HYPER181
DTH HAMMER

HYPER 181 – MAINTENANCE, OPERATING AND SERVICE MANUAL

11/03/2020

Robit

www.robitgroup.com

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The **Robit Hyper 181** is a strong and robust tool of a simple and straight forward design to provide maximum performance within a minimum of maintenance.

The Hyper 181 is designed to operate efficiently at air pressures between 100psi (7bar) and 225psi (15bar).

The Hyper 181 accepts Hyper 181 button bits (N180) as standard. In addition to this the Hyper 181 can be modified to accept button bits with a Mission Sd18 shank design by simply replacing the chuck, piston and bit retainers. A QL200 version is also available.

The Hyper 181 hammer is supplied as standard with a check valve arrangement. This is designed to maintain pressure inside the hammer when the air is switched off and so help prevent contaminated water from entering the hammer.

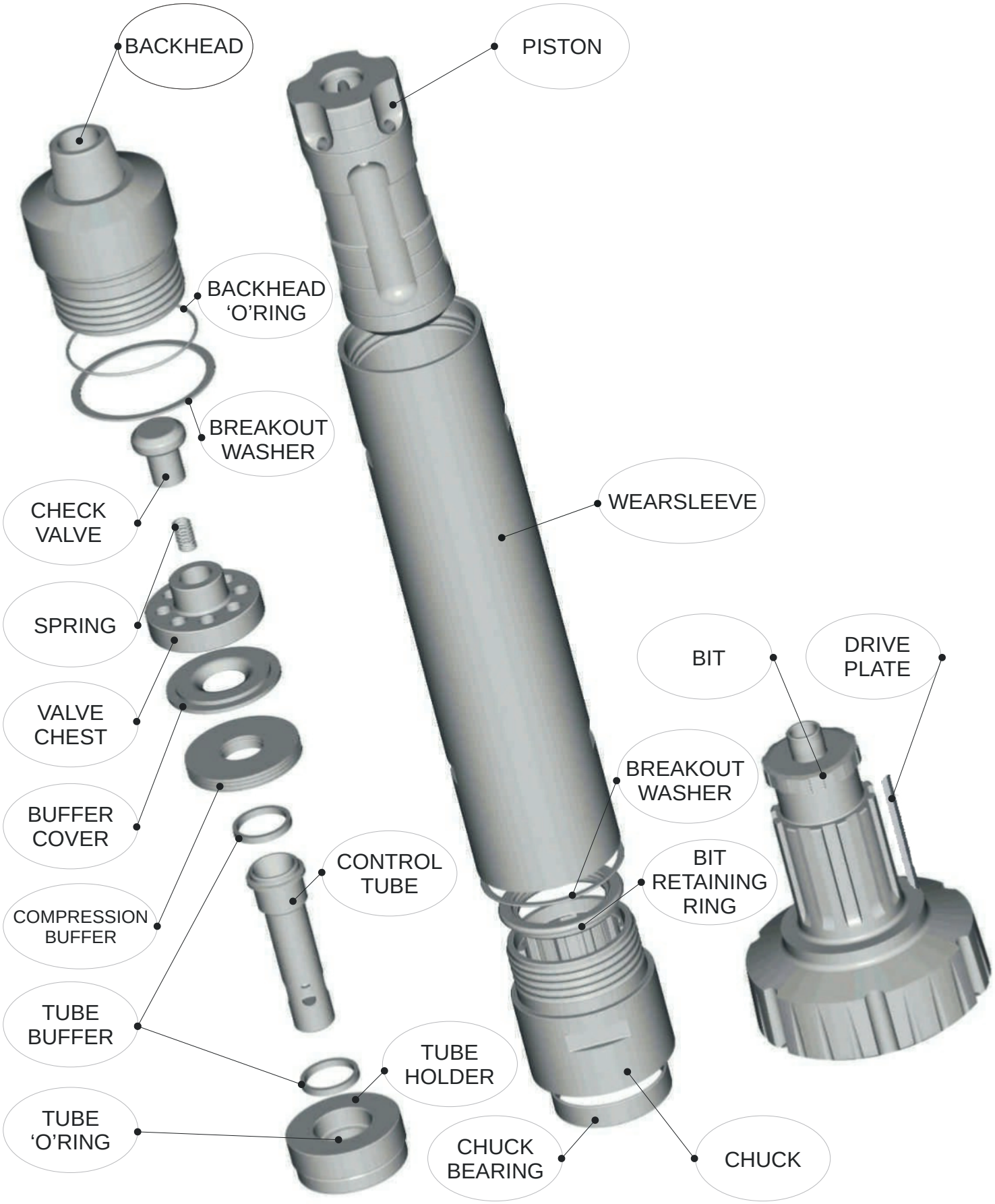
The Hyper 181 hammer standard backhead is 8⅝" API reg pin, but alternative thread or hexacon connections can be supplied on request.

The Hyper 181 hammer is designed to give optimum performance with the minimum consumption of compressed air. If however, for particular deep hole applications extra flushing air is required, the hammer can be fitted with a choke system, that can easily be applied to suit your operational requirements.

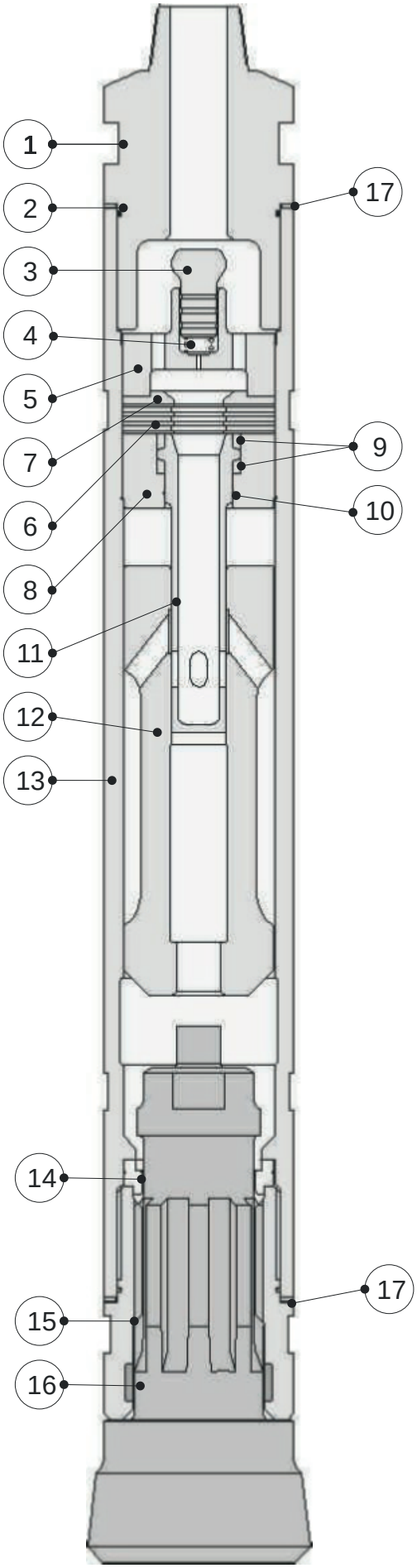
ALWAYS THINK

SAFETY FIRST!

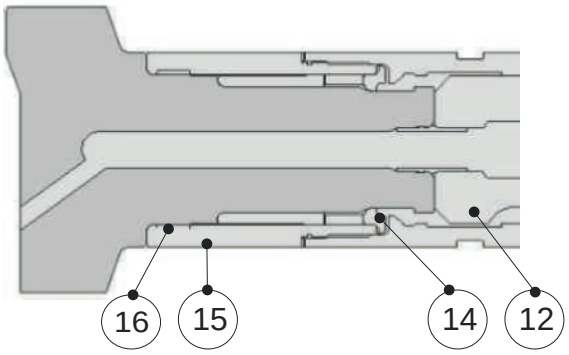
HYPER 181


BACKHEAD
PISTON
BACKHEAD 'O'RING
BREAKOUT WASHER
CHECK VALVE
WEARSLEEVE
SPRING
BIT
DRIVE PLATE
VALVE CHEST
BREAKOUT WASHER
BUFFER COVER
CONTROL TUBE
BIT RETAINING RING
COMPRESSION BUFFER
TUBE BUFFER
TUBE HOLDER
TUBE 'O'RING
CHUCK BEARING
CHUCK

3 HAMMER PARTS

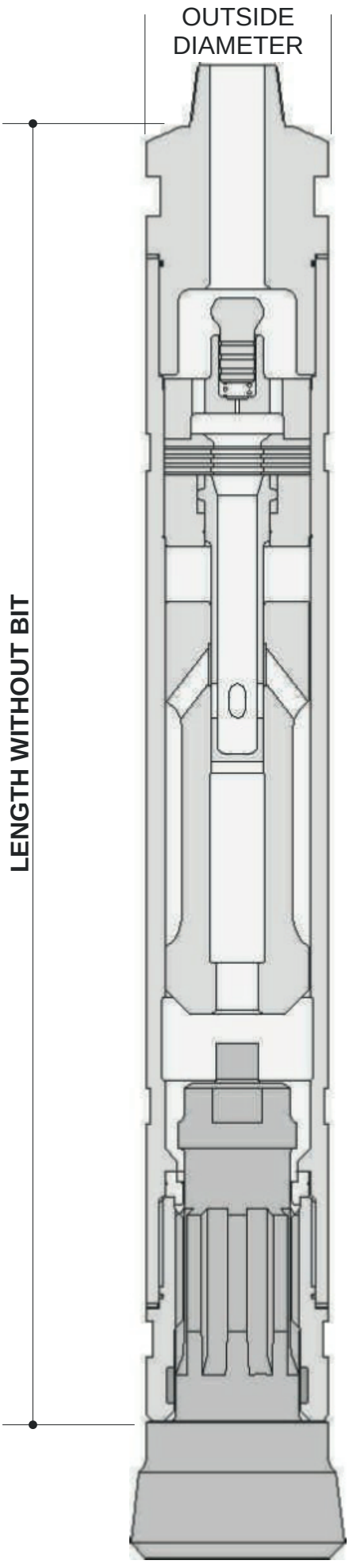


Ref	Description (N180)	Part Number
1	Backhead 8⅝" Reg Pin	HSH1813882M
2	Backhead 'O' Ring	HSH18114
3	Check Valve	HSH18108
4	Check Valve Spring	HSH18110
5	Diverter	HSH18107
6	Compression Buffer	HSH18128
7	Buffer Cover	HSH18173
8	Tube Holder	HSH18131
9	Tube Buffers (2)	HSH18129
10	Tube 'O' Ring	HSH18130A
11	Control Tube	HSH18130
12	Piston	HSH18103180
13	Wearsleeve	HSH18100
14	Bit Retaining Ring	HSH18137180
15	Chuck	HSH18135180
16	Chuck Bearing	HSH18135180BE
17	Breakout Washers	HSH18126
Complete Hammer		**BR181H01**



Ref	Description (SD18 Conv)	Part Number
1	Backhead 8⅝" Reg Pin	HSH1813882M
2	Backhead 'O' Ring	HSH18114
3	Check Valve	HSH18108
4	Check Valve Spring	HSH18110
5	Diverter	HSH18107
6	Compression Buffer	HSH18128
7	Buffer Cover	HSH18173
8	Tube Holder	HSH18131
9	Tube Buffers (2)	HSH18129
10	Tube 'O' Ring	HSH18130A
11	Control Tube	HSH18130
12	Piston	HSH18103096
13	Wearsleeve	HSH18100
14	Bit Retaining Ring	HSH18137096
15	Chuck	HSH18135096
16	Chuck Bearing	HSH18135096BE
17	Breakout Washers	HSH18126
Complete Hammer		**BR181H02**

HAMMER SPECIFICATIONS



	Specification	
STANDARD BACKHEAD CONNECTION	8⅝”API reg pin	
CHUCK CONNECTION CONFIGURATION	HYPER 181 (N180) STD OR Sd18	
LENGTH LESS BIT	N180 86” 2185mm	SD18 88.60” 2250mm
OUTSIDE DIAMETER OF HAMMER	16” 406mm	
OUTSIDE DIAMETER OF CHUCK	16” 406mm	
BORE DIAMETER	12.25” 311mm	
PISTON STROKE	5.75” 146mm	
PISTON WEIGHT	730lbs 330kgs	
WEARSLEEVE ACROSS FLATS SIZE	15.5” 394mm	
WEIGHT OF HAMMER LESS BIT	3545lbs 1608kgs	

5 AIR CONSUMPTION

PRESSURE (PSI)	PRESSURE (BAR)	AIR CONSUMPTION litres/second	AIR CONSUMPTION litres/minute	AIR CONSUMPTION cubic metre/min	AIR CONSUMPTION cubic feet/minute
100	7	513	30806	31	1088
125	9	718	43053	43	1520
150	10	943	56595	57	1999
175	12	1189	71317	71	2518
200	14	1452	87133	87	3077
225	15	1733	103971	103	3672

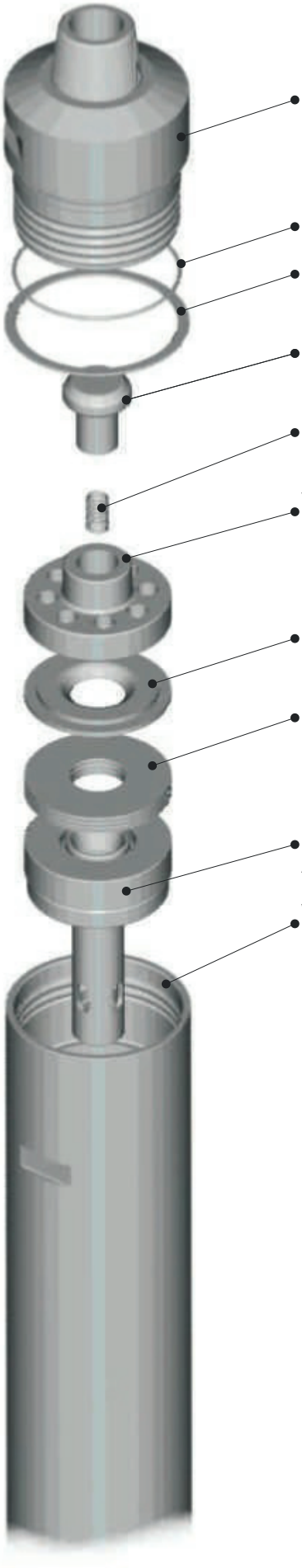
Drill through this face should extra flushing be required

Additional Flushing

The Hyper 181 has a control tube with a softened face which can be easily drilled through to allow for extra flushing air should this be required.
In certain drilling conditions extra flushing air may be required to overcome increasing back pressure and maintain the necessary up hole velocity to ensure efficient hole cleaning. In such conditions, a small hole can be drilled into the face of the control tube which will allow extra live air to be delivered directly to the bit face. The size of the hole will determine the extra volume of air delivered to the bit face depending on the operating pressure.

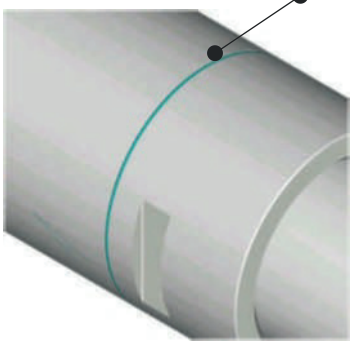
STRIPPING THE HAMMER 6

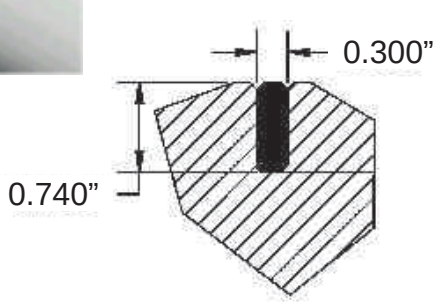
NOTE:- All components must be washed clean and laid out on a dirt free surface to enable inspection to take place. The stripping procedure is explained in the following section,



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

Note:- On no account should the wearsleeve be impacted by a hand hammer or splitting be assisted by use of localised heat: ie. welding/blow torch, this will invalidate the warranty
Should splitting prove difficult, the breakout washers can be ground out, taking care not to deface other pieces of the drill, to relieve pressure and help splitting,





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.

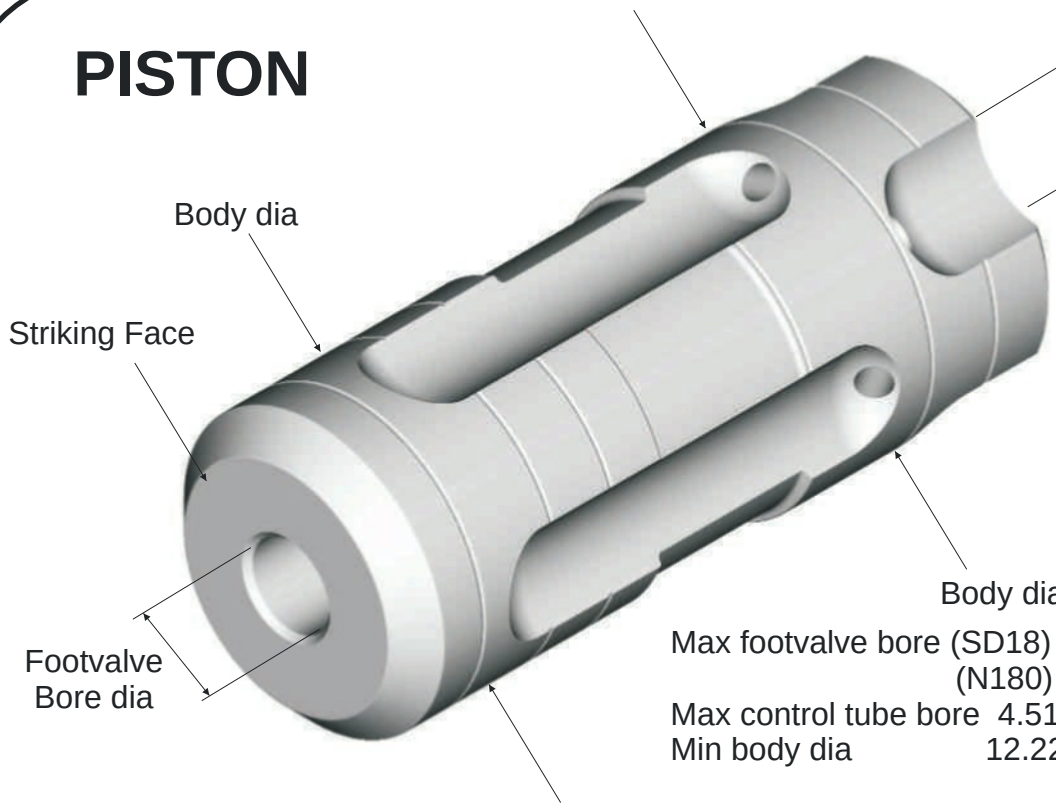
7 CHECKING FOR WEAR AND DAMAGE

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) 3.670” (93.2mm)
(N180) 3.740” (95.0mm)
Max control tube bore 4.517” (114.7mm)
Min body dia 12.220” (310.1mm)

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

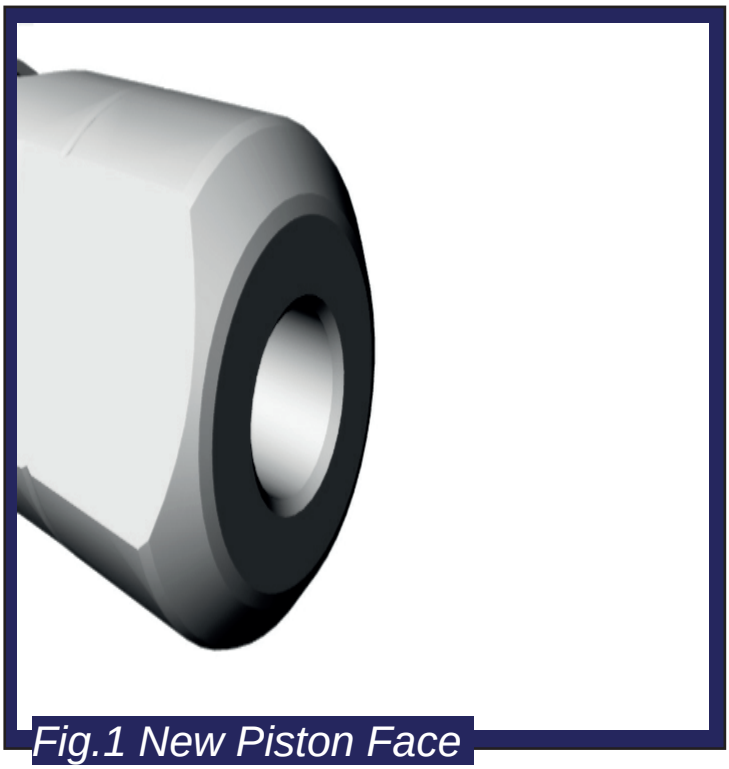


Fig.1 New Piston Face

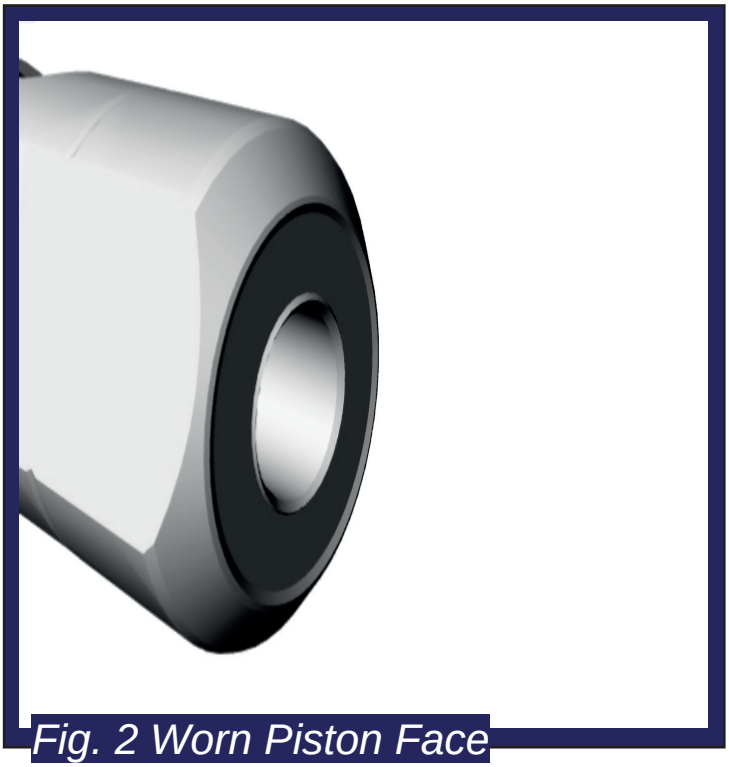


Fig. 2 Worn Piston Face

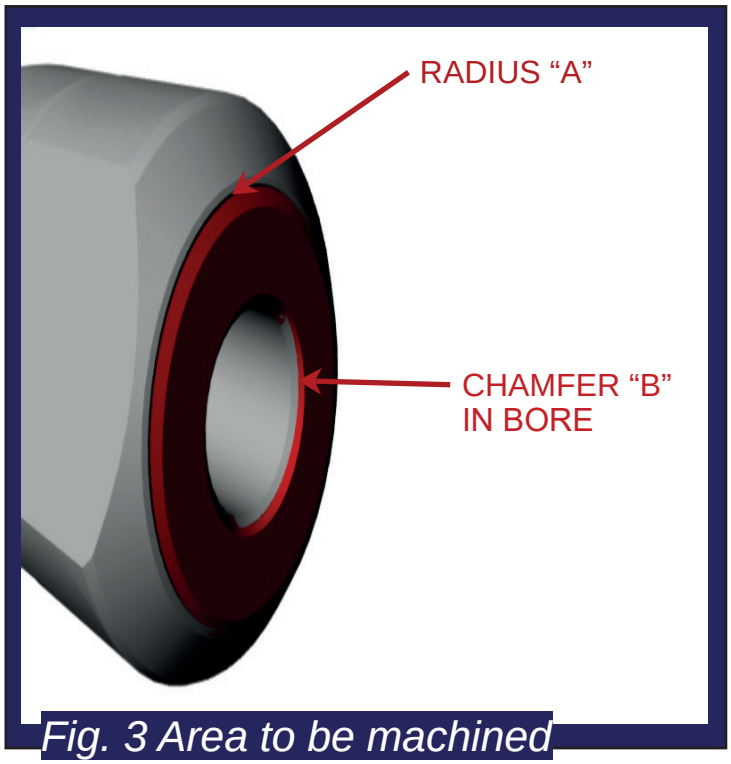


Fig. 3 Area to be machined

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 amout 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.**

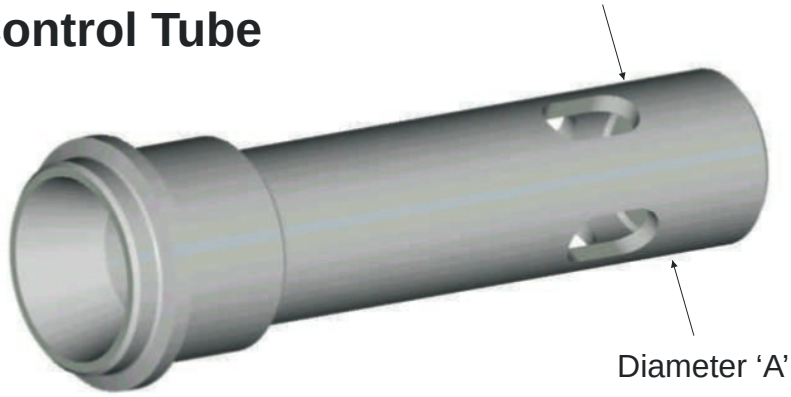
The table below contains useful machine information for reforming the piston face.

MACHINE DETAIL		
HAMMER	**RADIUS “A”**	**CHAMFER “B”**
HYPER 181	0.125”	0.250” @45

8 CHECKING FOR WEAR AND DAMAGE

Control Tube

Control Tube
Minimum Dia
4.492” (114mm)



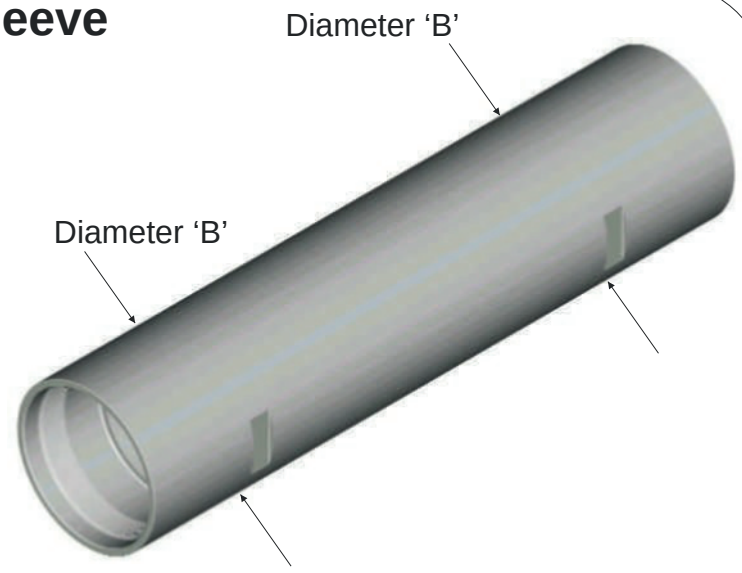
Examine the control tube diameter ‘A’, using a micrometer, check the diameter has not worn under the specified minimum.
If there are signs of pick-up they should be removed by using emery cloth.

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.

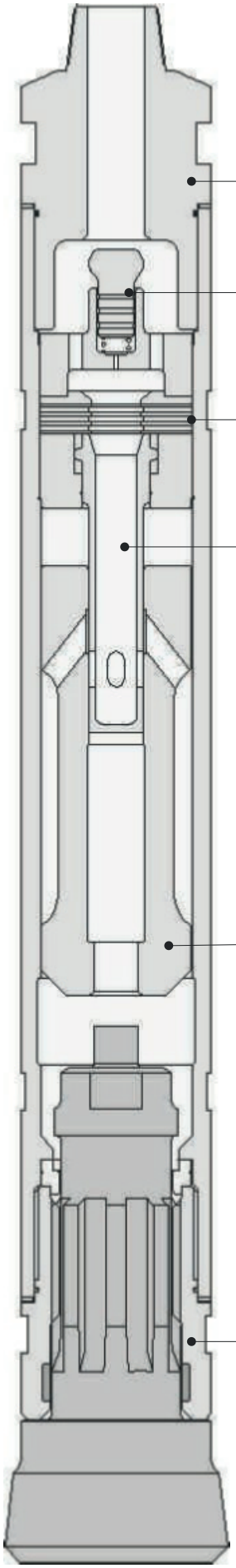
If there are signs of pick-up they should be removed by using emery cloth.

Wearsleeve
Minimum Dia
15.7” (399mm)



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



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. Assemble the two control tube buffers and the ‘O’ ring around the control tube, then push the assembly into the tube holder. Coat the outside of the assembly with rock drill oil and insert it into the backhead end of the wearsleeve

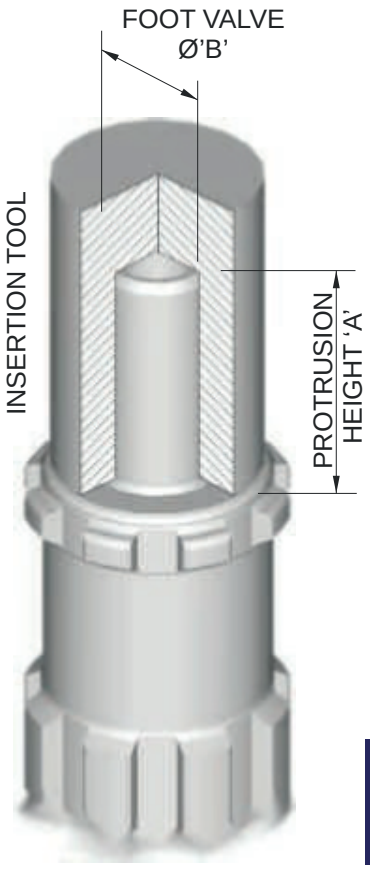
6. Slide the compression ring on to the control tube assembly.

7. Insert the spring into the check valve and then slide the assembly into the valve chest. Fit the buffer cover to the valve chest. Push the whole assembly down onto the compression ring.

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 hand tight, then measure the gap between the wearsleeve face and the lock-up face on the backhead. This gap should be a minimum of 2mm, - if the gap is smaller the ring should be removed and replaced with a new compression ring. When the gap exceeds 2mm the backhead should be fully tightened using the appropriate backhead spanner.

9. Pre torque the whole assembly to 944 Kgm torque before use.

10 BUTTON BIT FOOTVALVES



The Robit Hyper 181 hammer is designed to be used with Foot Valves that are to the following specifications:

SHANK TYPE	PROTUSION HEIGHT 'A'	FOOTVALVE DIAMETER 'B'
SD18	2.75" 69.85mm	3.61" 91.7mm
Numa 180	3" 76.2mm	3.68" 93.5mm

To guarantee the diameter and protrusion height are correct it is recommended the correct insertion tool is used.

Using Foot Valves which are larger in diameter than the sizes shown, will result in premature failure of the Foot Valve.

Foot Valves which are much smaller in diameter than the sizes shown will reduce the performance of the hammer.

11 LUBRICATION

The Hyper 181 piston oscillates at 650 bpm at 150 psi (10bar). It is therefore extremely important that an adequate supply of the correct type of rock drill oil is constantly fed to the hammer whilst it is operating.
Failure to do so will quickly lead to excessive component wear and 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.
An air line lubrication system should be installed, preferably on the drill rig. The lubricator reservoir should be of sufficient capacity to supply the required volume of rock drill oil for a full shift. With larger hammers, this may be impractical but the capacity should be sufficient for at least half a shift.
This is equally important that the lubricator system must be adjustable and have a visual check to ensure the lubricator does not run out of oil.
As a good general guide, all Robit Hyper hammers require a third of a pint of oil per 100cfm of air through the hammer (0.07 litre per metre cubed)

Eg Hyper 181 operating at 150psi = 2016cfm = 6.7 pints per hour
10.3bar = 57cmm = 4 litre per hour

The amount of lubricating oil should be increased by 50% when drilling with water or foam.
When new drill pipes are added to the drill string, it is recommended that a half pint (a quarter of a litre) of rock drill oil is poured into the pipe to provide a good internal coating and helps prevent the hammer from running dry at any time. 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 degree centigrade, then a 30 grade oil should be used. If the ambient temperature is greater than 25 degree centigrade, use a 50 grade oil.
Robit supply their own recommended rock drill oil and this is detailed below, together with other brands of suitable oils.

MAKE	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

HAMMER STORAGE PROCEDURES 12

We recommend following the points listed below when removing a 'down hole hammer' from service. This will ensure trouble free operation once the hammer starts work again.

The hammer should be stripped and cleaned and free of all water/moisture as possible.
Robit T220 or similar rock drill oil should be poured into backhead (see chart below for quantity) allowing all parts to be coated throughout the hammer.
Both ends of the hammer should be then covered to prevent the ingress of dirt, etc.
It should be then laid horizontally in a dry environment ready for use next time.

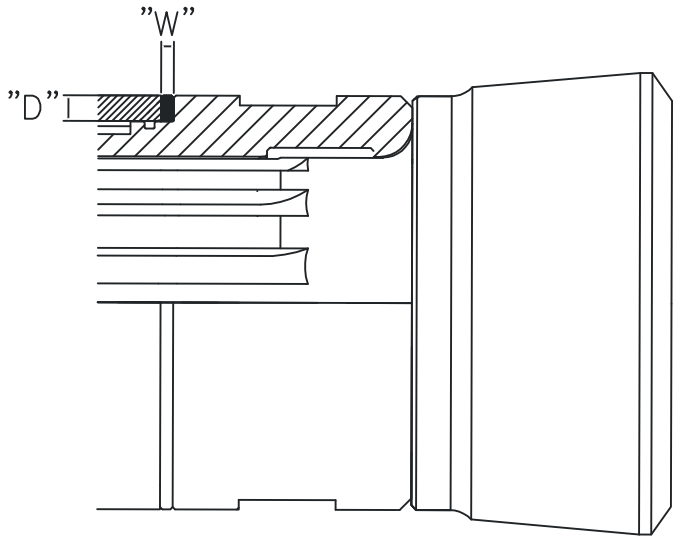
Model	Qty in UK Pints	Qty in litre's
Hyper 181	2	1.25

If this procedure is followed then apart from protecting the hammer from corrosion it will protect the parts from premature wear and of course reduce 'down time' and eventual repair costs.
However we strongly recommend that the hammer, especially if stored for any long periods of time should be stripped, cleaned, inspected and re-oiled prior use to be sure of smooth drilling.

TROUBLESHOOTING 13

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

A. CHUCK RELEASE WASHERS



CHUCK RELEASE WASHERS		
HAMMER MODEL	"W"	"D"
HYPER 181	0.300" - 7.62mm	0.740" - 18.80mm

Chuck Release Washers are fitted to the Robit Range of Hyper Hammers to assist the removal of the Chuck from the Wearsleeve after drilling.

The Chuck Release Washer is manufactured from a composite material that reduces the friction between the lock up faces on the Chuck and Wearsleeve making it easier to overcome the tensional loading applied to these parts during the drilling process.

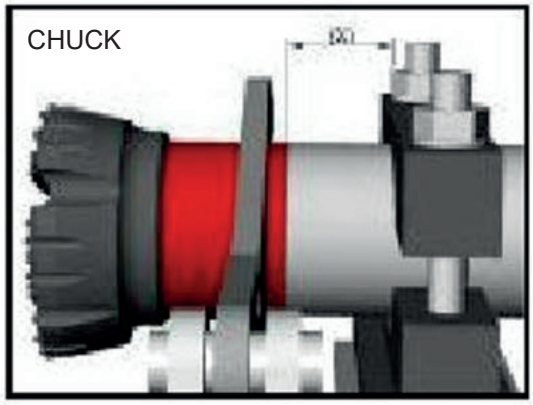
Due to the forces applied to the Chuck Release Washer you may find that its thickness ("W") is reduced during the drilling cycle and it is therefore recommended that a new Washer be fitted each time the Chuck is removed.

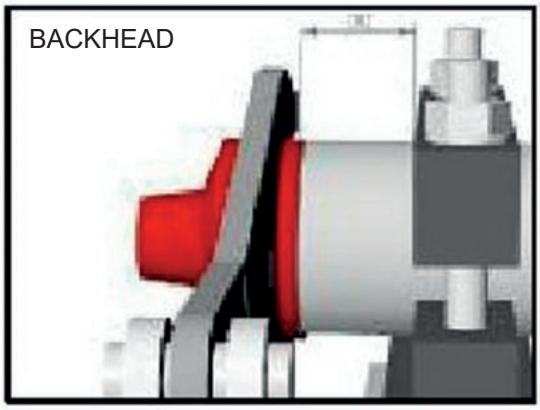
It is possible that on some of the larger Hammers in the Robit range, when drilling with large diameter Button Bits or Overburden Systems, certain conditions can generate higher torques than normally expected, resulting in difficulties when trying to remove the Chuck from the Wearsleeve. Should this occur then the removal of the Chuck can be achieved by cutting away the Chuck Release Washer. We do however stress at this point that cutting away the Chuck Release Washer is a final option and should not be done until all other options have proved unsuccessful.

If the cutting away of the Chuck Release Washer is necessary for the removal of the Chuck then it must be done with extreme care to avoid damage to either the Chuck or the Wearsleeve. The composition of the Chuck Release Washer allows for it to be cut with either a hacksaw or a small hand grinder equipped with a slitting wheel. The hacksaw method is much safer and less likely to damage the Chuck or Wearsleeve, but obviously much slower than the hand grinder with a slitting wheel. To remove the Chuck Release Washer a cut must be made in the centre of the washer all the way around it's circumference, and completely through the Washer, thus transforming the single washer into two thinner washers that will then spin freely. Great care must be taken, especially if the Washer is cut with a slitting wheel, to ensure that the cut only penetrates the Washer and does not pass through into the body of the Chuck.

The size shown as 'D" in the above table should be your MAXIMUM depth of cut, and it is recommended that either the saw blade or the slitting wheel are marked in some way so as to indicate when they have achieved this depth.

B. CLAMPING POSITIONS





CLAMP POSITIONS	
HAMMER MODEL	“X” DISTANCE FROM WEARSLEEVE END FACE
HYPER 181 CHUCK	8.250” / 210mm
HYPER 181 BACKHEAD	9.000” / 229mm

There are many different “Splitting” Machines available for unscrewing the threaded connections on a Robit Hyper 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.

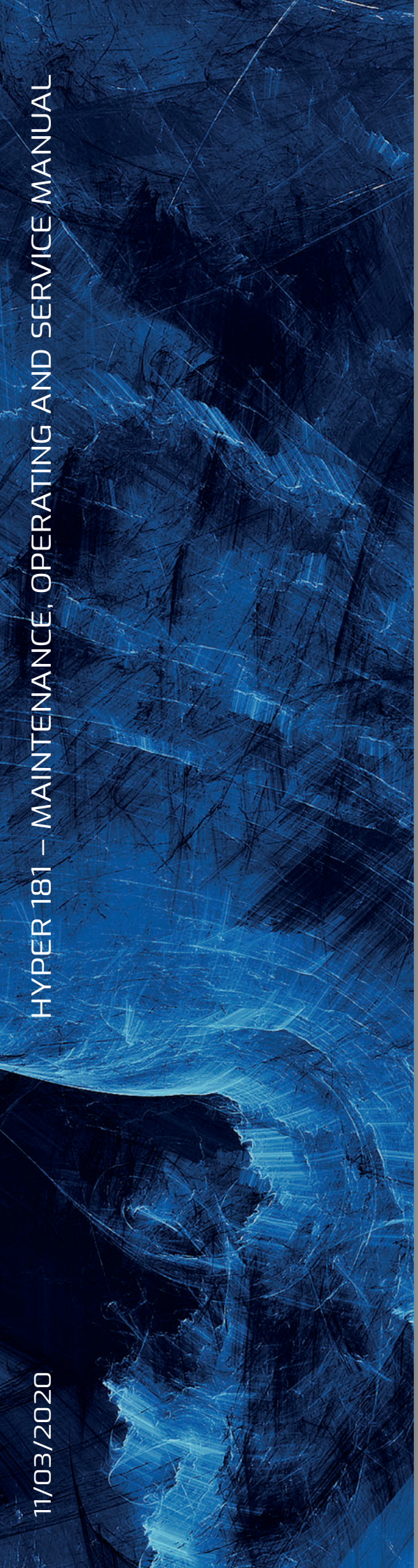
The above table shows the correct position for the clamping mechanism to ensure no additional load will be applied to the threaded connection, thus making the joint easier to split.

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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