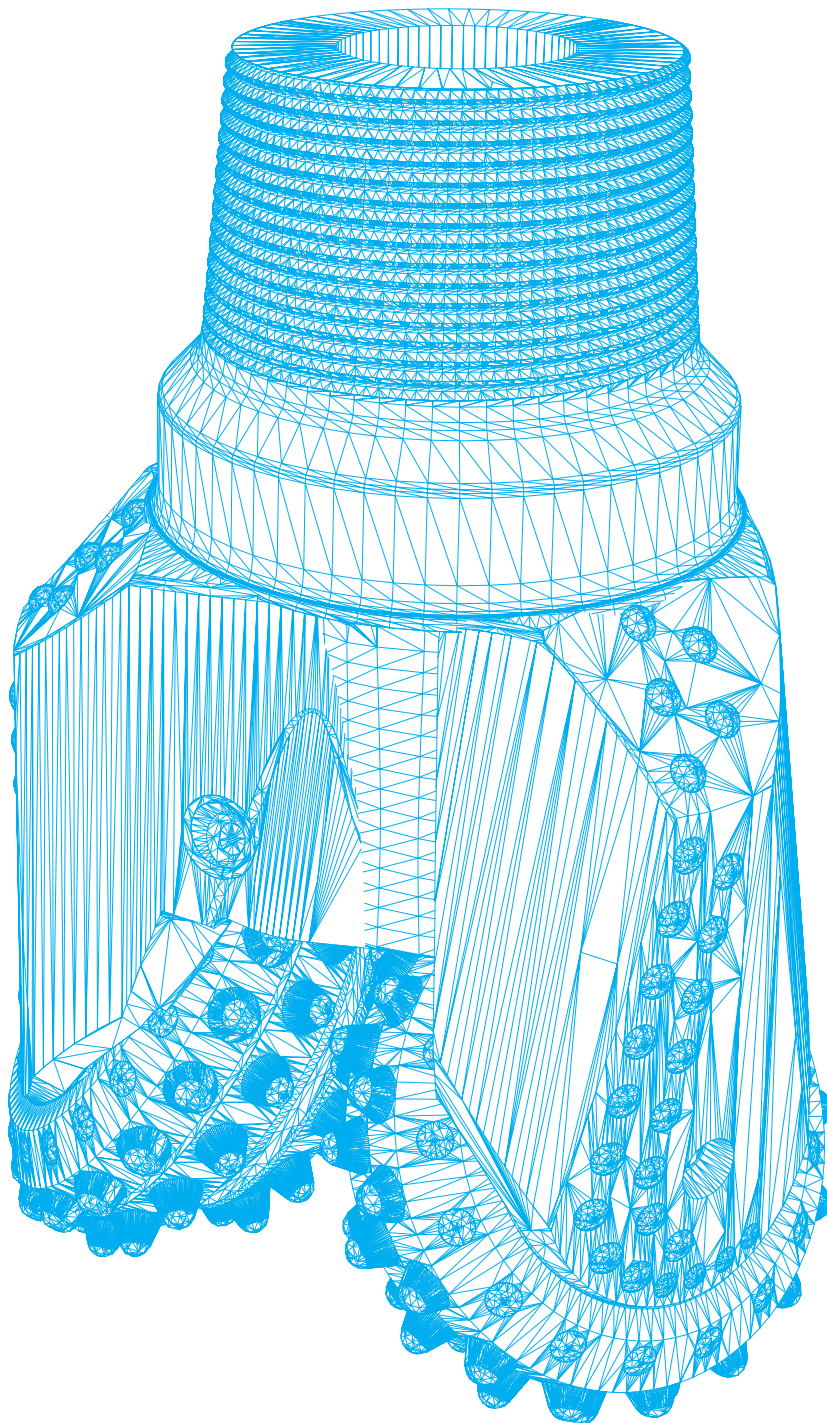


ROTARY DRILLING BITS AND DRILL STRING TOOLS





PUTTING YOUR SAFETY FIRST

The mining industry continues to demand even higher levels of safety and productivity. In order to meet these requirements, we work continuously to develop even safer products, and to produce comprehensive manuals enabling for safer and effective use of our products.

IT'S ALL ABOUT EVERYONE'S HEALTH

Helping you to ensure a safe workplace and healthy workforce is of the utmost importance to us. The wellbeing of any person coming into contact with our equipment is paramount. Therefore, we strive to identify and assess potential risk factors that could threaten the health of you and your employees.

All of the products in this catalogue are designed to meet safety requirements. Those responsible for equipment and parts installation must take care to ensure that all necessary steps have been taken to satisfy performance and safety requirements. This includes making sure that any applicable laws, regulations, codes and standards are followed.

BE AWARE OF ALL SAFETY PROCEDURES

We ask that you start by obeying all instructions given. Never work under an unsupported roof or close to potential "pinch" areas. Beware of the potential hazards of a loose roof and ribs, and scale down roof and ribs prior to bolting. It is important to bolt early in the mining process – as soon as is safely and practically possible.

Safe work procedures should incorporate inspection Before the machine operates, and also through regular monitoring based upon mining conditions, safety

and hazard management systems. Workers should be provided with safety information, instruction and training on transportation, installation, operational care and disposal of drilling tools. and to produce comprehensive manuals on the safe and effective use of our products.

DRESS RIGHT FROM HEAD TO TOE

(PPE) at all times. This is what we strongly recommend, to help avoid injury:

- Safety helmet
- Hearing protection
- Safety glasses
- Protective high visibility clothing
- Respiratory protection
- Safety boots
- Any site-specific PPE as required

MAKE A RISK ANALYSIS BEFORE YOU START

Pay attention to safety when planning all of your work. Before you start, always take your time to go through all operations. Identify any potential risks and take appropriate measures to avoid them. If necessary, seek expert advice on how to help minimize risks. Finally, make sure that you have the right resources to perform all tasks in the safest manner possible.

TOGETHER WE WILL TAKE YOUR BUSINESS FURTHER

For more than 150 years we have been committed to providing the highest-quality products and solutions to the mining industry. Our spirit and business ethics have remained unchanged, and developments within society and the industry have contributed to our innovative solutions.

Today, we continue to conduct business in close cooperation with you and other customers all over the world, with the promise of being a proactive and innovative partner.

We believe that we can make a difference to the successful running of your business. You need to get the best out of your equipment – with no compromise on quality, delivery time or service. With us as partners, we will create solutions that make your operation run as effectively as possible.

One thing is certain: our products and solutions will continue to meet the ever-growing needs of the mining industry, and your business.

“Today, the hallmark of great work is innovation and technology. Being second best is not an option for us.”

Sandvik was founded in 1862 by Göran Fredrik Göransson, who was the first in the world to succeed in using the Bessemer method for steel production on an industrial scale.



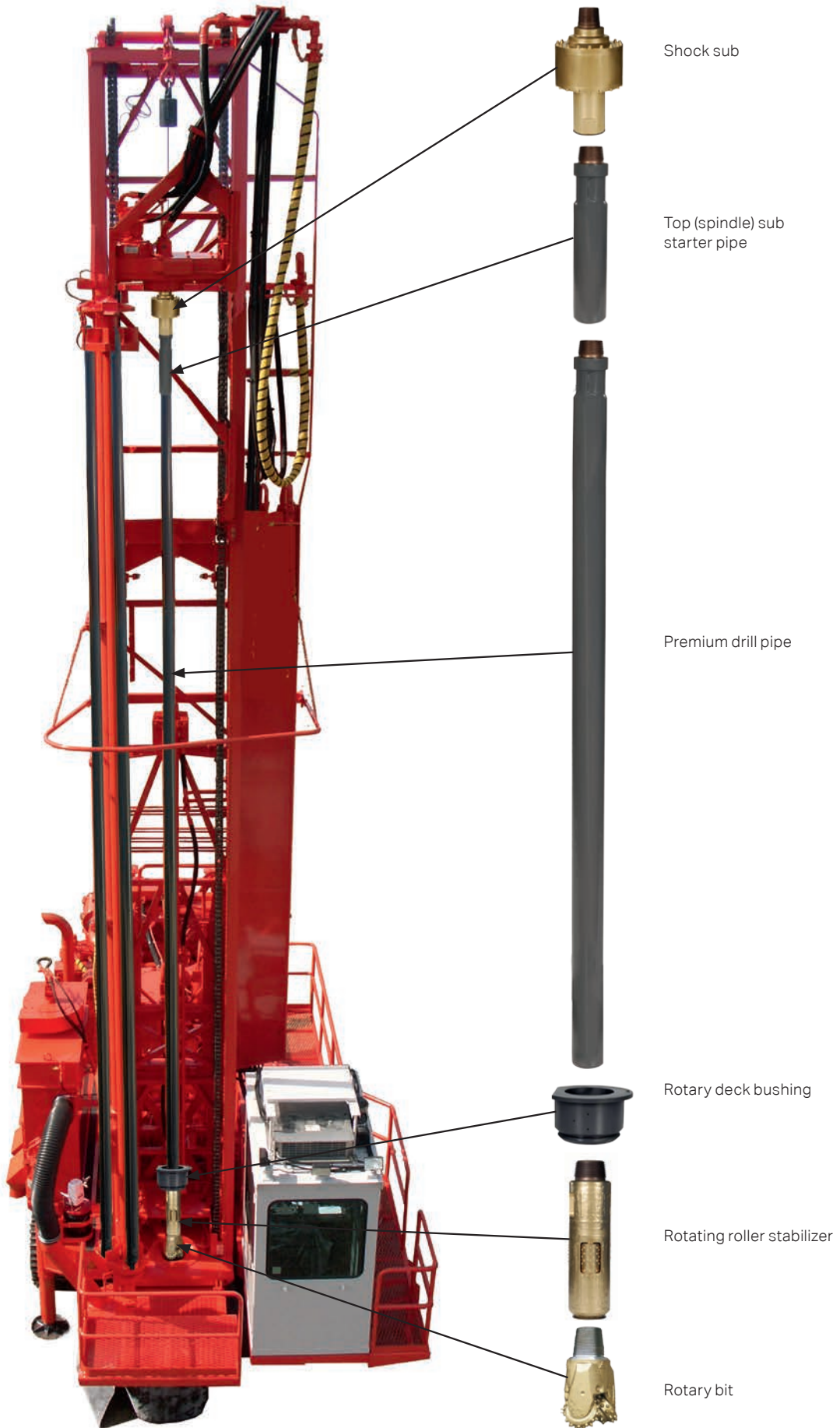
LINKING DRILL BIT TO DRILL RIG

To drill a good hole, you need the right drill rig, drill string tools, and bits for your specific application, and you have to have them all working together. At Sandvik Mining we can offer your total drilling solution.

We now have the broadest offerings in the industry, including premium quality drill pipe, rotary subs and adapters, stabilizers, deck bushings, shock subs, and of course rotary bits.

As the world's premier supplier of roller cone bits, we provide products and expertise to improve drilling results across a full range from 159 to 406 mm holes (6 1/4 to 16 "). With both air and sealed bearing bit ranges, carbide grades and insert geometries with cutting structures optimized for all conditions, you can trust us to improve your drilling efficiency, keep the tools operating reliably, and offer high performance in all drilling applications.





WHATEVER YOUR'RE DRILLING WE HAVE THE BIT FOR THE JOB

SANDVIK BITS BUILT FOR ROCK BREAKING

Choosing the correct drill bit is fundamental to successful and economical drilling. Important factors to consider include the rock compressive strength, abrasiveness, homogeneity, the desired penetration rate, the capabilities and characteristics of the drill rig, and previous drilling experience at the mine.

SANDVIK ROLLER CONE BITS EXCEED THE LIMITS

Sandvik roller cone bits are optimized for service life at the maximum possible penetration rate for the drilling conditions. Carbide grade, shape & size, and cutting structure density are selected to achieve the balance between productivity and bit life. There is never a compromise on quality. To achieve long life, the bearings must withstand the high axial and radial forces that are generated during drilling. The bearing design, geometry and material selection are critical factors that go into the development of new bits.

PERFORMANCE FOR APPLICATION EXCELLENCE

Superior air-cooled bearing performance is achieved from a bearing design that has advanced metallurgy, optimized proportioning of components and geometry. The RR221 air bearing bit range is powered by technology that continues to evolve to meet the demands of the surface mining industry. Enhancements include improved surface finishes, balanced radial and axial bearing loading, and optimized air flow for maximized cooling.

Drill bits operate in an extremely tough environment and attention to detail is crucial. Such focus created our patented RR321 bit range with a new air bearing design. Changes to key internal features, combined with the closest tolerances we have ever put into an air bearing has resulted in performance increases from 15 to 30% over the old RR320 design.

The extra protection of the RR440's patented radial shaped "dual seal" technology delivers extended bearing hours and greater reliability than conventional o-ring seals. The bearing's Kevlar coated excluder seal protects the primary seal from cuttings and debris, making the system virtually bulletproof. Plus the Phinodal bearing sleeves dramatically increase bit load and rotation speed capacities, increasing operational penetration rates and bit life in the most challenging of drilling environments.

RR440 bearings have 50% greater load capacity and routinely achieve over 200% the bearing life of air bearings.

MORE THAN JUST BITS

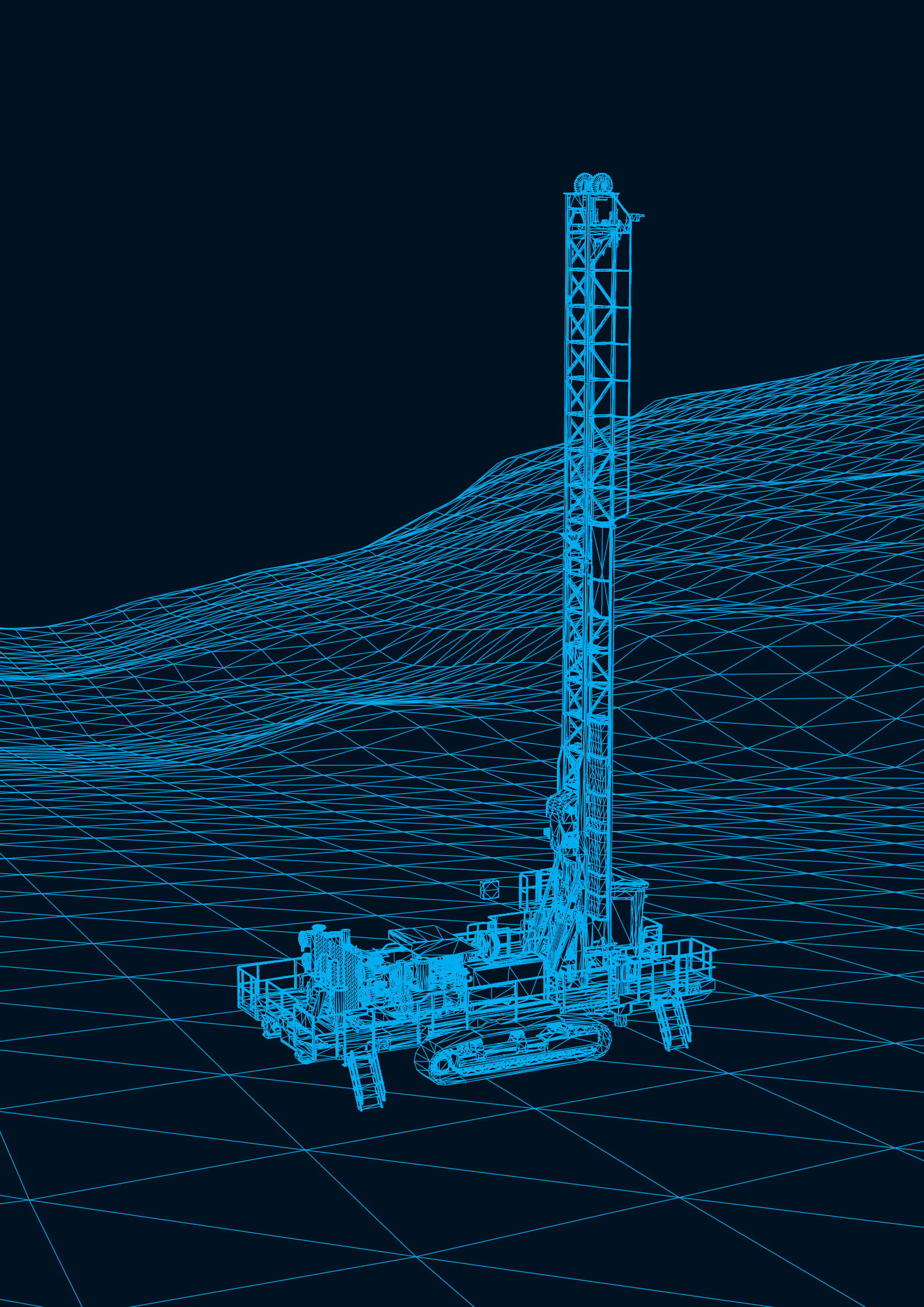
We pride ourselves on being your total solutions provider and preferred partner of choice. In line with this value, our high performance drilling tools provide longer life and the lowest overall operating costs. Great performing products backed by our global reach of experienced and dedicated personnel make Sandvik the natural choice as your drill string components solutions provider.

Sandvik offers a variety of services designed to improve your drilling process. These services include:

- Drilling performance audits and recommendations
- On-site support and services
- Drill rig audits including air, weight and rotation speed measurement
- Product selection and a staged plan of product development and improvement
- Dull bit evaluation
- Classroom training
- Performance feedback

We are pleased to offer customers on site support including training for the appropriate use of all our products for your application.

When you purchase our product you receive much more than a drill bit or a drill string tool. The Sandvik experience includes service and support during and after the sale. Although we have a global footprint, our service is local by design. Our sales and product specialists are stationed in your communities so we can understand your needs and deliver solutions efficiently and responsively. Your local Sandvik team is supported by application Drillmasters who work together with a focus to improve your drilling operation.



BITS OFFERING

The RR221 series features a class-leading patented air bearing system that offers long service hours. The cutting structures are optimized to add key features for each application. The series incorporates all of Sandvik's design, manufacturing and materials expertise to provide high quality and reliable performance.



RR221 AVAILABILITY SELECTION CHART

BIT SIZE mm inch	APPROX. WT. kg / lb	CUTTING STRUCTURE TYPE											
		X05	X07	X10	X20	X30	X40	X47	X50	X60	X70		
159 6 1/4"	20 / 44							X					
171 6 3/4"	22 / 49			X		X					X		X
187 7 3/8"	25 / 56									X			
200 7 7/8"	35 / 77	X		X	X	X	X	X			X		X
216 8 1/2"	36 / 80				X	X	X			X			
229 9"	43 / 94		X		X	X			X			X	
251 9 7/8"	59 / 130				X	X	X					X	X
270 10 5/8"	67 / 148		X		X	X	X			X			
311 12 1/4"	98 / 216				X	X	X			X	X		X

The RR321 bearing system has evolved from one of the best performing air bearing bits in the surface mining industry. Because these bearings are capable of longer operating hours, our engineers have applied a systems approach to the drill bit technology. Additional features are present on these bits to maximize life and operational penetration rates in challenging environments.



RR321 AVAILABILITY SELECTION CHART

BIT SIZE mm inch	APPROX. WT. kg / lb	CUTTING STRUCTURE TYPE											
		S07	S10	S15	S17	S20	S30	S35	S40	S47	S50	S60	S70
171 6 3/4"	22 / 49						X				X		
200 7 7/8"	35 / 77	X	X		X		X		X		X		
216 8 1/2"	36 / 80						X		X				
229 9"	43 / 94	X		X			X			X	X	X	
251 9 7/8"	59 / 130		X	X		X	X		X		X	X	X
270 10 5/8"	67 / 148	X	X			X	X		X		X	X	
311 12 1/4"	98 / 216		X			X	X		X		X	X	
349 13 3/4"	133 / 294						X	X	X		X		
381 15"	184 / 406								X				X
406 16"	213 / 470									X	X	X	

The RR440 series is the only commercialized no-service-required sealed journal bearing blasthole bit designed for surface mining. It is powered by Charger® bearing technology. To maximize the RR440's bearing performance we created a system of features that harness the latest in material science, engineering, and manufacturing technology. That's why the RR440 series of roller cone bits has for 15 years, been the benchmark for drilling excellence, and remains that today



RR440 AVAILABILITY SELECTION CHART

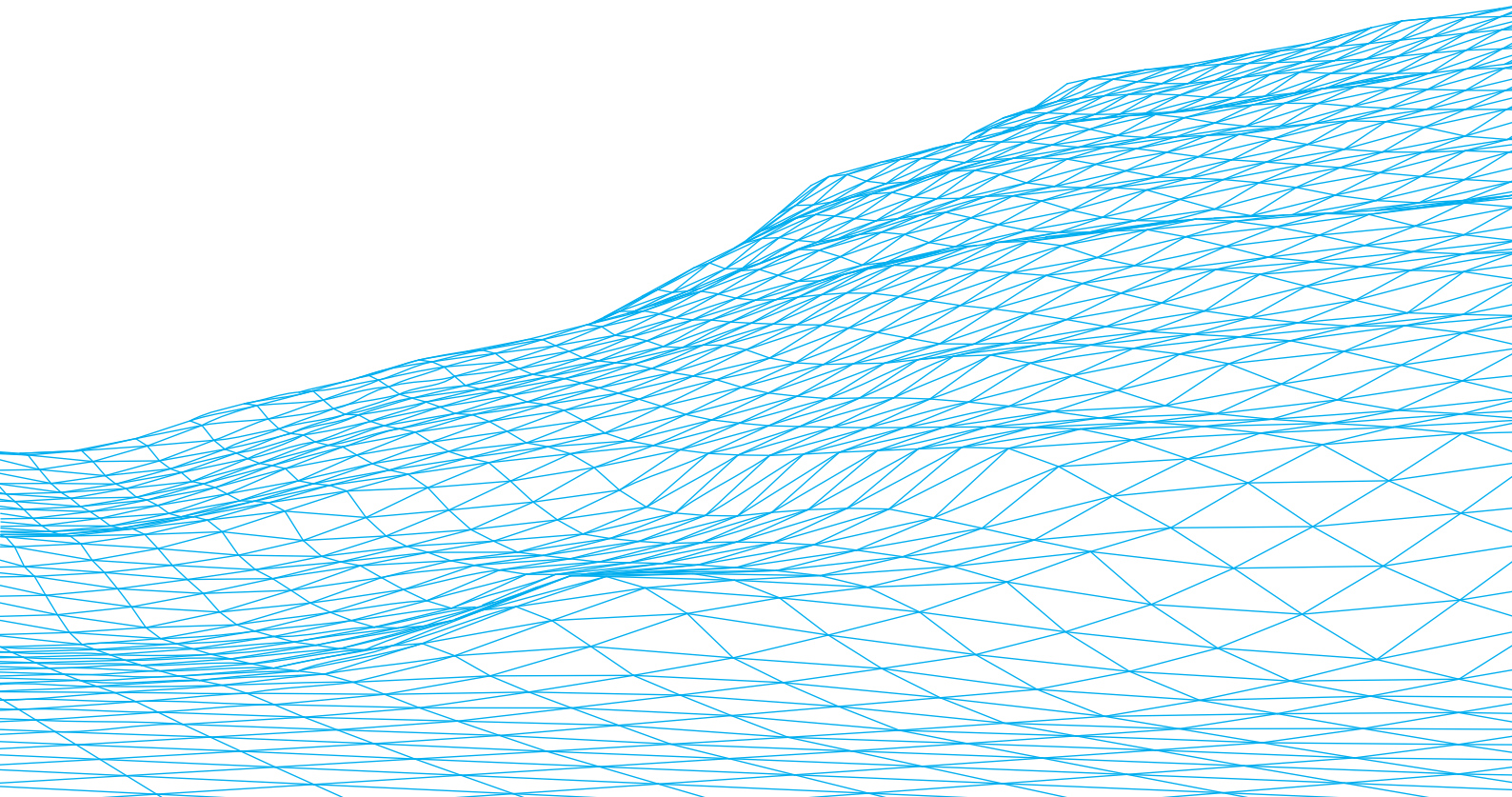
Softest Formation
Most Aggressive Bit
Hardest Formation
Least Aggressive Bit

← CUTTING STRUCTURE TYPE →

BIT SIZE		APPROX. WT.		CUTTING STRUCTURE TYPE													
mm	inch	kg/lb		07QX2	17QX2	20QX2	25QX2	30QX2	35QX2	37QX2	39QX2	40QX2	45QX2	50QX2	60QX2	70QX2	
171	6 3/4	22 / 49						X							X		
200	7 7/8	35 / 77			X		X				X						
229	9	43 / 94		X		X						X		X	X		
251	9 7/8	60 / 130		X				X	X		X	X		X	X	X	
270	10 5/8	67 / 148		X	X	X	X	X	X		X	X			X		
311	12 1/4	98 / 216						X		X	X	X	X	X	X		
349	13 3/4	133 / 294						X	X				X	X			
406	16	213 / 470								X		X					

Note:

1. Working ranges of bit types overlap, please consult your Sandvik product specialist for recommendations.
2. Different carbide grades are available on many of these bits, please consult your Sandvik product specialist for recommendations.
3. The sizes and types listed in the table above reflect the standard bits that were available at the time we published this brochure. Because we are continually adding new bit sizes and types to our product line, please consult with your Sandvik representative for the most current offerings.



BENEFITS BY APPLICATION

INTERIOR ROW INSERTS

Interior row inserts are critical for high bit life and sustained penetration rates. We select the best inserts for your application specific products.



	RR221	RR321	RR440
Chisel TCI (tungsten carbide insert) provides durability and faster cutting action for soft and medium-soft formations.	✓	✓	✓
The unique geometry of the vector shaped interior row inserts attack the rock at the angle of cone rotation to maximize insert penetration in soft and medium-soft formations		✓	✓
Sculptured inserts increase the strength by increasing cross-sectional area and by eliminating sharp edges that cause stress risers which can lead to insert breakage. Ideal for soft and medium-soft formations.		✓	✓
Tough conical top inserts in hard rock formations and abrasive rock conditions have a geometrical shape that optimizes both strength and wear resistance.	✓	✓	✓

GAGE ROW INSERTS

We offer a range of gage row insert shapes suited to all drilling applications. Insert selection is optimized for all bits in our product range.



	RR221	RR321	RR440
The chisel gage insert performs well in soft homogenous drilling conditions.	✓	✓	✓
Radial Bow chisel is a good choice in soft to medium-soft formations.	✓	✓	✓
The crest geometry of QX gage inserts present a large cross-sectional area to the rock, creating large bottom-hole craters at the bit gage maximizing life and penetration rates.			✓
The SWIC shape coupled with proprietary TCI grades increases gage contact in medium hard abrasive drilling conditions.	✓	✓	✓
Ollon, double conical and relief gage SWIC are shapes for medium-hard to hard formations.	✓	✓	✓
Conical inserts offer both strength and wear resistance in hard, abrasive rock.	✓	✓	✓

PATENTED TRUCUT GAGE CUTTING TECHNOLOGY

Trucut gage cutting technology uses a combination of SRT semi-round top inserts on the gage, and patented off gage inserts. These inserts cut the wall more efficiently, minimizing breakage and extending bit life and penetration rates.

	RR221	RR321	RR440
Trucut gage cutting technology		✓	✓



HEEL ROW CUTTING AND REAMING TECHNOLOGY

A range of heel row configurations are available depending on the bit design and application. These reduce gage wear and extend bit life.

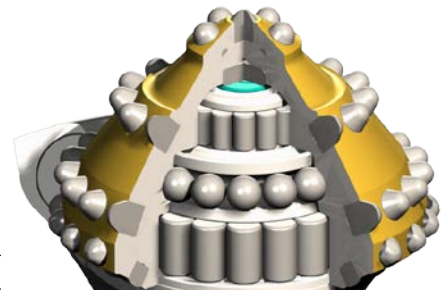
	RR221	RR321	RR440
Standard	✓	✓	✓
Shot-gunned	✓	✓	✓
Dual Heel	✓	✓	✓



PATENTED AIR-BEARING TECHNOLOGY

Patented air bearing technology is optimized for high hours and maximum durability by using advanced materials and metallurgy. This yields higher load capacity, longer bit life, and lower cost per meter drilled.

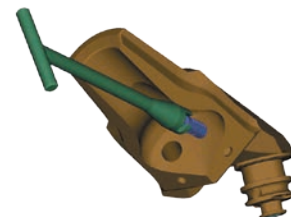
	RR221	RR321	RR440
Patented Air Bearing	✓	✓	



REMOVABLE AIR TUBES

Non-metallic removable air tubes allow cleaning of formation from the air passages, if needed. This extends bit life and reduces costs.

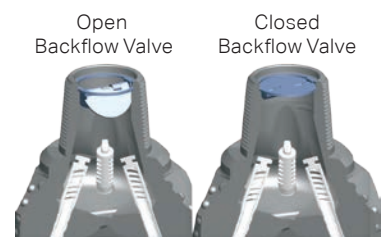
	RR221	RR321	RR440
Non-metallic removable air tubes	✓	✓	



BACKFLOW VALVES

Backflow valves act as a check valve limiting ingress of water and cuttings to the bit body. This increases bearing life and reduces the incidences of bearing failure.

	RR221	RR321	RR440
Back Flow Valve	✓	✓	✓

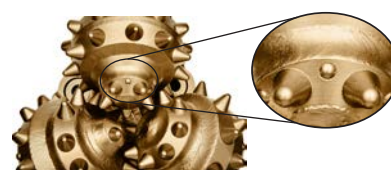


BENEFITS BY APPLICATION

CONE WEAR PROTECTION, PATENTED RIDGE CUTTER TECHNOLOGY

Cone wear protection and patented ridge cutter technology are used to prevent excessive cone erosion and remove un-cut rock ridges. (Not available on all bits.)

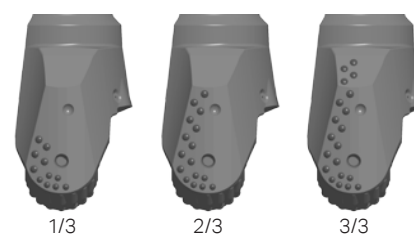
	RR221	RR321	RR440
Patented process applies special material to minimize cone wear.	✓	✓	✓
Ridge cutter cutters are rows of small diameter inserts positioned between the inserts inbetween the main cutting inserts.		✓	✓



LEG AND SHIRTAIL PROTECTION

Leg protection can be customized to drilling conditions, extending bit life and increase your productivity. $\frac{3}{8}$ leg protection is designed for drilling wet and or dirty hole conditions where unstable hole conditions require backreaming.

	RR221	RR321	RR440
The RR220 and RR321 offer a standard $\frac{1}{8}$ leg and shirtail protection feature with optional $\frac{2}{8}$ and $\frac{3}{8}$ leg protection.	✓	✓	
The RR440 also offers $\frac{3}{8}$ leg protection for maximum performance in challenging conditions.			✓



LEG DESIGN FOR MAXIMUM HOLE CLEANING

Asymetrical design of leg forgings protects the key bit components and allows for improved bailing of drill cuttings. Combined with the preferential orientation of the nozzles, results in highly efficient bottom hole cleaning, increasing your bit life and penetration rates.

	RR221	RR321	RR440
Asymetrical leg design.	✓	✓	✓



PATENTED CHARGER QX2 DUAL-SEAL BEARING TECHNOLOGY

The patented QX2 bearing uses “dual seal” technology combined with Phinodal bearing sleeves to dramatically increase weight and rotation speed capacities. Kevlar® coated excluder seal protects the primary seal from cuttings and debris, making this system virtually bulletproof. The QX2 bearing delivers class leading bearing performance, allowing drillers to apply more weight and drill faster, lowering your total drilling costs.



	RR221	RR321	RR440
Patented Charger QX2 Dual Sealed Bearing			✓

PIN VENT PRESSURE COMPENSATION SYSTEM

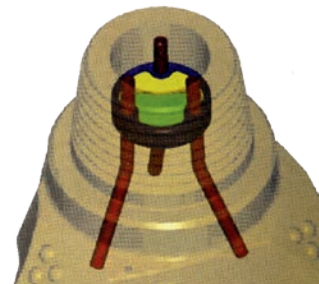
The pin vent pressure compensation system equalizes the internal bit pressure and external ambient pressure to prevent the ingress of cuttings and loss of lubricant. This optimizes seal life, extends bit life, and reduces your downtime.



	RR221	RR321	RR440
Pin Vent pressure compensation system			✓

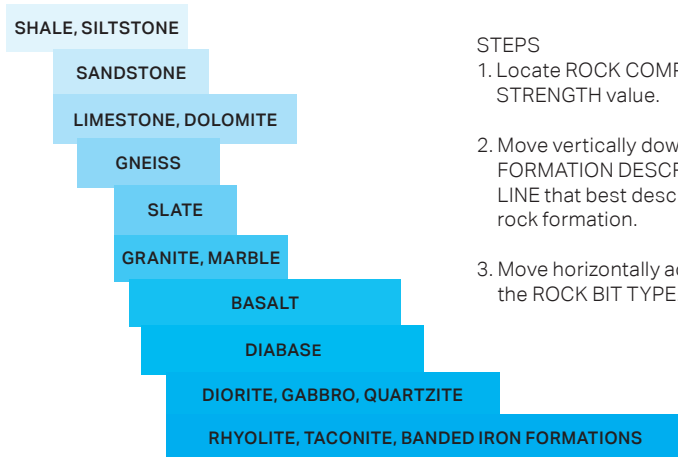
OPTIMIZED SEAL CLEANING SYSTEM

A unique backflow valve system combined with air tubes for seal cleaning prevent the ingress of cuttings and water, keeping the seal clean, maximizing bit life.



	RR221	RR321	RR440
Optimized seal cleaning system with backflow valve			✓

CUTTING SELECTION GUIDE



STEPS

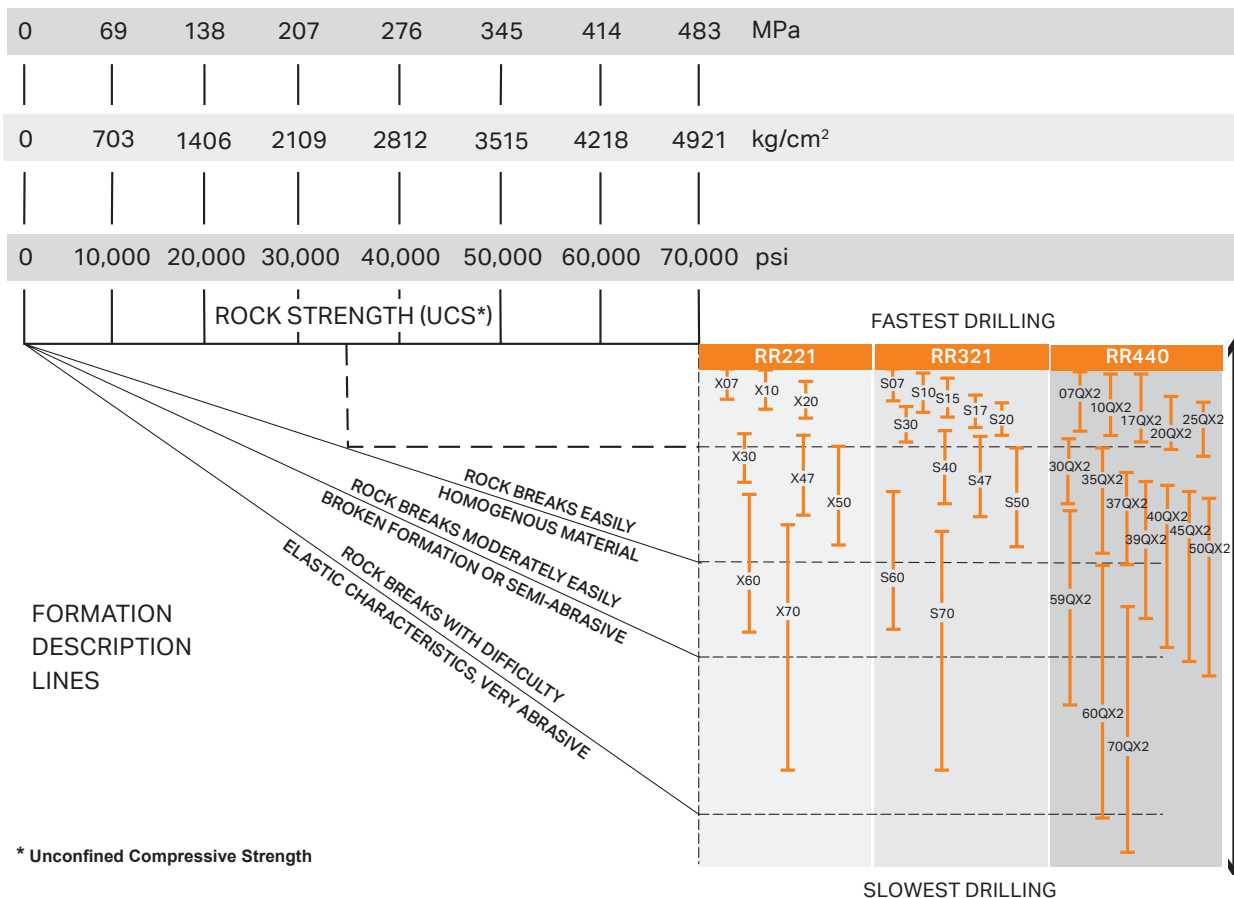
1. Locate ROCK COMPRESSIVE STRENGTH value.
2. Move vertically down to the FORMATION DESCRIPTION LINE that best describes the rock formation.
3. Move horizontally across to the ROCK BIT TYPE.

NOTE

For faster drilling, use the next smaller bit number. If insert breakage is encountered, use the next larger bit number.

EXAMPLE

Rock compressive strength 35,000 pounds per square inch and rock breaks easily – a S40 rock bit type is the best first selection.





SPECIFICATIONS

RR321/ RR221 GUIDELINES FOR WEIGHT-ON-BIT AND ROTATION SPEED*

BIT SIZE mm (inches)	WOB/RPM	X05	X07/S07	X10/S10	S15	S17	X20/S20
171 - 187 (6 4/3" - 7 3/8")	lb (1 000's)			8 - 16			
	tonnes			4 - 7			
	rpm			80 - 150			
200 - 229 (7 7/8" - 9")	lb (1 000's)	8 - 16	8 - 16	10 - 24	12 - 33	12 - 33	12 - 33
	tonnes	4 - 7	4 - 7	5 - 11	5 - 15	6 - 15	6 - 15
	rpm	90 - 160	90 - 160	80 - 150	80 - 150	80 - 150	80 - 150
251 - 279 (9 7/8" - 11")	lb (1 000's)		10 - 24	13 - 27	13 - 33		18 - 45
	tonnes		5 - 11	6 - 12	6 - 15		8 - 21
	rpm		80 - 150	80 - 150	80 - 140		80 - 130
311 - 349 (12 1/4" - 13 3/4")	lb (1 000's)			15 - 38			21 - 80
	tonnes			7 - 17			9 - 36
	rpm			80 - 150			70 - 120
381 - 406 (15" - 16")	lb (1 000's)						
	tonnes						
	rpm						

* Consult with your Sandvik representative for the best operating parameters for your site conditions.

RR440 GUIDELINES FOR WEIGHT-ON-BIT AND ROTATION SPEED*

BIT SIZE mm (inches)	WOB/RPM	07QX2	17QX2	20QX2	25QX2	30QX2	35QX2
171 to 187 (6 4/3" - 7 3/8")	lb (1 000's)					10 - 40	
	tonnes					4 - 18	
	rpm					75 - 120	
200 to 229 (7 7/8" - 9")	lb (1 000's)	9 - 30	14 - 37	14 - 37	14 - 39		
	tonnes	4 - 14	6 - 17	6 - 17	6 - 18		
	rpm	90 - 160	80 - 150	80 - 150	80 - 130		
251 to 279 (9 7/8" - 11")	lb (1 000's)	14 - 37	20 - 50	20 - 50	20 - 55	20 - 60	25 - 70
	tonnes	6 - 17	9 - 22	9 - 22	9 - 25	9 - 27	11 - 31
	rpm	80 - 160	80 - 150	80 - 130	80 - 130	70 - 120	70 - 120
311 to 349 (12 1/4" - 13 3/4")	lb (1 000's)					25 - 80	25 - 85
	tonnes					11 - 36	11 - 38
	rpm					75 - 125	70 - 120
381 to 406 (15" - 16")	lb (1 000's)						
	tonnes						
	rpm						

* Consult with your Sandvik representative for the best operating parameters for your site conditions.

X30/S30	S35	X40/S40	X47/S47	X50/S50	X60/S60	X70/S70
10 - 33			12 - 42	12 - 42		20 - 45
5 - 15			5 - 19	5 - 19		9 - 21
75 - 120			60 - 110	60 - 110		60 - 100
16 - 35		20 - 40	20 - 40	20 - 50	25 - 57	25 - 57
7 - 16		9 - 18	9 - 18	9 - 23	11 - 26	11 - 26
75 - 120		70 - 110	60 - 110	60 - 110	60 - 100	60 - 100
18 - 50		22 - 57		25 - 65	25 - 80	25 - 85
8 - 23		10 - 26		11 - 30	11 - 36	11 - 39
75 - 120		60 - 110		60 - 110	60 - 90	60 - 90
23 - 80	27 - 85	27 - 85	27 - 85	40 - 110	40 - 110	
10 - 36	12 - 38	12 - 38	12 - 38	18 - 50	18 - 50	
70 - 120	60 - 110	60 - 110	60 - 110	60 - 90	60 - 90	
	30 - 90	40 - 100			50 - 120	
	14 - 41	18 - 44			23 - 54	
	75 - 120	60 - 100			60 - 80	

37QX2	39QX2	40QX2	45QX2	50QX2	60QX2	70QX2
				18 - 47		
				8 - 21		
				60 - 110		
		20 - 50		20 - 65	20 - 65	
		9 - 23		9 - 30	9 - 30	
		60 - 120		60 - 100	60 - 100	
	25 - 75	30 - 85		35 - 85	40 - 95	40 - 100
	11 - 34	14 - 38		16 - 38	18 - 43	18 - 45
	65 - 110	65 - 110		60 - 100	60 - 90	60 - 90
27 - 85	28 - 100	28 - 100	28 - 100	40 - 110	50 - 120	
12 - 38	13 - 44	13 - 44	13 - 44	18 - 50	23 - 54	
70 - 120	65 - 110	60 - 110	60 - 110	60 - 90	60 - 90	
40 - 120		50 - 130				
18 - 54		23 - 58				
70 - 110		60 - 100				

THE RIGHT DRILL STRING FOR ALL YOUR NEEDS

SANDVIK ROTARY DRILLING TOOLS – ENGINEERED FOR EFFICIENCY

Our rotary drill string products and services are specifically designed for maximizing your productivity and minimizing operational costs. With longer tool service life, downtime is reduced, thereby improving your productivity.

HIGH PERFORMANCE FOR APPLICATION EXCELLENCE

Our products are engineered to efficiently handle the hard rock and abrasive formations commonly found in surface mines. Built to withstand extreme torsional and axial loads, Sandvik drill string components are manufactured with premium quality materials and undergo rigorous product testing. Sandvik offers significant advantages in its high performance drill string components:

- Extensive in-house materials and reliability engineering expertise
- Leading technology and intellectual property developments
- State-of-the-art manufacturing
- Efficient and reliable delivery times
- Certified quality process
- A thorough understanding of drilling and applications

HIGH QUALITY ASSURANCE STANDARDS

We are committed to the highest quality standards in our manufacturing process, resulting in superior products. Our Quality Assurance program utilizes raw material traceability. In addition, the highly skilled product specialists at our manufacturing facility conduct thorough inspections and test each product to assure we deliver superior quality products to our customers. Critical factors in Sandvik drill string component development and manufacturing include:

- Stringent material specifications and verification
- Welding process control and ultrasonic weld inspection
- Precise pipe straightness specifications and verification

MATERIALS AND RELIABILITY TESTING

We have materials and reliability labs at key locations around the world. Materials and reliability engineers are industry leading experts in the areas of materials and the science of maximizing product reliability. Our experts work closely to identify optimum material properties and ensure quality standards. As a result, you receive a full range of high performance drilling tools.

DRILL PIPE ROTARY HEAD CONNECT TO DRILLED HOLE

SANDVIK DRILL PIPE

DESCRIPTION

The drill pipe transmits extreme torsional and axial loads to the drilling tools. Because it encounters various abrasive and hardness conditions, the drill pipe's durability and reliability are crucial to the drilling operation.

Sandvik drill pipes are manufactured to the highest quality assurance standards using an optimized combination of design, tube quality and hard facing materials. They are

available in a wide variety of lengths to meet your specific drilling application:

- Rotary drill pipe
- Down-the-hole hammer drill pipe
- Kelly pipe
- 76 - 340 mm (3" - 13 3/8") outer diameter (OD)
- 0,91 - 18,3 m (3' - 60') lengths

BENEFIT

- Complete product traceability
- High durability
- Versatility in various pipe sizes



SEAM-LESS TUBING

DESCRIPTION

Sandvik drill pipe bodies are manufactured from premium quality, heat treated seamless tubing. Sandvik offers a range of high quality material grades to optimize your applications

BENEFIT

- An optimum combination of tube quality and hard facing material
- The best value grades for specific applications

RP416 & RP412

DESCRIPTION

The RP416 series ultra premium grade pipe is a special heat-treated and quenched alloy. It is designed for hard abrasive formations that cause the body of the pipe to wear out before the tool joints. The physical characteristics, yield, tensile and Brinell hardness of this alloy tube provide more durable, wear resistant mid-body tube than a standard, hot rolled, seamless carbon tube.

Sandvik's RP412 series premium grade pipe is typically required in non-abrasive formations when the tool joints wear out before the tube. The RP412 series is a ST52 hot-rolled, seamless carbon tube.

BENEFIT

- RP416**
 - More durable
 - Wear resistant mid-body tube
- RP412**
 - Typically for non-abrasive formations
 - Premium wear quality



TOOL JOINTS

DESCRIPTION

Sandvik tool joints are manufactured from premium grade or modified heat treated material for maximum wear resistance and life. The tool joints are fitted to the tube body using a proprietary process that ensures concentricity and axial alignment.

BENEFIT

- Fast make-up of drill bit to pipe
- Better seating of threads due to accuracy of axial alignment



HARD MATERIAL WEAR PROTECTION (OPTION)

DESCRIPTION

Based on your application, hard material wear protection can prove to be a cost-effective option when applied either radially or axially on the tool joints as well as the lower portion of the tube

BENEFIT

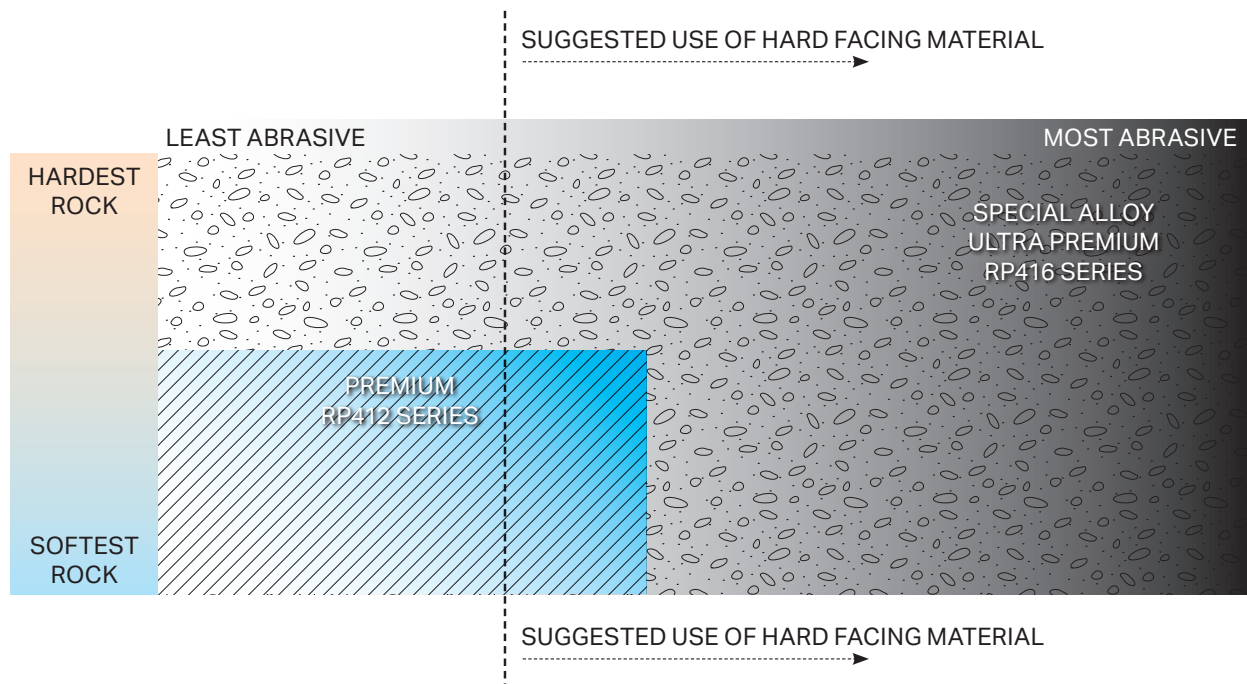
- Better wear on tool joints
- Longer component life



DRILL PIPE AVAILABILITY SELECTION CHART

This selection guide recommends pipe grades appropriate for various rock hardness and abrasiveness. It also suggests conditions for applying optional hard

facing material. Consult your Sandvik product specialist for specific recommendations for your drilling application.



SANDVIK BLASTHOLE DRILL PIPE SIZES

(O.D.) OUTER DIAMETER		WALL THICKNESS		TUBE WEIGHT		PIN BOX SET APPROX. WEIGHT		RECOMMENDED CONNECTIONS	SUGGESTED BIT SIZE RANGE
mm	in	mm	in	kg/m	lb/ft	kg	lb		
101.6	4	12.7	½	28	19	27.2	60	2 ¾" API REG - API IF	4 ⅝" through 5 ⅛"
114	4 ½	7.33	⅝ ₁₆	19	13	59	130	3 ½" API REG - 2 ⅞" API IF - 3" BECO	4 ⅝" through 5 ⅛"
114	4 ½	12.7	½	31	21	59	130	3 ½" API REG - 2 ⅞" API IF - 3" BECO	5 ⅝" through 6 ¼"
114	4 ½	19.05	¾	45	30	59	130	3 ½" API REG - 2 ⅞" API IF - 3" BECO	5 ⅝" through 6 ¼"
127	5	19.05	¾	51	34	72.6	160	3 ½" BECO	5 ⅝" through 6 ¼"
139.7	5 ½	19.05	¾	57	38	81.6	180	3 ½" BECO	6 ¼" through 6 ¾"
152.4	6	19.05	¾	63	42	108.9	240	4" BECO	6 ¾" through 7 ⅞"
152.4	6	25.4	1	79	53	108.9	240	4" BECO	7 ⅝" through 7 ⅞"
158.75	6 ¼	19.05	¾	65	44	113.4	250	4" BECO	7 ⅝" through 7 ⅞"
165.1	6 ½	19.05	¾	68	46	124.7	275	4 ½" BECO	7 ⅝" through 7 ⅞"
165.1	6 ½	25.4	1	88	59	124.7	275	4 ½" BECO	7 ⅞"
177.8	7	19.05	¾	74	50	152	335	4 ½" BECO - 5 ¼" BECO	7 ⅞"
177.8	7	25.4	1	95	64	152	335	4 ½" BECO - 5 ¼" BECO	9"
193.67	7 ⅝	22.2	⅞	94	63	181.4	400	5 ¼" BECO	9"
193.67	7 ⅝	25.4	1	106	71	181.4	400	5 ¼" BECO	9" through 9 ⅞"
219	8 ⅝	25.4	1	122	82	235.9	520	6" BECO	9" through 9 ⅞"
219	8 ⅝	38.1	1 ½	170	114	235.9	520	6" BECO	9 ⅞" through 11"
235	9 ¼	25.4	1	131	88	267.6	590	6" BECO	9 ⅞" through 11"
235	9 ¼	38.1	1 ½	185	124	267.6	590	6" BECO	10 ⅝" through 11"
273	10 ¾	25.4	1	155	104	340.2	750	8" BECO	10 ⅝" through 11"
273	10 ¾	31.7	1 ¼	189	127	340.2	750	8" BECO	12 ¼" through 13 ¾"
273	10 ¾	38.1	1 ½	220	148	340.2	750	8" BECO	12 ¼" through 13 ¾"
324	12 ¾	25.4	1	189	127	585.1	1290	8" BECO	13 ¾" through 15"
340	13 ⅝	31.7	1 ¼	243	163	635	1400	10" BECO	15" through 17 ½"
340	13 ⅝	38.1	1 ½	286	192	635	1400	10" BECO	15" through 17 ½"

HIGH PERFORMANCE DRILL STRING TOOLS

ROTARY SUBS AND ADAPTER

DESCRIPTION

Sandvik offers a full range of rotary subs and adapters for any drilling needs. Subs are used to connect the various components throughout the entire drill string from the drill bit to the rotary head. They provide a variety of functions such as changing from one thread form to another (cross-over subs), or reducing wear to the threads of components (thread-saver subs).

Using special alloy material all subs and adapters are manufactured to

the same high quality standards as Sandvik drill pipe. Sandvik rotary subs are available as bit (bottom) subs, top (spindle) subs, cross-over subs and thread-saver subs.

BENEFIT

- Optimum hard material wear protection on bit subs
- Hard face material in the 58 to 60 Rockwell C range
- Hard facing available on all subs (option)



ROTARY SUBS AND ADAPTER

DESCRIPTION

RP424 welded blade stabilizers are commonly used to stabilize and control hole deviation. Sandvik stabilizers provide smoother bores and faster penetration rates due to more efficient bit performance. The RP424 welded blade stabilizer offers an integral welded blade design with no moving parts, and a specialized tungsten carbide pad design. Its specific gage tolerances optimize performance and extend bit life. The RP424 is available in a wide selection for various hole and drill string sizes including 3 to 4 blades, and straight or spiral blades.

RP427 rotating roller stabilizers provide more reaming and cutting action than a welded blade stabilizer. The RP427 incorporates Sandvik's tungsten carbide inserts, which are resistant to breakage, provide more effective cutting action, and result in more durable life. For maximum rate of penetration, partner the RP427 with Sandvik's roller cone bits. The RP427 roller stabilizer uses the largest possible diameter rollers and bearings that are practical for a specified hole size. This increases the life of the stabilizer as compared to stabilizers with small rollers and bearings.

BENEFIT

RP424

- Minimizes rough bores, spiral bores, ledges, and crooked holes
- Provides smoother bores to minimize particles in hole bottom and reduce re-drill time
- Best for soft to medium formations in wet or dry conditions

RP427

- Eliminates scraping and gouging of guiding elements
- Maintains concentricity
- Provides adequate stabilization without imposing excessive torque
- Best for hard and abrasive formations in areas that include broken ground, creating hole wall instability or undergauge hole conditions



DECK BUSHINGS

DESCRIPTION

Deck bushings centralize the drill pipe over the hole, prevent misalignment of the bit and drill string, and extend the life of the bit and drill string. Sandvik deck bushings are engineered to run smoothly and provide extended trouble free operation. Specialty high alloy, heat treated material is used throughout the entire deck bushing line.

RP432 is a static, non-rotating type deck bushing that has a solid body with no moving parts and replaceable wear sleeves. The sleeves are tack welded into place and are replaced as the sleeves wear. This

type of deck bushing is normally used when the drilling application is down-the-hole (DTH). The DTH's application does not require the rpms that are seen in rotary drilling applications. The RP432 static deck bushing is not suggested for use when rotary drilling.

RP434 rotary deck bushing is designed with triple race ball bearings, allowing the inner sleeve to rotate as the drill pipe passes through it. This results in less vibration, torque and drill pipe diameter gouging and scraping as compared to a static fixed-type deck bushing.

BENEFIT

RP432

- High alloy, heat treated materials provide longer service life
- Available for all makes and models of drill rigs

RP434

- Triple race ball bearing design ensures smoother, longer bearing life
- Transmits less vibration through the drill string to the rotary head
- Smooth and quiet drill cab atmosphere
- More cost effective than static bushings



SHOCK SUBS

DESCRIPTION

RP442 shock subs are designed to lower drilling vibrations and prevent them from being transmitted into the rotary drill head and drill bit in mid-size to large drilling rigs. Sandvik's Material and Reliability engineers' extensive research efforts have resulted in optimum materials selection to ensure premium performance, durability and long life

RP442 shock subs use a series of rubberized elements, torsional blocks, and springs to absorb maximum torsional shock while cushioning the axial loads. These shock subs help reduce or eliminate premature rotary head failure, mast fractures, and poor bit life. The end results are lower maintenance costs, improved bit life, and smoother operating conditions.

BENEFIT

RP422 Shock sub

- Reduces drill rig mast maintenance
- Provides smoother on-bottom running
- Extends bit life
- Lowers rotary drive head repairs



BIT SUBS

PIN CONNECTION	OUTER DIAMETER (OD)		STANDARD LENGTH		SUB WEIGHT		WEIGHT PER UNIT		
	inch	mm	inch	mm	lbs	kgs	lbs/ft	kgs/m	
2 3/8 API REG		89	3 1/2	457	18	45	20	30	45
2 3/8 API REG		102	4	457	18	60	27	40	60
2 7/8 IF		114	4 1/2	457	18	70	32	46	69
3 1/2 API REG		114	4 1/2	610	24	97	44	48	71
3 1/2 API REG		127	5	610	24	122	55	61	91
3 1/2 BECO		127	5	610	24	117	53	59	88
3 1/2 BECO		140	5 1/2	610	24	145	66	73	109
4 or 4 1/2 BECO		159	6 1/4	610	24	176	80	88	131
4 or 4 1/2 BECO		165	6 1/2	610	24	194	88	97	144
4 1/2 BECO		178	7	610	24	230	104	115	171
5 1/4 BECO		191	7 1/2	610	24	270	123	134	199
5 1/4 BECO		194	7 5/8	781	30 3/4	344	156	134	199
6 BECO		219	8 5/8	781	30 3/4	434	197	170	253
6 BECO		235	9 1/4	813	32	531	241	200	298
7 BECO		245	9 5/8	889	35	628	285	215	320
8 BECO		273	10 3/4	889	35	743	337	255	380
8 BECO		311	12 1/4	1067	42	1215	551	347	768
10 BECO		324	12 3/4	1067	42	1308	593	374	557
10 BECO		340	13 3/8	1067	42	1462	663	418	622

STABILIZERS

HOLE SIZE		BODY DIAMETER		STANDARD LENGTH		RP424		RP427	
mm	inch	mm	inch	mm	inch	lbs	kgs	lbs	kgs
159	6 1/4	127	5	673	26 1/2	144	65	130	59
172	6 3/4	140	5 1/2	673	26 1/2	210	95	163	74
199	7 7/8	159 - 178	6 1/4 - 7	673	26 1/2	250	113	220	100
229	9	194	7 5/8	724	28 1/2	350	159	290	132
250	9 7/8	219	8 5/8	781	30 3/4	470	213	400	181
270	10 5/8	219 - 235	8 5/8 - 9 1/4	781	30 3/4	520	236	460	209
279	11	235 - 245	9 1/4 - 9 5/8	781	30 3/4	580	263	510	231
311	12 1/4	273	10 3/4	781	30 3/4	790	358	650	295
349	13 3/4	311	12 1/4	1041	42	1130	513	1030	467
381	15	340	13 3/8	1041	42	1540	699	1350	612

DECK BUSHINGS

OD NOMINAL		RP432 STATIC WEIGHT		RP434 ROTARY WEIGHT		TYPICAL PIPE OD		TYPICAL BIT DATA	
mm	inch	lbs	kgs	lbs	kgs	mm	inch	mm	inch
191	7 1/2	55 - 110	25 - 50	50 - 105	23 - 48	102 - 114	4 - 4 1/2	121 - 165	4 3/4 - 6 1/2
254	10	90 - 165	41 - 75	85 - 160	39 - 73	114 - 178	4 1/2 - 7	143 - 229	5 5/8 - 9
279	11	140 - 170	64 - 77	135 - 165	61 - 75	138 - 178	5 1/2 - 7	171 - 229	6 3/4 - 9
305	12	125 - 155	57 - 70	120 - 150	54 - 68	152 - 178	6 - 7	187 - 229	7 3/8 - 9
330	13	150 - 225	68 - 102	145 - 220	66 - 100	178 - 235	7 - 9 1/4	229 - 279	9 - 11
381	15	170 - 330	77 - 150	160 - 320	73 - 145	194 - 273	7 5/8 - 10 3/4	229 - 311	9 - 12 1/4
406	16	195 - 360	89 - 163	185 - 350	84 - 159	219 - 273	8 5/8 - 10 3/4	251 - 311	9 7/8 - 12 1/4
438	17 1/4	360 - 400	163 - 181	350 - 390	159 - 177	273 - 340	10 3/4 - 13 3/8	311 - 406	12 1/4 - 16
483	19	460 - 510	209 - 231	450 - 500	204 - 227	311 - 340	12 1/4 - 13 3/8	349 - 406	13 3/4 - 16

Approximate weight. Actual depends on inside diameter of deck opening.



RECYCLING THAT PAYS OFF FOR YOU

Environmental considerations are crucial in all of our operations, and never more so than when it comes to the recycling of cemented carbide.

The global shortage of raw material has inspired us to create an extensive scrap-recycling program. We recognize today's increasing environmental concerns, and we are the only mining company that recycles both steel and cemented carbide.

In fact, we have been collecting and recycling both scrap and discarded drilling consumables for conversion back into basic raw materials for almost 10 years. A large number of customers have joined our recycling program during this period. One major reason for this is that we make it easy for them to recycle, by collecting scrap from their own premises.

All of our customer service centres are now set up to receive used cemented carbide-enhanced products. Our recycling plant in Chiplun, India complies with the most stringent environmental standards, and is certified to the ISO 14001 and OHSAS 18001 (ISO 45001) international standard.

WHAT WE OFFER:

- Recycling of cemented carbide available worldwide
- Sustainable recycling process with low environmental impact
- Cost recovery and reduced waste disposal for you
- Money received for worn tools can purchase new inserts or finance new tooling projects
- Consumables and tools from all manufacturers are accepted
- A win-win situation for all

Adopting sustainable business practices and handling them in the right way is a foundation that contributes across the entire business value chain.

The whole supply chain will be improved by incorporating recycling into the business process. For instance, our recycling process significantly reduces energy consumption and carbon dioxide emissions, thereby reducing environmental impact.

PERFORMANCE TIPS

ROTARY DRILLING - BEST PRACTICE CHECKLIST

1. Always make up and break out bits carefully.
2. Only grease the bottom 1/3rd of bit or pipe threads.
3. Internal bit air pressure should be 35 - 40 PSI.
4. Always break in a new bit by drilling at a reduced weight and rotation for the first hole.
5. To collar or start a new hole, reduce down pressure and rotation speed.
6. Always switch on the bailing air before the bit starts drilling the hole and keep the air on until the bottom of the collar is reached.
7. Re-establish the bottom hole pattern with reduced down pressure and rotation when drilling is interrupted.
8. Never drill an old hole with a new bit. This can pinch the cones, damaging the bearings and prematurely destroying the bit.
9. As rock hardness increases, decrease rotary speed and increase down pressure.
10. In softer rock, use lower down pressure and higher rotary speeds.
11. Do not use more water than is necessary to control dust and maintain the hole wall condition.
12. Maintain rotation and bailing air while tripping into or out of a hole.
13. Near bit stabilization, deck centralizers, and shock subs can help bit life and drill longevity. Keep these tools in good condition to maximize performance and replace promptly when worn out.
14. Always clean, dry and lubricate a bit before an idle period and ensure the cones turn freely.
15. Before reusing a bit that has been idle, make sure all cones turn freely.
16. Bent drill steel will reduce drill bit life.
17. Record accurate drill data and note drilling issues. This information can be used to develop improved drilling tools.

THREAD GREASE

Use Sandvik thread grease on all threaded connections to extend thread life and prevent galling, corrosive conditions and difficulty breaking connections.

	WEIGHT (kg)	PART NO.
Can	4,5	795-1960
Can	18	795-1961
Low temp. Can	18	795-1963
Barrel	50	795-1967

EXAMPLE OF MARKING BITS

Sometimes our part numbers and serial numbers are confused which can lead to poor data capture. Below is an example of typical pin stamping with the key details identified.

1. Serial number - H029186036
2. Part number - 0038199-02
3. Type - S07
4. Size - 9"



IMPORTANT HEALTH AND SAFETY INFORMATION

MATERIAL COMPOSITION

Most hardmetal products contain tungsten carbide and cobalt.

ROUTES OF EXPOSURE

Grinding or heating hardmetal blanks or hardmetal products will produce dusts or fumes with dangerous ingredients that can be inhaled, swallowed or come in contact with the skin or eyes.

ACUTE TOXICITY

The dust is toxic by inhalation. Inhalation may cause irritation and inflammation in the airways. Skin contact can cause irritation and rash. Sensitized persons may experience an allergic reaction.

CHRONIC TOXICITY

Repeated inhalation of aerosols containing cobalt may cause obstruction in the airways. Prolonged inhalation of increased concentrations may cause lung fibrosis or lung cancer.

Cobalt is potent skin sensitizer. Repeated or prolonged contact can cause sensitization.

CLASSIFICATION

Following hazard classification according to GHS/CLP applies to the hardmetal powder (3 %≤Co<10 %):

- Acute Inhalation 3, H331: Toxic if inhaled.
- Carcinogenicity 1B, H350i, May cause cancer by inhalation.
- Repr. 2, H361f; Suspected of damaging fertility.
- STOT RE 1, H372: Causes damage to lungs through prolonged or repeated exposure by inhalation.
- Resp. Sens. 1B, H334 : May cause allergy or asthma symptoms or breathing difficulties if inhaled.
- Skin Sens.1, H317: May cause an allergic skin reaction.
- Aquatic Acute 1, H400: Very toxic to aquatic life.
- Aquatic Chronic 2, H411: Toxic to aquatic life with long lasting effects.

PRECAUTIONARY STATEMENTS

- Do not breathe dust.
- Wear protective gloves/protective clothing/eye protection.
- In case of inadequate ventilation wear respiratory protection.
- Avoid release to the environment.
- IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing. If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.

