



# REVERSE CIRCULATION

**MINERAL EXPLORATION  
ENVIRONMENTAL  
GEOTECHNICAL  
GEOTHERMAL  
ROTARY  
SONIC  
HDD**



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## REVERSE CIRCULATION DRILLING



Reverse Circulation drilling is recognized as a fast and cost efficient alternative to diamond core drilling. With continuous advancements, deep holes and fast penetration rates are possible in almost all ground conditions, making Reverse Circulation the preferred drilling method for initial exploration, ore body development and other exploratory drilling.

Reverse Circulation drilling utilizes dual wall drill rods made up of an outer rod and an inner tube. The inner tube is designed to provide a continuous path for the drill cutting to pass from the bit face to the surface. Air or fluids are forced down the annulus between the drill rods and inner tube to the drilling tool (Reverse Circulation hammer, Tricone, or Fixed Cutter Bit). The cuttings return to the surface inside the inner tubes of the rods, where they are directed to a cyclone for separation and sample collection.

Hole Products offers a complete line of quality Reverse Circulation tooling including rods, subs, hammers, bits, and accessories. In addition, our sales and support team has the knowledge and experience necessary to provide troubleshooting and onsite tooling solutions.

Please contact your Hole Products representative for additional details.

*Products listed in the catalog are representative of the most common industry sizes and styles.  
Please contact your Hole Products representative for additional product offerings.*

## REVERSE CIRCULATION DRILL RODS

Hole Products offers a complete line of premium quality reverse circulation, drill rods, in sizes from 3 1/2" to 10 3/4", and with a number of thread connections. All Reverse Circulation rods are manufactured using the most advanced technologies and specifically engineered to provide high strength, excellent wear resistance, and long life.

Reverse Circulation, dual wall drill rods are manufactured with an outer drill rod and an inner tube located inside the rod. When the drill rods are threaded together, the inner tubes seal together to provide a continuous route for cuttings to travel from the bit face to the surface for collection.

Please contact your Hole Products representative for additional details and ordering assistance.



REVERSE CIRCULATION DRILL ROD SPECIFICATIONS							
Thread Type	Remet	Remet	Remet	Metzke	Metzke	Matrix	Matrix
Rod O.D.	3 1/2"	4"	4 1/2"	4"	4 1/2"	4"	4 1/2"
Outer tube O.D.	88.9mm	101.7mm	114.3mm	101.7mm	114.3mm	101.7mm	114.3mm
Outer tube I.D.	81.8mm	94.6mm	107.2mm	94.6mm	107.2mm	94.6mm	107.2mm
Outer tube WT	5.3mm	7.1mm	7.1mm	7.1mm	7.1mm	7.1mm	7.1mm
Inner tube O.D.	38.1mm	50.8mm	63.5mm	50.8mm	63.5mm	50.8mm	63.5mm
Inner tube I.D.	32.6mm	45.3mm	58mm	45.3mm	58mm	45.3mm	58mm
Inner tube WT	5.5mm	5.5mm	5.5mm	5.5mm	5.5mm	5.5mm	5.5mm
Spanner Flat	90mm	90mm	90mm	90mm	90mm	90mm	90mm
Weight 3.0 m	75 kg.	75 kg.	95 kg.	75 kg.	95 kg.	75 kg.	95 kg.
Weight 6.0 m	120 kg.	150 kg.	168 kg.	150 kg.	168 kg.	150 kg.	168 kg.

## REVERSE CIRCULATION HAMMERS

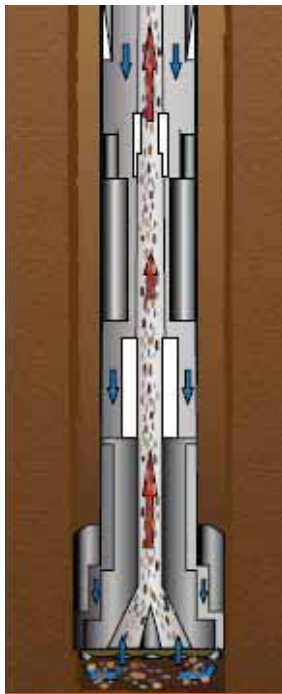
Hole Products offers a complete line of Reverse Circulation hammers and spare parts from the industry's leading manufacturers including Mincon® and Sandvik®. Hammers are available in a wide range of sizes and styles, to provide maximum performance and longevity on all RC drilling jobs.

Reverse Circulation hammers are designed with an inner sample tube that extends through the center and into the top of the hammer bit. The RC hammer exhausts the air between the bit splines and over the face of the bit. This forces the sample into the recovery holes in the face of the bit, through the center of the hammer and upward through the drill rod inner tubes to the surface for collection. The use of a shroud or collar is required when a RC hammer is used, to help direct the return air and cuttings up through the face of the bit.

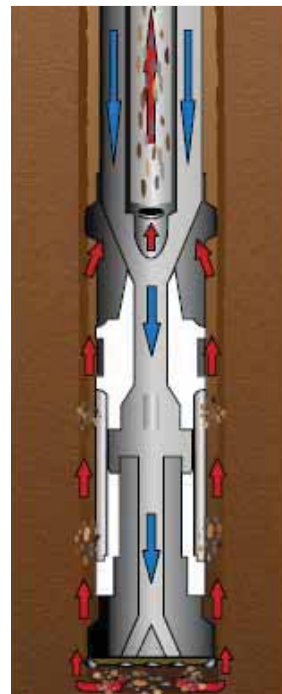
Conventional DTH hammers can also be used in RC drilling operations, but increase the potential for sample loss and contamination. A conventional DTH hammer is used in conjunction with a cross-over sub located between the hammer and drill rod. The sample travels from the face of the bit up the outside of the hammer and into the cross-over sub. The sub directs the sample up the center of the dual wall rods and to the surface.

Please contact your Hole Products representative for additional details.

**RC HAMMER**



**CONVENTIONAL HAMMER**



# MINCON® REVERSE CIRCULATION HAMMERS

Hole Products offers Mincon reverse circulation hammers and bits in a wide range of sizes and styles for use on all grade control and exploration projects. Mincon hammers are designed to provide trouble free performance in even the deepest holes and most demanding drilling conditions.



Mincon reverse circulation hammers offer a number of features and benefits including:

- Multiple chuck sleeve lengths for varying drilling conditions.
- Single piece, heat treated sample tubes, offering superior wear resistance.
- Metal sprayed chuck and wear sleeves to increase wear resistance.
- Ease of service, with no special tools required.

MINCON REVERSE CIRCULATION HAMMER MODEL		MR116	MR120	MR132	MX4044	MX4550	MX5053	MX5456
HAMMER OUTSIDE DIAMETER	METRIC	116mm	120mm	132mm	92mm	109mm	120mm	132mm
	IMPERIAL	4.57"	4.57"	5.2"	3.625"	4.290"	4.720"	5.20"
HAMMER LENGTH (Less Drill Bit)	METRIC	1143mm	1165mm	1165mm	1055mm	1165mm	1165mm	1165mm
	IMPERIAL	45.0"	45.9"	45.9"	41.5"	45.9"	45.9"	45.9"
BACKHEAD SPANNER FLAT SIZE	METRIC	94mm	94mm	94mm	76mm	94mm	100mm	100mm
	IMPERIAL	4"	4"	4"	3"	3.7"	4"	4"
DRILL BIT SHANK TYPE		MR116	MR120	MR132	MX4044	MX4550	MX5053	MX5456
BACKHEAD THREADS AVAILABLE		4" & 4 1/2" Metzke	4" & 4 1/2" Metzke	4 1/2" Metzke	3 1/2" Remet	4" Remet	4 1/2" Metzke	4 1/2" Remet
		4" & 4 1/2" Remet	4" & 4 1/2" Remet	4 1/2" Remet				
DRILL BIT SIZE RANGE	METRIC	121mm - 127mm	127mm - 143mm	137mm - 146mm	102mm - 114mm	114mm - 127mm	127mm - 137mm	140mm - 146mm
	IMPERIAL	4.75" - 5"	5" - 5.625"	5.4" - 5.75"	4.0" - 4.5"	4.5" - 5"	5" - 5.375"	5.5" - 5.75"
HAMMER WEIGHT (Less Bit)	METRIC	65 kgs.	70 kgs.	77 kgs.	46 kgs.	56 kgs.	70 kgs.	77 kgs.
	IMPERIAL	143 lbs.	154 lbs.	170 lbs.	101 lbs.	132 lbs.	154 lbs.	169 lbs.
PISTON WEIGHT	METRIC	14 kgs.	16 kgs.	19 kgs.	7.5 kgs.	12.3 kgs.	15 kgs.	18 kgs.
	IMPERIAL	30.9 lbs.	35.3 lbs.	41.9 lbs.	16.5 lbs.	27 lbs.	33 lbs.	40 lbs.
BACKHEAD STAND OFF	METRIC	0.75mm	0.75mm	0.75mm	0.9mm	0.9mm	0.75mm	0.75mm
	IMPERIAL	0.030"	0.030"	0.030"	0.036"	0.036"	0.030"	0.030"

## SANDVIK® REVERSE CIRCULATION HAMMERS

Hole Products offers a complete range of Sandvik reverse circulation hammers. These hammers feature a superior design, providing excellent performance and durability. Maximum energy output and minimum air consumption results in increased productivity and reduced costs.

Sandvik Reverse Circulation hammers provide feature a number of performance enhancing features including:

- Large bore sample tube to increase hammer life and sample return.
- Excellent performance with or without a booster.
- Metal sprayed shroud to increase longevity.



SANDVIK REVERSE CIRCULATION HAMMER MODEL		RE035	RE004	RE542	RE543	RE040	RE545	RE052	RE054
HAMMER OUTSIDE DIAMETER	METRIC	82mm	107mm	109mm	117mm	121mm	122mm	121mm	130mm
	IMPERIAL	3 4/16"	4 3/16"	4 5/16"	4 10/16"	4 12/16"	4 13/16"	5 6/16"	5 8/16"
HAMMER LENGTH (Less Drill Bit)	METRIC	885mm	1211mm	1204mm	1204mm	1210mm	1279mm	1226mm	1252mm
	IMPERIAL	34 13/16"	47 11/16"	47 6/16"	47 6/16"	47 10/16"	50 6/16"	48 4/16"	49 5/16"
BACKHEAD SPANNER FLAT SIZE	METRIC	70mm	90mm	96.5mm	96.5mm	94mm	96.5mm	94mm	100mm
	IMPERIAL	2 12/16"	3 9/19"	3 13/16"	3 13/16"	3 11/16"	3 13/16"	3 11/16"	3 15/16"
DRILL BIT SIZE RANGE	METRIC	86mm - 102mm	114mm - 127mm	121mm - 133mm	124mm - 133mm	127mm - 140mm	124mm - 140mm	133mm - 143mm	140mm - 146mm
	IMPERIAL	3 3/8" - 4"	4 1/2" - 5"	4 3/4" - 5 1/4"	4 7/8" - 5 1/4"	5" - 5 1/2"	4 7/8" - 5 1/2"	5 1/4" - 5 5/8"	5 1/2" - 5 3/4"
HAMMER WEIGHT (Less Bit)	METRIC	22 kgs.	52 kgs.	50 kgs.	50 kgs.	72 kgs.	63 kgs.	67 kgs.	76 kgs.
	IMPERIAL	48.4 lbs.	114.4 lbs.	110 lbs.	110 lbs.	158.4 lbs.	138.6 lbs.	147.4 lbs.	167.2 lbs.

## SANDVIK® REVERSE CIRCULATION BITS

Hole Products offers a complete range of Sandvik's unique Ultra Flow Reverse Circulation bits. These bits feature a system that is designed to direct air in a straight line to the bit face via 8 exhaust channels. Bits are available in a wide range of sizes to meet any requirement. To optimize performance and bit life in a variety of rock conditions, Sandvik bits are offered with drop center, cross flow, or hard formation face designs.

SANDVIK REVERSE CIRCULATION MODEL		RE035	RE004	RE542	RE543	RE040	RE545	RE052	RE054
BIT DIAMETER	METRIC	86 to 102	114 to 121	114 to 133	121 to 133	127 to 137	123 to 140	133 to 143	137 to 146
	IMPERIAL	3 3/8" to 4"	4 1/2" to 4 3/4"	4 1/2" to 5 1/4"	4 3/4" to 5 1/4"	5" to 5 3/8"	4 7/8" to 5 1/2"	5 1/4" to 5 5/8"	5 3/8" to 5 3/4"
WEIGHT	kgs	4 to 4.5	11 to 16	11 to 16	12 to 16	16 to 18	12 to 16	16 to 18	17 to 19
	lbs	9 to 10	24 to 33	24 to 35	26 to 35	35 to 39	26 to 35	35 to 39	37 to 41

# REVERSE CIRCULATION BITS

Hole Products offers a complete line of Reverse Circulation hammer bits, tricones, and pdc's for use in a variety of formations, and under a wide range of drilling parameters. Bits are available in a variety of sizes and styles and with a number of thread connections.

## HAMMER BITS

Reverse Circulation hammer bits are similar to conventional hammer bits, but feature sample recovery ports in the face and a large bore through the center to accept the hammer's inner tube. Deep channels on the outside of the drill bit head to allow the exhaust air to force the sample into the recovery ports in the bit face.



## TRICONE BITS

Reverse Circulation tricones are available for use in a variety of rock formations, and with open or sealed bearings. Reverse Circulation tricones are similar to conventional tricones, but feature a bored out center, to allow samples up the inner tube.



## PDC BITS

Reverse Circulation PDC bits are fully customizable to meet any drilling parameters, and for use in a variety of formation. Reverse Circulation PDC's are similar to conventional PDC bits, but feature an open center.

Please refer to the Drill Bits section of this catalog for more information on Tricone and PDC bits, or contact your Hole Products representative for ordering assistance.





## REVERSE CIRCULATION SUBS

Hole Products offers a wide range of reverse circulation subs. All subs are manufactured using premium alloys and the most advanced manufacturing techniques, to maximize performance and durability. Reverse Circulation subs are available in a variety of sizes and with all industry standard thread connections. Our standard sub offering includes saver subs, adapter subs, cross-over subs, and bit subs. Custom subs are also available to meet all Reverse Circulation system requirements.

### SAVER SUBS

Saver Subs are positioned at the top of the Reverse Circulation rod string, between the first rod and the top drive head assembly. The subs purpose is to protect the top drive head threads from the wear and tear of frequent make and break connections during the drilling cycle.

### CROSS-OVER SUBS

Cross-over Subs allow the use of conventional DTH hammer in Reverse Circulation drilling. When used in conjunction with a crossover sub mounted above the hammer, the cuttings move up from the bit face into the inner tube through the open slots located on the crossover sub. Crossover subs can also be used to adapt between the rod string and hammer if they are different thread patterns.

### ADAPTER SUBS

Adapter Subs are used to adapt between multiple tooling sizes and thread profiles. Adapter subs can be manufactured in a wide range of sizes and styles, and with any thread connection.

### BIT SUBS

Bit subs connect the Reverse Circulation rod string to the rock bit. Bit subs are available in two designs: one, as an adapter to connect the rod string to the bit for drilling in overburden, and two, as a sub with an inner tube designed to direct the sample up the inner tube of the rods, to the surface for collection.



## AIR SWIVELS

Hole Products offers a variety of air swivels for use on reverse circulation drilling operations. Reverse Circulation air swivels can be customized to connect any pin or box connection, and designed for use on any rig.

Air swivels attach to the top of the Reverse Circulation drill rods or tubing to form a connection with the compressor or pump to allow circulation of the drilling mud, air, or water. The swivel feeds air or fluids into the outer drill rod, while maintaining a sealed inner tube to allow the cuttings to flow to the surface. Reverse Circulation swivels allow the drill pipe to rotate, while the side port for the cuttings to be returned remains stationary.



## CYCLONES & SPLITTERS

As part of our complete Reverse Circulation product line, Hole Products offers cyclones and splitters for sample collection on reverse circulation drill rigs.

The cyclone is designed to reduce the speed of the sample stream, separate the sample from the air, allowing it to be collected. A quality cyclone will increase sample recovery, and help prevent sample contamination.

Splitters are used to give an accurate representation of the complete sample by separating the sample down to a smaller size. Riffle splitters are commonly used with dry samples, while rotating cone splitters are used for wet sampling.

