Bulroc [U.K.] LTD

Maintenance Operating and Service Manual for Hyper 31, 41, 51, 63, & 81 Left Hand Threaded Models

HYPER D.T.H.HAMMERS

Introduction

The BULROC range of Left hand threaded Hyper down the hole hammers are strong and robust tools of a simple and straight forward design to provide maximum performance within a minimum of maintenance.

Please Note:
That, contrary to other BULROC hammer models, the Hyper series do use bits with Footvalves.

BULROC Left hand threaded Hyper hammers are supplied as standard with a Check Valve arrangement which is designed to maintain the pressure inside the hammer when the air is switched off and so help prevent contaminated water from entering the hammer.

BULROC Left hand threaded Hyper hammers are designed to give optimum performance with the minimum consumption of compressed air. If, however, particular deep-hole application require extra air flushing. This can be achieved by drilling through the soft alloy plug in the piston. More information is given on page 9.

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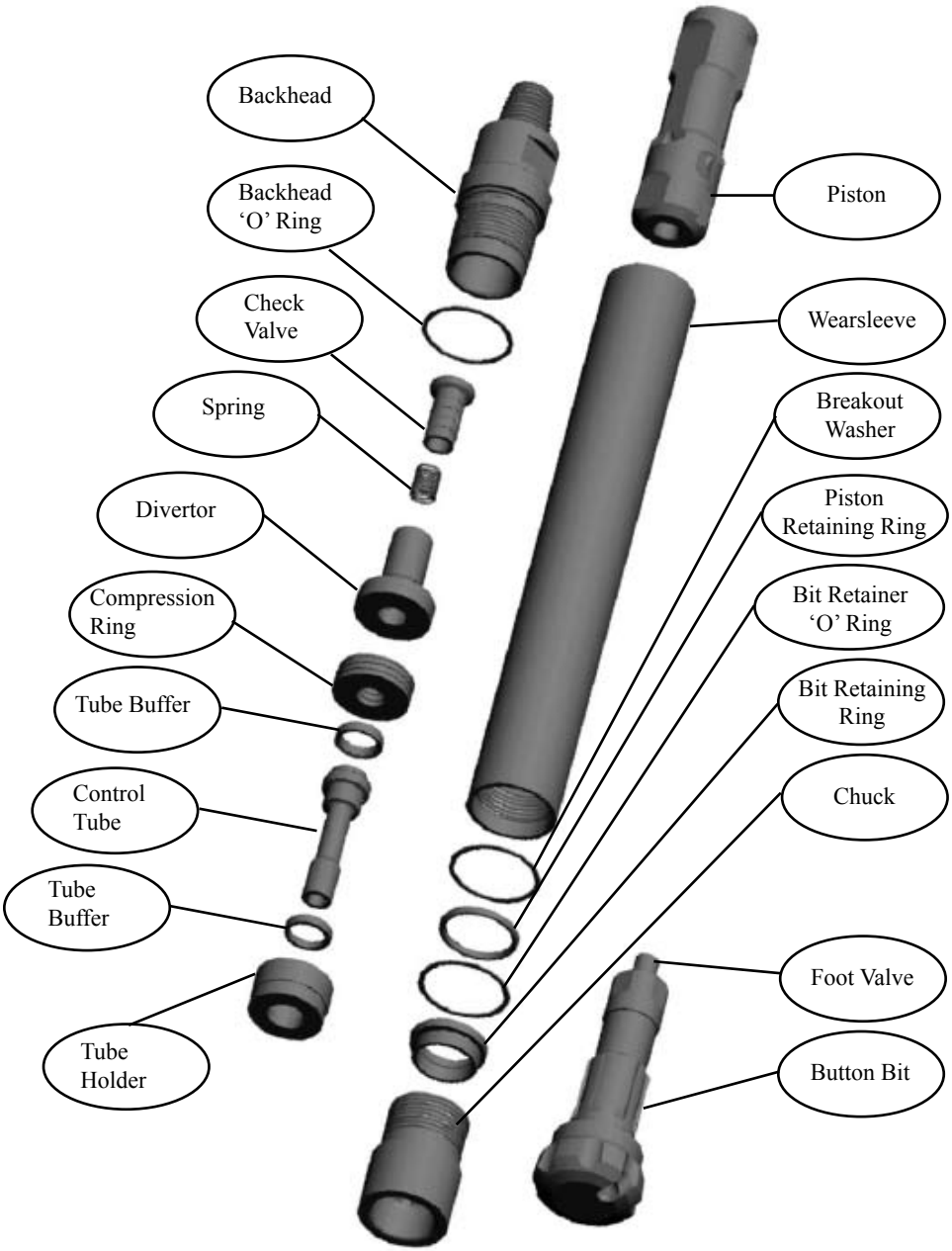
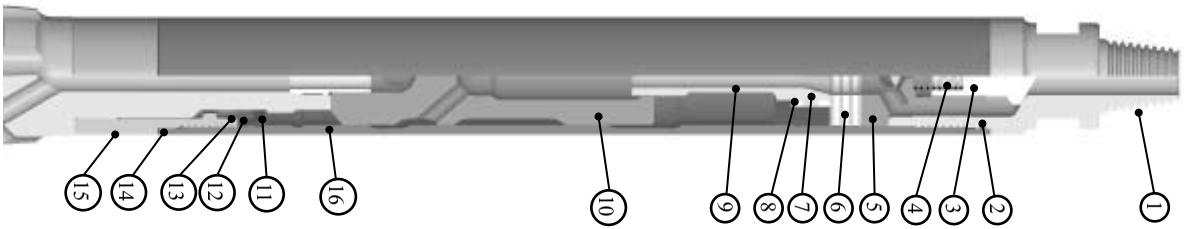
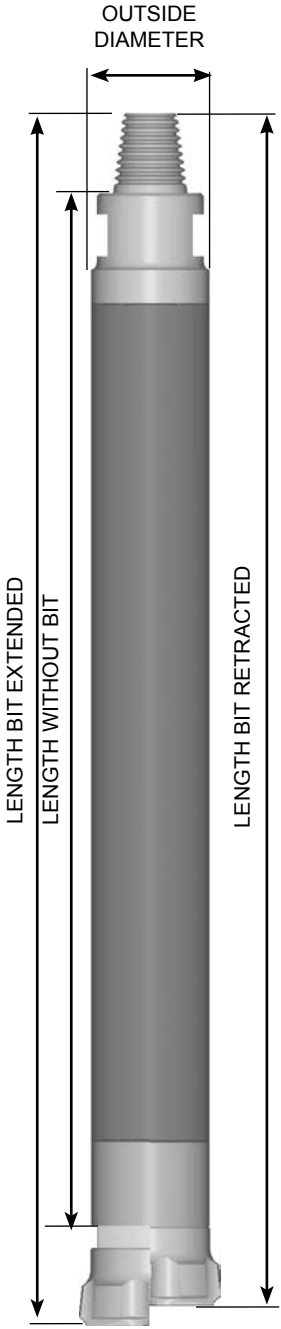
Components


Backhead
Backhead 'O' Ring
Check Valve
Spring
Divertor
Compression Ring
Tube Buffer
Control Tube
Tube Buffer
Tube Holder
Piston
Wearsleeve
Breakout Washer
Piston Retaining Ring
Bit Retainer 'O' Ring
Bit Retaining Ring
Chuck
Foot Valve
Button Bit



	PART NUMBERS					
REF	Description	Hyper 31	Hyper 41	Hyper 51	Hyper 63	Hyper 81
1	Backhead	HSH3138LH	HSH4138LH	HSH5138LH	HSH6338LH	HSH8138LH
2	Backhead ‘O’ Ring	HSH3114	HSH4114	HSH5114	HSH6314	HSH8114
3	Check Valve	IPRCV01	IPRCV02	IPRCV03	IPRCV04	IPRCV05
4	Check Valve Spring	IPRCVS01	IPRCVS02	IPRCVS03	IPRCVS04	IPRCVS04
5	Diverter	HSH3120	HSH4120	HSH5120	HSH6320	HSH8120
6	Compression Ring	HSH3125	HSH4128	HSH5128	HSH6328	HSH8128
7	Tube Holder	HSH3131	HSH4131	HSH5131	HSH6331	HSH8131
8	Tube Buffers	HSH3129	HSH4129	HSH5129	HSH6329	HSH8129
9	Control Tube	HSH3130	HSH4130	HSH5130	HSH6330	HSH8130
10	Piston	HSH3103	HSH4103	HSH5103	HSH6303	HSH8103
11	Piston Retaining Ring	HSH3132	HSH4132	HSH5132	HSH6332	HSH8132
12	Bit Retaining Ring	HSH3137	HSH4137	HSH5137	HSH6337	HSH8137
13	Bit Retaining ‘O’ Ring	HSH3137A	HSH4137A	HSH5137A	HSH6337A	HSH8137A
14	Chuck Release Washer	HSH3126	HSH4126	HSH5126	HSH6326	HSH8126
15	Chuck	HSH3135LH	HSH4135LH	HSH5135LH	HSH6335LH	HSH8135LH
16	Wearsleeve	HSH3100LH	HSH4100LH	HSH5100LH	HSH6300LH	HSH8100LH

Specifications



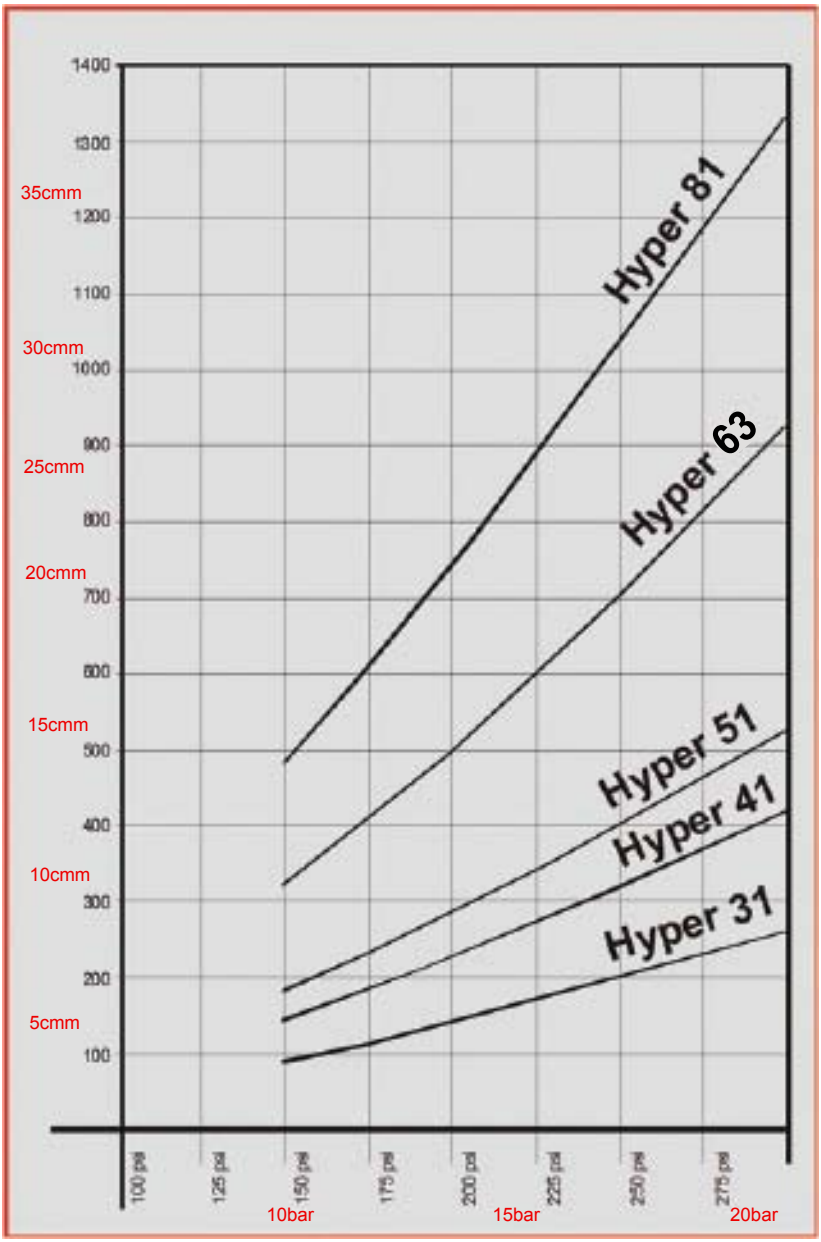
	HYPER 31	HYPER 41	HYPER 51	HYPER 63	HYPER 81
Standard Backhead Connection	2 3/8" API REG PIN	2 3/8" API REG PIN	2 7/8" API REG PIN	3 1/2" API REG PIN	4 1/2" API REG PIN
Standard Chuck Connection	Hyper 31	Hyper 41	DHD350R	DHD360	DHD380
Length (Without Bit)	34.56" 878mm	38.97" 990mm	43.94" 1116mm	48.50" 1232mm	55.47" 1409mm
Length (Bit Extended)	38.77" 985mm	43.67" 1109mm	46.00" 1168mm	55.29" 1404mm	63.24" 1606mm
Length (Bit Retracted)	37.55" 954mm	42.27" 1074mm	47.75" 1213mm	53.54" 1360mm	61.07" 1551mm
Outside Diameter Of Hammer	3.12" 79.2mm	3.75" 95.2mm	4.50" 114.3mm	5.55" 141mm	7.25" 184.1mm
Bore Diameter	2.45" 62.2mm	3.00" 76.2mm	3.62" 92.0mm	4.58" 116.3mm	5.88" 149.4mm
Piston Stroke	4.00" 102mm	4.25" 108mm	4.25" 108mm	4.25" 108mm	4.00" 102mm
Piston Weight	11.0lb 5.0kg	17.6lb 8.0kg	34.3lb 15.6kg	49.0lb 22.3kg	113.3lb 51.4kg
Complete Hammer Weight Without Bit	52.8lb 24.0kg	81.4lb 37.0kg	145.2lb 66.0kg	211.1lb 96.0kg	426.8lb 194.0kg

Conversions

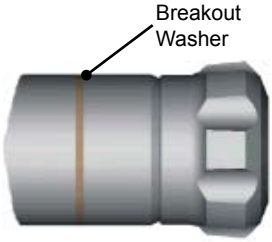
	Chuck	Bit Retainer	Piston	Complete Hammer
HYPER 31				
IR DHD 3.5	HSH3135040LH	HSH3137040	HSH3103040	BR31H040LH
HYPER 41				
IR DHD 340A	HSH4135091LH	HSH4137091	HSH4103091	BR41H091LH
HYPER 51				
IR DHD 350R	HSH5135092LH	HSH5139092	HSH5103	BR51H02LH
HYPER 63				
IR DHD 360	HSH6335093LH	HSH6337093	HSH6103	BR63H01LH
HYPER 81				
Mission SD8	HSH8135094LH	HSH8137045	HSH8103045	BR81H045LH

Other Button Bit conversions are available on request.

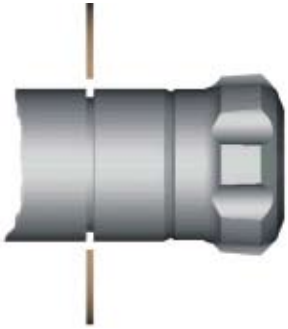
Air Consumption



Stripping / Dismantling The Hammer



After extensive drilling,the chuck might become to tight to loosen on a Bulroc Bench Splitter or the drill rig. If this problem occures the breakout washer can be ground or drilled out, which will relieve the pressure and enable the chuck to be removed.



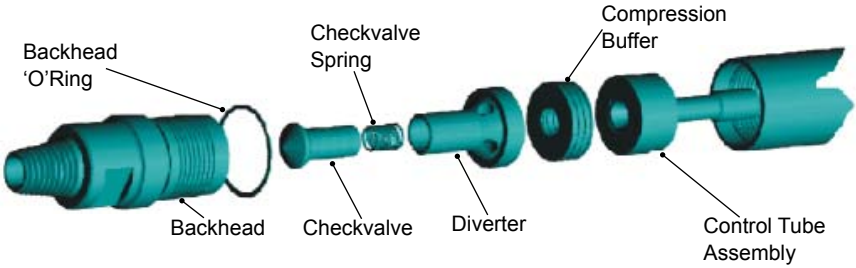
(NB On no account should the wearsleeve be impacted by a hand hammer. Splitting should not be assisted by the use of localised heat. i.e. Blow torch

Assuming now both the Chuck & Backhead threads have been loosened either on the drilling rig or hammer splitter, the stripping procedure is as follows.

1. Remove the Chuck assembly. This comprises the Button Bit, Chuck, Chuck Release Washer & the Bit Retainers.

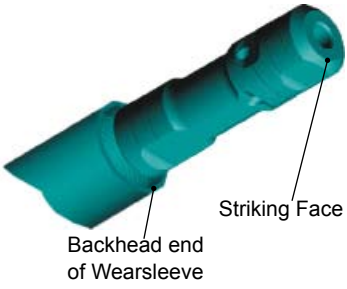
2.With the hammer laid horizontal, unscrew the Backhead and remove it from the Wearsleeve. The diverter along with the Check Valve arrangement can now be pulled from the Backhead end.

3.The remaining Compression Buffer and Control Tube assembly can best 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.
(N.B. Remember Threads are Left hand so unscrew clockwise.)



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

5.Unless there is damage to the Piston Retaining Ring it should not be necessary to remove it from the Wearsleeve. If the Retainer is damaged it can be removed by dropping the inverted Piston onto the ring from the Backhead end of the Wearsleeve.

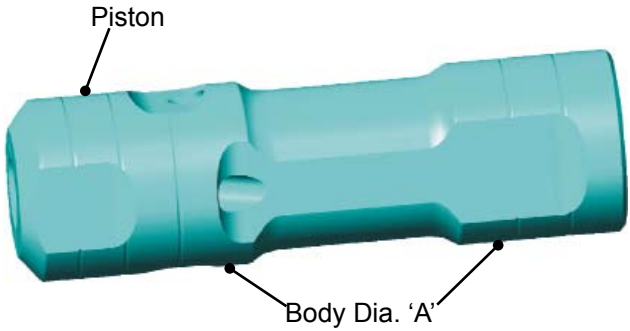


Checking For Wear & Damage

Premature wear to internal parts is a result of either :

1. Incorrect or insufficient lubrication
2. The ingress of debris into the hammer
3. Incorrect service & 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.



There are two main areas to examine on a used Piston. Check the Body diameter ‘A’ for signs of ‘Pick-up’ and burning (both are signs of insufficient lubrication). Using a micrometer, measure the diameter and refer to the table for the minimum size.

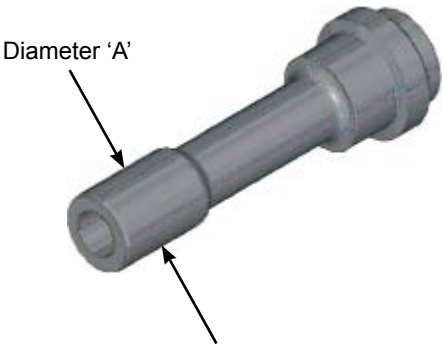
Any light ‘Pick-up’ marks can be removed by using emery cloth. However if there are signs of overheating & cracking, the Piston should replaced and the lubrication system examined.

Hammer	Minimum Ø (A)
Hyper 31	2.443” (62.05mm)
Hyper 41	2.993” (76.02mm)
Hyper 51	3.618” (91.90mm)
Hyper 63	4.575” (116.21mm)
Hyper 81	5.870” (149.10mm)

Checking For Wear & Damage

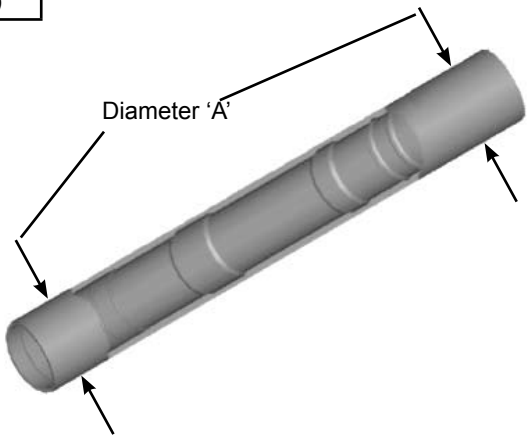
CONTROL TUBE

Hammer	Minimum Ø (A)
Hyper 31	1.120” (28.45mm)
Hyper 41	1.244” (31.60mm)
Hyper 51	1.564” (39.27mm)
Hyper 63	1.875” (47.62mm)
Hyper 81	2.368” (60.15mm)

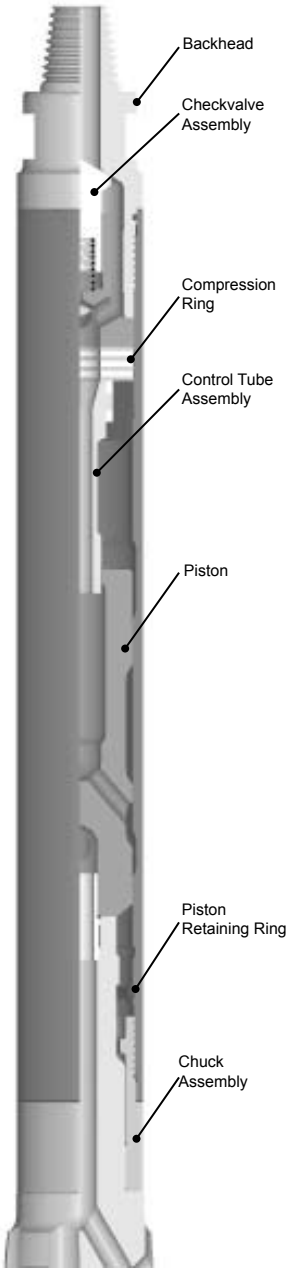


Wearsleeve

Hammer	Minimum Ø (A)
Hyper 31	2.94” (74.61mm)
Hyper 41	3.49” (88.70mm)
Hyper 51	4.22” (107.25mm)
Hyper 63	5.25” (133.54mm)
Hyper 81	6.76” (171.89mm)



Rebuilding The Hammer



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

2. Stand the wearsleeve on the floor, Chuck end upwards. Insert the Piston Ring into the bore, hammer the ring down until it springs into the groove in the Wearsleeve bore. It is important to make sure that the Piston Retaining Ring is positioned in the the groove correctly. Failure to do so will seriously affect hammer performance.

3. Clamp the Wearsleeve horizontally in a vice taking care not to overtighten the jaws. Assemble the Chuck, Chuck Release Washer and Bit Retainers around the Bit, ensuring the Retainers are fitted with a new 'O' Ring. Cover the thread with a copper based grease. Then lift the whole assembly into the Wearsleeve. 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 Piston striking face enters first.)

5. Assemble the two Control Tube Buffers around the Control Tube and 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 onto the Control Tube Assembly.

7. Insert the Spring into the Check Valve and then slide the assembly into the Valve Chest. Push the whole assembly down into the Compression Ring.

8. Fit a new 'O' Ring to the Backhead and coat the threads with copper based thread grease. Screw the Backheads into the Wearsleeve until it is hand tight, then measure the gap between the Wearsleeve face and then lock-up face on the Backhead. This gap should be a minimum of 1 mm, if the gap is smaller, the Ring should be removed and replaced with a new Compression Ring. When the gap exceeds 1 mm the Backhead should be fully tightened using the appropriate Backhead spanner.

Button Bit Footvalve Diameter & Protrution

Bulroc Hyper Hammers are designed to be used with Foot Valves that are to the following specifications.

	Insertion tool No.	Protrusion Height 'A'	Footvalve diameter 'B'	Shank Type
Hyper 31	FVIT038	1.916" (48.7mm)	0.880" (22.35mm)	Hyper 31
Hyper 41	FVIT091	2.235" (56.8mm)	1.055" (26.79mm)	Hyper 41
Hyper 51	FVIT092	2.630" (66.8mm)	1.370" (34.80mm)	DHD 350
Hyper 63	FVIT093	1.940" (49.3mm)	1.500" (38.10mm)	DHD 360
Hyper 81	FVIT098	1.890" (48.0mm)	2.000" (50.80mm)	DHD 380

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

Using Footvalves which are larger in diameter than the sizes shown will result in premature failure of the Footvalve. Footvalves which are much smaller in diameter than the sizes shown will reduce the performance of the hammer.

Lubrication

The Hyper Pistons oscillate at around 1000 bpm at 150 psi (10 bar). It is therefore extremely important that an adequate supply of the correct type of rock drill oil is constantly fed to the hammers whilst operating. Failure to do so will quickly lead to excessive component wear and if the oil supply is cut off 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 impracticle but the capacity should be sufficient for atleast half a shift. It 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 Bulroc Hyper Hammers require a third of a pint of oil per hour, per 100cfm of air through the hammer (0.07 litre / m^3).

Eg :Hyper 41 operating at 300psi = 427cfm = 1.42 pints per hour
21bar = 12.1cmm = 0.8 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 (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 it is between 0 & 25 degrees centigrade, then a 30 grade oil should be used. If it is greater than 25 degrees centigrade, use a 50 grade oil. Bulroc supply our own recommended rock drill oil and this is detailed below with other brands of suitable oils.

Storage Procedure

We Recommend following the points listed below when removing a 'Down Hole Hamme' for service. This will ensure trouble free operation once the hammer starts work again.

The hammer should be stripped and cleaned free of all water / moisture as possible. Bulroc 320 or similar rock drill oil should be poured into the backhead (see chart below for quantity) alloowing 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 then be laid horizontally in a dry environment ready for use next time.

Model	Qty in UK Pints	Qty in liters
Hyper 31	1/4	0.14
Hyper 41& 51	1/2	0.28
Hyper 63 & 81	3/4	0.43

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 eventually 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 to use to ensure smooth drilling.

Troubleshooting

TROUBLE	PROBABLE CAUSE	REMEDY
Inoperative Drill	Drill Bit blow holes blocked	Unblock holes
	Dirt Inside drill	Strip & clean drill
	Worn or damaged parts	Replace damaged parts
	Insufficient lubrication	Check oil level, Adjust lude needle valve
	Excessive lubrication	Adjust lube needle valve
	Hanging Piston	Piston stuck, Polish the score marks
	Insufficient air pressure	Check compress or discharge & increase operational valve
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, Adjust lude needle valve
	Dirt in drill	Strip & clean
Low Return Air Velocity	Low air pressure	Increase air pressure
	Insufficient hole flushing air passing through hammer	Drill or increase hole size through the piston
	Drill bit exhaust holes blocked	clean out blockages
Spasmodic Operation	Failed or damaged parts	Overhaul drill
	Lack of oil	Check lubrication
	Drill bit broken	Replace bit
	Dirt in drill	Strip & clean