Robit H18 DTH Hammer

Operation and Service Manual

Robit Oyj

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Contents

1 Introduction

The Robit H18 DTH hammer is a strong and robust tool of a simple and straight forward design to provide maximum performance within a minimum of maintenance.

The H18 is designed to operate efficiently at air pressures between 100psi (7bar) and 225psi (15bar).

The H18 accepts N180 shank bits as standard. In addition to this the H18 can be modified to accept button bits with a Mission SD18 shank design by simply replacing the chuck, piston and bit retainers.

The H18 hammer standard backhead is 85⁄8” API reg pin.

1.1 Operator's manual

Please study and observe the operator's manual thoroughly in order to maintain the safety and reliability of the machine.

Robit Plc reserves the right to make changes.

For production-related reasons, the figures and technical specifications in this operator's manual may deviate from the actual product.

Robit Plc cannot be held liable for any material damage or injuries caused by using the device incorrectly or in violation of the instructions.

If you do not understand the instructions or some parts of this manual appear to be missing, please contact Robit Plc.

Thank you for choosing Robit Plc as your systems supplier. We are confident that we will fulfil your expectations regarding both usability and the availability of services.

Maintaining the operator's manual

Keep the manual in good condition and available to the operator and service personnel.

Ordering a manual

You can order a manual from Robit Plc's customer service or from our Robit retailer.

1.1.1 Copyright

Robit Plc reserves the right to change the values, equipment and service instructions provided in the manual without advance notification.

1.2 Warranty

warranty information regarding Robit Plc's general warranty terms.

1.3 See the Customer service

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2 Safety

The purpose of the safety information is to reduce the number of accidents and prevent personal injury and property damage. Please read the safety instructions carefully and ensure that you are using the equipment in a safe manner. Use only components and accessories described in this manual.

Warning:

- Rock chips and dust which may be discharged from the face of the bit or bore hole at high velocities and can cause severe injury.
- Use eye protection at all times.

Warning:

- Percussive hammer emits noise, which can cause hearing damage.
- Use proper hearing protection to safeguard your hearing against damage.

Warning:

- Moving parts can cause severe personal injury.
- Beware of getting fingers trapped between the chuck and bit and do not use hands or feet to clear the top of the borehole at any time.
- Wear protective clothing and safety equipment and observe all safety regulations as prescribed by your employer, government, or the site on which you work.
- Do not wear loose clothing that may get caught in rotating parts.

Warning:

- Falling heavy loads can cause severe injury.
- Always use proper and approved lifting equipment and take every precaution to safeguard yourself against injury.

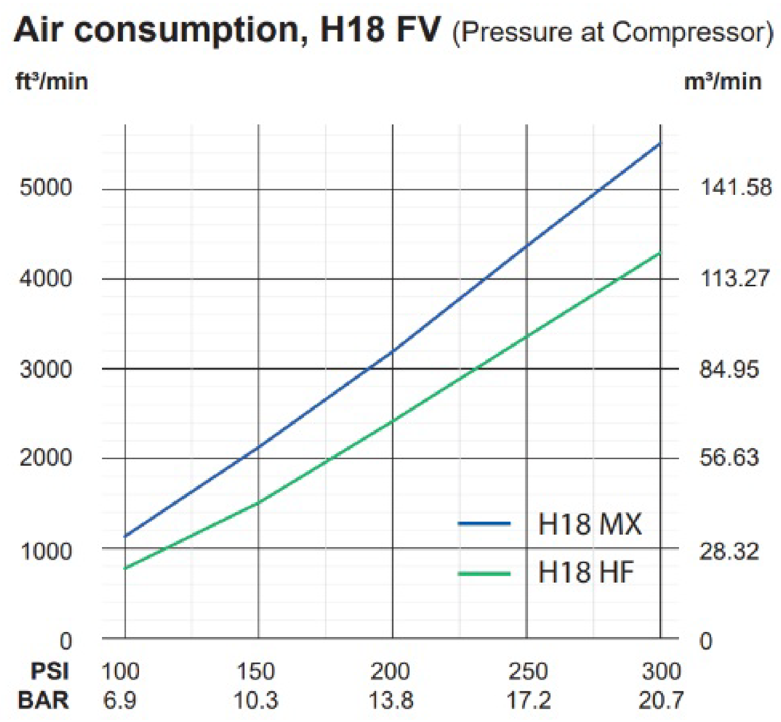
3 Technical description

The Robit H18 hammer is designed for drilling 458mm - 660mm (18" to 26") diameter holes.

Technical Specifications		
	Imperial	Metric
Weight (less bit)	2330 lbs	1057 kg
Length (less bit)	64.8”	1646 mm
Outside dia.	15.75”	400 mm
Piston weight	736 lbs	334 kg

Ref	Description	Part number	BOM Quantity
1	BACKHEAD 8 5-8IN REG PIN	4000375	1
2	BREAKOUT WASHER	9004111	2
3	BREAKOUTWASHER SAFETY BUFFER	4000405	2
4	BACKHEAD "O" RING	HSH18114	1
5	CHECK VALVE	4000380	1
6	CHECK VALVE SPRING	9004109	1
7	COMPRESSION RING	9004110	1
8	VALVE CHEST	4000378	1
9	SWITCH SPACER	4000383	1
10	CONTROL TUBE	4000379	1
11	TUBE HOLDER	4000381	1
12	WEARSLEEVE	4000377	1
13	FOOTVALVED PISTON N180	4000376	1
14	RETAINING SNAP RING	9004112	1
15	FV VOLUME OCCUPIER	4000382	1
16	VOLUME OCCUPIER O RING	9004113	1
17	BIT RETAINER N180	4000404	1
18	CHUCK N180	4000390	1
19	CHUCK BEARING - N180	HSH18135180BE	1

Complete hammer assemblies	
4000374	DTH HAMMER H18 N180 FV HF 8 5-8 API REG PIN
4000384	DTH HAMMER H18 N180 FV MX 8 5-8 API REG PIN
4000385	DTH HAMMER H18 N180 TL MX 8 5-8 API REG PIN
4000388	DTH HAMMER H18 N180 TL HF 8 5-8 API REG PIN



3.1 Drill bit

The DTH drill bit is at the working end of drilling and just like the hammer, it will perform extremely well if cared for. Good drill bit care and maintenance helps ensure the longest life and best performance from that bit.

A drill bit is capable of taking considerable punishment in drilling operations. However, care must be taken while handling them to ensure that the bit you are drilling with is in good working condition. Drill bit foot valves or blow tubes are manufactured from hard plastics and can be easily broken if dropped or something heavy is dropped on them. Dropping the bits onto hard surfaces (such as metal) can cause the tungsten carbide buttons to crack and break.

In drilling conditions that are very abrasive such as granite, sandstone or quartzite the chuck should be indexed more than one spline. The DTH hammer chucks are multiple lead threads so it may also be necessary to turn the chucks starting position so that any grooves that have progressed into the wear sleeve are also separated into new locations as demonstrated below.

4 Operating instructions

Note: Familiarise yourself with the controls of the machine and work in accordance with the manufacturers recommendations.

The percussive mechanism begins to operate as the air supply is turned on and when the drill bit is pushed firmly into the hammer. Excessive thrust pressures are not needed to make it work.

The thrust controls on the drill should be adjusted to the correct pressure and readjusted to take into account the weight of any extra tubes added so that the thrust pressure remains constantInsufficient thrust pressure will make the hammer drill erratically and less efficiently and cause premature wear to the bit and chuck splines with likely damage to the hammer components and threads.

When the hammer is lifted from the rock face, the drill bit extends from the chuck and the percussive action ceases. Extra air will pass through the hammer, which can be used to flush the hole clean.

Whenever possible, the pressurized air in the hammer should be drilled out to avoid situations where back hammering can occur. This is not always possible in conditions where the rock is quite fractured and broken.

When changing drill rods, ensure that the drill string has been depressurized before breaking the tool joint. Rapid depressurization of the drill string can cause a sudden pressure drop in the hammer forcing debris from the bottom of the hole into the hammer.

Before adding drill tubes make sure that the threads are clean and well greased and that there are no contaminants likely to enter the hammer to cause damage and early wear.

4.1 DTH hammer set-up

It is important to remember that although the injection of water into the hammer will increase the pressure in the hammer, the water is a restriction in the hammer that will cause a drop in the drilling performance.

Both temperature and altitude have an effect on air and consequently on compressed air. Higher temperatures and higher altitudes result in air becoming thinner, less dense, and the effect of this is a reduction in a compressor's delivery pressure. For example, if we take a compressor which will deliver 28.3 m^3/min (1000 cfm) at sea level and a temperature of 20° C (68° F), this same compressor will only deliver 21.1 m^3/min (745 cfm) at 2744m (9,000ft), given a temperature of 4.4° C (40° F).

Additional information on the effect of temperature and altitude on compressed air can be found in the compressor documentation.

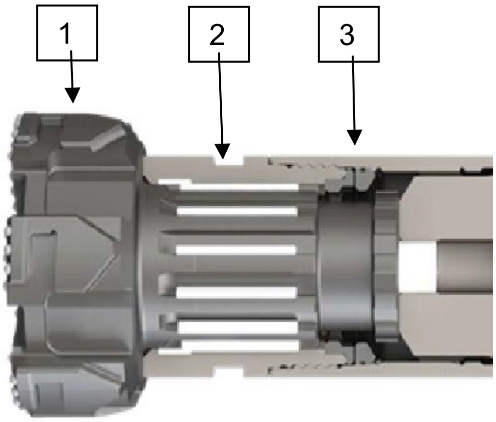
4.2 Commissioning a DTH hammer

Coat the drill bit shank and the hammer threads with rock drill oil for protection and easier break-out. Prior to use, lubricate the hammer with ¼ liter (½ pint) of rock drill oil. The oil should be poured through the backhead and by using a long screwdriver inserted into the backhead; the check valve can be depressed to allow the oil to run down into the piston chamber.

Alternatively, install the hammer onto the drill machine’s rotary head, place a piece of cardboard on the table, locate the hammer’s drill bit just over the cardboard and turn the air on low. When the cardboard becomes wet with rock drill oil all internal components should be sufficiently coated with oil.

Fit the hammer to the drilling rig ensuring no debris or dirt enters the hammer from the site, dirty tubes or from unclean air lines. Make sure that the coupling threads from the drill are of the same specification to that of the hammer and they are in good condition. Run the hammer at half the air flow for a few minutes to allow the oil to flow through and for internal components to settle in.

4.3 Drill bit installation



When installing a new drill bit *(1)* into a new hammer lubricate the splines on the bit with rock drill oil. Place the chuck *(2)* over the bit and install the bit retaining ring *(3)*.

When using the drill machine's rotary head to screw the chuck into the hammer, take care not to cross thread the chuck.

When installing a new bit on a used hammer it is important to inspect the chuck for wear to the body and splines. In soft and broken drilling conditions there is often excessive bit travel that results in uneven wear to the splines. Where this wear is excessive the chuck should be replaced as failure to do this will result in premature wear to the splines of the new drill bit, and possible damage to other components in the hammer due to lateral movement of the drill bit in the hammer.

The body of the chuck should also be inspected for any gouging or grooving that is caused by erosive wear. Where this has occurred index the chuck so that the grooves or gouges do not line up with the drill bits exhaust grooves. In the case when a used or newly sharpened drill bit is installed on a used hammer, the same indexing principles occur. If the bit is to be removed, sharpened and replaced back on the hammer, mark the location of the current bit alignment on the chuck and drill bit prior to removal. After sharpening, index the chuck by one spline so that the drill bits exhaust grooves are moved to a new location on the chuck.

Prior to using a new or used drill bit it should be inspected for the following and lubricated with rock drill oil:

- Check the condition of all the carbides and ensure that no damage has occurred and that the carbides are sharp.
- Inspect the face and head of the bit for any cracking or damage that could be detrimental to the drill bit.
- Make sure the gauge row carbides have sufficient clearance from the head of the bit.
- Inspect the foot valve (blow tube) for damage or cracking.
- Check that the foot valve is not loose, and check the length of the foot valve from the strike face of the bit to the top of the foot valve.
- Inspect the splines of the drill bit and chuck. Remove any burrs that have formed.
- Excessive wear to the splines of the bit and/or chuck will cause the hammer to run loose and can cause broken foot valve, shanking of the bit, or damage to the strike face of the piston and/or drill bit.

4.4 Torquing up a DTH hammer

Robit DTH hammers use a compression ring to ensure that the hammers top end components are held firmly in place. This is extremely important as any movement of these components will result in premature wear and loss of performance.

When a hammer's backhead is closed up by hand there is a gap between the wear sleeve and backhead shoulder known as stand-off. All Robit hammers have 0.030" (0.76 mm) stand-off. The stand-off must be completely closed as part of the locking system for the hammer. It is not recommended to use the hammer action of drilling to close up the gap as movement in the top end will occur that will be detrimental to the hammer and ultimately lead to premature wear and loss of performance. Recommended torque for closing the hammer is between 1020 - 1350 Nm (750 - 1000 ft.lb) per inch of hammer diameter.

Fit the hammer to the drilling rig ensuring no debris or dirt enters the hammer from the site, dirty tubes or from unclean air lines. Make sure that the coupling threads from the drill are of the same specification to that of the hammer and they are in good condition. Run the hammer at half the air flow for a few minutes to allow the oil to flow through and for internal components to settle in.

4.5 Hammer storage

Note: Before restarting any hammer after prolonged periods of inactivity, disassemble and inspect all internal parts. Clean and remove any oxidation with an emery cloth. Re-lubricate all internal components with rock drill oil and reassemble the hammer.

Short Term Storage (e.g. 1 -2 weeks)

- Using high pressure air, blow the hammer clear of all water.
- Turn automatic oiler up full and cycle hammer until oil is running out the shank of the drill bit.
- If there is not an automatic oiler, pour 1 litre (2 pints) of rock drill oil in to the backhead.
- Turn the air on and cycle for 10 seconds in order to lubricate the internal parts.
- Seal the hammer at the backhead and chuck end to exclude any dust or foreign particles.
- Store the hammer horizontally in a clean and dry environment.

Long Term storage (e.g. 1 month or longer)

- Using high pressure air, blow the hammer clear of all water.
- Break out the back head and chuck on the rig as it is easier to do it here than back in the workshop.
- Disassemble the hammer.
- Inspect and clean all hammer components.
- Lubricate all the internal components with rock drill oil.
- Reassemble the hammer, and seal the backhead and chuck end.
- Store the hammer horizontally in a clean and dry environment.
- Periodically rotate the hammer as the oil will settle.

5 Maintenance instructions

Dismantling the hammer for servicing or to change the bit can be made easier if the chuck threads are regularly greased and the backhead threads are well greased any time the hammer is opened for servicing. We recommend that a good quality thread grease be used. In acidic conditions, we do not recommend copper based greases as this can trigger a galvanic reaction with corrosive effect to damage the root of the threads and cause failure. Care should be taken when working on the hammer and all safety guidelines should be followed for the equipment being used. Personal protective equipment should also be worn while working.

5.1 Dismantling the hammer

NOTE:- All components must be washed clean and laid out on a dirt free surface to enable inspection to take place. The stripping procedure is explained in the following section.

Assuming both the chuck and the backhead threads have been loosened either on the drilling rig or by using a hydraulic splitter, the stripping procedure is as follows:

1. First remove the chuck assembly. This comprises the button bit, drive - plates (or drive pins with the SD 18 conversion), chuck release washer, chuck ‘O’ ring, and bit retainers.
2. With the hammer laid horizontal, unscrew the backhead and remove it from the wearsleeve. The valve chest along with the check valve arrangement can now be pulled from the backhead end.

   The remaining buffer cover, compression buffer and control tube assembly can be removed by lifting the chuck end of the wearsleeve which will allow the piston to push the parts up to the end face, from where they can be removed by hand.

3. Lifting the Chuck end of the Wearsleeve again will allow the Piston to slide to the end face from where it can be removed.

a. Checking for wear and damage

About this task

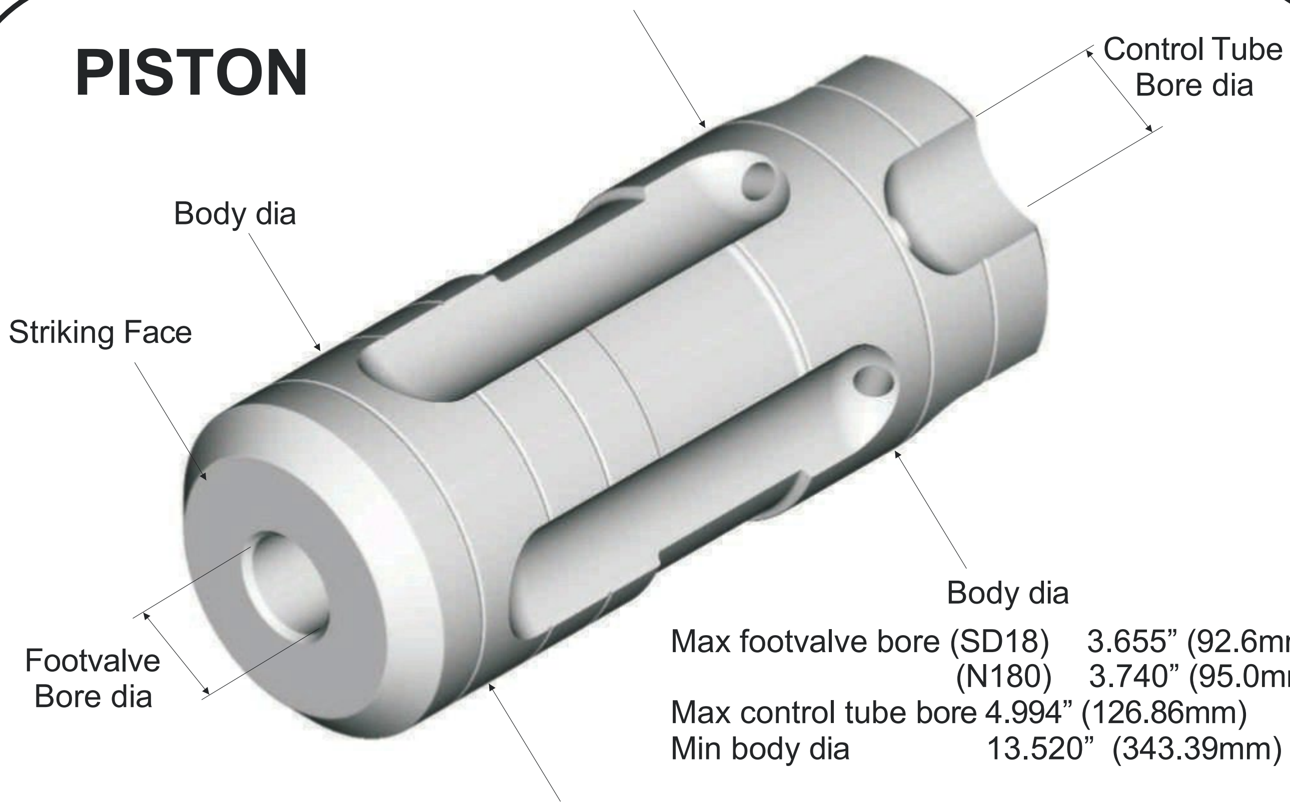
Premature wear to internal parts is a result of either incorrect or insufficient lubrication, the ingress of debris into the hammer, or incorrect service and storage. The maximum wear allowances shown in this section are a guide as to when to replace parts. In certain conditions parts may need to be replaced before they reach the sizes shown.

Premature wear to internal parts is a result of either:-

1. Insufficient or incorrect lubrication.
2. The ingress of debris in the hammer.
3. Incorrect service and storage.

The maximum wear allowance shown in this section are a guide as to when to replace parts. In certain conditions parts may need to be replaced before they reach the sizes shown.

PISTON



Max footvalve bore (SD18) 3.655” (92.6mm)
(N180) 3.740” (95.0mm)
Max control tube bore 4.994” (126.86mm)
Min body dia 13.520” (343.39mm)

1. There are two main areas to examine on a used piston:-

Check the body diameter for signs of pick-up and burning (both are signs of poor lubrication). Using a micrometer, measure the diameter and refer to the quoted minimum size above.

Any light ‘Pick up’ marks can be removed using emery cloth, however if there are signs of overheating and cracking, the piston should be replaced and the lubrication system examined.

2. Secondly, using a micrometer, measure the diameter of the bore at both ends of the piston and refer to the maximum quoted sizes.

3. Examine the striking face. Distortion is acceptable proving there are no signs of cracking. Burrs and dents can be removed with an emery stone.

Maintaining the piston face

Fig.1 New Piston

Fig. 2 Worn Piston

During the working life of the hammer the Striking Face on the Piston may become dented or deformed *(see fig.2)*. To prevent this face from cracking, or chipping, the Piston should be returned to a lathe where the strking face can be re-machined flat and then have the outer radius and inner chamfer reformed *(see fig.3)*..
Care should be taken to remove the minimum amount of material during this re-machining process and at no point should more than 2mm be removed from the face. **Pistons with wear patterns, or indentations deeper than 2mm should be replaced.**
The table below contains useful machine information for reforming the piston face.

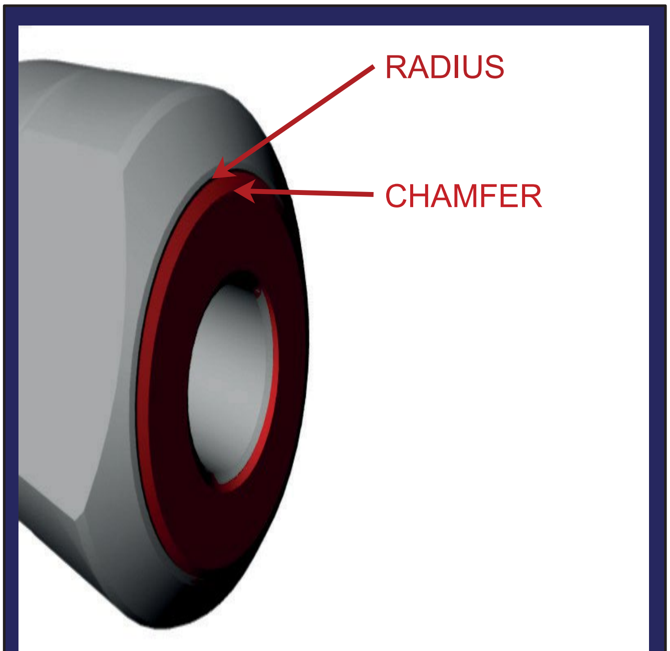
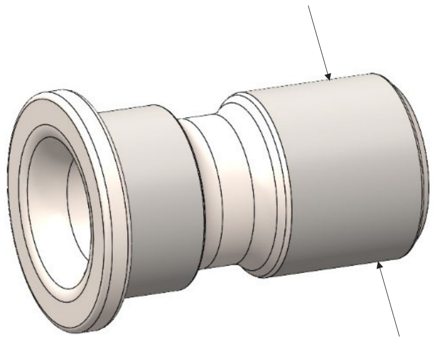


Fig. 3 Area to be

MACHINE DETAIL		
HAMMER	**RADIUS “A”**	**CHAMFER “B”**
H18	0.125”	0.250” @45

Control Tube

Control Tube Minimum Dia
4.928” (125.18mm)



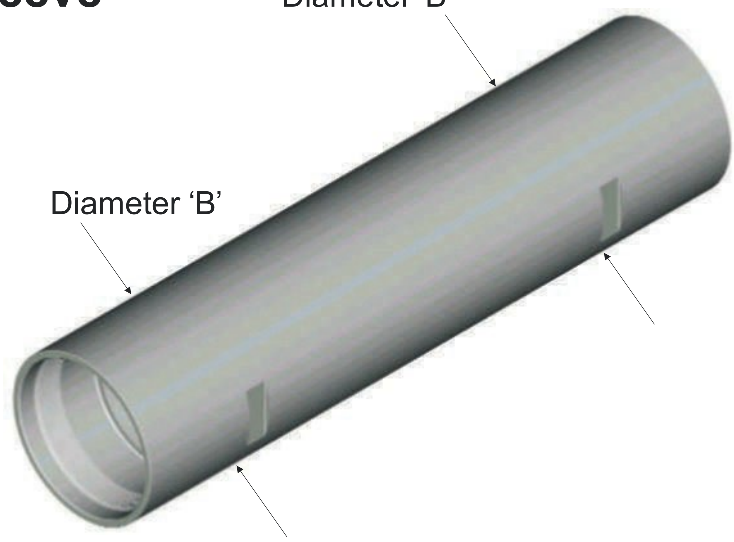
Examine the control tube diameter ‘A’, using a micrometer, check the diameter has not worn under the specified minimum.
If there are signs of pick-up they should be removed by using emery cloth.

Wearsleeve

Using either a micrometer or vernier, measure the outer diameter ‘B’ of the wearsleeve. If it is below the minimum it must be replaced. The wear rate of the wearsleeve can be slowed by replacing the chuck before the wear areas reaches the wear sleeve.

If there are signs of pick-up they should be removed by using emery cloth.

Wearsleeve Minimum Dia
15.433” (392mm)



If a piston has broken within the wearsleeve it is imperative that the bore is honed to remove any burrs or ‘pick-up’ failure to do so will result in ‘pick-up’ on the replaced piston and will lead to early failure of this component

b. Rebuilding the hammer

1. Ensure all the maintenance work outlined in the previous section has been completed.

2. Lay the wearsleeve on two wooden blocks, support the chuck end so as to raise the sleeve 50mm - 70mm off the ground this will make it easier to screw in the chuck assembly.
3. Assemble the chuck, chuck release washer and bit retainers around the bit ensuring the chuck and bit retainers (SD18 only) are fitted with new 'O' rings. check the condition of the drive plates (or pins) and the chuck bearing and replace if necessary. Cover the threads with a copper-based grease. Then screw the chuck fully in until there is no gap between the wearsleeve and the chuck release washer.

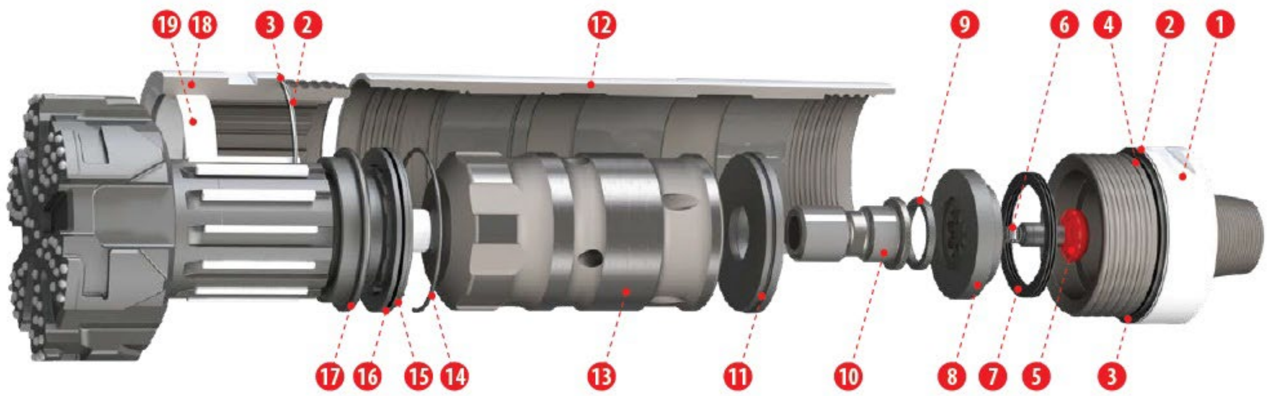
4. Coat the piston with rock drill oil and slide it into the backhead end of the wearsleeve. (Ensure the piston striking face enters first).

5. Insert Tube Holder into Wearsleeve and insert Control Tube and Switch spacer into desired position (see High Efificiency/ Maximum performance configurations below) and assemble valve chest.

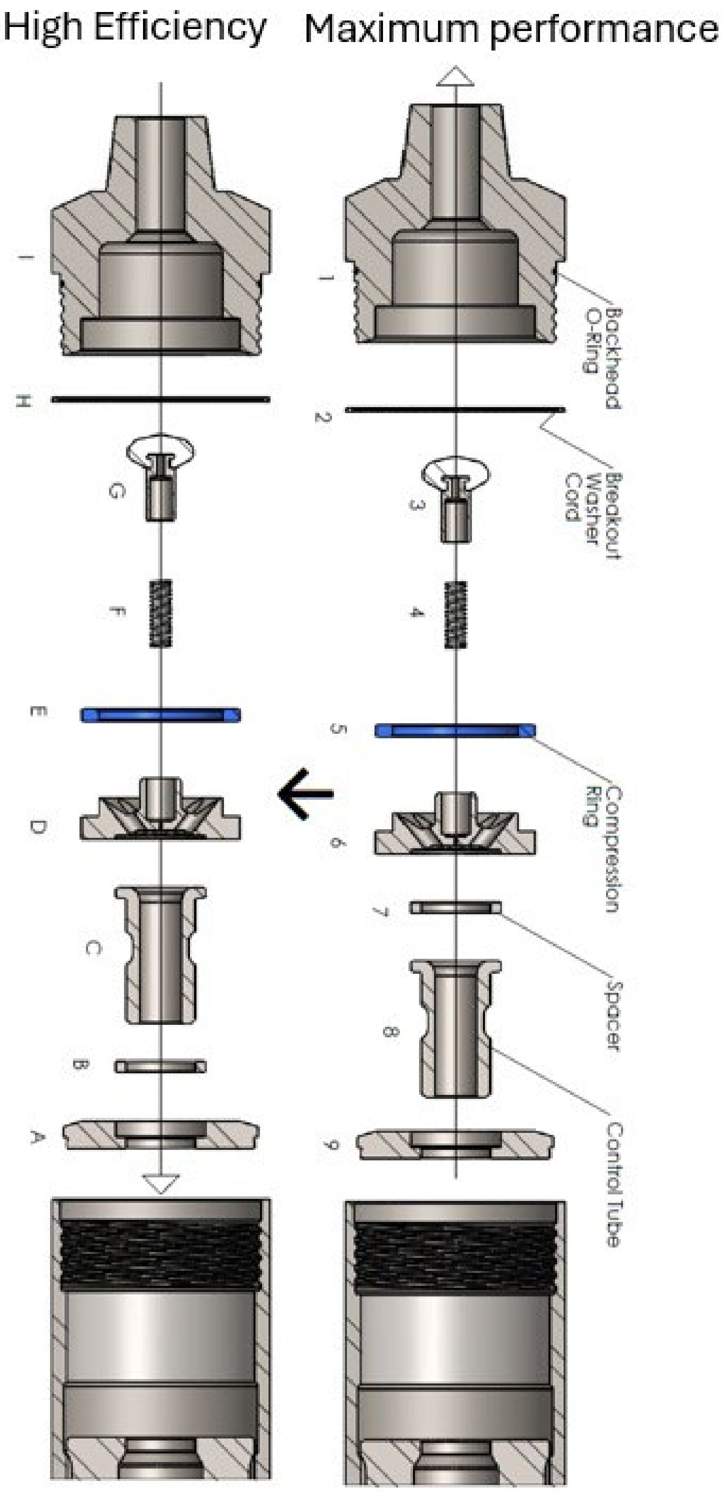
6. Slide the compression ring on to the control tube valve chest assembly.

7. Insert the spring into the check valve and then slide the assembly into the valve chest.

8. Fit a new 'O' Ring to the backhead and coat the threads in copper-based grease. Fit the backhead breakout washer. Screw the backhead into the wearsleeve until it is tight.



Converting from High efficiancy to Maximum Performance configurations.



Key
Items labelled with numbers, are numbered in the order of removal.
Items labelled with letters, are labelled in order of re-assembly.

c. Lubrication

The hammer pistons oscillate at around 1000 bpm at 10 bar (150 psi). It is therefore extremely important that an adequate supply of the correct type of rock drill oil is constantly fed to the hammer to protect the internal components and to provide a good air seal between the piston and the inner cylinder as well as the piston and the wear sleeve for efficient drilling.

If the oil supply is cut of for any reason, the piston will quickly seize inside the wearsleeve, resulting in irreparable damage to both components.

The correct consumption of oil is dependent upon the air volume and conditions. There should be visual evidence of oil around the drill bit shank and within the tube joints when changing tubes.

The grade of rock drill oil will be determined by the ambient temperature at the drilling site. If the ambient temperature is between 0 and 25 degrees centigrade, then a 30 grade oil should be used. If the ambient temperature is greater than 25 degrees centigrade, use a 50 grade oil.

Table 1: Oil recommendations

Oil manufacturer	Type 30 grade	Type 50 grade
Robit	T220	T320
BP	Energol RD-E 100	Energol RD-E 300
Chevron	Aries 100	Aries 320
Shell	Torcula 100	Torcula 320
Esso/Exxon	Arox EP100	Arox EP320

There are two main types of lubricators in use on drill rigs: a plunger oiler and a venturi oiler.

Plunger oilers operate on a timed plunger system that feeds a fixed amount of oil into the air stream at timed intervals. The main benefit with this type of system is that the oil tank does not need to be pressurized.

Venturi lubricators work like a carburetor. A constricted area in the venturi creates a pressure drop which draws oil into the line. The oil is atomized and mixed very efficiently with the air allowing for excellent adherence to the hammer components. The volume of oil used is generally controlled with a needle valve. The rate of lubrication is dependent on oil viscosity which varies with temperature.

When using water injection to flush and clean the hole, the quantity of rock drill oil being used must be increased. When drilling with 3.8 liters (1 gallon) a minute, the quantity of oil used should be increased by 50%.

As a general guide, all DTH hammers require 0.07 liters of oil per meter cubed of air through the hammer.

0,07 x Hammer Air Consumption (in cubic meters per minute) = Amount of oil to use (in liters per hour).

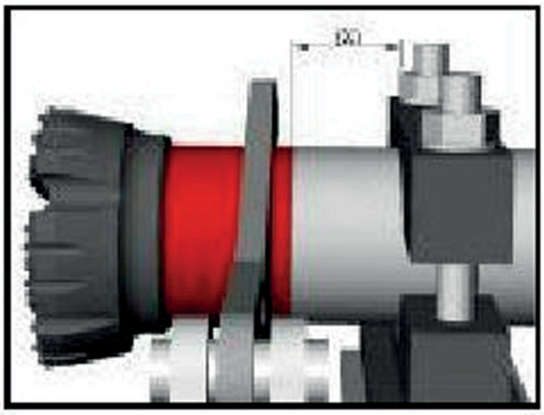
For example, the H18 HF hammer operating at 10.3 bar (150 PSI) uses 42.5 m^3/min (1500 CFM) and requires 3 liters per hour of oil.

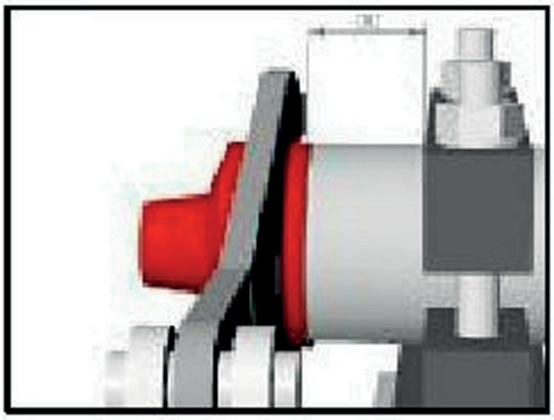
Important: Insufficient lubrication or incorrect lubrication grades may result in damage being caused to the hammer and it’s components. Hydraulic oils, engine oils, gear oils and diesel are not recommended for lubricating DTH hammers.

6. Troubleshooting

PROBLEM	PROBABLE CAUSE	REMEDY
INOPERATIVE DRILL	Drill bit blowholes blocked	Unblock holes
	Dirt inside drill	Strip and clean drill
	Worn or damaged parts	Replace damaged parts
	Insufficient lubrication	Check oil level, adjust lube needle value
	Excessive lubrication	Adjust lube needle value
	Hanging Piston	Pistion stuck. Polish out the score marks
	Insufficient air pressure	Check compressor discharge and increase to operational value
SLOW PENETRATION	Insufficient air pressure	Increase discharge pressure
	Dull drill bit	Re-grind or change bit
	Worn drill parts	Replace worn parts
	Too much or too little lubrication	Check oil level and if necessary adjust lube needle value
	Dirt in drill	Strip and clean
LOW RETURN AIR VELOCITY	Insufficient hole flushing air passing through hammer	Drill or increase hole size through the piston
	Drill bit exhaust holes blocked	Clean out blockage
SPASMODIC OPERATION	Failed or damaged parts	Overhaul drill
	Lack of oil	Check lubrication
	Drill bit broken	Replace bit
	Dirt in drill	Strip and clean

6. Clamping Positions





CLAMP POSITIONS	
HAMMER MODEL	"X" DISTANCE FROM WEARSLEEVE END FACE
H18	8.250" / 210mm

There are many different "Splitting" Machines available for unscrewing the threaded connections on a Hammer, some are attachments to the Drill Rig, others are independent hydraulic units, or purpose made Bench arrangements. Regardless of which machine is chosen they all require some method of securing the Wearsleeve whilst applying a torque to either the Chuck or Backhead.

The most common machines use either Clamps or Chains around the O/D of the Wearsleeve and the positioning of these is very important, if they are placed too close to the joint being "Split" they will in effect increase the frictional forces on the threaded connection making it impossible to unscrew the component from the Wearsleeve.

The above table shows the correct position for the clamping mechanism to ensure no additional load will be applied to the threaded connection, thus making the joint easier to split.

Due to the high torque loads applied to a Hammer during its drilling cycle, equally high loads are required to "Split" the Chuck and Backhead away from the Wearsleeve and because of this the clamping arrangement around the Wearsleeve must generate enough friction to prevent it from spinning during the process.However great care must be taken to make sure the clamps or chains are not over-tightened as this can cause deformation to the Wearsleeve that can result in both Wearsleeve failure and Piston seizure once the Hammer is returned to service.

To help increase the Wearsleeve's resistance to deformation it is recommended that the Hammer Piston is first slid to the end of the Hammer being "split", before clamps of chains are attached. By doing this the Piston O/D will limit the amount of deformation in the Wearsleeve bore if too much clamping pressure is applied.

NOTE:

The use of Chain type Hydraulic Breakers can leave deep intrusions in the O/D of the Wearsleeve which may result in stress concentrations that could lead to premature failure of the Wearsleeve.

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Operation and Service Manual

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