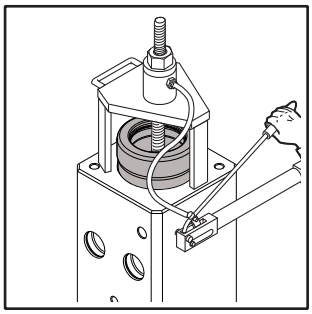
DISASSEMBLING FRONT HEAD

1. Remove parallel pin from front head.

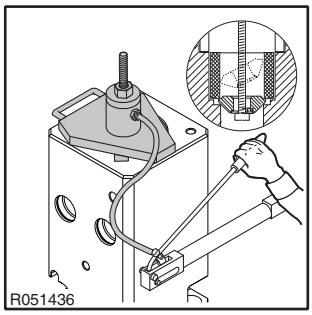


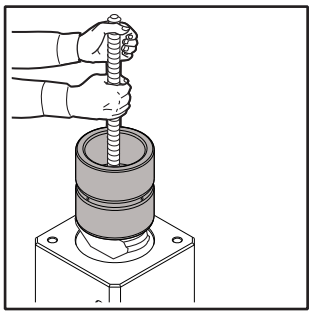
2. Set front head upside down on floor.
3. Remove rubber plugs and retaining pin.
4. Using bushing's extractor tool, pull lower tool bushing out.





5. Attach tool bushing's extractor tool. Install puller's flange by tilting it as shown in detail.
6. Pull upper tool bushing out by using hydraulic jack.
7. Lift upper tool bushing bushing out from front head.



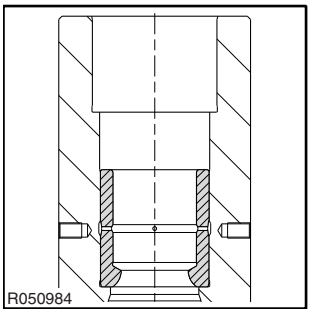


ASSEMBLING FRONT HEAD

1. Clean and dry all parts carefully. Check all parts for cracks and excessive wear. See wear limits for thrust ring and upper tool bushing in specifications section. See “Changing the lower tool bushing” on page 64.

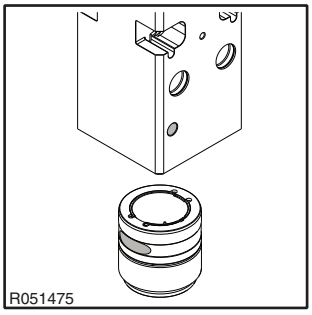
2. Apply thread grease on outer surfaces of upper tool bushing. Lubricate inner surface of upper tool bushing with tool grease.

3. Install upper tool bushing. Note bushing direction.



4. Apply thread grease on contact surfaces of lower tool bushing and front head. Heat the front head so that the temperature difference is 80 °C (176 °F) between front head and lower tool bushing before installing.

5. Put lower tool bushing on the floor and lift the front head on to it. Align the retaining pin grooves in the lower tool bushing and the front head.



6. Install retaining pin and rubber plugs.

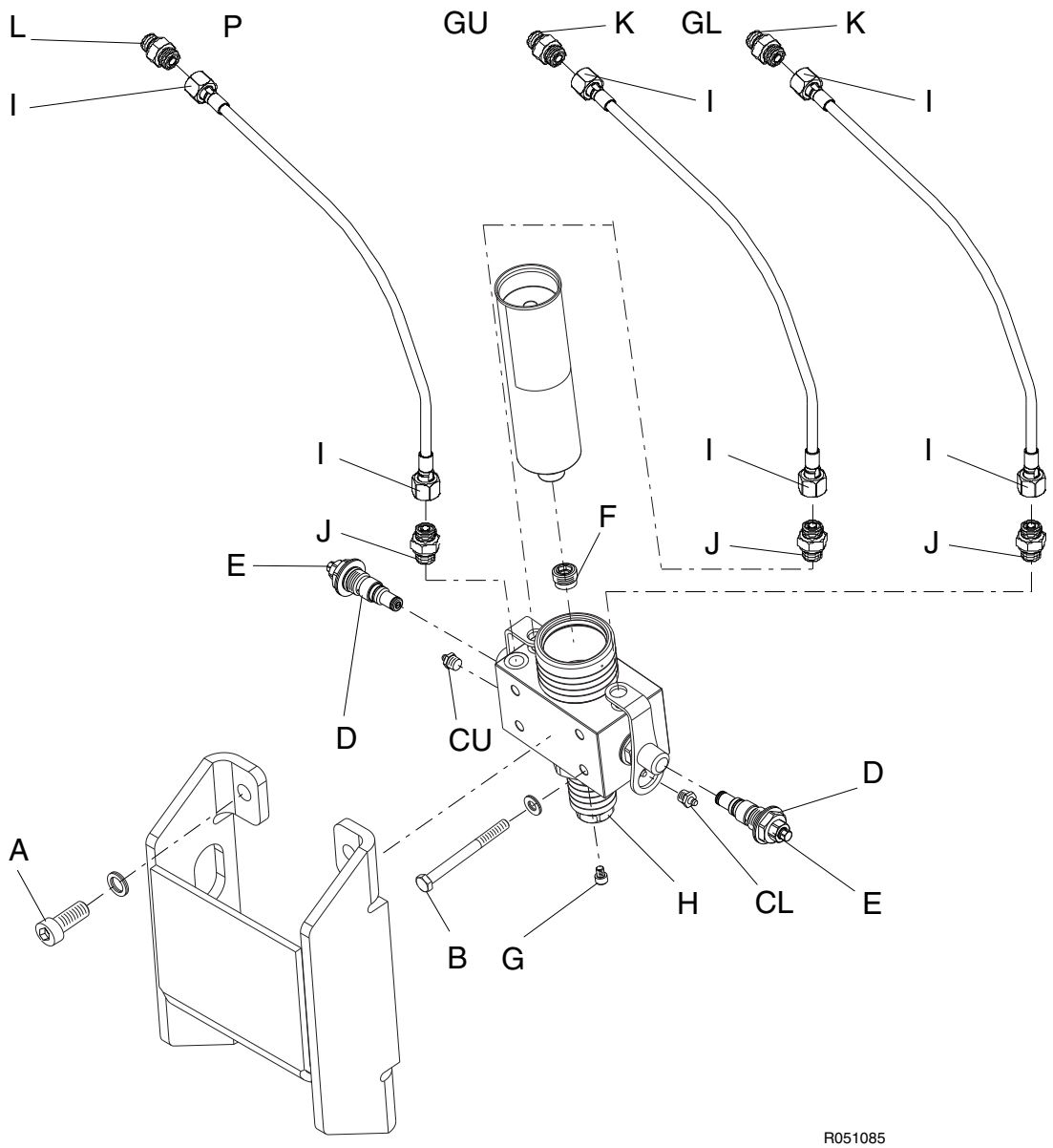
7. Lubricate inner surface of lower tool bushing with tool grease.

8. Set front head standing on lower tool bushing on floor.

9. Install parallel pin to front head.

1.14 GREASING DEVICE

TORQUES AND LUBRICANTS



Item	Tightening torque/Specification
Mounting plate screws (A)	200 Nm (148 lbf ft)
Greasing device screws (B)	40 Nm (30 lbf ft)
Grease nipple for upper tool bushing (CU)	33 Nm (24 lbf ft)
Grease nipple for lower tool bushing (CL)	33 Nm (24 lbf ft)
Doser to the body (D)	150 Nm (111 lbf ft)

Item	Tightening torque/Specification
Locking nut for the adjusting screw (E)	50 Nm (37 lbf ft)
Check valve to the cartridge holder (F)	15 Nm (11 lbf ft)
Screw for spring housing lock plate (G)	25 Nm (18 lbf ft)
Spring housing (H)	400 Nm (295 lbf ft)
Nut (I)	45 Nm (33 lbf ft)
Connector to greasing device (J)	45 Nm (33 lbf ft) / Loctite 2701
Connector to grease connection in hammer (K)	70 Nm (52 lbf ft)
Connector to pressure connection in hammer (L)	70 Nm (52 lbf ft)
Oil pressure in hammer (P)	
Grease connection for upper tool bushing in hammer (GU)	
Grease connection for lower tool bushing in hammer (GL)	

Item	Lubricant
All seals and O-rings	O-ring grease
Threads and lock washers	Thread grease
All parts	Hydraulic oil

RELEASING PRESSURE

Warning! The hydraulic pressure inside the hammer must always be released before making any adjustments or repairs when the hammer is connected to the carrier. There may also be pressurized oil trapped inside the hammer even if the hammer is disconnected from the carrier. Release the hydraulic pressure according to the following instructions before opening any hoses, plugs or valve covers.

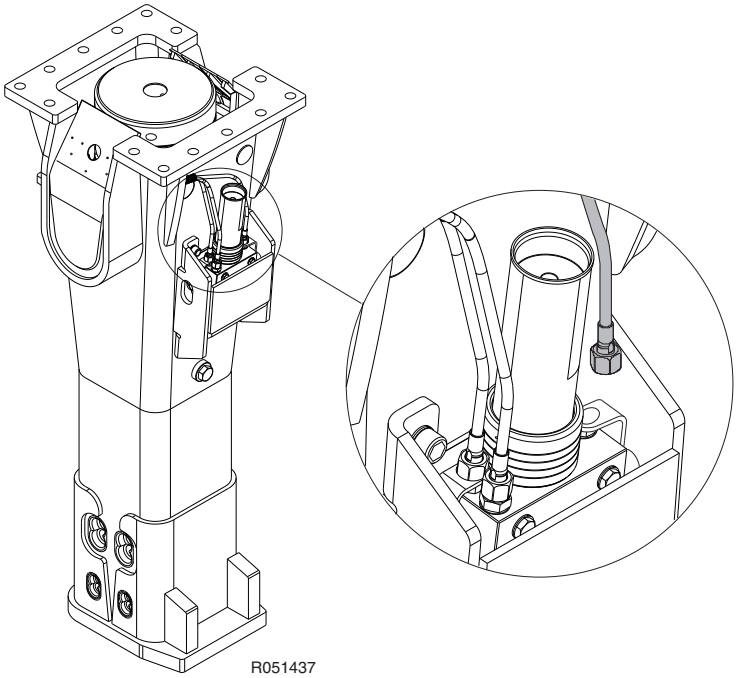
1. Stop the carrier engine.

2. Operate the boom and hammer controls to release any pressure trapped inside the hoses.

3. Wait at least 10 minutes for the oil pressure to drop inside the hammer.

REPLACING GREASING DEVICE HOSES

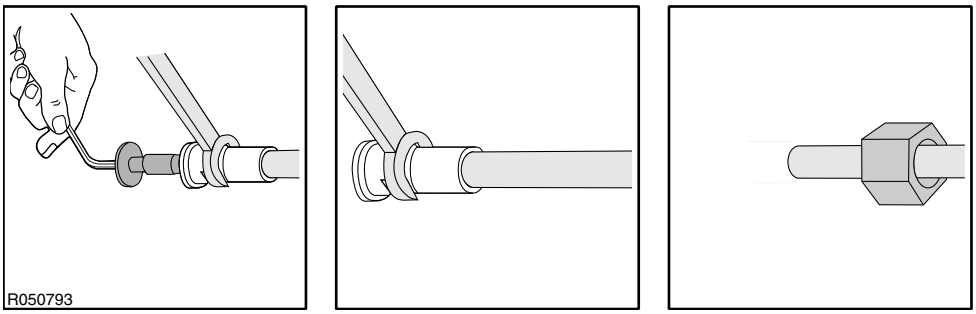
1. Remove the hose assembly by opening the nuts from both ends of the hose.

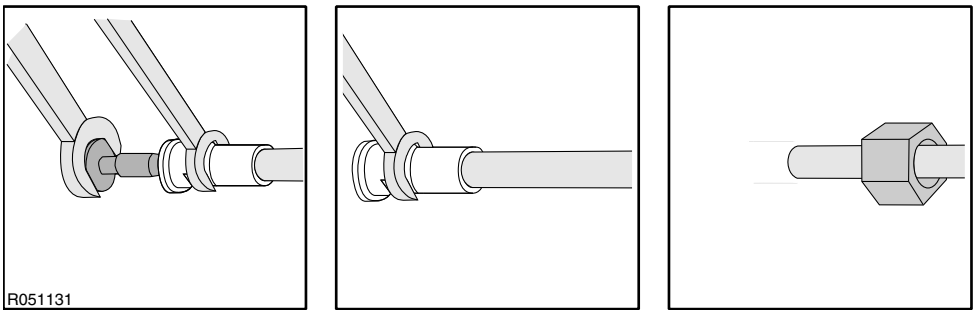


2. Unscrew the inserts with a 5-mm Allen key and a 12-mm open-ended spanner or a 12-mm and 14-mm open-ended spanners.

3. Remove the sleeves. The thread is left-handed.

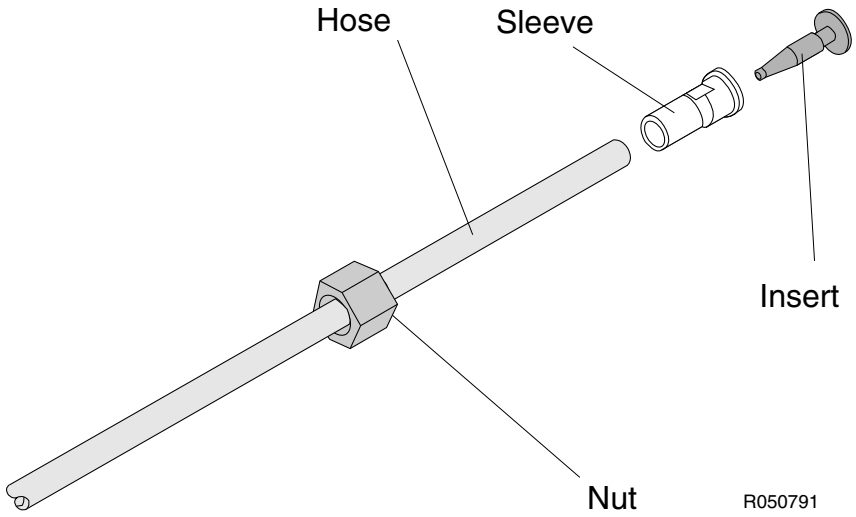
4. Remove the nuts.





5. Use a sharp knife to cut the new hose to the appropriate length. See the parts manual specification for the correct hose length.

6. Lubricate the coupling parts with hydraulic oil.

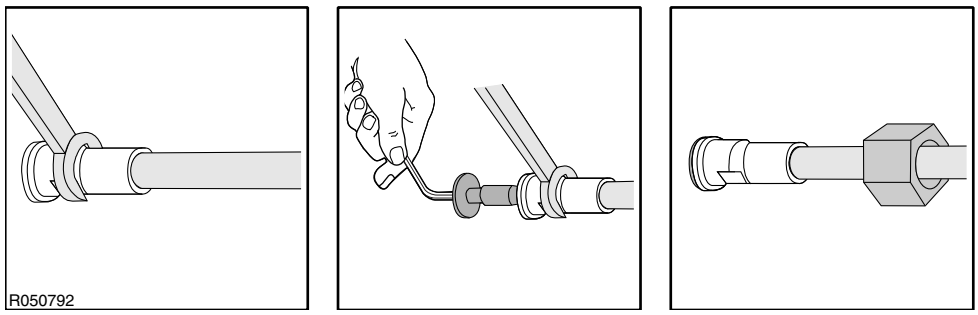


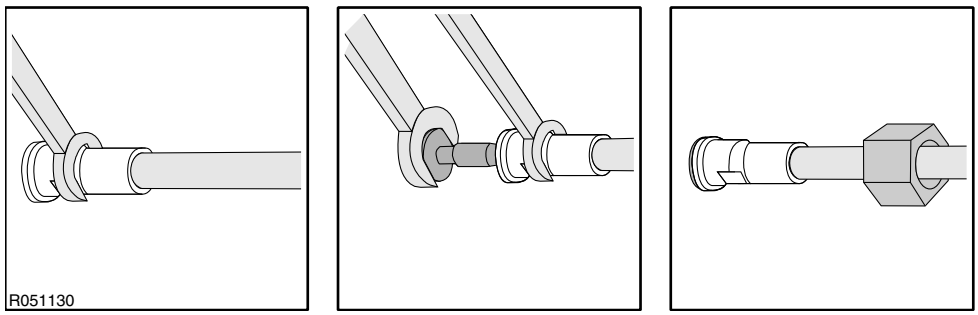
7. Insert the nut on the hose.

8. Use a 12-mm open-ended spanner to screw the sleeve on the hose as far as it will go. The thread is left-handed.

Important: After stopping, turn the sleeve back one (1) round. Mark the position of the sleeve to the hose.

9. Install the insert.and tighten it. There are two different designs of insert: one can be tighten using a 14 mm combination spanner and the other one, using a 5 mm allen key. Hold the sleeve and the hose together while tightening the insert to prevent that the hose does not turn inside the sleeve. Continue until the insert faces the sleeve.





10. Prepare the other end of the hose.

11. Check that there are no blockages in the hose assembly.

12. Install the hose assembly.

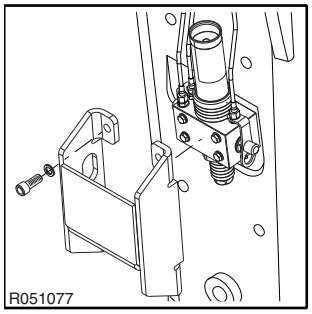
13. Connect the hose assemblies. Tighten the nut and the adapter to the specified torque.

DISASSEMBLING THE GREASING DEVICE

Warning! The hydraulic pressure inside the hammer must always be released before removing any of the plugs or valves. Read the instructions on releasing the hydraulic pressure from the hammer.

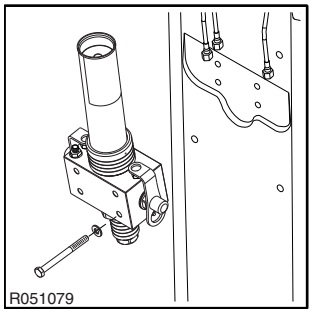
1. Release the pressure inside the hammer.

2. Remove the shield from the housing.



3. Remove the grease and pressure hoses from the greasing device.

4. Remove the greasing device from the housing.

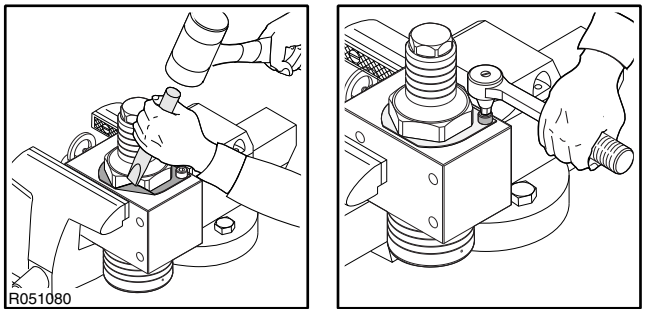


5. Remove grease cartridge.

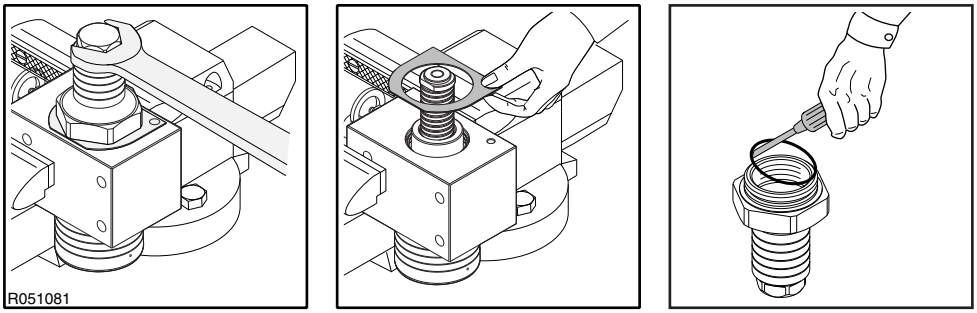
6. Clamp the greasing device in a vice.

7. Release the lock plate with a hammer and a chisel.

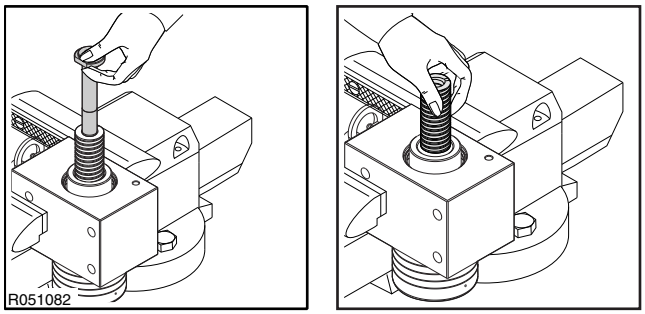
8. Remove the lock plate screw with a 6-mm Allen key.



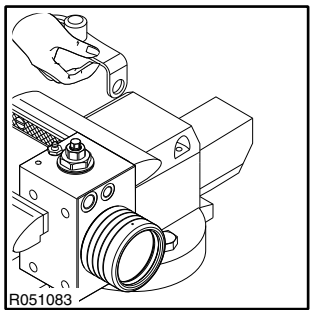
9. Loosen and remove the spring housing with a 36-mm open-ended spanner.
10. Remove the lock plate.
11. Remove the O-ring from the spring housing.



12. Remove the piston with the nut.
13. Remove the spring.

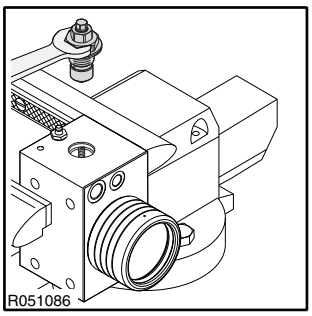


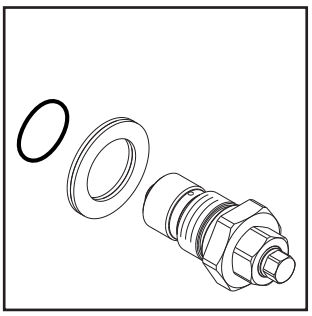
14. Remove the shield plug for the adjustment screw.



15. Use a 30-mm open-ended spanner to remove the doser plug with adjusting screw, nut and lock washer.

16. Remove the O-rings and lock washer from the plug.





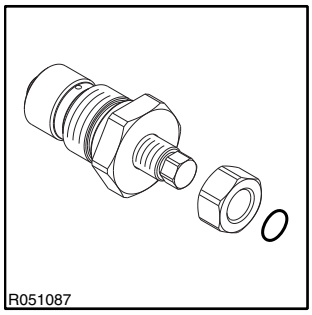
17. Remove the O-ring from the adjusting screw.

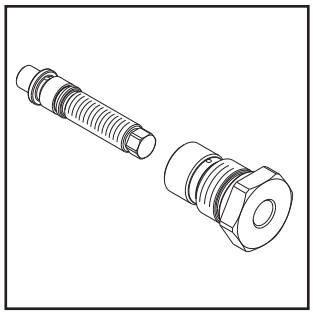
18. Remove the nut from the adjusting screw.

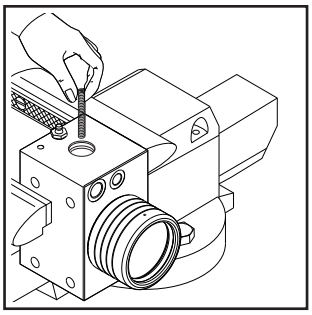
19. Remove the adjusting screw from the plug.

20. Remove the O-ring from the adjusting screw.

21. Remove the spring.

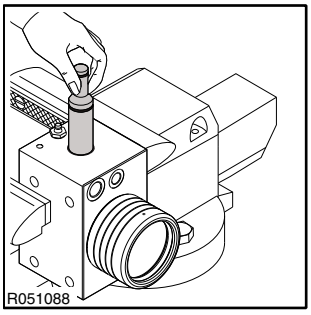


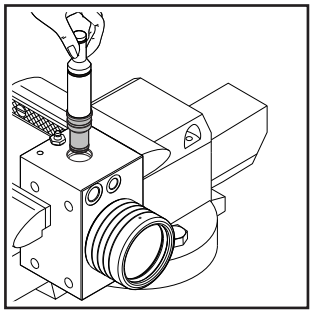




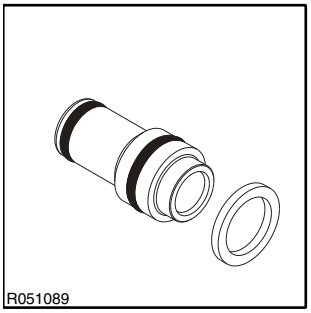
22. Screw the doser body assembling tool onto the doser body.

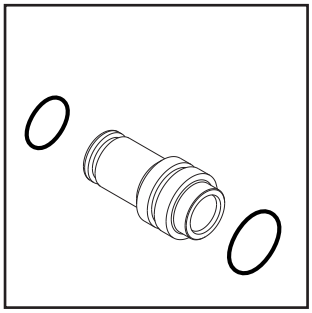
23. Pull the doser body with pistons out using the assembling tool.



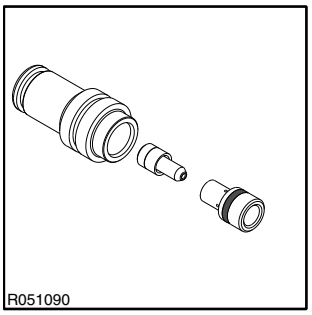


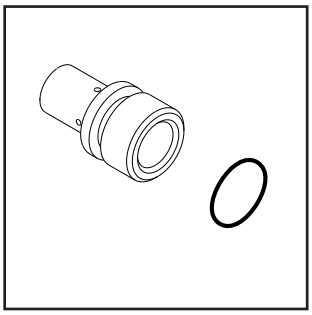
24. Remove the shim plate from the doser body.
25. Remove the O-rings from the doser body.



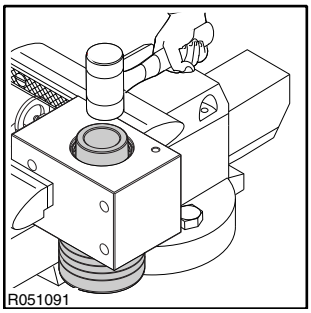


26. Push the pistons out from the doser body with a pin.
27. Remove the O-ring from the piston.



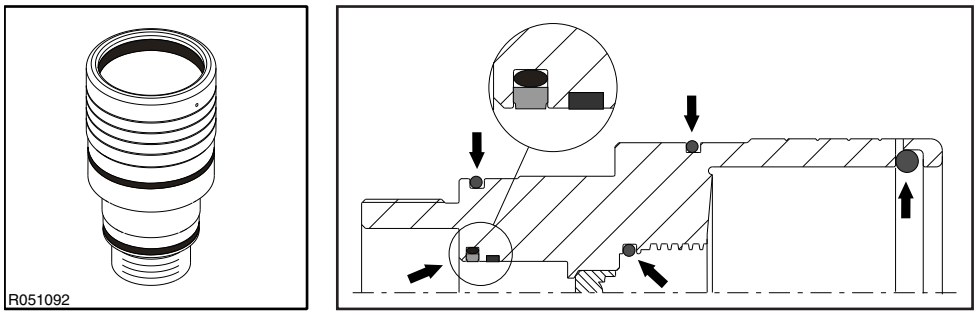


28. Remove the cartridge holder from the body with a plastic hammer.

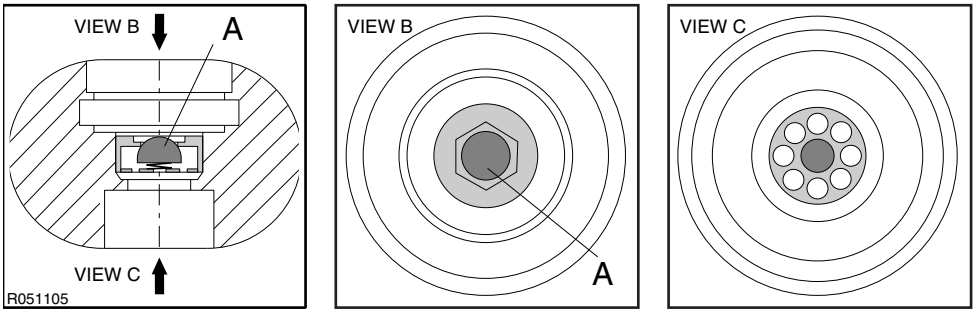


29. Remove the O-rings from the cartridge holder.

30. Remove the seal and the guide ring from the cartridge holder.



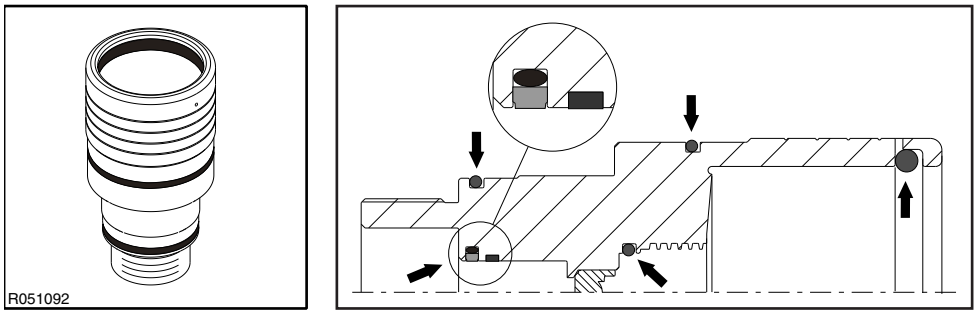
31. Clean the cartridge holder thoroughly with a suitable solvent. Check that the spool (A) moves freely inside the check valve. It is not recommended that you remove the check valve if no damage is found.



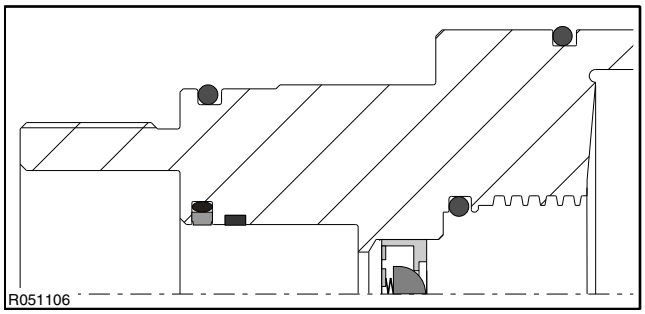
ASSEMBLING THE GREASING DEVICE

1. Clean all parts carefully.

2. Install the O-rings, guide ring and the seal in to the cartridge holder.

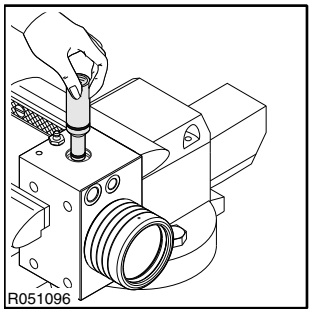


3. If you removed the check valve earlier, install the check valve in to the cartridge holder and tighten it to the specified torque.



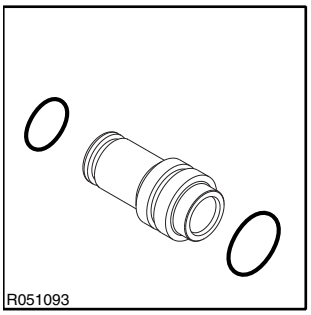
4. Clamp the greasing device body in a vice.

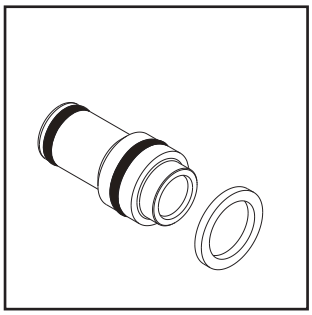
5. Install the cartridge holder to the body. Align the holes for the dosers in the cartridge holder and the body with the doser body assembly tool.



6. Install the O-rings to the doser body.

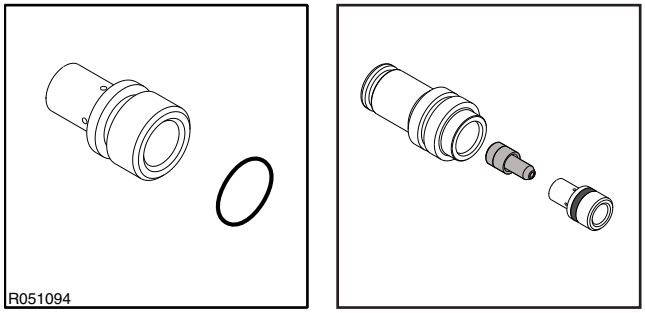
7. Install a new shim plate to the doser body.



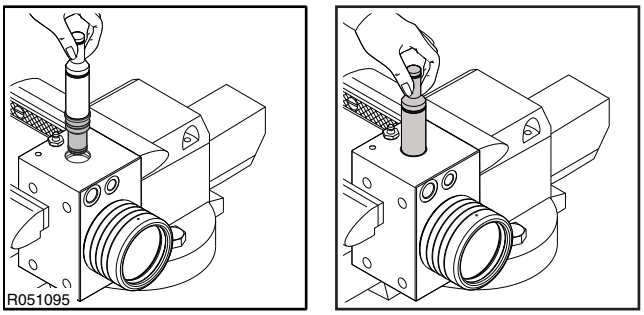


8. Install the O-ring to the piston.

9. Install the pistons to the doser body. Note: Install new rubber piston.

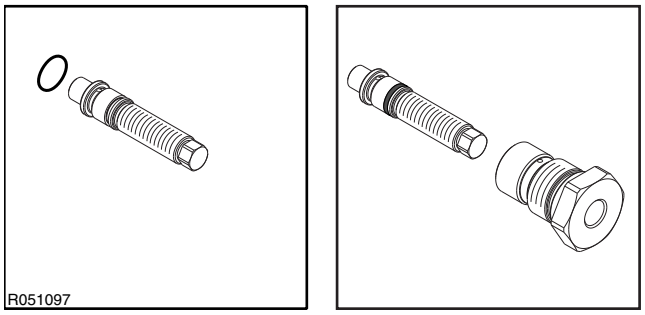


10. Install the doser body and pistons into the body with the doser assembling tool.



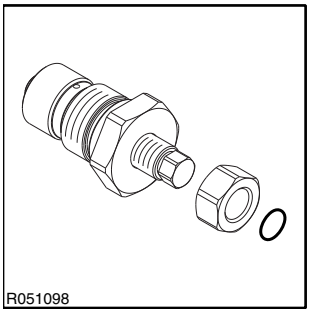
11. Install the O-ring to the adjusting screw.

12. Install the adjusting screw to the plug. Turn the adjusting screw so that it is fully open.



13. Install the nut to the adjusting screw.

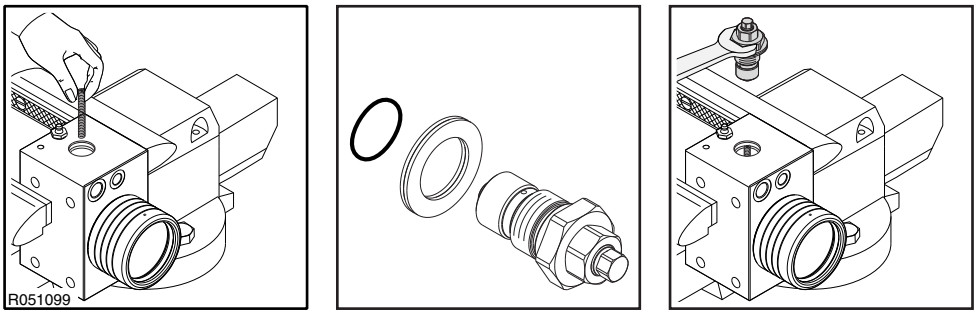
14. Install the O-ring to the adjusting screw.



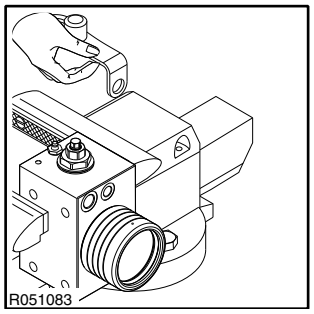
15. Install the spring.

16. Install the O-rings and the lock washer to the plug.

17. Install the doser plug with adjusting screw, nut and lock washer. Tighten the plug to the specified torque setting.

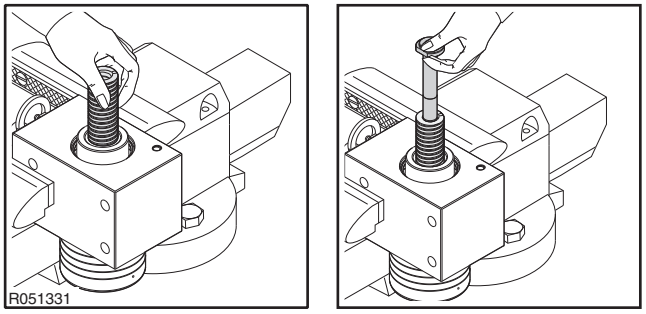


18. Install the shield plug for the adjustment screw.

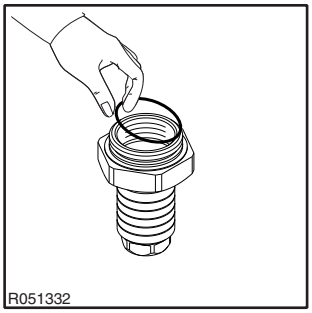


19. Install the spring.

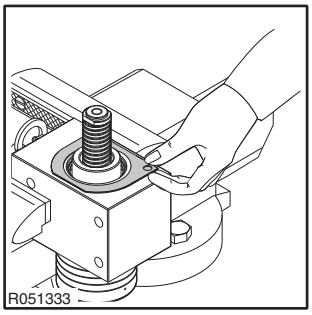
20. If the nut has been removed from the piston, reinstall it to the piston and lock it with Loctite 2701. Install the piston with the nut.



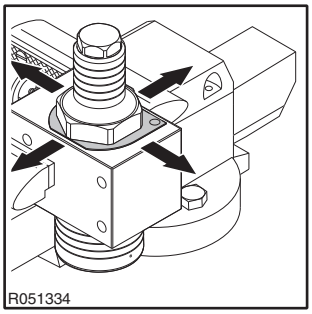
21. Install the O-ring to the spring housing.



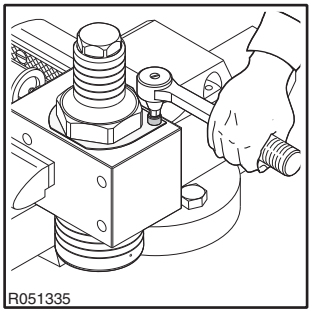
22. Install the lock plate of the spring housing. Note: Use always a new lock plate. Do not install the lock plate securing screw yet.



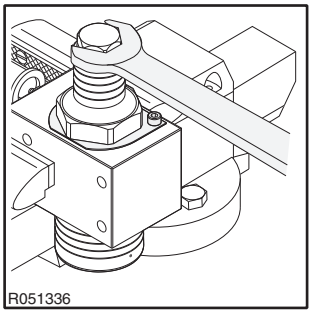
23. Install the spring housing. Before tightening it completely center the lock plate so that the lock plate will connect properly with the spring housing`s matching diameter.



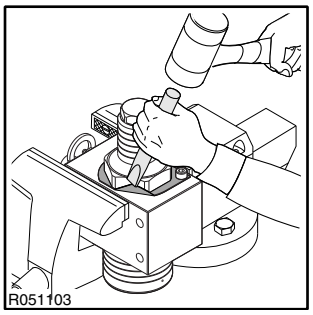
24. Install the lock plate screw. Tighten the screw to the specified torque setting.



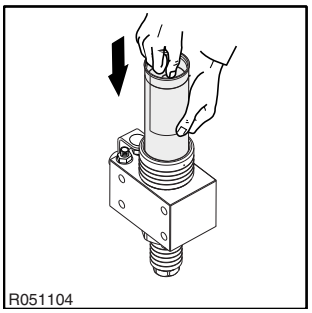
25. Tighten the spring housing to the specified torque setting.



26. Lock the spring housing by bending the lock plate with a chisel and a hammer.



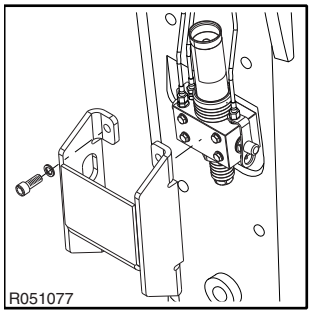
27. Install the new grease cartridge. Prefill the greasing device by pressing the piston of the grease cartridge manually.



28. Attach the greasing device in to the housing. Tighten the screws to the specified torque setting.

29. Connect the grease and pressure hoses to the greasing device and hammer.

30. Install the shield to the housing. Tighten screws to the specified torque setting.

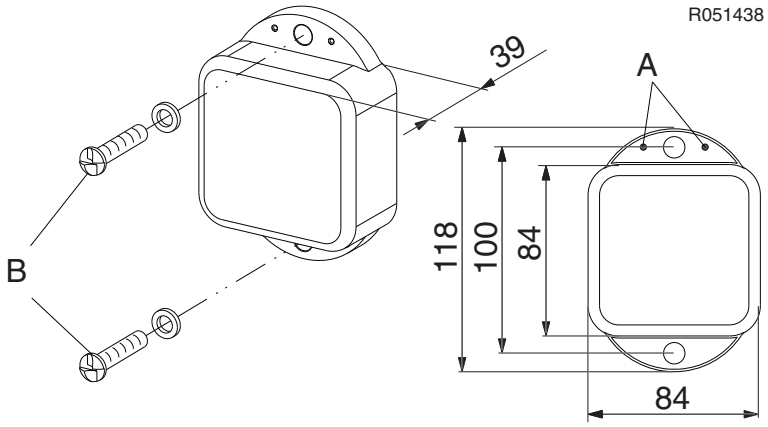


31. Prefill the hammer's grease channel by applying tool grease with a grease gun to the grease nipple located on the side of the greasing device. Continue until some grease appears from the tool bushing`s grease holes (use assistant if possible). This may take some time; the capacity of hammer internal grease channel is approximately 500 - 1000 grams.

1.15 RD3 REMOTE MONITORING DEVICE

MOUNTING DIMENSIONS

Surface-mounted



Item	Tightening torques
Orientation marks (A)	UP
RD3 mounting screws M8 (B)	10 Nm (7 lbf ft)

Item	Adhesive
Mounting screws	Locking fluid, high strength locking force (e.g., Loctite 277)

Orientation

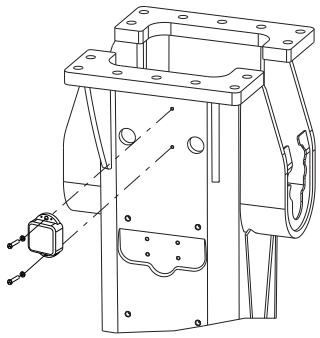
The indentations (A) on the remote monitoring device are orientation marks. These marks indicate the upright position of the device. These must be on top when installing the device on the hammer.

Location on housing

The device can be mounted in several ways, depending on the hammer model:

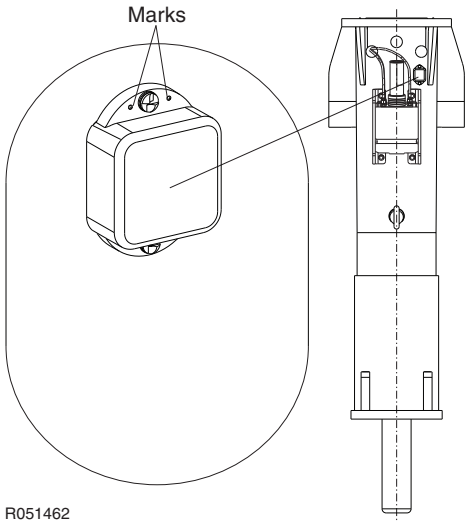
- surface-mounted
- recess-mounted

Surface-mounted



R051466

INSTALLING THE SURFACE-MOUNTED RD3



Warning! The hammer must be secured from falling down in any direction when handling it.

1. If you are replacing an existing RD3 device, remove the old device. See "Removing an RD3 device".

2. If this is the first RD3 installation on your hammer or you must reposition the RD3 device, make the holes to mount the RD3:

Note: If you are repositioning the device, choose a flat surface where it will be protected from flying debris or sudden impact.

- Mark the places for the mounting screw threads. Note: Use the RD3 device as a template. Remember to orient the device with the orientation marks up.
- Drill the holes for the threads perpendicular to the surface of the hammer.
- Make the threads with a threading tool, using lubricant.
- Clean the threads carefully.

3. Apply the recommended locking fluid to the mounting screws.

4. Position the RD3 device on the hammer, in line with the mounting holes and orientation marks up.

5. Attach RD3 to the hammer with the washers and mounting screws, Tighten the screws to the specified torque.

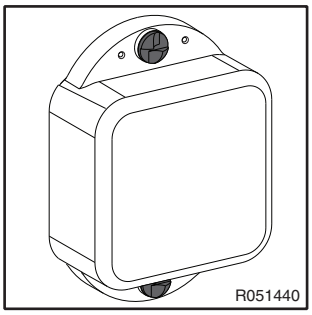
6. Activate RD3.

REMOVING AN HOUSING-MOUNTED RD3 DEVICE

Follow these instructions to remove an existing RD3 device.

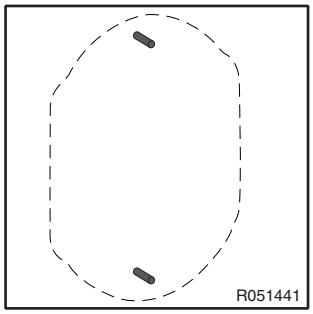
Warning! The hammer must be secured from falling down in any direction when handling it.

1. Cut the mounting screw heads off with a saw.



2. Remove the remote monitoring device.

3. The mounting screws are secured with locking fluid. Heat the mounting screws and twist them off.



4. Clean the threads carefully.

ACTIVATING AN RD3 DEVICE

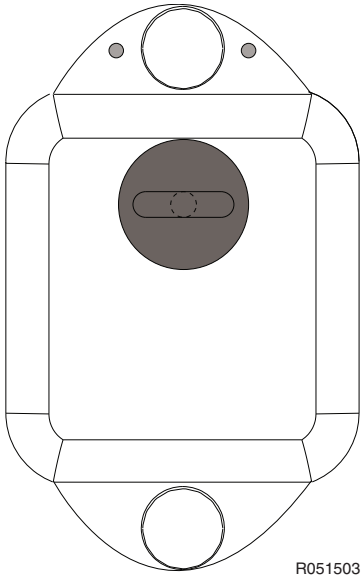
Follow these instructions to activate an existing RD3 device.

Warning! Big magnets have a very strong attractive force. Unsafe handling could cause contusions, bruises, or bone fractures. Wear heavy protective gloves when handling larger magnets.

Warning! Magnets could affect the proper functioning of pacemakers and implanted heart defibrillators. If you or others nearby wear one of these devices, maintain a safe distance from magnets.

Note: RD3 requires activation only as a spare part or retrofit.

1. Place the magnet on top of RD3 as shown. Warning! The super magnet has a 30-kg adhesive force. Keep a safe distance from metal objects!



2. Wait 15 seconds to activate the device. Note: The RD3 device does not have an indicator to acknowledge successful activation.

When activated, the RD3 device starts sending hammer operating and location information to SAM. By default, RD3 sends information to SAM once a day, at midnight local time. See the "Device last connected" field in SAM for the latest RD3 transmission.

Note: The RD3 data can be viewed in the online service, SAM. To access SAM, go to https://sam.rockprocessing.sandvik/ .

1.16 UNDERWATER OPERATION

PREPARING THE HAMMER FOR UNDERWATER USE

The operating principle for underwater operation is to conduct pressurized air through a built-in channel to the spaces above and below the piston. The air pressure prevents water from entering the hammer. **Notice! If water fills the space between the piston and the tool, a strong pressure wave is generated and the hammer can be seriously damaged. In addition, water will enter the hydraulic system.**

The hammer is designed for only short periods of operation underwater, after it has been specially prepared for such underwater operation. Before underwater operation, you must modify the hammer mechanism and service the hammer. **Notice! A standard hammer (that is, one not specially prepared for underwater use) cannot be used for underwater operation.**

To prepare the hammer for underwater operation, you must:

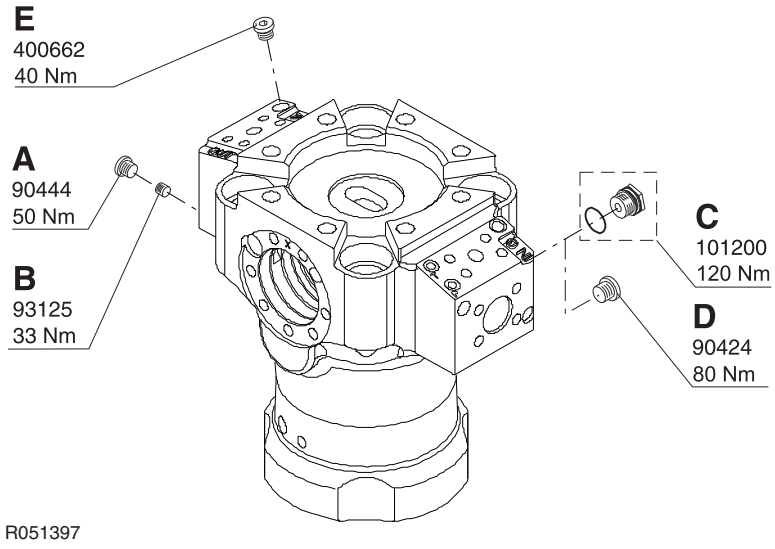
- Modify the hammer mechanism for underwater operation.
- Treat the accumulator retaining screws, tie rod threads and other parts with thread grease to prevent corrosion. This is very important because, otherwise, they could rust and become stuck.
- Seal parts with a silicone compound to prevent water from entering the hammer.
- Establish an air supply to the hammer according to specifications.
- Install a pressure switch in the hammer circuit to minimize the risk of water entering the hammer during operation.
- Select a tool grease that is suitable for underwater operation. Use it during the entire underwater operation.

MODIFYING THE HAMMER MECHANISM

Note: Plugs are secured with locking fluid. You must heat them before opening.

See the accompanying figure for correct part identification.

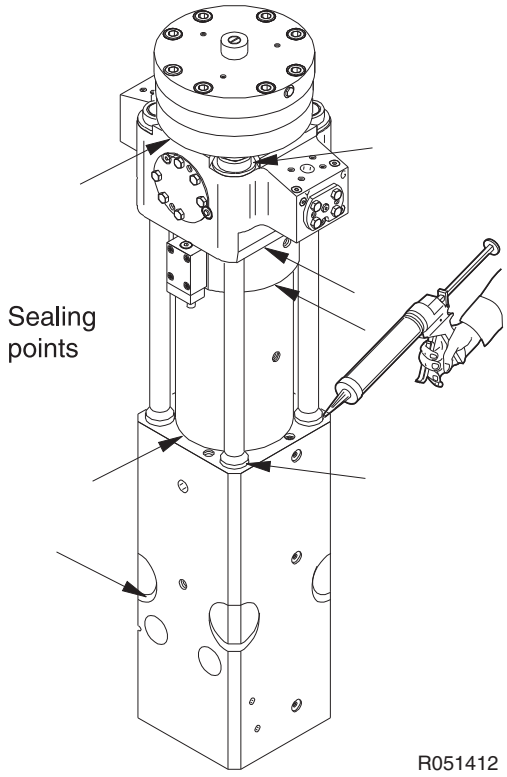
1. Remove the hammer mechanism from the housing.
2. Remove plug (A).
3. Remove plug (B) located underneath plug (A).
4. Re-install plug (A). Tighten it to the specified torque.
5. Remove breather (C) and replace it with plug (D). Tighten it to the specified torque.
6. Seal the specified parts with silicone compound.
7. Install the hammer in the housing.
8. Remove breather (E) and connect the air hose. The correct port is marked with letter "A".



SEALING THE HAMMER FOR UNDERWATER OPERATION

Seal all grooves, junctions, joints and gaps with silicone compound. The following points are the most important and must be sealed:

- The groove between the tie rods and the front head.
- The groove between the tie rods and the valve body.
- The groove between the tie rod nuts and the front head.
- The junction of the cylinder and the front head.
- The junction of the seal carrier and the cylinder.
- The gap between the top end of the tie rod, valve body and accumulator.
- The junction of the accumulator and the valve body.
- The junction of the valve body and the cylinder.



ESTABLISHING AN AIR SUPPLY

It is recommended that you fit the air compressor on the carrier, because a long distance between the hammer and compressor causes the pressure to drop in the air hose.

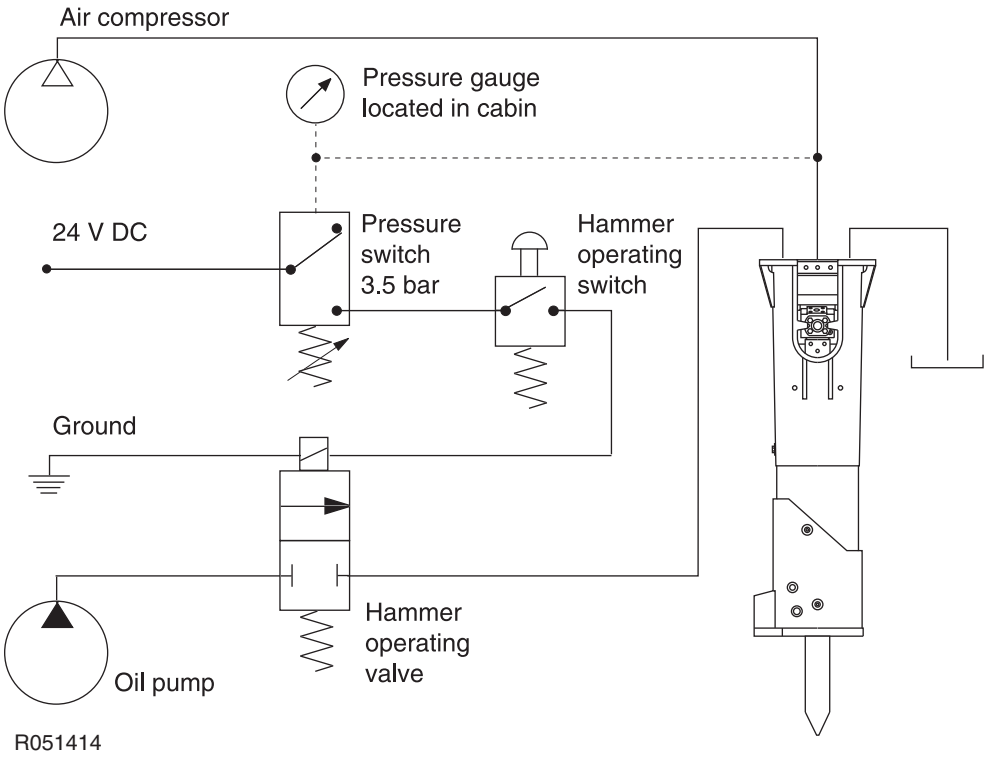
The required air pressure and air flow depends on the hammer model and the wear of the tool bushings and tool. The recommended values for air pressure (measured near the air connection port), air flow and line sizes are given in the table.

Item	Specification
Air flow (m^3/min)	3.2
Min. pressure (bar)	5
Min. inner dia of air hose / max length	3/4" / 15 m
Max inner dia of connection hose / max length	3/8" / 1.5 m

INSTALLING THE PRESSURE SWITCH

In order to minimize the risk of water entering the hammer, you must add a pressure switch to the hammer circuit. The purpose of this connection is to stop the hammer immediately if the air pressure goes below the adjusted minimum level.

Fit the pressure switch according to the following scheme:



MAINTENANCE INTERVALS FOR UNDERWATER OPERATION

Rammer hammers are designed for underwater operations of only short duration. The wear resistance of hammer parts is considerably lower in underwater use than in normal use. This is caused by corrosion and by the abrasive effect of mud in water.

After starting underwater hammering, the hammer must be inspected often, for example after every half hour operation. Adapt the inspection intervals to working conditions. Follow this procedure:

Maintenance after every half-hour operation

- Grease the tool shank and tool bushings through the grease nipples.
- Check that the hammer mechanism moves normally inside the housing and that the buffers are in good condition.
- Check all hoses and connections.
- Check the operation of the air pressure switch.

Daily maintenance

- Remove the retaining pin and the tool for inspection. Grind the burrs away if necessary.
- Check that the tool has received sufficient grease.

Hammer service after underwater operation

- Completely dismantle and service the hammer after working under water. Clean and check all hammer parts and either replace or repair damaged parts.
- Assemble the hammer with new seals.

Notice! Neglecting the hammer service after underwater use can cause severe damage to the hammer. The piston could rust even in a few days, depending on the environment.

PRODUCTIVITY WITH UNDERWATER OPERATION

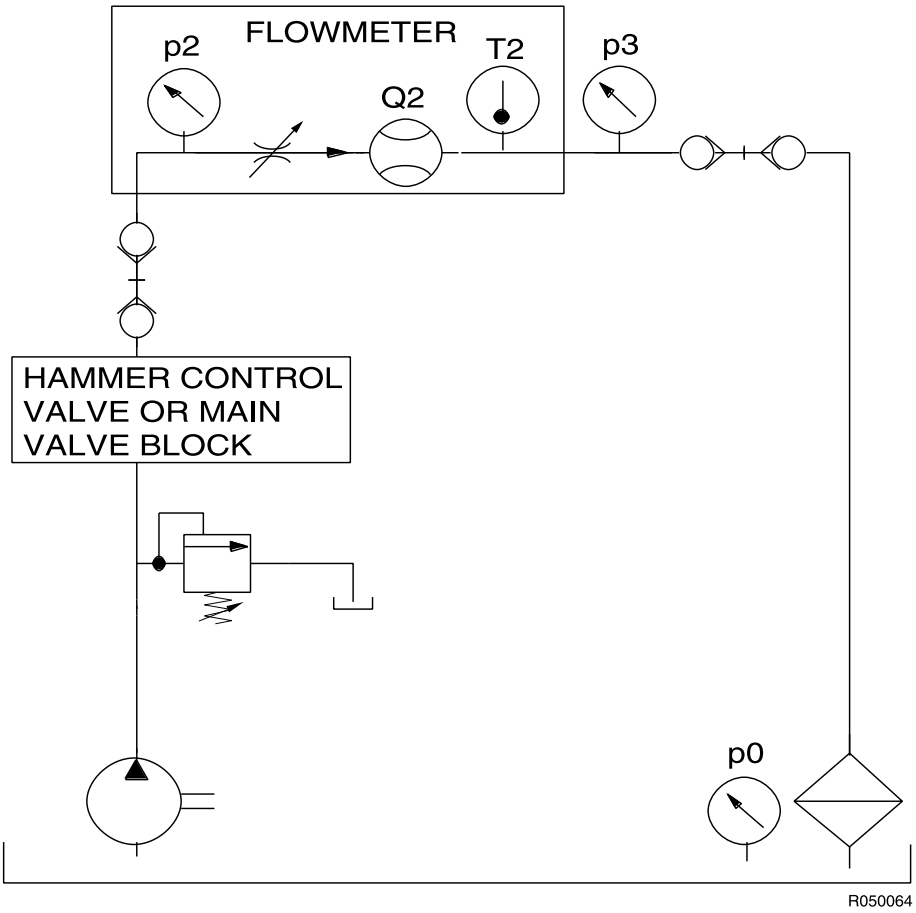
In underwater applications, the productivity of a hydraulic hammer is considerably lower than in normal work. This is because:

- The object being broken is not visible to the operator. This causes a misalignment between the tool and the object, resulting in unnecessary idle strokes.
- The hammer must be inspected and greased more often than in normal work.
- The hammer must always be completely serviced after underwater use.

2. TESTING

2.1 MEASURING HAMMER CIRCUIT

MEASURING POINTS



p_0 tank (with closed circuit from suction pipe of the pump)

p_2 straight before the restriction of the flow meter (e.g. Webster flow meter includes pressure gauge for p_2)

Q_2, T_2 at flow meter, which connects pressure and return line of the hammer circuit

p_3 straight after flow meter

HOW TO MEASURE

Procedure for measuring and adjusting the hammer circuit:

Note: Check and calibrate all the gauges you are going to use. Faulty pressure gauges should be changed.

Note: If the flow to the hammer is adjusted by changing the engine revolutions, always check the flow also at full engine revolutions. Note: It is absolutely forbidden to use hammer above specified oil flow range.

Warning! Don't exceed the carrier's main relief valve setting.

1. Check the lines, couplings, clamps etc. to ensure their condition. Replace worn or damaged components and tighten loose joints.

2. Check that there is a pressure relief valve in the hammer line.

3. Make sure that carrier's hydraulic oil temperature is at normal operating level when measuring.

4. Connect the flowmeter in place of the hammer. It is preferable to use same hoses and couplings that are used with the hammer, especially in cases when hoses are equipped with quick couplings.

5. Check that the adjustable restriction is open.

6. Start the engine and press the hammer operating switch.

7. Close the hammer line to adjust the crack point of pressure relief valve 50 bar (gauge p_2) above the hammer max. operating pressure shown in the technical data.

8. Open the restriction so that the hammer's operating pressure at gauge p_2 is reached.

9. Check that the hammer's oil flow is within the limits.

10. Check that the return line back pressure p_3 doesn't exceed the values allowed at the hammer oil flow.

11. Check that the hammer's oil flow doesn't increase when the carrier's operating pressure exceeds the pressure in the hammer line (pressure compensated flow control). To do that, drive the boom, stick and bucket cylinders to the tilt position while pressing the hammer operating switch and checking the flow.

12. Open the restriction.

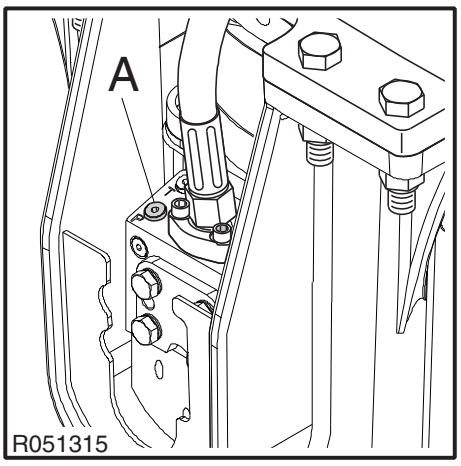
13. Stop the carrier engine.

14. Connect the hammer in place of the flow meter.

15. Measure hammer operating pressure. See “Measuring hammer operating pressure” on page 165.

2.2 MEASURING HAMMER OPERATING PRESSURE

SPECIFICATIONS FOR MEASURING OPERATING PRESSURE



Item	Description
Plug (A)	Pressure measuring port

Item	Specification/Torque
Plug (A)	R1/4 30 Nm (22 lbf ft)

MEASURING HAMMER OPERATING PRESSURE

Warning! When measuring hammer operating pressure, you are working in hammer's danger area. Protect yourself against flying debris.

1. Hammer operating pressure must be measured with carrier hydraulic circuit in its optimum operating temperature. Before starting hammer operating pressure measuring procedure, operate carrier until hydraulic oil has warmed sufficiently.

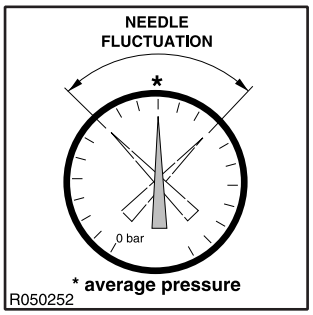
2. Stop the carrier engine.

3. Remove pressure measuring plug (A) and connect a 250 bar pressure gauge with a minimum 10 meter hose to high pressure measuring port, BSP 1/4".

4. Start carrier and adjust engine revolutions. Set engine revolutions to hammer operating revs. If carrier has power/work modes, please select mode intended for hammer work.

5. Position tool e.g. on a thick steel plate and start to operate the hammer.

6. Read average operating pressure reading on pressure gauge.



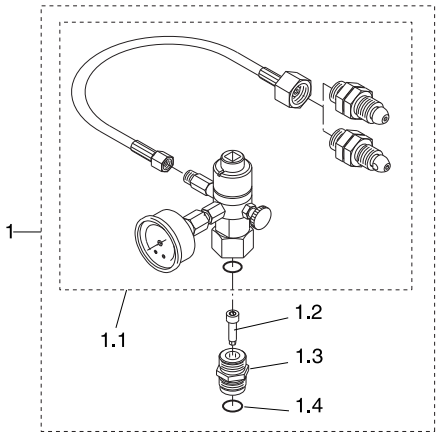
7. Average operating pressure reading should range between given specifications. Note: When measuring operating pressure by hammering on a steel plate or equivalent hard material, the pressure reading should be in the lower end of the specified pressure range. Hammer's operating pressure tends to raise when working with soft material. See “Hammer specifications” on page 82.

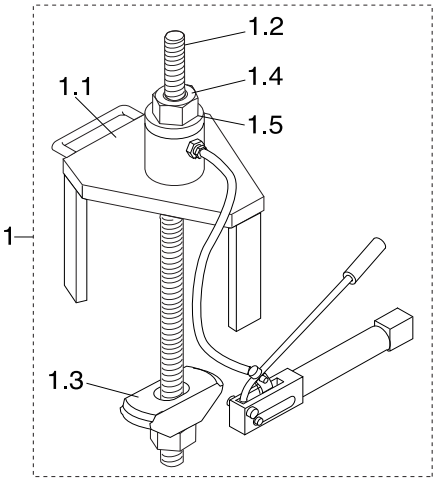
8. If pressure reading is not within specifications, re-adjust pressure control valve spring pre-load and measure operating pressure again. See “Pressure control valve” on page 114.

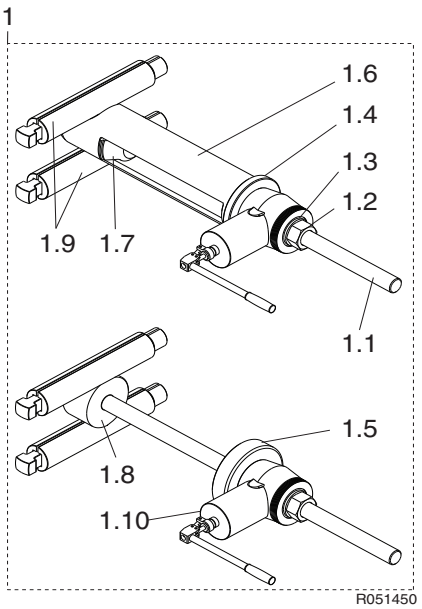
9. Stop carrier and remove gauge. Torque plug (A) to specified setting.

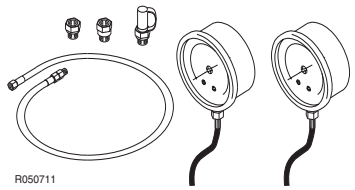
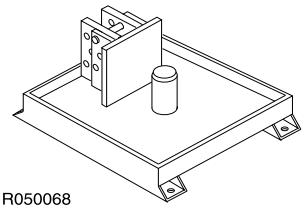
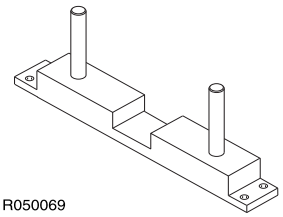
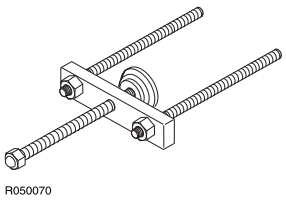
3. SERVICE TOOLS

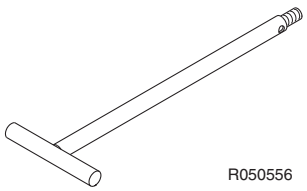
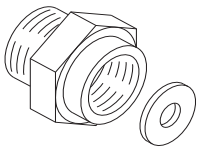
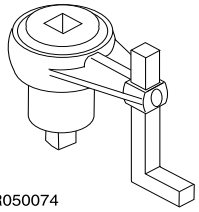
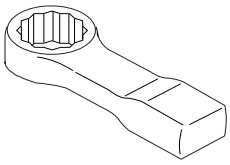
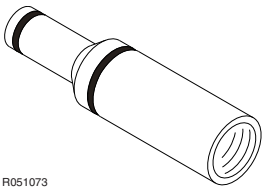
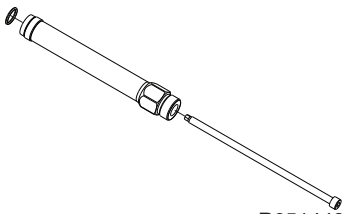
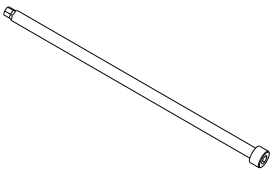
3.1 SPECIAL SERVICE TOOLS

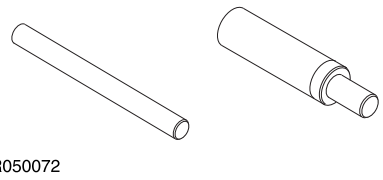
Item	Name	Part no.	Qty	Picture
1	Accumulator charging kit (incl. parts 1.1-1.4)	40633	1	 R050065
1.1	Charging device	101688	1	
1.2	Socket	40601	1	
1.3	Adapter	101635	1	
1.4	O-ring	901135	1	

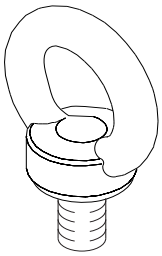
Item	Name	Part no.	Qty	Picture
1	Bushing extraction tool, (incl. parts 1.1-1.6)	101101	1	 R050066
1.1	Puller frame	101118	1	
1.2	Threaded rod	101104	1	
1.3	Puller plate (upper tool bushing 1655, 2155, 2166, and lower tool bushings 1533, E64)	101153	1	
1.3	Puller plate (lower tool bushing, 2166, E65, E68)	110722	1	
1.3	Puller plate (lower tool bushing 1655, 2155, E63, E66N)	101074	1	
1.3	Puller plate (lower tool bushing E68, 2577, 2577PRO)	101059	1	
1.4	Washer	101124	2	
1.5	Nut	902001	2	
1.6	Puller plate set (upper tool bushings E64, E66N, E68)	101125	1	

Item	Name	Part no.	Qty	Picture
1	Tool bushing extraction tool (incl. parts 1.1-1.9)	176990	1	
1.1	Threaded rod, M39 8.8	176419	1	
1.2	Nut	955142	1	
1.3	Washer	955132	1	
1.4	Plate	176773	1	
1.5	Plate	178393	1	
1.6	Puller frame	176771	1	
1.7	Puller plate	176991	1	
1.8	Locking plate	176992	1	
1.9	Wedge	178390	2	
1.10	Hydraulic hole cylinder, max force 50 ton	955154	1	

Name	Part no.	Qty	Picture
Pressure gauge assembly 60 bar and 250 bar	41787	1	
Hammer assembly stand	102548	1	
Accumulator assembly stand	101099	1	
Puller	101100	1	

Name	Part no.	Qty	Picture
Puller	150020	1	 R050556
Adapter for French nitrogen bottle	901311	1	 R050073
Torque converter	90634	1	 R050074
Slogging ring wrench 36 mm	90643	1	 R050076
Assembling tool for doser body	953795	1	 R051073
Adapter assembly for checking accumulator pressure	175459	1	 R051449
Adapter assembly screw for checking accumulator pressure	176025	1	 R051714

Name	Part no.	Qty	Picture
Drift pins			 R050072
Drift pin D15.5	400369	1	

Name	Part no.	Qty	Picture
Lifting eyes			 R050075
Lifting eye M12	90607	2	
Lifting eye M16	90690	2	
Lifting eye M20	90624	2	
Lifting eye M24	90605	2	

3.2 STANDARD SERVICE TOOLS

Name	Specification
Torque wrench	150-700 Nm (3/4")
Torque wrench	20-200 Nm (1/2")
Ratchet handle	1/2"
Extension	L=125 mm (1/2")
Sliding T-handle	3/4"
Adapter	3/4"->1/2"
Adapter	1/2"->3/4"
Combination spanner	8 mm
Combination spanner	10 mm
Combination spanner	12 mm
Combination spanner	13 mm
Combination spanner	19 mm
Combination spanner	27 mm
Combination spanner	30 mm
Combination spanner	36 mm
Combination spanner	41 mm
Combination spanner	46 mm
Combination spanner	50 mm
Combination spanner	70 mm
Hex. socket	24 mm (1/2")
Hex. socket	30 mm (3/4")
Hex. socket	36 mm (3/4")

Name	Specification
Hex. socket	50 mm (3/4")
Allen type screw socket	5 mm (1/2")
Allen type screw socket	6 mm (1/2")
Allen type screw socket	8 mm (1/2")
Allen type screw socket	10 mm (1/2")
Allen type screw socket	12 mm (1/2")
Allen type screw socket	14 mm (1/2")
Allen type screw socket	17 mm (3/4")
Allen type screw socket	19 mm (3/4")
Pry bars	400 mm
Nylon drift	D30 mm
Lifting chain	
Hammer	Plastic, 1000 g
Hammer	Ball headed, 680 g
Hammer	2000 g
Screwdriver	6x150 mm
Screwdriver	8x250 mm
Oil can	0.5 l
Grease gun	
Flowmeter	70-350 l/min
Pressure gauge for measuring back pressure	40 bar

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