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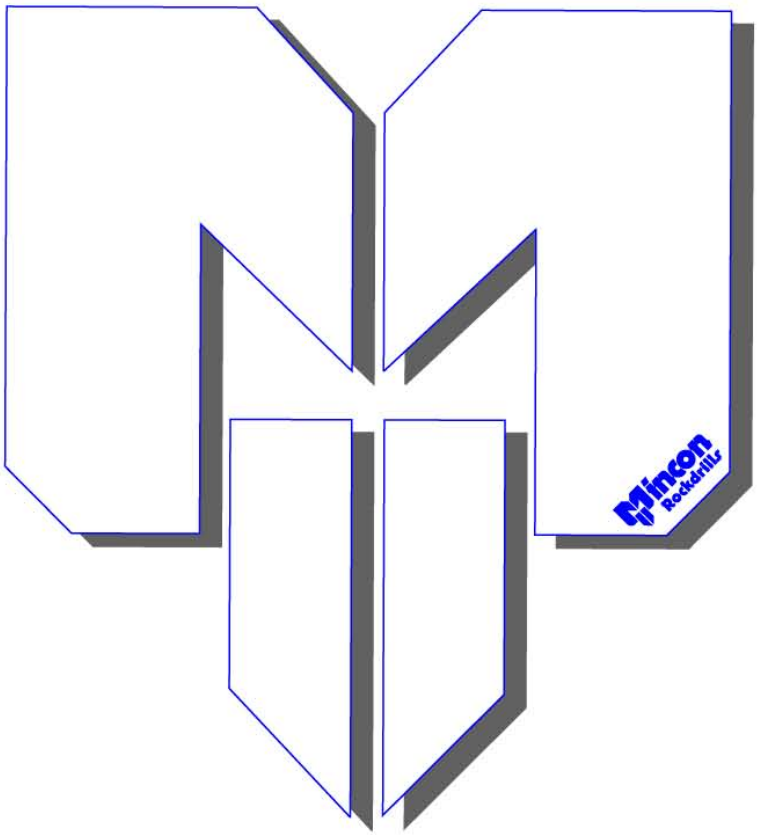
Mincon Rockdrills

Mincon MC80



DTH Hammer Operation & Service Manual

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"Leaders in the Field of Drilling Technology"

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1. Introduction

Thank you for choosing the Mincon MC80 Down-the-Hole hammer. Please read this manual carefully before using your hammer in the interests of safety, warranty and best operational care. The Mincon MC80 is ruggedly built with a hardened wear sleeve to withstand the stresses of drilling in the most extreme conditions. However, on the inside it is a precision tool with care taken in manufacture to ensure that the components meet finely matching tolerances to provide fast drilling, reliability and efficient use of air without waste. With correct care your Mincon MC80 hammer should provide you with top performance reliability and long service life.

- Warranty is provided by Mincon as per the warranty section 5.
- Please keep this instruction manual as a permanent part of your DTH Hammer.
- The specifications and instructions contained in this manual are based on the up-to-date information as at publication date.

2. Installation and Operation

2.1 Safety

Be sure to work safely at all times. 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 and cause serious personal injury.

Remember that a "Down-the-Hole" percussive hammer emits noise and you should therefore take every precaution to safeguard your hearing against damage by using proper ear protectors. Use eye protection at all times. 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.

Hammers can be heavy – Always use proper and approved lifting equipment and take every precaution to safeguard yourself against injury. Keep hands clear at all times – 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.

Other safety advice is given throughout this document which you are advised to read.

2.2 Hammer Care.

2.2.1 Storage

If you intend to store the Hammer, we recommend that ½ pint (¼ litre) of good quality rock drill oil be poured into the hammer to protect it. 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. Ensure that the thread protector and chuck cap are fitted to keep debris out and to prevent oil leakage. Store the hammer horizontally in a clean dry place.

2.2.2 Commissioning

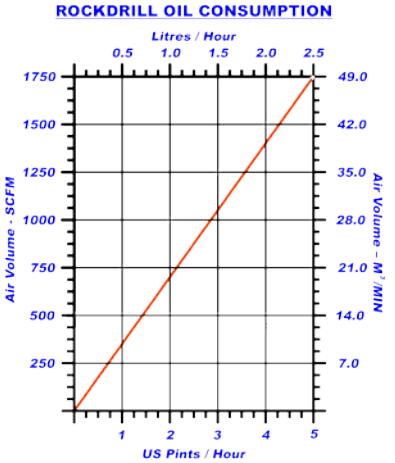
Always use reputable drill bits in good condition. Using overrun bits will effect penetration rates, and reduce chuck life significantly due to excess cuttings wash.

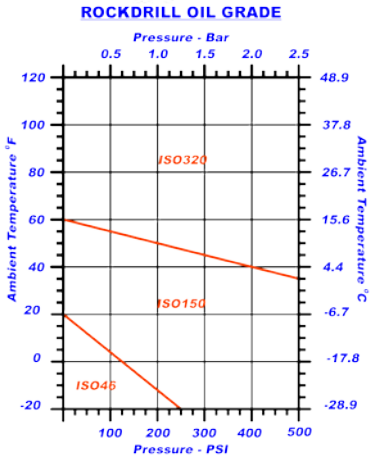
Coat the drill bit shank and the hammer threads with grease for protection and easier dismantling. Prior to use, lubricate the hammer with ½ pint (¼ litre) of rock drill oil as described above.
Fit the hammer to the drilling rig ensuring no debris or dirt enters the hammer from the site, dirty tubes 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.

2.2.3 Lubrication

It is vital for DTH hammers to receive a constant supply of proper rock drill oil to protect the internal components and to provide a good air seal between the piston and the inner cylinder, and the piston and the wear sleeve for efficient drilling. The correct consumption of oil is dependent upon the air volume and conditions. Please refer to the lubrication graph below for recommendations. When drilling in wet conditions the normal amount should be doubled. There should be visual evidence of oil around the drill bit shank and within the tube joints when changing tubes.

The recommended grade of oil is dependent on the ambient temperature in which drilling is taking place as well as the operating pressure. As a rule of thumb, ISO320 grade rock drill oil should be used whenever possible as the hammer is a high frequency tool, however, where the pump cannot pump the oil in colder conditions, a lower grade of oil can be used as per the graph below.





Remember: 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.

2.2.4 Operation

Be sure to 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 should be readjusted to take account of the weight of any extra tubes added so that the thrust pressure remains constant and not excessive. Insufficient 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.

Rotation speeds should not be too high and should be selected to suit drilling conditions and drill bit diameters. High rotation speeds do not provide fast drilling and can cause premature wear of drill bits, hammers and tubes. Too slow a rotation speed can cause binding in the borehole and damage to drill bit inserts.

The controls of the drill should be adjusted in order to provide the largest drill chip size with the smoothest rotation and feed characteristics. Recommended rotation speeds would normally vary between 25 – 35 R.P.M. for most applications.

Where big diameter drill bits are used or when drilling in hard abrasive rocks, slower rotation speeds are recommended. Conversely, in soft, non-abrasive rock a slightly faster rotation speed may be selected to produce more satisfactory results.

Some ground conditions may cause binding within the hole, with the added risk of the hammer and drill string becoming jammed. Any excessive pullback forces or high rotation speeds used in an attempt to recover the drill string may generate heat zones around the hammer, which may alter the metallurgy of the components to cause damage and ultimate failure. A backreamer sub may help prevent jamming in bad ground conditions and prevent heat damage.

You are strongly advised not to pour diesel into the hammer as this may create an internal combustive effect and will damage the hammer and its components. Any heat induced failures are not covered by our terms of warranty.

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.

Proper drill guides and break out systems must be used which suit the diameter of the hammer. All tools and spanners used for the drill bit and break out flats must fit properly.

Make certain that the hammer is stationary when applying spanner or breakout tools. Do not rotate the hammer with a spanner attached to the drill string unless it is safely captivated within the breakout clamp.

2.3 Servicing

2.3.1 General

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, and 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.

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2.3.2 Opening Chuck and Backhead

The threads used in Mincon Hammers are right hand threads. Proper tools and break-out systems should be used at all times to dismantle DTH hammers, otherwise damage may be caused to the components which could result in eventual failure or affect the performance of the Hammer. When using Petol wrenches or similar systems, ensure that the wrench is not placed on the threaded section of the wear sleeve. Petol wrench jaws should be carbide, and in good condition. It is good practice to keep a spare set of jaws with the rig. Do not strike or hit the outer components as this could weaken the heat treated steels. Hitting the hammer may also cause hard metal fragments to be chipped off which may be projected and cause personal injury or eyesight loss.

Do not apply heat to the hammer, as this can alter the metallurgical composition and result in premature failure. Additionally, applying heat can also cause distortion to the wear sleeve, which in turn would lead to failure. Do not trap the hammer under drill rig tracks or vehicle wheels which could cause bending and distortion of the hammer body. Failures caused by these actions cannot be supported by warranty.

Take care when dismantling the hammer to make sure that parts and drill bits do not become detached and cause damage or personal injury.

2.3.3 Dismantling Hammer to Change Drill Bit

When possible, dismantling the Hammer to change the drill bit is preferably best done in a workshop environment to avoid the risk of injury and for cleanliness. Be careful to ensure that the drill bit and chuck are fully supported together so that there is no risk of them becoming detached and causing injury. Before fitting a new drill bit visually inspect the splines of the chuck and the piston striking face to ensure that both are not damaged in any way.

Place chuck onto the bit, and secure with the bit retaining ring into the top of the chuck. Liberally grease the threads on the chuck. Screw chuck into wear sleeve by hand, alternatively, if using the rig to screw chuck on, ensure that no cross threading occurs. Prior to use, place bit in a bit basket and torque up chuck. This is essential, as the chuck can loosen if not properly torqued, and premature chuck failure can occur.

2.3.4 Disassembly for Full Servicing of Hammer

Breakout the Chuck and Backhead as described previously. Unscrew chuck and remove bit and bit retaining ring. Unscrew the backhead and check to see if the check valve and spring are operating correctly, and then remove them. Mark one end to identify either the chuck or backhead end for reassembly latter.

Stand hammer up with the chuck end uppermost. Using a mild steel bar, tap the strike face of the piston to remove the air distributor and inner cylinder. The steel make-up ring and lock ring should fall out during this process, if so remove them and continue until the top of the air distributor is at the top of the wear sleeve. The hammer can now be placed flat on the ground or put up onto a suitable vice, and using the mild steel bar, hit the piston strike face from the chuck end, to completely remove the air distributor, inner cylinder and piston.

Stand the wear sleeve up with the chuck end on the ground. Invert the piston and drop into the wear sleeve so that it is upside down. Take care to ensure that fingers do not get caught between the piston and wear sleeve. Again stand the hammer up with the backhead end uppermost, and tap the piston strike face with the mild steel bar to remove the aligner. A number of blows may be necessary as the aligner and wear sleeve are an interference fit.

The piston retaining ring can be removed by using a mild steel bar and hitting the section opposite the gap on the ring which will ride up the taper on the wear sleeve and come out. It can then be pulled out by hand.

2.3.5 Inspection

Prior to inspection, thoroughly clean all parts using a suitable cleaning agent. Diesel is not recommended for cleaning as it can cause erosion to components, and damage to health.

All parts should be visually inspected for any signs of damage, wear or cracking. The inner cylinder, wear sleeve and lock rings can be checked for unseen cracking by suspending them and lightly tapping with a screw driver. If they emit a ringing tone then they should be sound. However, a dull flat tone if emitted may indicate cracking, and the part should be replaced.

Take particular care to check the internal bore of the wearsleeve for pick-up marks and galling. If these are present, the barrel of the wear sleeve should be honed out, using a hand hone to remove them.

Inspect surface of the piston for pick-up marks and galling (usually caused through poor lubrication or the presence of contaminants) and smooth out with emery paper or a hand held grit stone. Where galling of the piston has occurred, substantial heat has been generated and quite often, micro cracking has occurred on the piston. In these cases, the piston should be replaced if there is evidence of such cracking. Check the strike face of the piston for cracking or damage.

2.3.6 Checking Wear Limits

The performance of the hammer is dependent on the amount of wear the critical components have. These should be measured and recorded in the Service log in the appendix. The service log gives the location of where measurements should be made. Depending on how many parts need to be replaced, it may be economical to replace the hammer all together.

Where the reverse wear limit has been reached on the outer diameter at the chuck end of the wear sleeve, the hammer can be reassembled with the backhead end becoming the chuck end. Additionally if the internal running surface in the wear sleeve for the piston is excessive, the wear sleeve can be reversed.

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2.3.7 Reassembly

The hammer can be reassembled in the following manner, referring to the exploded view of the hammer in the appendix. Ensure all components are liberally coated with good quality rock drill oil and threads with thread grease.

After identifying which end will be the chuck end, fit the piston retaining ring in this end. This can be pushed into place, using a small bar or screwdriver to ensure that it is seated correctly. Stand the wear sleeve up with the chuck end to the top, and push the aligner in as far as it will go by hand. Using a steel dolly that fits into the wear sleeve and over the aligner, hit the aligner into place with a sledgehammer. Place the bit retaining rings into the chuck and screw the chuck in place. If the chuck does not close up fully, the aligner is not in fully.

Turn wear sleeve over with the chuck on the floor, and drop the piston in with the strike face in first. Again ensure that fingers do not get caught between the wear sleeve and the piston. Place the three piece seating ring on the inner cylinder and secure in place with the seating ring O Ring. Insert The Air distributor into the inner cylinder at the seating ring end and using a soft headed mallet, tap it into place so that it seats up against the top of the inner cylinder.

Place the inner cylinder assembly into the wear sleeve, and tap down with a soft headed mallet. When beginning to hit the assembly, ensure that it goes in square. Using a steel dolly, on top of the air distributor and inside the wear sleeve, drive the assembly into place with a sledgehammer.

Drop the lock ring into place and then the steel make up ring on top of this. Insert the spring and check valve in place and finally screw the backhead in place. With the backhead in place, there should be a small gap between the backhead and the wearsleeve. This gap should be between 0.015" and 0.030", and can be measured using a feeler gauge. If the gap is less than the minimum, then the lock ring will need to be replaced. Protect the hammer as earlier described by internal lubrication.

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3. Trouble Shooting

Problem	Possible cause	Remedy
Low penetration and high pressure	Chuck shoulder length worn too much	Measure chuck shoulder length against discard length and discard if necessary as air is restricted on the upstroke of the piston
	Contamination in hammer	Open hammer and clean the obstruction
	Too much water injection	Reduce level of water in flow
Rough or erratic operation	Too much feed pressure	Set the feed pressure until the rotation starts to bind. Then back off the feed pressure until the rotation runs smoothly
	Shoulder length of the chuck has worn too much	Measure the chuck shoulder against the discard length and discard if necessary as air is restricted to the upstroke of the drill
	Rotation speed too slow	Drill bit peripheral rotation speed of 12 – 15" per second (300-380mm). Place chalk mark on drill rod and check the advance revolution. If greater than ½" (12mm) per revolution increase rotation until the advance per revolution is a maximum of between 3/8" – ½" (10-12mm)
	Worn bit bearing (some models only)	Replace bit bearing if outside discard limit
	Too much water injection	Reduce level of water injection
Low penetration / Low pressure	Worn drill clearances	Inspect piston, inner cylinder, wearsleeve, air distributor probe and bearing against discard measurements as outlined in repair section 2.2 and discard as necessary
	Lack of oil	Ensure there is an oil film coming from bit spline and bit parts. (Place cardboard under bit to check)
Drill running off bottom	Worn piston	Measure the large end of the piston for wear. If air leaks past this area it can cause the piston to cycle when off bottom
	Too much water injection	Reduce water injection flow
	Chuck I/D is worn	Replace chuck.
	Bearing I/D is worn.	Replace bearing.

PART FAILURE		
Problem	**Possible cause**	**Remedy**
Cracked wearsleeve	Abuse of wearsleeve	Avoid welding, heating or torque wrenching in the wrong place as outlined in section 1.4. Note also section 1.6
	Worn wearsleeve	Casing has worn beyond the discard point. Measure casing O/D approx. 3" from chuck end and backhead end and replace if necessary
	Corrosion	Ensure a pH neutral water, well filtered and free from contaminants is used in the drill. Corrosion usually accelerates from the threaded area or any undercut area. Coat with corrosion protector if there is any danger of corrosion
Cracked backhead body	Bogged Drill requiring lots of fighting to recover the drill	If such danger is imminent use a dig out sub
Piston cracked through large diameter	Lack of lubrication causes micro-cracks leading to breakage	Check lubricator and ensure oil film on the bit splines and slow holes
	Drill badly bogged which can cause wearsleeve to distort (causing functional heat and cracks)	Flood tool with water when bogged
	Feeding hard through voids on broken ground can cause wearsleeve to distort causing heat and cracks	Use light feed and ensure the hole is kept clean and consolidated. Use foam or mud if necessary
	Using wrench over wrong area causes wearsleeve to distort	Use wrench only in the Area indicated in spec 1.4
Piston strike end breaking	Not enough down-force	Increase feed until rotation binds and pressure pulses and then back off until the rotation and pressure becomes smooth
	Contamination from excess water injection causes pitting in the piston face and external failure	Avoid excessive water. Use only pH neutral water. Use only filtered water, free from contamination

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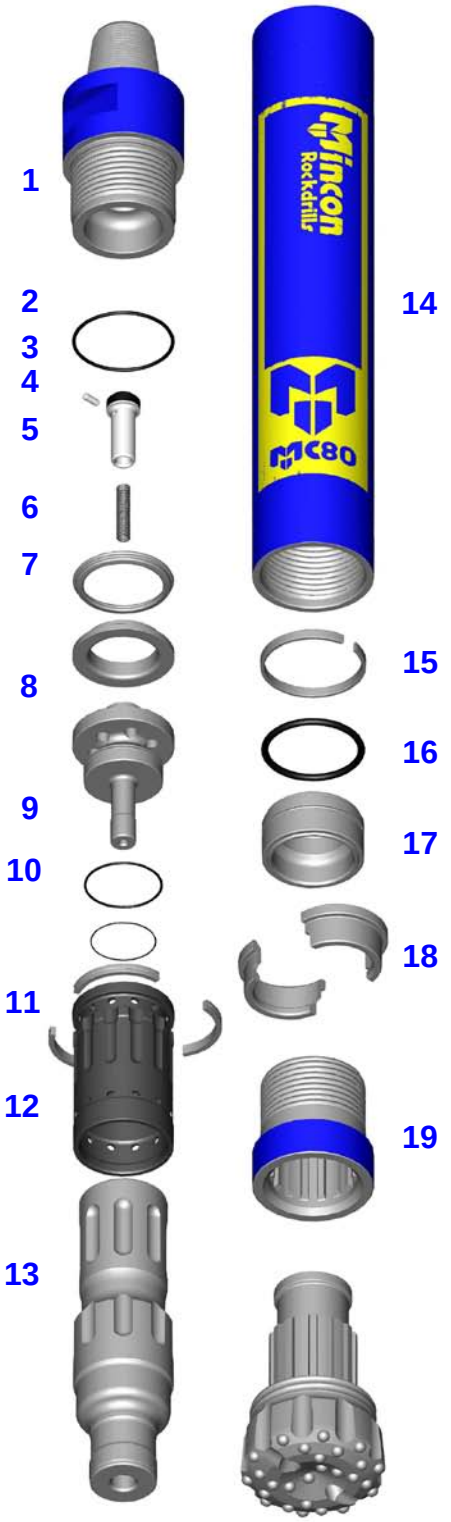
4. Appendix

4.1 DTH Hammer exploded view and Parts List and Technical Data



MINCON MC80 PARTS LIST AND SPECIFICATIONS

Item	Description	Part Number
	Mincon MC80 Hammer	MD801AS08
1	Backhead	MD801BH01
2	O Ring	MD822OR01
3	Choke Blank	MD806CH01
	Choke 1/8" (3.2mm)	MD806CH02
	Choke 3/16" (4.8mm)	MD806CH03
4	Check Valve	MD802CV01
5	Spring	MB503SP01
6	Lock Ring	MD805LR01
7	Steel Make-up Ring	MD804SM01
8	Air Distributor	MD807DR01
9	O Ring	MD821OR01
10	O Ring	MD820OR01
11	Seating Ring	MD809SR01
12	Inner Cylinder	MD808IC01
13	Piston	MD810PN04
14	Wear Sleeve	MD811WS01
15	Piston Retaining Ring	MD812PR02
16	O Ring	MD1221OR01
17	Aligner	MD813BB02
18	Bit Retaining Ring	MD814BR05
19	Chuck	MD815CK05

Outside diameter	7.15"	181.0mm
Minimum Bit Size	7.88"	200mm
Spanner Flat Size	5.5"	140.0mm
Length (Less Bit, Backhead Shoulder to Chuck)	51.7"	1117mm
Bit Shank Type	MC81	
Backhead Thread	4 ½" A.P.I. Reg. Pin	
Piston Weight	102 Lbs	46.4 Kgs
Wear Sleeve Reverse Limit	6.770"	172.0mm
Wear Sleeve Discard Limit	6.650"	169.0mm

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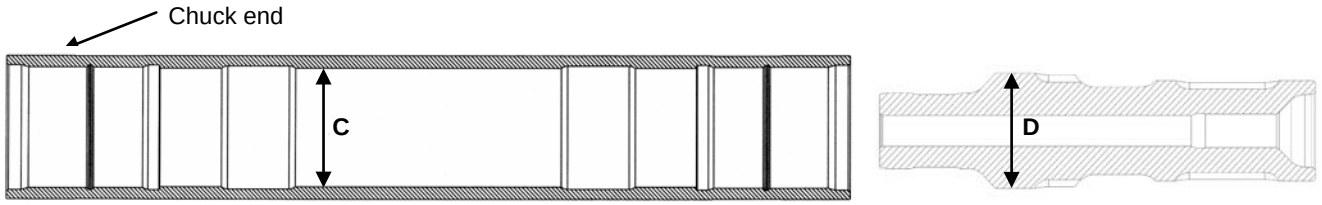
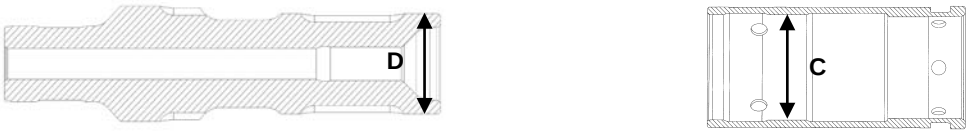
4.2 Hammer Service Log

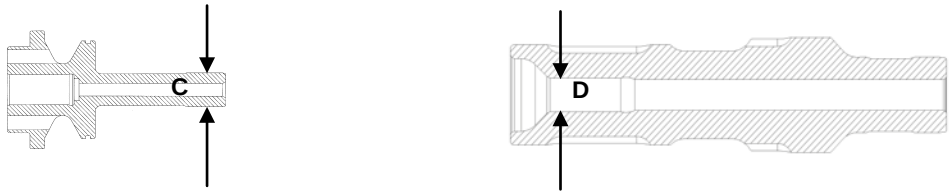
WEARSLEEVE / PISTON CLEARANCE									
Part	**New Dimension**		**As Measured**		**Wear**		**Actual Clearance**		**Discard Clearance**
Wearsleeve	A	5.887" (149.54mm)	C		C-A		C-D		≥ 0.010" (0.25mm)
Piston OD	B	5.882" (149.40mm)	D		B-D				



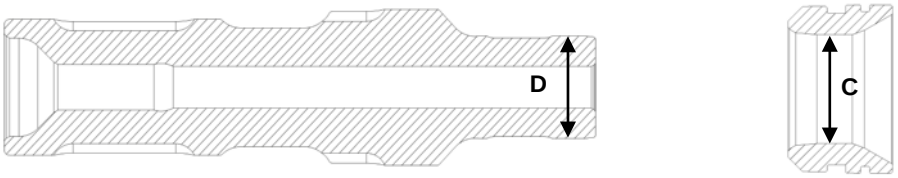
INNER CYLINDER / PISTON CLEARANCE									
Part	**New Dimension**		**As Measured**		**Wear**		**Actual Clearance**		**Discard Clearance**
Cylinder ID	A	5.178" (131.53mm)	C		C-A		C-D		≥ 0.010" (0.25mm)
Piston OD	B	5.173" (131.40mm)	D		B-D				



DISTRIBUTOR PROBE / PISTON ID CLEARANCE									
Part	**New Dimension**		**As Measured**		**Wear**		**Actual Clearance**		**Discard Clearance**
Distributor Probe OD	A	1.508" (38.30mm)	C		C-A		C-D		≥ 0.010" (0.25mm)
Piston ID	B	1.516" (38.50mm)	D		B-D				



DISTRIBUTOR PROBE / PISTON ID CLEARANCE									
Part	**New Dimension**		**As Measured**		**Wear**		**Actual Clearance**		**Discard Clearance**
Aligner ID	A	3.984" (101.2mm)	C		C-A		C-D		≥ 0.016" (0.4mm)
Piston Nose OD	B	3.976" (101.00mm)	D		B-D				



EXTERNAL WEAR		
Description	**Wear Limit**	**As Measured**
Wearsleeve Reverse Dimension:	5.310"(135.00mm)	
Wearsleeve Discard Dimension:	5.060" (128.50mm)	
Note 1: If no evidence of significant air pressure drop or if wearsleeve is wearing evenly on the top and bottom end, recommendation is to not reverse wearsleeve.		
Note 2: Chuck should be replaced when wear transfers to wearsleeve.		

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5. Warranty

Mincon DTH HAMMERS
Warranty, October 2002

Mincon warrants that the Mincon DTH Hammers and spare parts therefore, manufactured by Mincon and delivered to the initial user to be free of defects in materials or workmanship for a period of 3 months after initial operation or 6 months from the date of shipment to the initial user, whichever occurs first. Mincon may elect to repair the defective part or issue full or partial credit towards the purchase of a new part. The extent of credit issued will be determined on a pro-rata basis bearing in mind the service life of the defective part against the normal service life of that part. The part will be replaced or repaired without charge to the initial user at the place of business of an authorized Mincon distributor during normal working hours. The user must present proof of purchase at the time of exercising the warranty.

The warranty applies only to failures resulting from defects in the material or workmanship and does not apply to failures occurring as a result of abuse, misuse, corrosion, erosion, negligent repairs and normal wear and tear. Failure to follow recommended operating and maintenance procedures which result in component failure will not be considered for warranty.

This warranty is in lieu of all other warranties, other than title, expressed or implied.

Limitation of Liability

Mincon will not accept any remedies to the user other than those set out under the provisions of warranty above. The total liability of Mincon or its distributors with respect to the sale of DTH Hammers or spare parts therefor, whether based on contract, negligence, warranty, indemnity or otherwise shall not exceed the purchase price of the product upon which such liability is based. Mincon and its distributors shall in no event be liable to any party relating to this sale for any consequential, indirect, special or punitive damages arising out of this sale or any breach thereof, or any defects in or failure of or malfunction of the Mincon DTH Hammer or spare parts.

Warranty will be voided where:

- There is evidence of damage resulting from insufficient or incorrect lubrication.
- There is evidence of misuse through the application of heat, welding or of being struck.
- There is evidence of distortion or bending however caused.
- There is damage caused as a result of using incorrect servicing tools or procedures.
- If it is evident that the hammer or its components have achieved a reasonable proportion of their anticipated life.