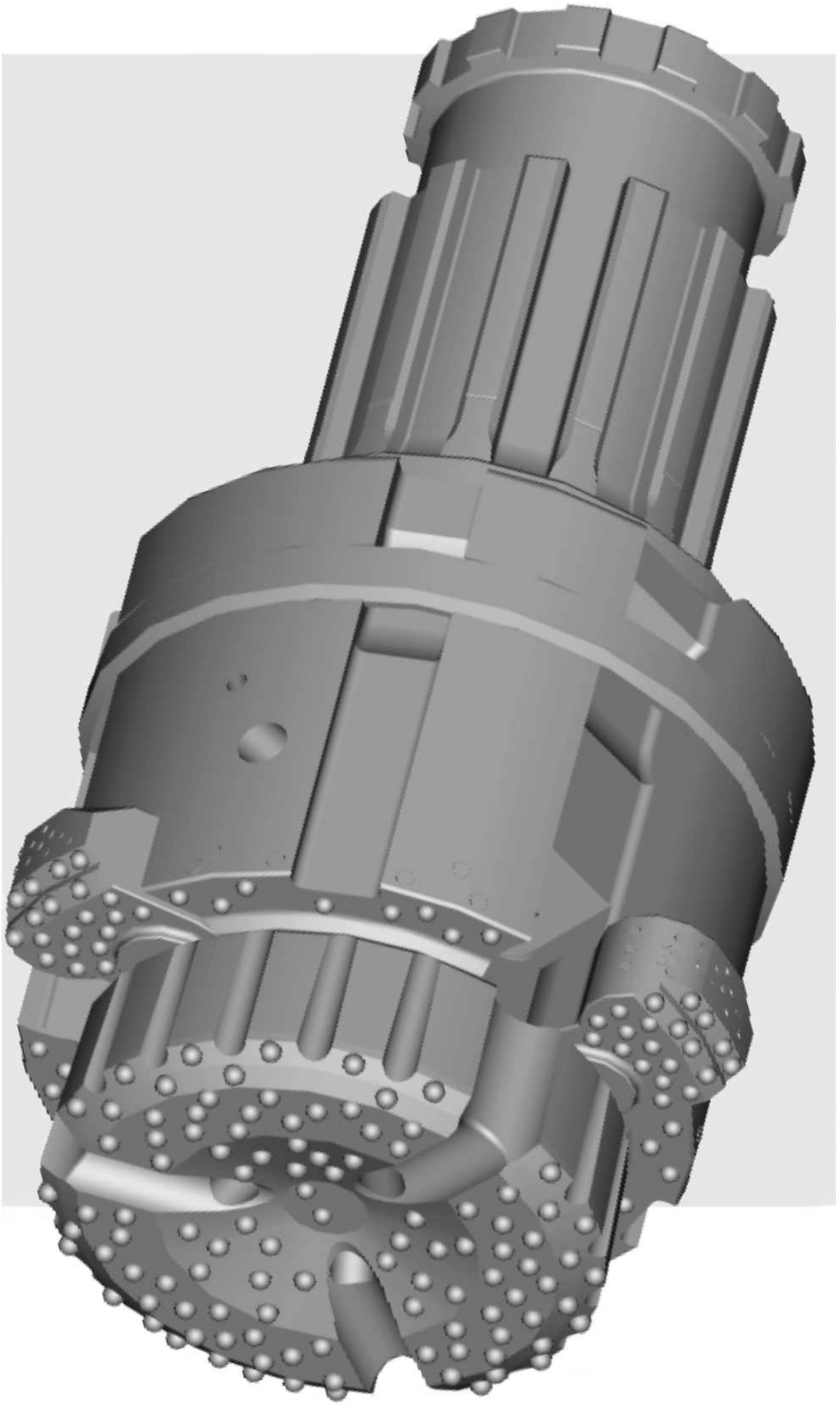
Bulroc



BULROC CDS 610

MAINTENANCE, OPERATING AND SERVICE MANUAL

1. Introduction

The Bulroc CDS610 Overburden System is a concentric drilling system designed to simultaneously case a hole through loose overburden conditions down into the solid rock below.
The system has a multi-stage-cutting head to guarantee the holes it produces are both straight and true. The independent segments around the periphery of the head give equal concentric cutting forces resulting in fast, low torque drilling.
Because "down time" is very costly, this system is designed to require the minimum amount of maintenance. However when parts do eventually wear, the construction of the system is such that the areas of the cutting head which experience most wear, can be replaced independently to the slower wearing areas minimising operating costs.

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Bulroc [U.K.] LTD
Manufacturers of Rock Drilling Equipment
Station Lane, Old Whittington, Chesterfield ,Derbyshire S41 9QX
Tel: 01246 450608 Fax: 01246 454621
E-mail: info@bulroc.com www.bulroc.com

2. Using The CDS 610

Drill Rigs :-

Drill rigs on which the CDS 610 is to be used should have a feed length at least one meter longer than the longest casing. This will allow sufficient clearance for any adapters or drive subs required by the system.

Drill Tubes :-

Standard Drill rods used with the system will require sleeves fitting over their entire length. This will enable the cuttings to achieve the required "up hole velocity" thus preventing blockages inside the casing. As a general guide the sleeve diameter should be 4" smaller than the bore of the casing, but the exact size can be calculated by using the formula opposite. A figure of 1000ft/min should be used as a minimum for the required velocity.
The sleeves should finish 4 - 6mm away from the lock up faces on the rod. To enable the rods to be split, sockets should be welded into the sleeves to allow a 'C' Spanner to fit around the sleeve.
The length of the rods should be identical to the lengths of the casing. This will guarantee the break out socket on the rod is clear of the casing.

Hammer :-

In certain circumstances it may be necessary to sleeve the hammer. This sleeve however should be a split, bolt together type,not welded. The outer diameter of this sleeve should be the same as the diameter of the tube sleeves.
The diagrams overleaf show the recommended sizes for both the casing and the casing shoes.

UP HOLE VELOCITY FORMULA(METRIC)

$$VM = \frac{Y(CFM) \times 13050.96}{DM^2 - dm^2}$$

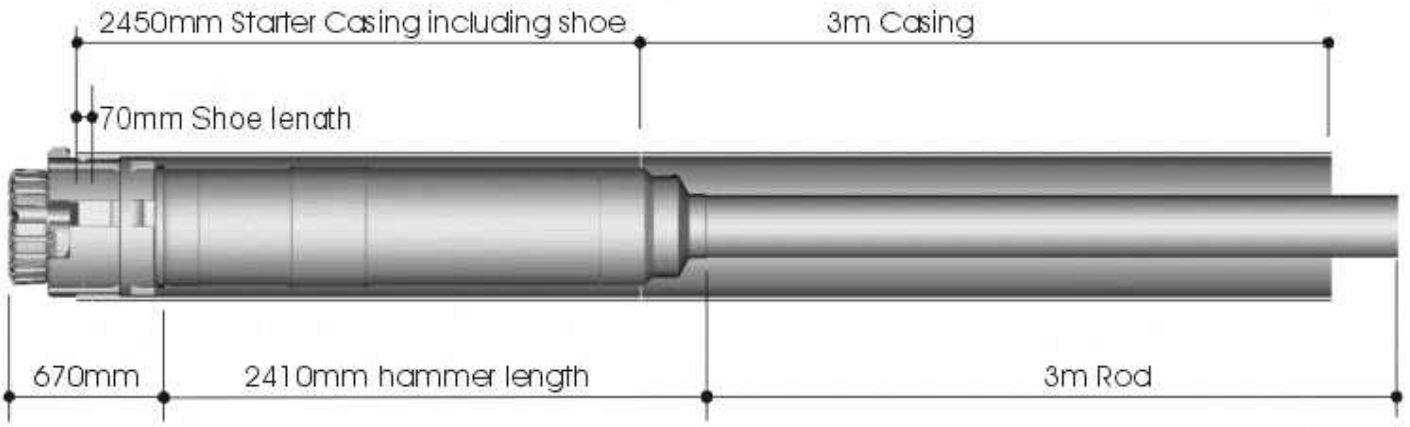
VM = Velocity in m / min
Y = Volume of air passed by Hammer at the selected pressure.
m3/min
DM^2 = Diameter of casing bore squared (in mm)
Dm^2 = Diameter of tube sleeve squared (in mm)

UP HOLE VELOCITY FORMULA(IMPERIAL)

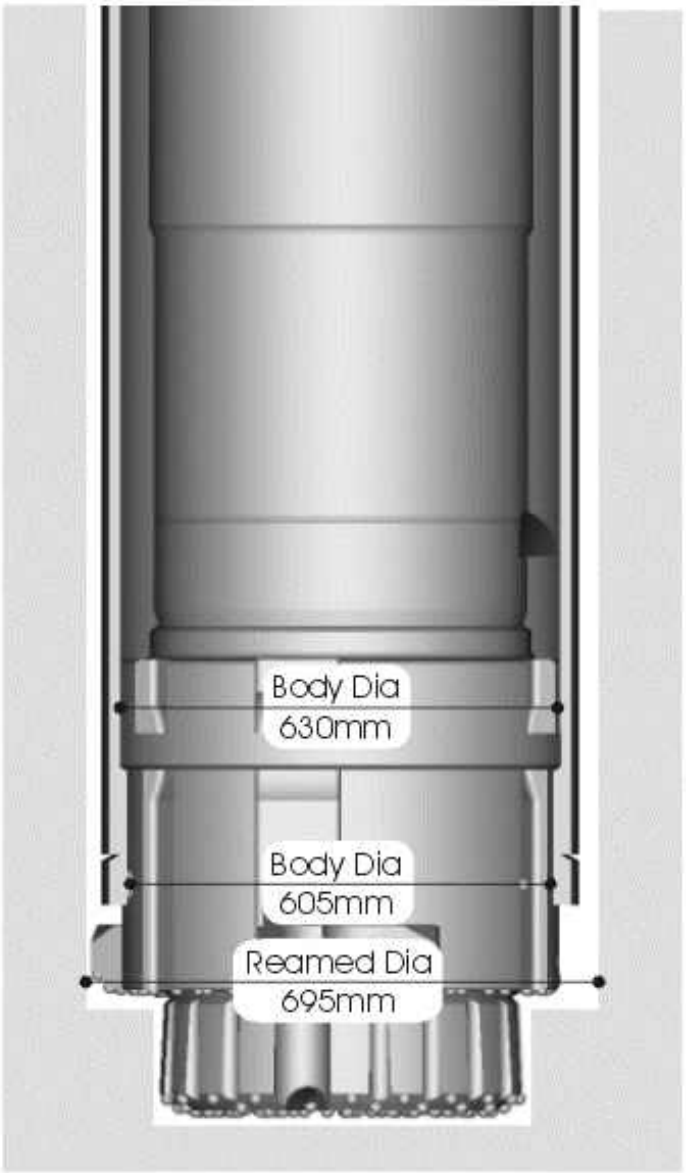
$$VF = \frac{Y(CFM) \times 183.4}{Dl^2 - di^2}$$

VF = Velocity in feet / min
Y = Volume of air passed by Hammer at the selected pressure.
Ft3/min
Dl^2 = Diameter of casing bore- squared (in inches)
Di^2 = Diameter of tube sleeve squared (in inches)

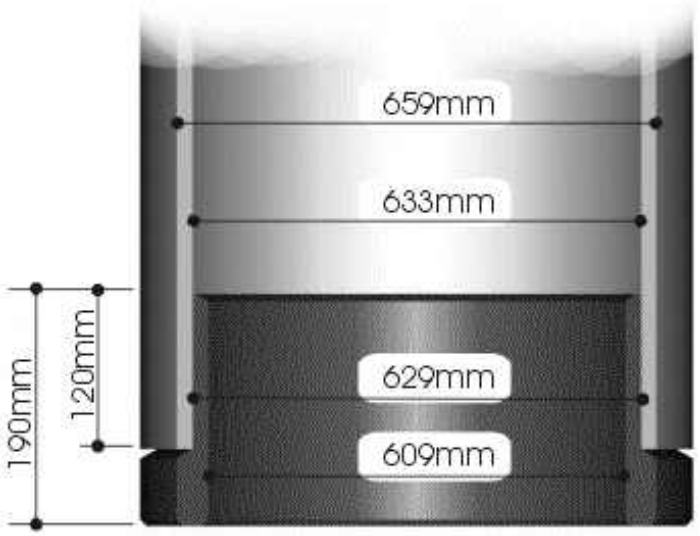
3. Calculating lengths for starter casings



The above diagram shows the length of Starter Casing required when using standard CDS equipment including the Bulroc HYPER 241 hammer. If an alternative hammer is to be used, the Starter Casing length can be calculated by either adding or subtracting the difference in effective length of the alternative hammer from that of the HYPER hammer.



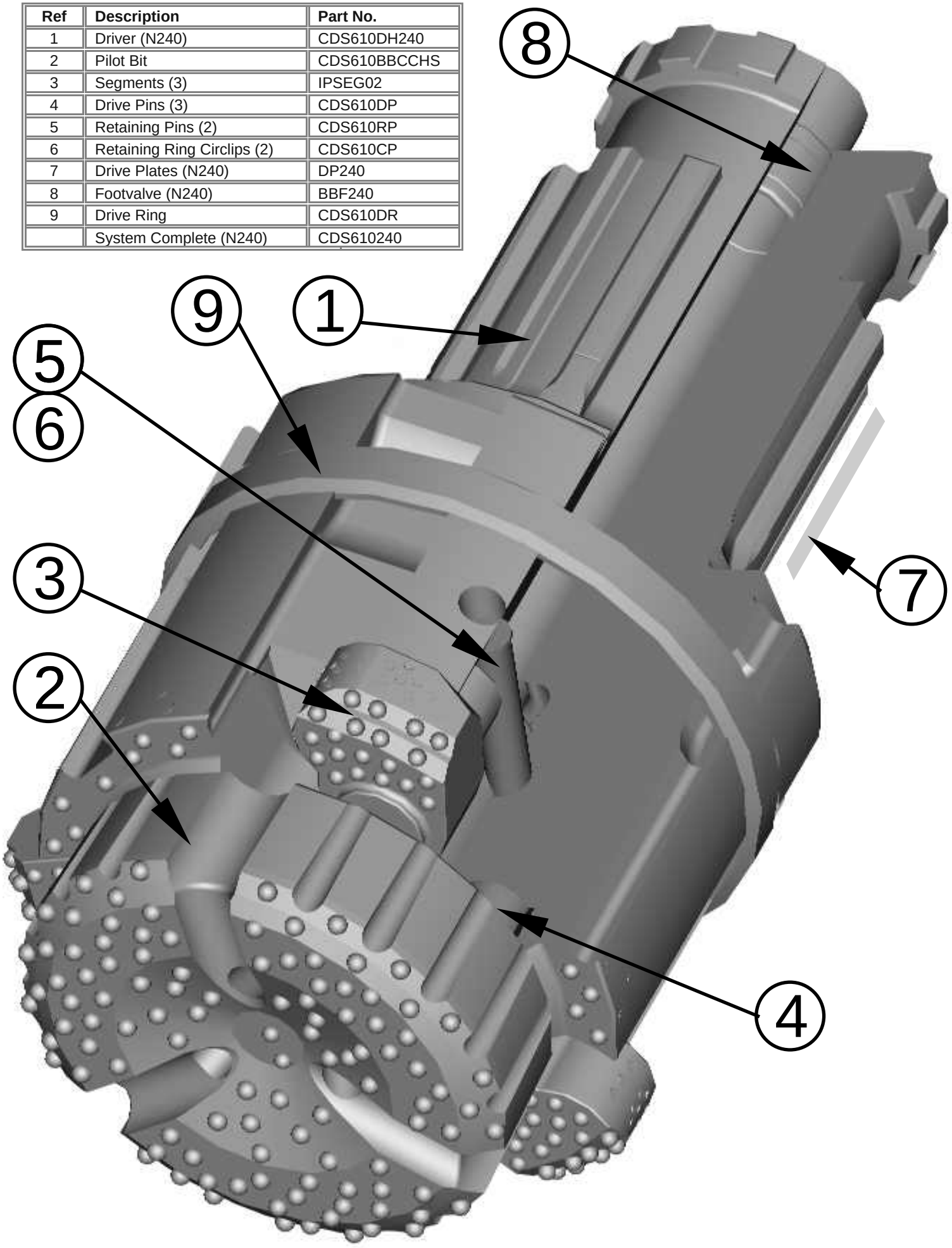
System parameters



Casing Shoe Sizes

4. CDS 610 Parts List

Ref	Description	Part No.
1	Driver (N240)	CDS610DH240
2	Pilot Bit	CDS610BBCCHS
3	Segments (3)	IPSEG02
4	Drive Pins (3)	CDS610DP
5	Retaining Pins (2)	CDS610RP
6	Retaining Ring Circlips (2)	CDS610CP
7	Drive Plates (N240)	DP240
8	Footvalve (N240)	BBF240
9	Drive Ring	CDS610DR
	System Complete (N240)	CDS610240

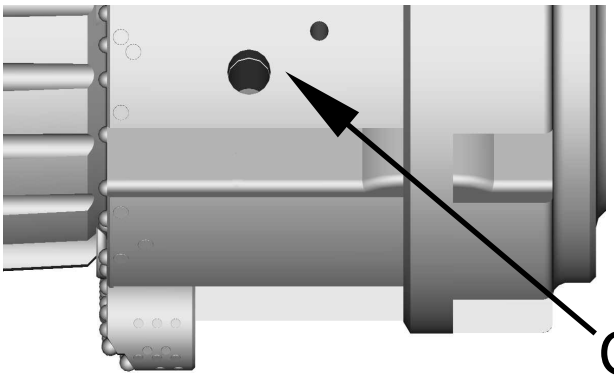


5. CDS 610 Servicing

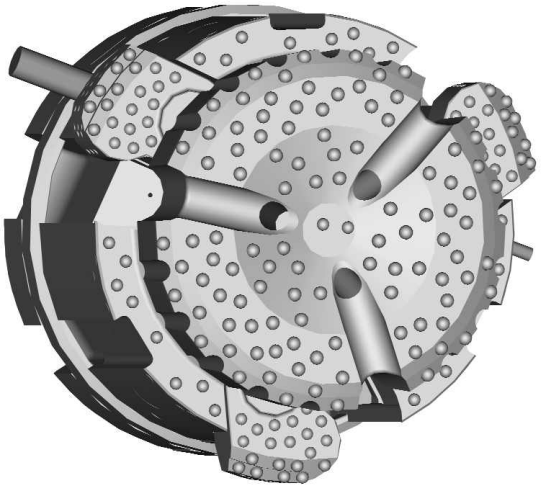
The Bulroc CDS 610 system is designed to require the minimum amount of service and maintenance. However, it is recommended that the system be stripped down every 500 metres and all the component parts checked for wear or damage.

It is important that the Retaining Pins are checked on a regular basis and that they are replaced if showing signs of wear. Always use a new Circlip.

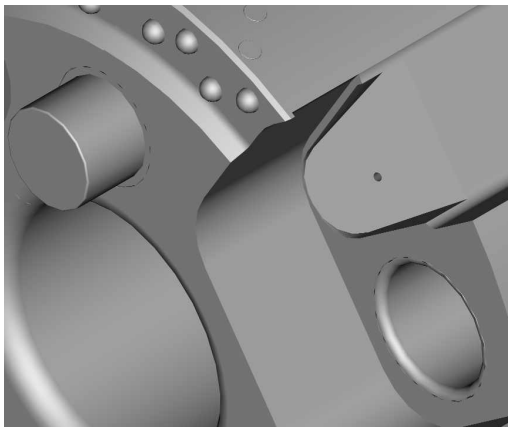
Eventually the segments will need to be replaced and at this time, the following procedures must be followed:-



1. Remove the Circlips that retain the Pins in the Driver.



2. Remove the Pins by pushing it out of the Driver using a small steel rod inserted into the opposite end of the pinhole.



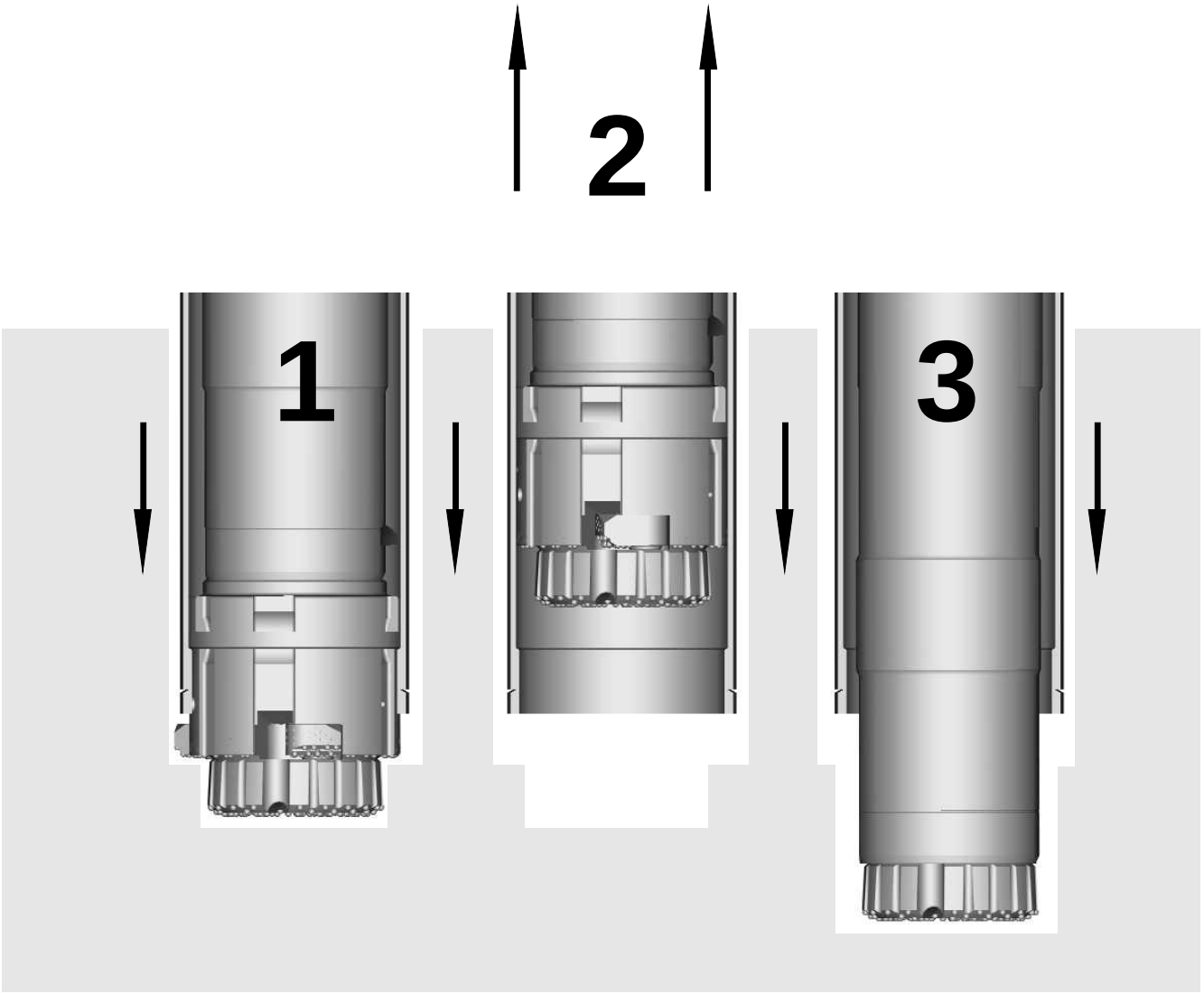
3. The Pilot Bit can then be removed from the Driver and the Drive Pins examined for wear or distortion. At the same time, check the Drive Pin Bushing or Sleeve for any signs of wear or distortion.

4. Once the Pilot Bit is removed the Segments can be lifted from their sockets in the Driver.
Whilst the system is stripped, examine the Bushes or Sleeves into which the Segments fit. These Bushes are fitted into the Driver to prevent wear whilst the Segments are cutting. Because they are manufactured from a hard wear resistant steel they should outlast many segment changes before they will require replacing.

5. When the new Segments are in place the Pilot Bit can be returned to the Driver, making sure that the Drive Pins are all in line with the corresponding holes in the Pilot Bit.

6. Replace the Retaining Pin and fit new Circlips to the Driver, making sure that the circlips are correctly seated.

6. How the System Works



The Bulroc Overburden system is designed to enable the operator to drill and simultaneously case a hole through loose overburden ground conditions down into solid rock.
(See diagram 1)

After reaching the required depth, the Segments can be moved into the closed position allowing the system to be retracted through the casing leaving a clean, cased hole.
(See diagram 2)

Should it be necessary to drill on further into the solid rock, the CDS system can be detached from the Hammer and replaced with a conventional Drill Bit that can pass through the casing shoe. (See diagram 3)

The Bulroc Overburden System simultaneously cases the hole by means of a drive shoulder on the driver. This shoulder locates against the top face of the casing shoe, which is welded into the starter casing. Because the casing does not rotate with the drill tubes, hence the torsional loads are relatively low; it means that either Left Hand threaded or welded casing can be used.

7. Reburbishing Worn Equipment

The Pilot bit and Segments

The most frequent cause of button failure can be attributed to overdrilling and incorrect button regrinding.
Regrinding at regular intervals, with the correct equipment, not only improves component life but also improves production and reduced overall drilling costs.

1) Buttons should be reground to their original shape when the wear flat is 1/3rd the diameter of the button.

2) If the button is cracked or chipped, it should be ground back flush to the steel matrix. It is possible to carry on drilling with a number of broken buttons if they are ground back in this way, providing they are not affecting the gauge diameter, or are not adjacent to each other since this would the smooth rotation of the bit.

3) After regrinding check the protrusion heights of the buttons. If a button protrudes too far from the steel body it will cause premature failure of the button. The side protection buttons should be ground back flush with the body. The gauge buttons should be ground back until their protrusion height is 1/2 their diameter.

To perform the task of regrinding correctly, we recommend the use of a hand held grinder with gravity fed water supply necessary to cool the impregnated diamond grinding cups. A Combo type grinding cup of the approximate diameter will remove the surrounding steel matrix and reform the carbide button at the same time.

The Driver

The shoulder on the Removable Drive Ring, where it contacts against the casing shoe, will eventually wear. This is quite natural. When the drive shoulder eventually becomes taper shaped it will tend to jam in the casing shoe.

To maintain the original shape of the drive shoulder, which is a 30-degree angle to the vertical, it is important that the system is used with a well fitting casing shoe, which has the same 30-degree angle.

When the drive ring is worn to a point where jamming occurs, it is time to burn off the old drive ring and replace with a new drive ring. This comes as a two piece ring that required welding in-situ. It is recommended that the unit be returned to the local agent for this operation.

8. Hints and Tips

Always Do the Following

1. Make sure the Driver will pass through all the lengths of casing intended for the job. If the casing is to be welded, extra clearance should be allowed for weld spots, which may break through into the inside of the casing.

2. If the casing is to be welded then the ends should be bevelled at an angle between 45 and 60 degrees. To prevent weld breaking through, and to help alignment, a 3mm wide land should be left on each end face.
If the casing is the threaded type, then it must be left hand. Because of the cost of the thicker walled casing required to produce a thread, it is normal practice to have threaded joints welded on to the end of thinner casing, thus keeping the cost to a minimum. If this is the case then great care must be taken to ensure the joints are true and concentric to the casing. An out of line joint can result in either the system jamming inside the casing, or the casing jamming in the hole. As with welded casing, the joints should have bevelled end faces to prevent weld breaking through into the inside of the casing.

3. Check the casing shoes before the job starts. The inside diameter of the shoe should be within the following tolerances.

CDS	
Minimum mm	**609**
Maximum mm	610

4. Check the length of the casing shoes. When in position against the drive shoulder on the driver there should be between 12mm and 25mm clearance between the back face of the segments and the front face of the casing shoe - depending on the size of the system. This distance will increase as the drive shoulder and/or the casing shoe wears.

5. Make sure the segments swing from open, to closed position freely by hand.

6. Use the diagram on page 3 to make sure the correct length of starter casing has been calculated.

7. When drilling commences, use slow forward rotation. If jamming occurs, ease back on the feed force or lift the CDS and the casing until rotation starts again. Initially, the casing may rotate but after drilling down the casing 1-2 meters, it will stop rotating.

8. Apply only light feed and reduced air pressure when setting the first casing and make sure the casing stays in line with the drill mast.

9. When drilling through soft materials (sand, clays etc.) frequently lift the CDS and the casing a little to ensure that it is loose and to flush out any debris from the casing. When the CDS is in the "hang position", all available air will go to directly flushing the casing. In sand and gravel's, it is often preferable to reduce air and feed pressure to a minimum. In all ground conditions, it is good practice to lift the casing frequently to make sure it is loose and to clear all debris from the casing.

9. Hints and Tips

10. When drilling in sticky, plastic clay, the addition of water or even foaming agents in the hammer air may be necessary to maintain good flushing.

11. Drilling through large boulders is generally recognised as a demanding task. When a boulder is hit at an angle, which is often the case, jamming may occur. In these circumstances, it is recommended that the boulder is "collared" by lifting the drill string. rotating it forward 30 degrees or so, and then applying feed without rotation for a few seconds to get a grip of the boulder. This action may need to be repeated several times before the boulder is successfully collared.

12. When the casing has been set to the required depth, and when drilling in sticky ground, care must be taken to clean out the inside of the casing before extracting the drillstring. Water poured inside the casing repeatedly and flushed out will help the process.On occasions it may be necessary to. pull the CDS system back into the casing to flush out blockages. To perform this task the system should be lifted into the "hang" position and rotated clockwise for 2 or 3 revolutions to ensure the bit face is clean. The system should then be pulled back against the casing shoe, and the air turned off. At this point the rod should be marked to give a reference point for when the system is fed back through the shoe. Reverse rotation for 1 revolution will then close the segments, and allow the system to be pulled back into the casing. Once inside the air can be turned back on, the system should then be fed up and down inside the casing until the blockage is cleared. At no time must the system be rotated whilst it is inside the casing as this will cause the segments to jam against the casing wall. When the casing is clean the system should be fed back through the shoe using the reference point on the rod to indicate when it is through the shoe. Once through the shoe the system can be rotated clockwise to open out the segments

13. Always regrind worn buttons..10. When drilling in sticky, plastic clay, the addition of water or even foaming agents in the hammer air may be necessary to maintain good flushing.

Never do the Following

1. Penetrate too fast in loose ground. Too fast penetration will "bury" the CDS and block the casing with nowhere for the hammer air to exhaust, hence stopping the hammer. Always give the flushing air a chance to bail out the debris and keep the casing clear.

2. Over rotate. This will lead to premature button wear. In rock or boulders, rotation of the CDS 610 is between 3 to 5 RPM. In loose ground conditions this can be increased by 50%.

3. Apply weld to either the Pilot bit or the Segments as this can lead to cracking and button failure. No warranty can be considered on these parts if there is any evidence of welding.

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Station Lane, Old Whittington, Chesterfield ,Derbyshire S41 9QX
Tel: +44(0) 1246 450608 Fax: +44(0) 1246 454621
E-mail: info@bulroc.com website bulroc.com