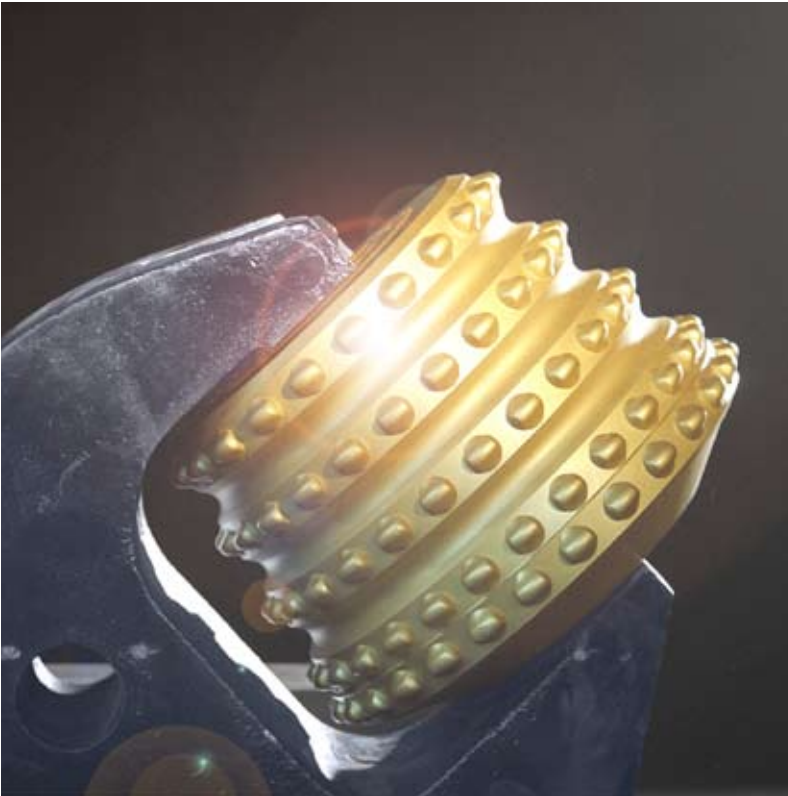
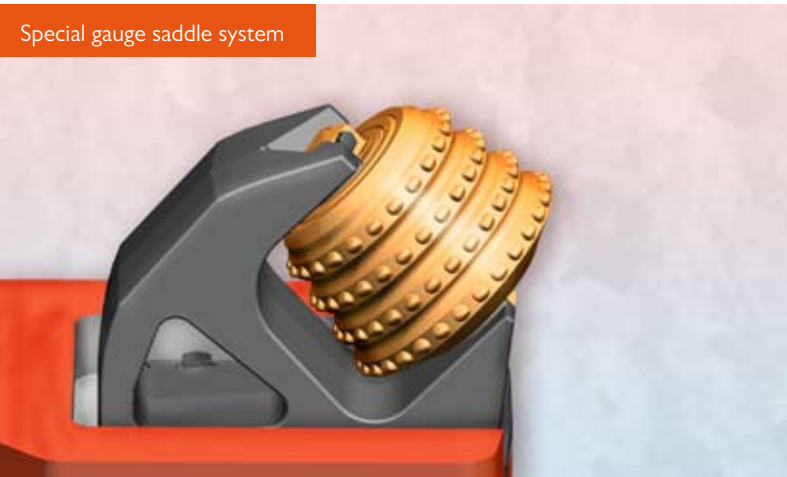


# Raise boring equipment





Special gauge saddle system



Segmented reaming heads

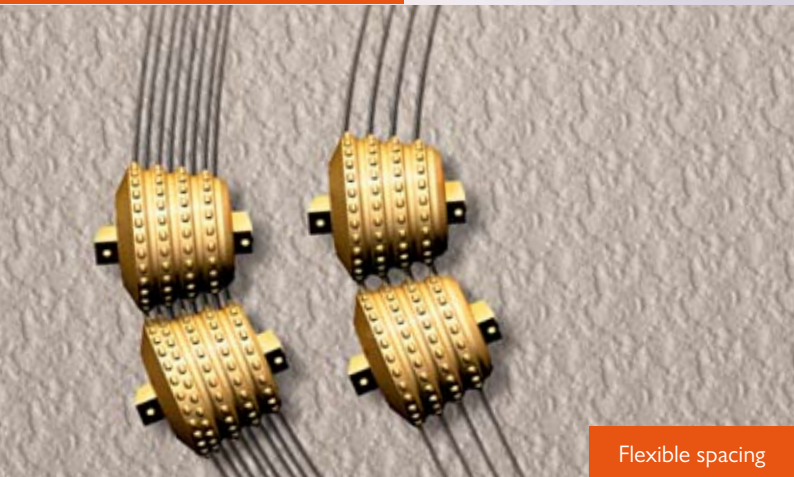


Extendable reaming heads



All components are bolted together

Optimum button design



Flexible spacing

# Reaming heads

## for any raise boring project

The Sandvik Raise Boring System includes a wide range of reaming heads in a number of types, sizes and configurations for boring holes from 0.6 to 6 meters in diameter. Designed for optimum performance in any type of project, the equipment is built according to certain fundamental principles.

All basic components are bolted to each other, which enables fast and easy mounting, assembly and servicing. Since the stem is bolted to the base-head, different sizes of stem can be fitted to suit different sizes of pilot hole. The saddles, too, are bolted to the head. They are therefore easy to re-position, which gives maximum flexibility.

The Sandvik system is based on standard components, which contributes greatly to its flexibility and high availability. All heads have a flat cutting profile which rotates smoothly and with optimum thrust utilisation.

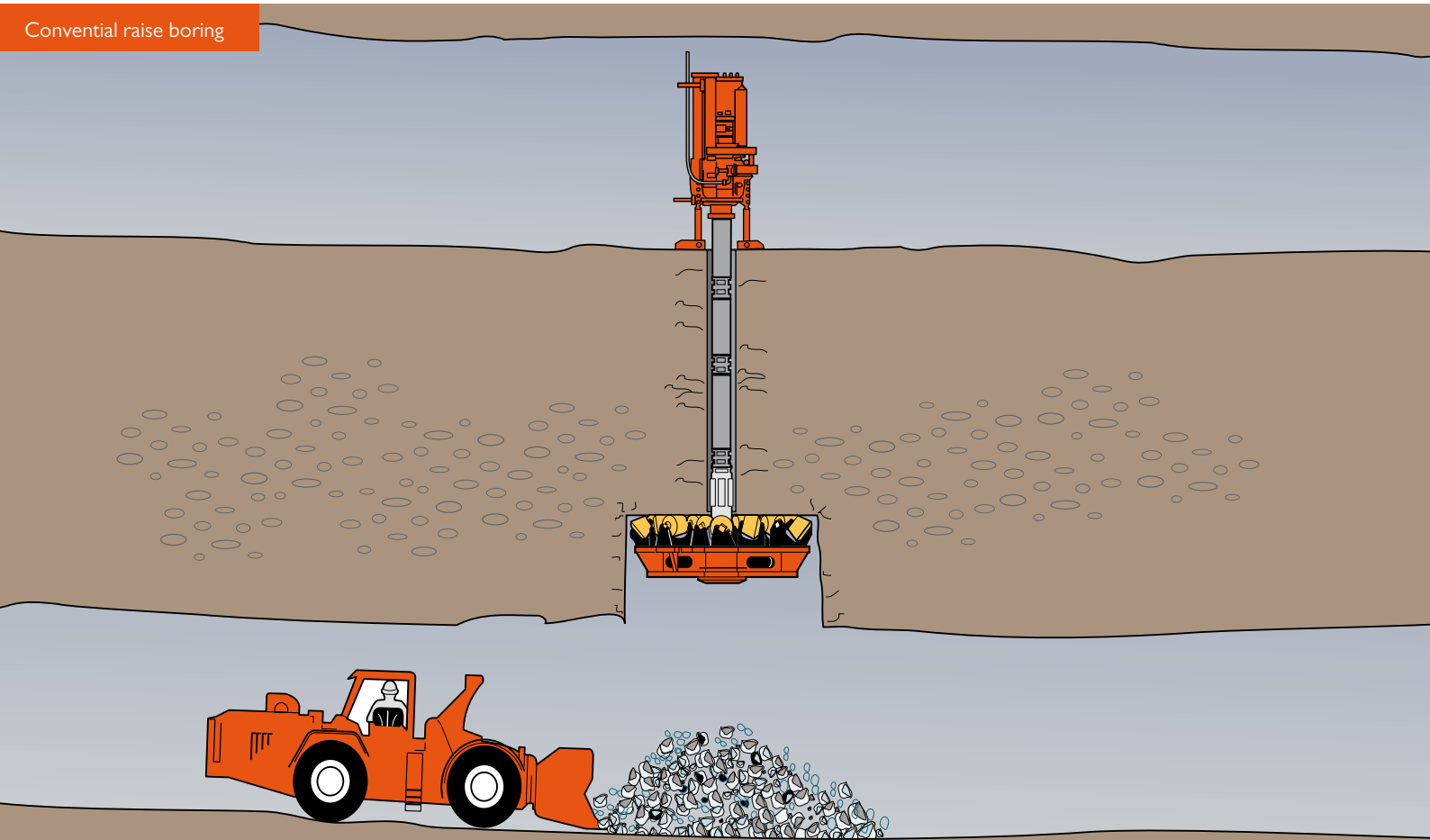
Sandvik reaming heads are easy to adapt to different rock conditions by re-arranging the cutters. The effect is to change the spacing between the rows of cemented-carbide buttons that break the rock. To enable row spacing to be varied, only two types of cutter are needed on any one reaming head. Placing one or the other type of cutter in different positions on the head gives either wide or narrow button-row spacing. The unique design of Sandvik cemented-carbide buttons ensures long service life and the highest possible rate of penetration.

A special gauge saddle system has been developed with the option to reduce the reamer diameter in two steps simply by changing to different types of saddle. This option can be used in any project with heavy gauge wear and it makes it easier to reach the rock face if the reamer is lowered for any service.

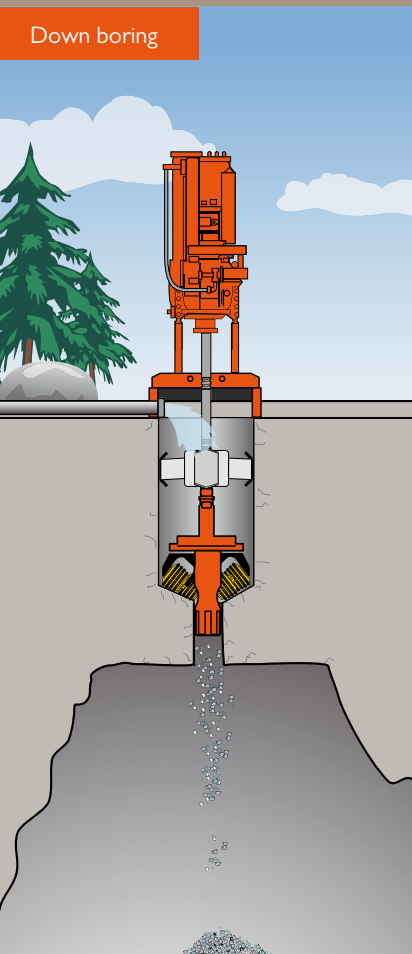
Larger diameter Sandvik reaming heads are available in segmented versions, which enable transport dimensions and weight to be reduced for projects in which there are size or weight restrictions.

We also offer a wide range of extendable reaming heads, which can be built to different diameters by fixing segments of different types and sizes to the base-head.

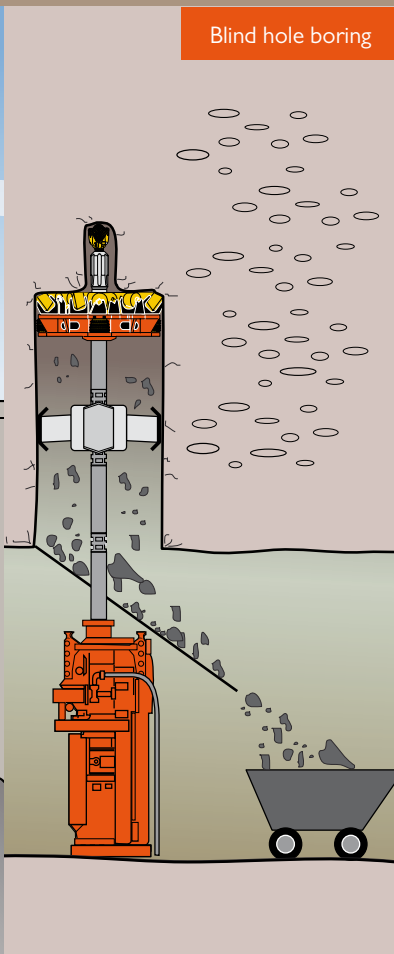
Conventional raise boring



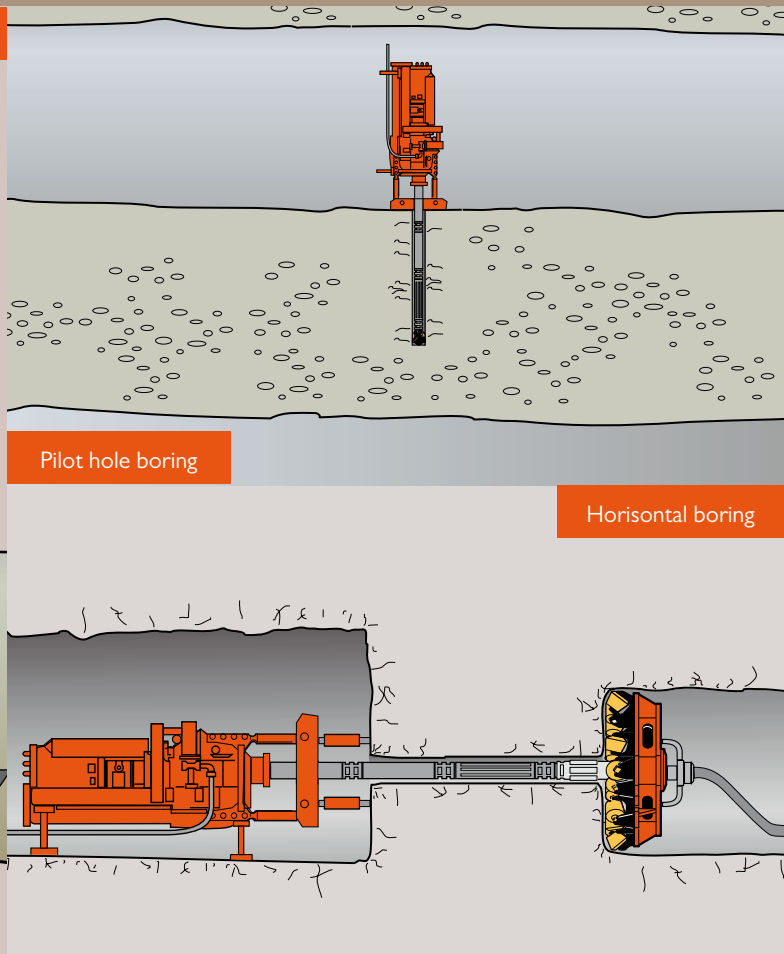
Down boring



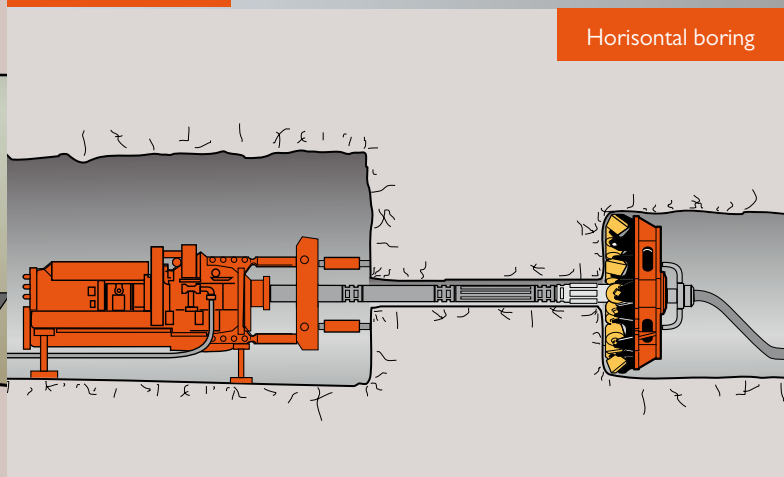
Blind hole boring



Pilot hole boring



Horizontal boring



# Raise boring

## methods

### Pilot drilling

Conventional raise boring begins with the drilling of a pilot hole. It is drilled using a roller bit with sealed bearings, together with hollow drill pipes 1.5 m in length with an international standard thread for high-torque applications.

The cuttings are removed from the pilot hole with the aid of water flushing. Introduced through the center of the drill string, the water flows out of the drill bit and up through the annulus between the drill pipes and the hole wall. If required, the pilot drilling can be controlled by using a directional drilling system.

### Raise boring

When the pilot hole breaks through into the lower level, the roller bit is removed and replaced with a reaming head. The reamer is rotated and pulled back toward the drilling unit. The cuttings fall by gravity into the chamber at the bottom of the hole, where they are mucked out using a LHD-type loader.

Raises up to 6 m in diameter and up to 1000 m in length are not uncommon. The raise-boring method is used to produce ventilation shafts, ore passes, manways, penstocks etc.

### Blind boring

When a raise is required but there is no access to the upper level, it has to be bored blind from below, usually without a pre-drilled pilot hole. A special type of head is required for blind boring. It drills the pilot hole and reams out the raise at the same time. The head is rotated and pushed upward. The cuttings fall out of the hole by gravity.

Normal blind raise diameters are from 0.6 to 1.8 m. Since the drill string is under compression during blind boring, special large-diameter stabilizers are needed to support the drill string. The blind-boring method is used to produce so-called slot raises, ore passes and manways.

### Horizontal boring

Horizontal boring is an excellent method in urban construction projects where drilling and blasting is restricted or forbidden and tunnel boring machines (TBMs) are too bulky. First, a horizontal pilot hole is drilled, with the aid of a directional drilling system if necessary. When the pilot bit breaks through, it is removed and replaced with a reaming head. Because the hole is horizontal, the reamer must be equipped with a special cuttings removal system.

Typical diameters for horizontal reaming are from 0.6 to 4.5 m. The method is used to drill tunnels for cables, escape routes, sewage etc without disturbing the environment unduly. Horizontal boring requires good rock stability.

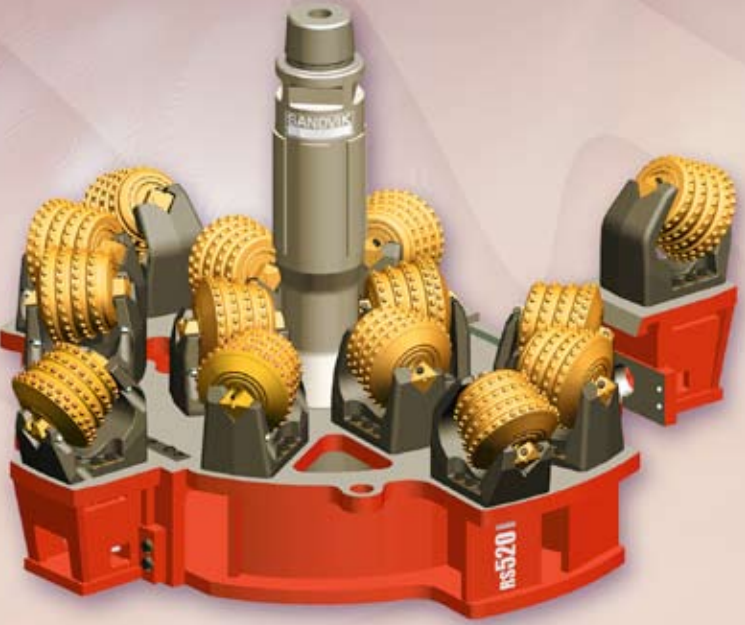
### Down boring with a pre-drilled pilot hole

In mines, large fill-holes between 0.6 and 1.8 m in diameter can be bored into stopes using reaming equipment, provided that a pilot hole can be pre-drilled into the stope. The pilot bit and drill string are then removed and a reamer fitted. The reamer is pushed and rotated downward, guided by a nosepiece that follows the pilot hole.

The cuttings fall by gravity down through the pilot hole. Since the drill string is under compression during down boring, special large-diameter stabilizers are needed to support the drill string.



Integral reaming head



Segmented reaming head



Extendable reaming heads

# Our types of reaming heads

## **Sandvik RS510 integral reaming heads**

A Sandvik RS510 integral reaming head is the first choice for any raise boring project in which there are no size or weight restrictions. The integral head is very strong and rigid. The stem, saddles and cutters are bolted to the head and easy to service.

All Sandvik integral reaming heads have a flat cutting profile for smooth rotation and low torque demands. There are various stem-fit and saddle options. Stem sizes from Ø228 to 381 mm (9-15") can be used.

## **Sandvik RS520 segmented reaming heads**

Sandvik RS520 segmented reaming heads should be chosen for projects in which there are restrictions on transport weights or dimensions. The segmented design comprises a base-head and two removable segments. This enables the reamer to be transported to the collaring site via small cages and narrow drifts. The segments are then fixed to the base-head using standard tools.

Sandvik segmented reaming heads, too, have a flat cutting profile for optimum performance. All components such as the stem, segments, saddles and cutters are attached by bolts. This makes them very versatile and enables quick and easy servicing. There are various stem-fit and saddle options. Stem sizes from Ø228 mm to 349 mm (9-13 ¾") can be used.

## **Sandvik RS530 extendable reaming heads**

Sandvik RS530 extendable reaming heads consist of a base-head to which four or six segments can be fitted. That means the reaming head can be built to different diameters. Sandvik extendable reaming heads are therefore a good option for any project in which there are both size and/or weight restrictions and high demands for hole-size flexibility. Segmentation allows the reamer to be transported to the collaring site via small cages and narrow drifts. The segments are then fixed to the base-head using standard tools.

Sandvik extendable reaming heads, too, have a flat cutting profile for optimum performance. All components such as the stem, segments, saddles and cutters are attached by bolts. This makes them very versatile and enables quick and easy servicing. Different centre bores (stem-fits) and saddle options are available.

Stem sizes from Ø280 to 381mm (11-15") can be used. The RS530 system permits raises of several different diameters to be bored with one and the same reaming head, thus reducing capital cost and keeping inventories to a minimum.



Blind boring head



Cutter



Saddles



Horizontal reaming head with scraper blades



Stem



Pilot bits





# Tailor-made reaming heads

## and components for different applications

In addition to the wide range of standard reaming heads for conventional raise boring, Sandvik offers to tailor-make reaming systems for any application that requires special design features. Examples include:

- Blind-hole boring systems with water-flushing, different drill-pipe to reamer connections and different stems to fit different sizes of pilot hole
- Down-boring systems with V-shaped reamers for improved cuttings removal while following a pre-drilled pilot hole, as well as different drill-pipe to reamer connections and removable wear-pad stem sleeves
- Horizontal-boring systems with scrapers and water flushing for efficient cuttings removal
- Underwater-reaming systems with pressure-compensated cutters and specially segmented components that are easy to handle

As with all Sandvik reaming heads, our tailored systems are designed and built in accordance with proven principles using:

- Bolted components for fast, easy handling and quick servicing
- Standard components for high availability, good flexibility and low inventories
- Flat cutting profiles for smooth rotation, optimum thrust utilization and performance

Please consult your nearest Sandvik raise-boring specialist if your project needs a tailored solution.

### Components and Spare parts

Key components for all standard reaming heads are always available from stock. Examples of standard-stock items include:

- Cutter types CMR 41 and CMR 52, which cover most applications
- Saddles for different positions and different types of reaming head
- Stems for different pilot-hole diameters with threads to fit any size of drill pipe
- Sealed bearing pilot bits featuring special designed gauge buttons in DP cemented carbide for high gauge wear resistance and high performance

For more detailed information about components, spare parts and ordering numbers, please see the Sandvik Raise Boring Heads – User Manual HR – 13121.

# Technical specification

## SANDVIK RS 510 Integral reaming heads

Integral Reaming Head with Ø340 mm centre bore (Stem fit)

Part No incl saddles	Type	Diameter mm/inch	No of Cutters	Weight Kg *
7008-1310-30	CRH 3	1060/42	4	2 700
7008-1311-30	CRH 3	1084/43	4	2 700
7008-1314-30	CRH 4	1420/56	6	3 400
7008-1315-30	CRH 5	1524/60	8	4 250
7008-1018-30	CRH 6	1829/72	10	5 100
7008-1021-30	CRH 7	2134/84	12	5 900
7008-1024-30	CRH 8	2440/96	14	6 850
7008-1924-30	CRH 8D	2447/96	14	7 100

Integral Reaming Head with Ø360 mm centre bore (Stem fit)

7008-1324-30	CRH 8L	2440/96	14	7 300
7008-1027-30	CRH 9L	2749/108	14	8 150
7008-1931-30	CRH 10D	3094/122	16	10 550

Integral Reaming Head with Ø390 mm centre bore (Stem fit)

7008-1731-30	CRH 10D	3094/122	16	11 050
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\* = Total weight including head, stem, saddles and cutters

## SANDVIK RS 520 Segmented reaming heads

Segmented Reaming Head with Ø340 mm centre bore (Stem fit)

Part No incl saddles	Type	Diameter mm/inch	No of Cutters	Weight Kg *
7008-1418-30	CRH 6S	1829/72	10	5 200
7008-1421-30	CRH 7S	2134/84	12	6 100
7008-1424-30	CRH 8S	2440/96	14	7 350

Segmented Reaming Head with Ø360 mm centre bore (Stem fit)

7008-1831-30	CRH 10SD	3094/122	16	10 750
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\* = Total weight including head, stem, saddles and cutters

## SANDVIK RS 530 Extendable reaming heads

Extendable Reaming Head with Ø340 mm centre bore (Stem fit)

Base head No incl saddles	Segment No incl saddles	Type	Diameter mm/inch	Cutters	Weight Kg *
7008-1318-30	2 X 7008-2101-30	CRH 6E	1829/72	10	5 700
7008-1318-30 **	2 X 7008-2169-30 **	CRH 6E	2152/85 **	10 **	5 850
7008-1318-30	2 X 7008-2169-30 4 X 7008-2170-30	CRH 6E	2429/96	14	7 250

Extendable Reaming Head with Ø360 mm centre bore (Stem fit)

7008-1724-30	2 X 7008-2101-30	CRH 8ESP	2440/84	14	8 600
7008-1724-30	2 X 7008-2167-30 2 X 7008-2168-30	CRH 8ESP	2763/109	16	9 450

\* = Total weight including head, stem, saddles and cutters

\*\* = Only possible to use two gauge cutters

# Technical specification

## SANDVIK RS 530 Extendable reaming heads

### Extendable Reaming Head with Ø360 mm centre bore (Stem fit)

Base head No incl saddles	Segment No incl saddles	Type	Diameter mm/inch	Cutters	Weight Kg *
7008-1631-32	2 X 7008-2134-30	CRH 10SE	3047/120	16	11 925
7008-1631-32	2 X 7008-2135-30 2 X 7008-2136-30	CRH 10SE	3372/133	18	14 075
7008-1631-32	2 X 7008-2135-30 2 X 7008-2136-30 2 X 7008-2138-30	CRH 10SE	3696/146	20	15 325
7008-1031-30 **	None	CRH 10E	3130/123	16	11 500
7008-1031-32 **	2 X 7008-2109-30 2 X 7008-2110-30	CRH 10E	3500/138	18	14 000
7008-1031-32 **	2 X 7008-2109-30 2 X 7008-2110-30 2 X 7008-2111-30	CRH 10E	3824/151	20	15 250
7008-1440-32 ***	2 X 7008-2109-30 2 X 7008-2110-30	CRH 10ED	3500/138	18	14 000
7008-1440-30 ***	2 X 7008-2152-30 2 X 7008-2153-30	CRH 10ED	3687/145	20	15 050
7008-1440-32 ***	2 X 7008-2109-30 2 X 7008-2110-30 2 X 7008-2111-30	CRH 10ED	3824/151	20	15 250
7008-1440-30 ***	2 X 7008-2144-30 2 X 7008-2145-30	CRH 10ED	4042/159	22	16 850

### Extendable Reaming Head with Ø390 mm centre bore (Stem fit)

7008-1338-30	2 X 7008-2150-30 2 X 7008-2164-30	CRH 12E	3534/139	18	22 510
7008-1338-30	2 X 7008-2150-30 2 X 7008-2151-30	CRH 12E	3840/151	20	25 150
7008-1338-30	2 X 7008-2161-30 2 X 7008-2162-30	CRH 12E	4146/163	22	26 670
7008-1338-30	2 X 7008-2148-30 2 X 7008-2149-30	CRH 12E	4500/177	24	28 000
7008-1338-30	2 X 7008-2146-30 2 X 7008-2147-30	CRH 12E	5000/197	26	30 550
7008-1338-30	2 X 7008-2159-30 2 X 7008-2160-30	CRH 12E	5100/201	26	30 550
7008-1338-30	2 X 7008-2154-30 2 X 7008-2155-30	CRH 12E	5520/217	30	36 600
7008-1338-30	2 X 7008-2156-30 2 X 7008-2158-30	CRH 12E	5876/231	32	38 450

\* = Total weight including head, stem, saddles and cutters

\*\* = Part No 7008-1331-3X for reaming head with Ø390 mm centre bore (stem fit)

\*\*\* = Part No 7008-1340-3X for reaming head with Ø390 mm centre bore (stem fit)



