

RP400 drill string tools surface mining



High performance drill string tools for all your drilling needs

This brochure describes Sandvik's rotary drill string products and services specifically designed for maximizing your surface mining drilling applications: drill pipe, shock subs, stabilizers, deck bushings, sub adaptors, and related information.

You can count on Sandvik drill string components to provide smoother bores and faster penetration rates, resulting in more efficient bit performance.

Our products are engineered to efficiently handle the hard rock and abrasive formations commonly found in surface mining drilling. 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 benefits 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 processes.*
- A thorough understanding of drilling and applications.*
- Over 20 years of product development history through the acquisition of the Implemin Company.*

Sandvik prides itself on being your total solutions provider and preferred partner of choice. In line with this value, our high performance drilling tools provide longer tool life and the lowest overall operating costs.

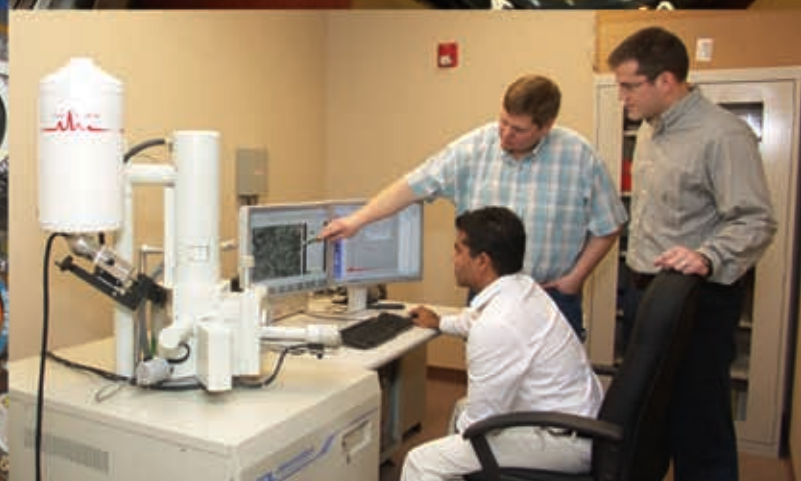
Great performing products backed by Sandvik's global reach of experienced and dedicated personnel make Sandvik the natural choice as your drill string components solutions provider.

A**B**

Controlled quality process

C

Variety of premium steel grades



Drill pipe

high performance drill string tools

A Drill pipe

The drill pipe is the conduit for handling 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 tube quality and hard facing materials. They are available in a wide variety of types and lengths to meet your specific drilling application.

- *Rotary drill pipe*
- *Down the hole hammer drill pipe*
- *Kelly drill pipe*
- *3" - 13 3/8" overall diameter (OD)*
- *3' - 60' lengths*
- *Complete product traceability*
- *On-site service and technical support*

B High quality assurance standards

Sandvik is committed to the highest quality standards in our manufacturing process, resulting in superior end 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*

MID-BODY TUBE

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 application.

- *Premium quality, heat-treated seamless tubing*
- *An optimum combination of tube quality and hard facing material*
- *The best value grades for specific applications*

RP416 Series ultra premium grade special alloy drill pipe

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 a more durable, wear resistant mid-body tube than a standard hot rolled, seamless carbon tube.

RP414 Series combination drill pipe

The **RP414 Series** of drill pipe combines Sandvik's **RP416** ultra premium grade and **RP412** premium grade in the mid-body of the drill pipe. The ultra premium grade is positioned at the bottom of the drill pipe to help reduce premature wash and diameter reduction due to extreme abrasive conditions.

RP412 Series premium grade drill pipe

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.

TOOL JOINTS

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 insures concentricity and axial alignment.

C Hard material wear protection (optional)

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.

MATERIALS AND RELIABILITY TESTING

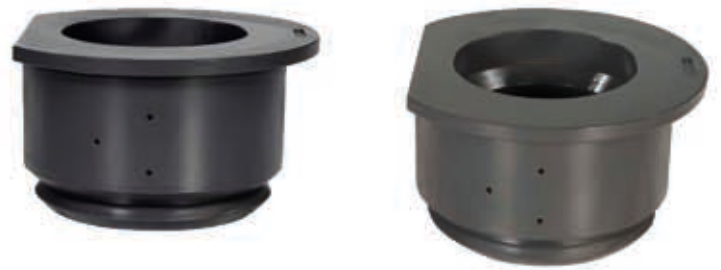
Sandvik Rotary Tools has four Materials and Reliability testing laboratories throughout the world, including one located at our main drill string components manufacturing facility in Santiago, Chile.

Materials and Reliability engineers are industry leading experts in the areas of materials and the science of maximizing product reliability. These Sandvik experts work closely with suppliers to identify optimum material properties and insure quality standards. As a result, you receive a full range of high performance drilling tools.



CAP. 5 TON.



D**E****F****G****H****I**

Rotary subs and stabilizers

high performance drill string tools

D Rotary subs and adapters

Sandvik offers a full range of rotary subs and adapters for any drilling need. 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 for 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**.

- *Stringent heat treatment specifications*
- *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 (optional)*

STABILIZERS

E RP424 welded blade stabilizers

- *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*

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 or 4 blades, and straight or spiral blades.

F RP427 rotating roller stabilizers

- *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 undergage hole conditions*

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 ROP, partner the **RP427** with Sandvik's premium performance 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 smaller rollers and bearings.

DECK BUSHINGS

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 smooth and provide extended trouble-free operation. Specialty high alloy, heat-treated material is used throughout the entire deck bushing line.

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

G RP432 static deck bushing

The **RP432 static deck bushing** 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 sleeve wears.

This type of deck bushing is normally used when the drilling application is down the hole (DTH). The DTH application does not require the RPM's that are required with rotary drilling applications. The **RP432 static deck bushing** is not suggested for use when rotary drilling.

H RP434 rotary deck bushing

The **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. Other benefits include transmitting less vibration through the drill string to the rotary head, and a smooth and quiet drill cab atmosphere.

- *Three ball bearing race design insures smoother, longer bearing life*
- *More cost effective than static bearings*

SHOCK SUBS

I RP442 shock subs

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 insure 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 and shock. 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.

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

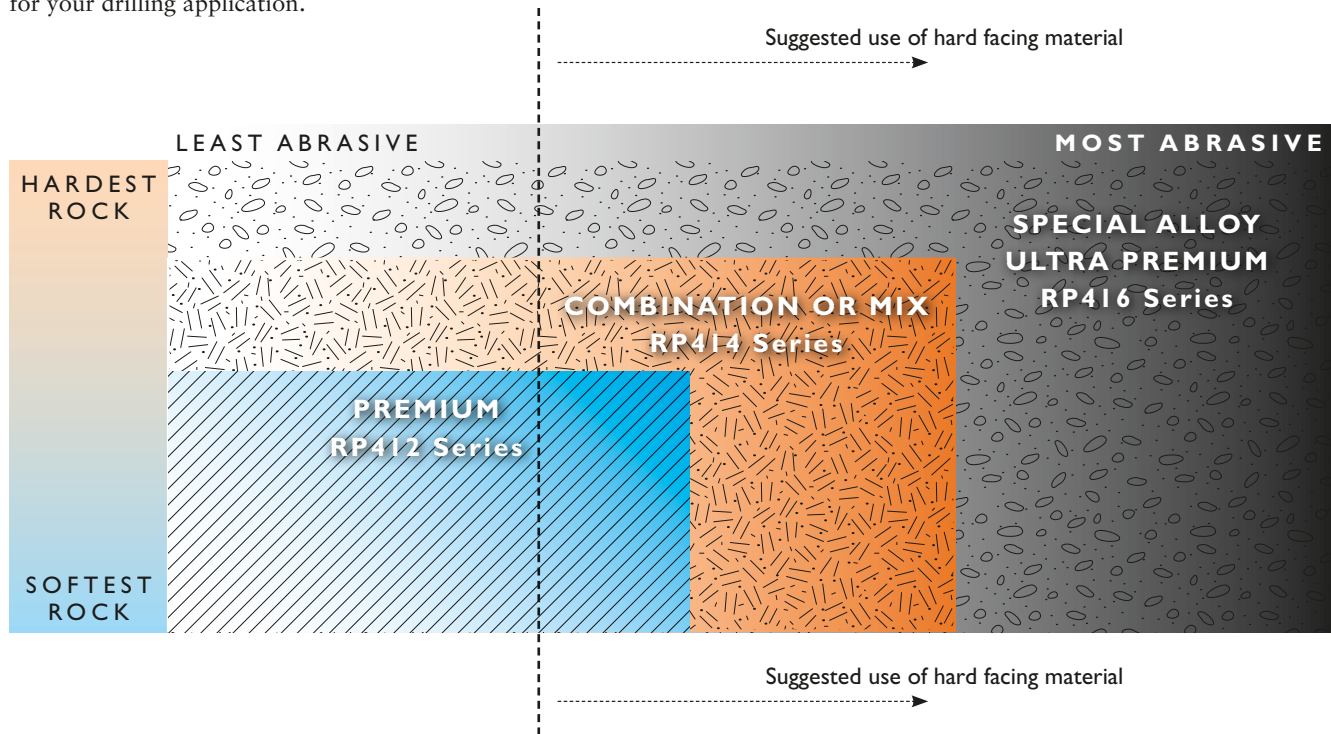


Selection guides

rotary blasthole drilling tools

Drill pipe selection guide

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 offers a variety of services designed to improve your drilling process. Our service offering includes:

- On-site support and services*
- Product selection*
- Application training*
- Wear evaluation*
- Classroom training*

Please contact your local Sandvik product specialist for more details about the service offerings for your area.

Stabilizers

Hole Size		Body Diameter		Standard Length		RP424		RP427	
mm	inch	mm	inch	mm	inch	Welded Blade Weight lbs	Weight kgs	Roller Stabilizer Weight lbs	Weight 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	
mm	inch	lbs	kgs	lbs	kgs
191	7 1/2	55 - 110	25 - 50	50 - 105	23 - 48
254	10	90 - 165	41 - 75	85 - 160	39 - 73
279	11	140 - 170	64 - 77	135 - 165	61 - 75
305	12	125 - 155	57 - 70	120 - 150	54 - 68
330	13	150 - 225	68 - 102	145 - 220	66 - 100
381	15	170 - 330	77 - 150	160 - 320	73 - 145
406	16	195 - 360	89 - 163	185 - 350	84 - 159
438	17 1/4	360 - 400	163 - 181	350 - 390	159 - 177
483	19	460 - 510	209 - 231	450 - 500	204 - 227

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

Bit subs

Pin Connection	Outer Diameter (OD)		Standard Length		Sub Weight		Weight per Unit	
	mm	inch	mm	inch	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

Selection guides

rotary blasthole drilling tools

Standard blasthole drill pipe sizes

Outer Diameter (OD)		Wall Thickness		Tube Weight		Pin/Box Approx. Weight		Recommended Connection
mm	in.	mm	in.	lbs/ft	kgs/m	lbs	kgs	
76.2 mm	3"	5.16 mm	.20 in.	6	9	30	14	2 3/8" API REG - API IF MOD
		7.01 mm	.28 in.	8	12	30	14	2 3/8" API REG - API IF MOD
88.9 mm	3 1/2"	5.49 mm	.22 in.	7	10	50	23	2 3/8" API REG - API IF
		7.62 mm	0.3 in.	10	15	50	23	2 3/8" API REG - API IF
101.6 mm	4"	7.15 mm	0.28 in.	11	16	60	27	2 3/8" API REG - API IF
		12.7 mm	1/2"	19	28	60	27	2 3/8" API REG - API IF
114.3 mm	4 1/2"	7.33 mm	.29 in.	13	19	130	59	3 1/2" API REG - 2 7/8" API IF - 3" BECO
		8.56 mm	.34 in.	15	22	130	59	3 1/2" API REG - 2 7/8" API IF - 3" BECO
		12.7 mm	1/2"	21	31	130	59	3 1/2" API REG - 2 7/8" API IF - 3" BECO
		19.05 mm	3/4"	30	45	130	59	3 1/2" API REG - 2 7/8" API IF - 3" BECO
		25.4 mm	1"	37	55	130	59	3 1/2" API REG - 2 7/8" API IF - 3" BECO
127 mm	5"	12.7 mm	1/2"	24	36	160	73	3 1/2" BECO - 4 1/2" API REG
		14.29 mm	9/16"	26	39	160	73	3 1/2" BECO - 4 1/2" API REG
		19.05 mm	3/4"	34	51	160	73	3 1/2" BECO - 4 1/2" API REG
		25.4 mm	1"	43	64	160	73	3 1/2" BECO - 4 1/2" API REG
139.7 mm	5 1/2"	12.7 mm	1/2"	27	40	180	82	3 1/2" BECO - 4 1/2" API REG
		19.05 mm	3/4"	38	57	180	82	3 1/2" BECO - 4 1/2" API REG
152.4 mm	6"	19.05 mm	3/4"	42	63	240	109	4" BECO - 4 1/2" API
		25.4 mm	1"	53	79	240	109	4" BECO - 4 1/2" API
158.8 mm	6 1/4"	12.7 mm	1/2"	31	46	250	113	4 1/2" API REG - 4" BECO - 4 1/2" BECO
		19.05 mm	3/4"	44	65	250	113	4 1/2" API REG - 4" BECO - 4 1/2" BECO
165.1 mm	6 1/2"	19.05 mm	3/4"	46	68	275	125	4 1/2" API REG - 4" BECO - 4 1/2" BECO
		25.4 mm	1"	59	88	275	125	4 1/2" API REG - 4" BECO - 4 1/2" BECO
177.8 mm	7"	19.05 mm	3/4"	50	74	335	152	4 1/2" API REG - 4" BECO - 4 1/2" BECO - 5 1/4" BECO
		25.4 mm	1"	64	95	335	152	4 1/2" API REG - 4" BECO - 4 1/2" BECO - 5 1/4" BECO
193.7 mm	7 5/8"	22.23 mm	7/8"	63	94	400	181	5 1/4" BECO
		25.4 mm	1"	71	106	400	181	5 1/4" BECO
219.1 mm	8 5/8"	25.4 mm	1"	82	122	520	236	6" BECO
		38.10 mm	1 1/2"	114	170	520	236	6" BECO
235 mm	9 1/4"	25.4 mm	1"	88	131	590	268	6" BECO - 7" BECO
		38.10 mm	1 1/2"	124	185	590	268	6" BECO - 7" BECO
273.1 mm	10 3/4"	25.4 mm	1"	104	155	750	340	8" BECO
		31.75 mm	1 1/4"	127	189	750	340	8" BECO
		38.10 mm	1 1/2"	148	220	750	340	8" BECO
323.9 mm	12 3/4"	25.4 mm	1"	127	189	1290	585	8" BECO
339.7 mm	13 3/8"	31.75 mm	1 1/4"	163	243	1400	635	10" BECO
		38.10 mm	1 1/2"	192	286	1400	635	10" BECO

Sandvik is a high-technology engineering group with world-leading positions in selected areas – tools for metal working, advanced materials technology, and mining and construction. We employ more than 40,000 people in 130 countries.

Sandvik Mining and Construction represents one-third of the overall Sandvik Group and serves a broad range of customers in construction, mineral exploration, mining and bulk materials handling. Our construction expertise covers quarrying, tunneling, demolition and recycling, and other civil engineering applications. Our mining products and services support customers on the surface and under ground, including coal, copper and gold mining.

