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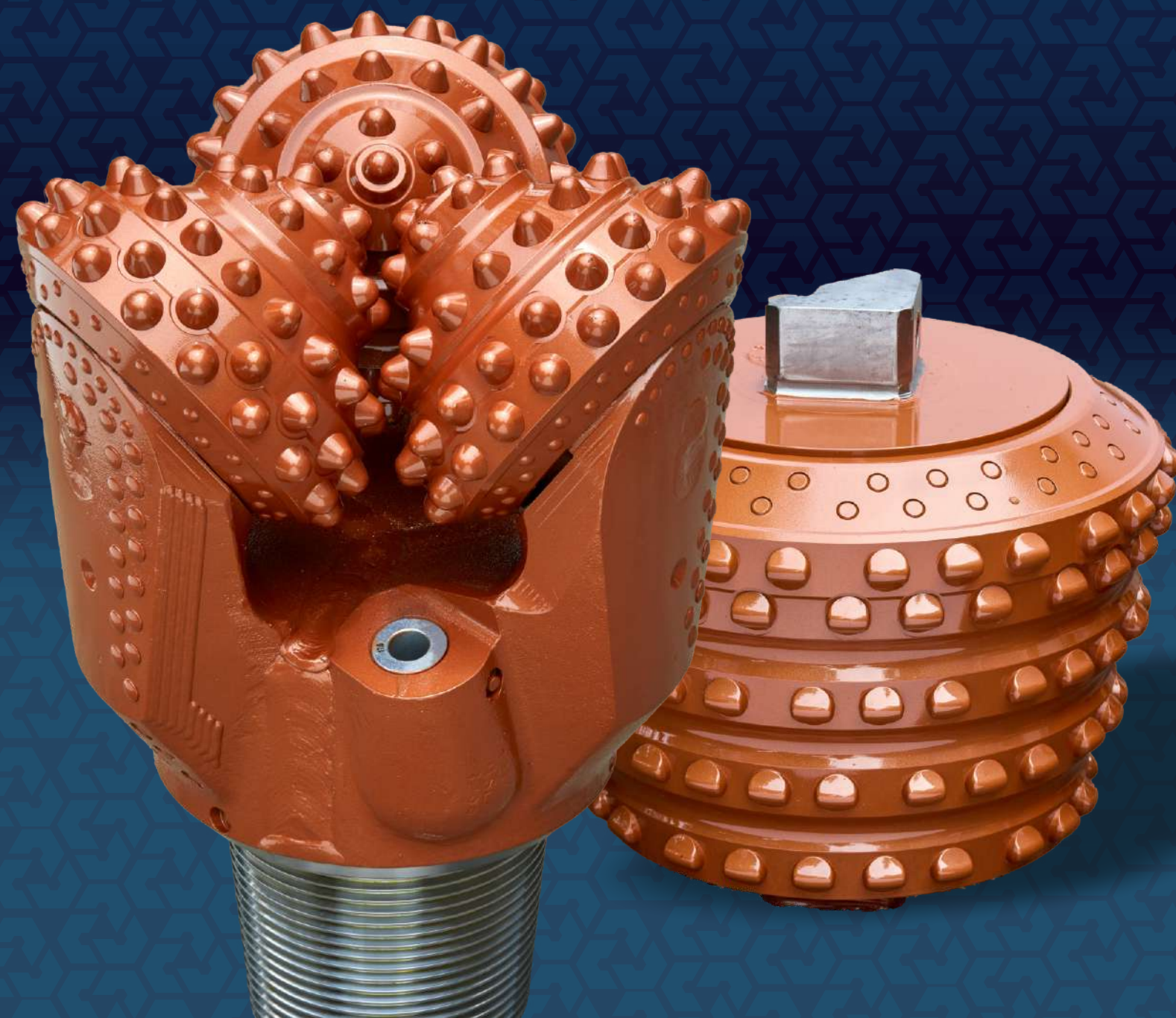
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Certified API Q1 (2437),
ISO 9001: 2015 (2567),
API Spec 7-1(1204)



Rotary Drill Bits



CGT/MKTG/2024 Dt 07/09/2024



CENERG, established in 2012, has grown to be a leading Rotary Drill Bit manufacturer based at Hyderabad – India. With an output of around 2500 bits per month, CENERG serves a strong customer base spread across 20 countries.

CENERG range of Rotary Drill Bits cover Blasthole, Waterwell, Construction, Raise Boring, Exploration and Horizontal Directional Drilling Applications. Bit sizes range from 2 3/8" to 20" in Milled Tooth and Tungsten Carbide Insert types.

Customer's unique drilling challenges call for special solutions. CENERG is well equipped to respond to these challenges from its wide range of products with short delivery times.

CENERG product development activity is aligned with evolving drill rig developments suiting autonomous drilling machines by providing reliable and high performing Rotary Drill Bits.

Our Vision

Make rock drilling Reliable,
Affordable and Smooth
for our Customers

Our Mission

Focus on continual innovation
of products to meet unique
customer challenges.



CENERG is spread across a 9000 square meter manufacturing facility and has the latest CNC Machines, Automated Heat Treatment Furnaces, Metallurgical labs, Inspection & Testing Machines.

In addition to ISO9001: 2015, API Spec 7-1 certifications, CENERG rotary drill bit facility in India is certified by American Petroleum Institute for quality management system conforming to API Q1.

CENERG has a strong leadership that guides a team of 300+ skilled employees working relentlessly to deliver the best in class products.

CENERG believes in workplace safety and reduction of incidents by investing in safety equipment and continuous training of personnel.

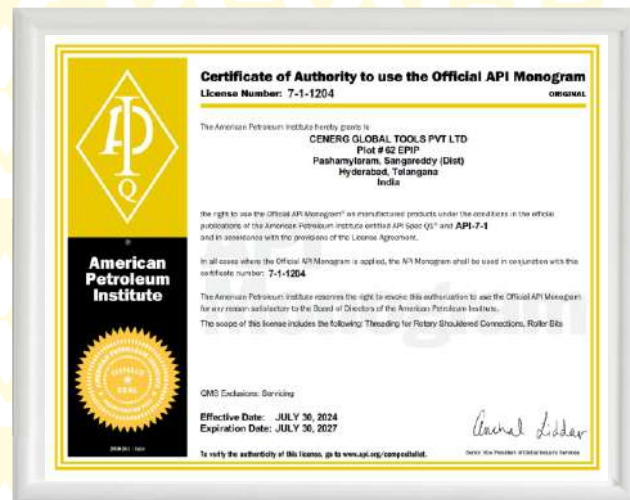
Emerging technologies like robotics and automation are used to enhance Safety, Reliability and Productivity.

CENERG QUALITY POLICY

We shall strive to achieve customer delight with respect to Quality, Timely Delivery & Dependability of our products.

We are committed to continually improve our performance with a team of dedicated professionals in all aspects of our business.

We are committed to comply with requirements & continually improve effectiveness of Quality Management System .

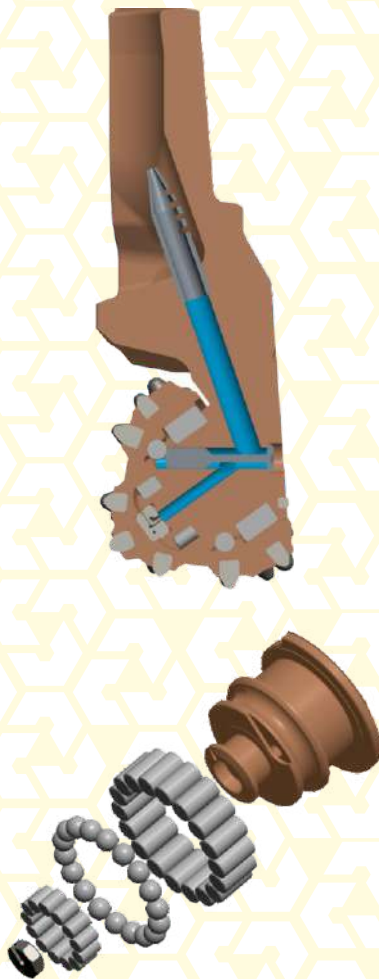


Bearing Types

Open bearing

Air Circulation

In this configuration an air passage is provided to the bearing area. The compressed air cools and lubricates the bearings and blows away any drilling debris extending the life of the bearing. This bearing configuration is commonly used in Blasthole Mining applications



Open bearing

Air, Mud or Foam Circulation

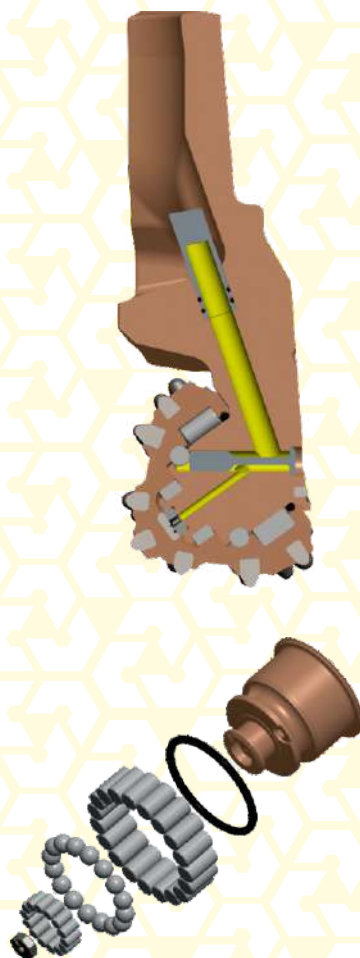
The standard open roller bearings are without a seal or an air passage. They are ideal for drilling shallow holes, in the hundreds of feet with either foam or mud circulation. These bearing configurations are commonly used in Water Well applications.



Semi-Sealed bearing

Air Circulation

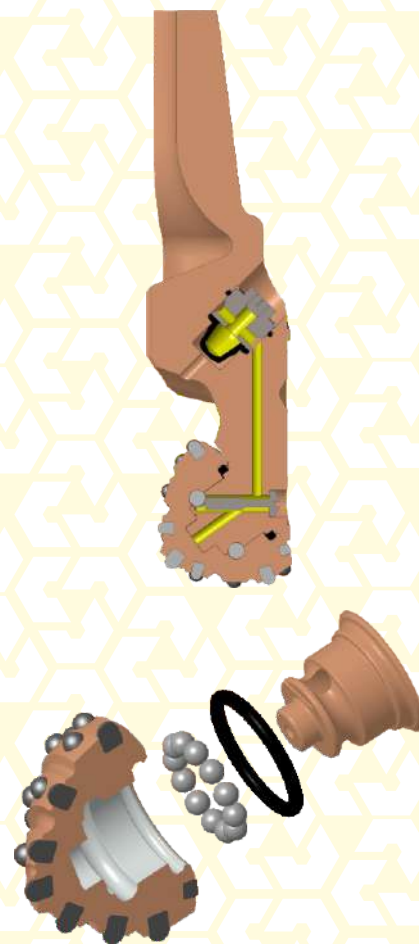
Semi-Sealed bearings for air circulation are similar to Open Air bearings, only difference being the bearing pack protected with an O- Ring Seal. The lubricant is filled into the bearing and sealed off. This prevents ingress of dirt into the bearing system and leakage of grease. This configuration is used for Mining applications with heavy water injection and ground water conditions.



Sealed friction bearing

Mud circulation

In bearings for Small Diameter Bits instead of the Floating Bush the internal surface of the Cone is silver plated using a special process. This design enables bearing size to be increased in relation to the diameter of the Bit enhancing its durability. This bearing design finds application in Reverse circulation and Waterwell drilling applications



Sealed roller bearing

Air & Mud Circulation

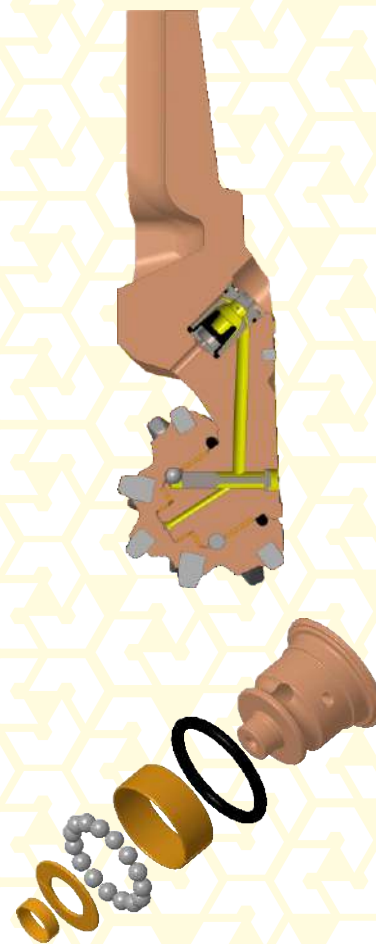
While sealed roller bearings have some of the features of Open to Air bearings, the bearing pack is protected with an O- Ring Seal and has lubrication and pressure compensator system built in. This prevents ingress of dirt into the bearing system and leakage of grease. This configuration is used for Mining, Exploration applications



Sealed Journal bearing

Air & Mud circulation

In Sealed Journal bearing the Rollers inside the cone are replaced by a Floating Bush made out of special alloys which is silver plated. The bearing Pack is protected with an O-Ring Seal. The bearing lubrication and pressure compensator system is built in. The Floating Bush is highly resistant to heat and galling. Consequently these bearings are very durable and suitable for Mining, Raise Boring, HDD applications

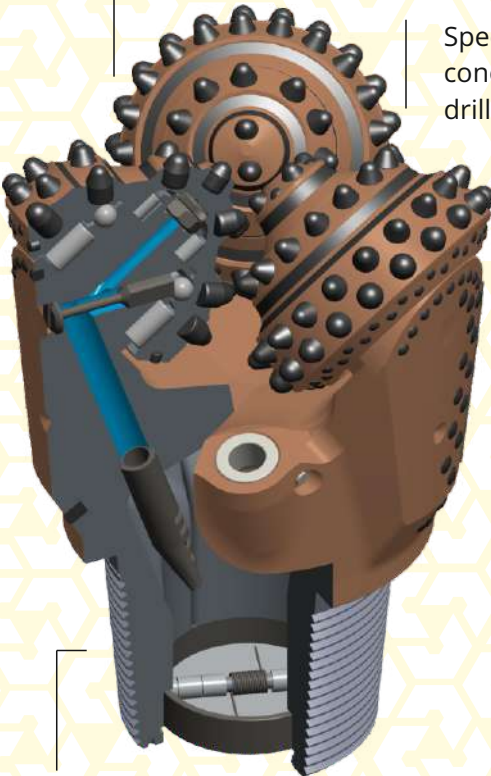


Bit features

Air to Bearing Bit

The cutting structure on the bits is optimized with intermittent pitch breaks for efficient rock breakage and to reduce vibration

Special features provided for cone steel erosion when drilling in abrasive formations.



API / Beco and other thread options provided as per customer request

**Customizable shirt tail protection options for maximum endurance

1/3rd shirttail protection for non abrasive drilling



2/3rd shirttail protection for medium hard and moderately abrasive drilling



Full shirttail protection for very hard and very abrasive drilling



Customizable gage protection options for maximum endurance



Double gage protection for very abrasive drilling conditions



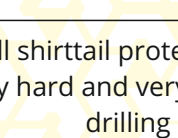
Single gage protection for normal non-abrasive drilling conditions



Small carbide inserts in between gage row inserts to reduce steel wear



Hard metal deposit on nose area of cones to avoid coring while drilling



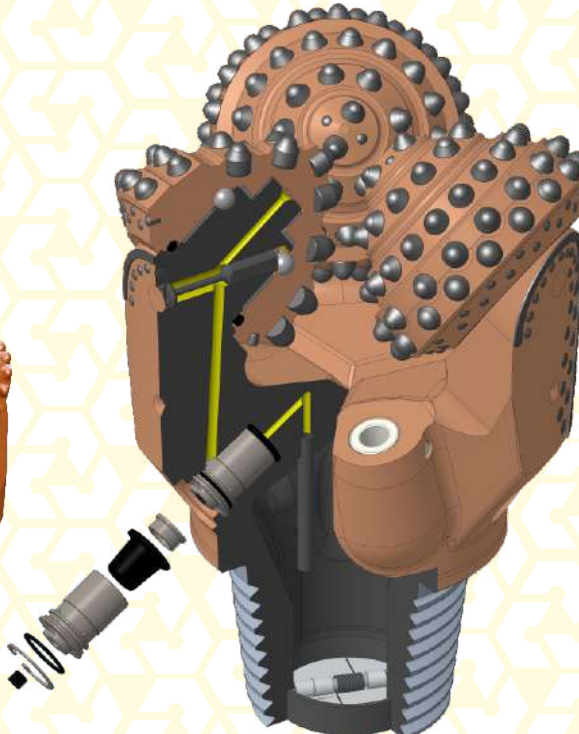
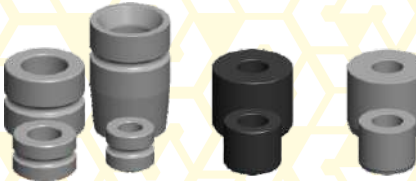
Bit features

Sealed Journal Bearing Bit

The teeth are long , strong, closely spaced with intermittent deletions to permit deep penetration
Sealed Journal Bearing package is for hard formations with higher weight on Bit

Grease compensator to maintain pressure inside the bearing and improve lubrication

Nozzles with nail retention and circlip retention



Semi Sealed Bearing Bit

Along with features of air to bearing bit, a Grease reservoir is provided to lubricate the bearing



Waterwell Open Bearing Bit

Water well bits come with centre flush hole as per customer request



Rotary Drill Bit Series

CN 25 - CN 31 Series Very Soft Formation



CN25



CN30

Design features: Large diameter and widely spaced chisel or sharp conical carbide insert with high projection. Small flat inserts placed in between, on gage and inner rows to prevent cone shell erosion. Laser hard faced spot deposits to arrest steel erosion. Additional flush space on shirttail for quick evacuation of cuttings.

Benefits: Vibration free drilling resulting in maximum penetration rates in very soft formation.

Applications: suitable for Sand, Mudstone, Sandstone type sedimentary formations with low compressive strengths of 20 to 60 Mpa

CN 37 – CN 44 Series Soft Formation



CN37



CN44

Design features: Large diameter and widely spaced chisel or sharp conical carbide inserts with high projection. Small flat inserts placed in between, on gage and inner rows to prevent cone shell erosion. Hard faced cone shell to delay erosion and exposure of active inserts.

Benefits: High penetration rates in soft formation along with vibration free drilling.

Applications: Suitable for Shale, Lime stone, Sandstone, Gravel - Soft formations with compressive strengths of 50 to 110 Mpa.

CN50 - CN 60 Series Medium Hard Formation



CN54



CN60

Design features: Moderately spaced conical inserts with medium projection. Doublerow gage protection inserts. Hard metal deposit on nose area to protect against cone shell erosion.

Benefits: Good penetration rates and longer life in medium hard and moderately abrasive formation. Longer bearing due to Smooth Drilling.

Applications: Suitable for Granite, Marble, Hard Sandstone - Medium Hard formations with Compressive Strengths of 90 - 150 Mpa.

CN 64 – CN70 Hard Formation



CN64



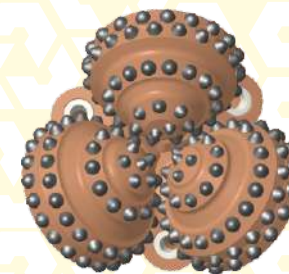
CN73

Design features: Closely spaced conical or spherical Inserts with medium to low projection. Hard metal deposit on nose area to protect against cone shell erosion.

Benefits: Good penetration rates in hard, consolidated and very abrasive formation. Longer bearing due to Smooth Drilling

Applications: Suitable for Dolomite, Granodiorite, Quartzite, Magnetite, Banded Hematite Quartzite. Formation of 150 to 250 Mpa. and banded iron and abrasive consolidated formations with compressive strengths of above 200 Mpa.

CN 74 - CN 80 Very Hard Formation



CN74



CN80

Design features: Closely spaced conical or spherical medium to low projection crack resistant tough carbide Inserts. Load balanced layout of inserts

Benefits: Stable penetration rates in very abrasive formation. Longer bearing life due to smooth drilling.

Applications: Quartzite, Taconite, Banded Iron. Very hard grade formations of 260 to 400 Mpa

Milled Tooth – Soft, Medium and Hard Formation



CN11



CN22



CN33

Design features: Aggressive and robust teeth protected with Tungsten carbide hard facing for extended performance

Benefits: Good penetration rates in unconsolidated and unfavourable rock conditions

Applications: Clay, Sand, Sandstone, Gravel, Silt stone, Mud Stone formations Compressive strengths up to 100 Mpa

New Products

Pilot Bits for Raise Boring:

These are sealed Journal bits with special cutting structures, have high wear resistant Tungsten carbide inserts in all rows. These Designs have closely spaced conical or spherical inserts which help bit diameter retention, thus giving longer life and higher bearing hours.

This design enables stable penetrations and longer bearing life due to smooth drilling.

The Bit sizes offered are from 6 1/2" to 17 1/2" with API REG pin connections.



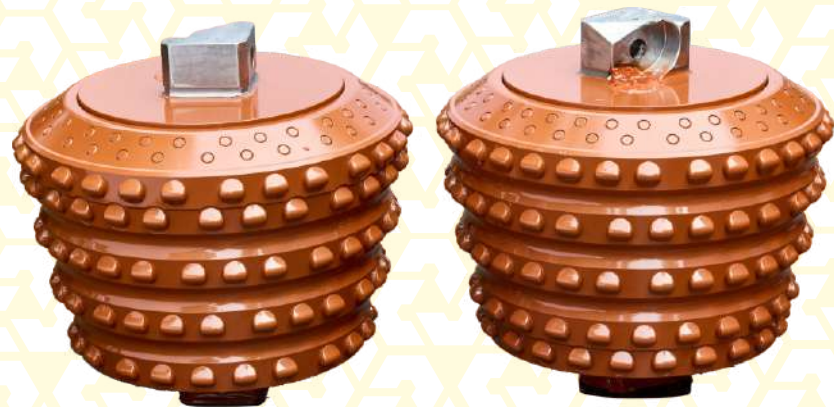
Raise Boring cutters:

Raise boring cutters have a flat cutting structure which are designed for tough drilling conditions.

Two cutter varieties, with different row space inserts are available to perform in different Rock formations. By suitably changing these 2 cutters' position in the reaming head, all rock formations can be reamed.

Each cutter has 5 rows of carbide, and when run in pairs provide an extra row of protection on the nose and gage row of each cutter.

Dia 12" & Dia 14" cutters in styles 5G and 5N (different row spacings) are currently offered for the Raise boring application.



New Products

MJB Sub Exploration Bits:

MJB Sub Roller bits' Cutting structures are Engineered to optimize performance in specific geological drilling environment. The bit body is made from high strength steel alloys designed to withstand the stresses of drilling.

MJB subs are employed in Exploration projects to collect soil, rock samples and assess conditions.

These have rotating cones with tungsten carbide inserts, suitable for a range of rock types. The geometry is optimized based on the specific drilling application, considering factors like rock hardness,abrasiveness, and the desired drilling speed.

Dia 4 3/4" to 6 3/4" MJB Subs in IADC 537 and 637 are currently offered.



Reverse Circulation Bits:

In Reverse circulation drilling systems, unlike conventional drilling where the drilling fluid flows down the drill string and returns to the surface through the annulus, the drilling fluid is pumped down the outer annulus and returns to the surface through the inner core barrel.

They work for longer bearing hours and help to achieve deeper depths in diverse geological conditions.

This Bit is a valuable asset in mineral exploration, geotechnical investigations, environmental monitoring, water well drilling, and mining operations.

RC Bits are made from Dia 4 3/4" to 6 3/4" in open and sealed bearing designs.



Product offering

Blasthole Mining Application												Open bearing – Air Circulation							
Bit Diameter		IADC X-X-2																	
Inch	mm	4- 1	4- 2	4- 3	4- 4	5-1	5-2	5-3	5-4	6-1	6-2	6-3	6-4	7-1	7-2	7-3	7-4		
5 1/8"	130							▲											
5 5/8"	143							▲	▲										
5 7/8"	150		▲					▲				▲			▲				
6 1/4"	159	▲	▲					▲				▲			▲				
6 1/2"	165		▲									▲							
6 3/4"	171	▲	▲									▲	▲		▲	▲			
7"	178	▲																	
7 3/8"	187		▲																
7 7/8"	200	▲	▲		▲		▲	▲	▲			▲	▲		▲				
8 1/2"	216							▲	▲			▲	▲		▲				
8 5/8"	219							▲	▲			▲	▲		▲				
8 3/4"	222							▲	▲			▲	▲		▲				
9"	229	▲	▲	▲	▲			▲	▲			▲	▲	▲	▲	▲			
9 7/8"	251	▲	▲	▲	▲	▲		▲	▲			▲	▲		▲	▲			
10 5/8"	270	▲	▲		▲	▲		▲	▲			▲	▲	▲	▲				
11"	284							▲				▲	▲	▲					
12 1/4"	311				▲			▲	▲			▲	▲		▲	▲			
13 3/4"	349								▲				▲						
16"	406								▲				▲						

Blasthole Mining Application												Semi Sealed Bearing - Air Circulation					
Bit Diameter		IADC X-X-5															
Inch	mm	4- 1	4- 2	4- 3	4- 4	5-1	5-2	5-3	5-4	6-1	6-2	6-3	6-4	7-1	7-2	7-3	7-4
6 ¾"	171							▲					▲				
7 ⅞"	200	▲	▲	▲					▲				▲				
8 ½"	216							▲				▲	▲				
8 ⅝"	219											▲	▲				
8 ¾"	222							▲	▲			▲	▲				
9"	229	▲	▲	▲				▲	▲			▲	▲				
9 ⅝"	244							▲				▲	▲				
9 ⅞"	251	▲	▲	▲	▲			▲	▲			▲	▲				
10 ⅝"	270	▲	▲	▲	▲			▲	▲			▲	▲				
11"	284							▲						▲			
12 ¼"	311				▲			▲	▲			▲	▲				

Blasthole Mining Application		IADC X-X-7										Sealed Journal Bearing - Air Circulation						
Bit Diameter																		
Inch	mm	4- 1	4- 2	4- 3	4- 4	5-1	5-2	5-3	5-4	6-1	6-2	6-3	6-4	7-1	7-2	7-3	7-4	8-3
6 3/4"	171								▲				▲					
7 7/8"	200	▲	▲	▲			▲		▲			▲	▲				▲	
8 1/2"	216								▲			▲	▲				▲	
8 5/8"	219								▲			▲	▲				▲	
8 3/4"	222							▲	▲			▲	▲		▲			
9"	229	▲	▲	▲	▲			▲	▲				▲				▲	
9 5/8"	244																▲	
9 7/8"	251	▲	▲	▲	▲			▲	▲				▲		▲		▲	
10 5/8"	270	▲	▲	▲	▲		▲		▲			▲	▲		▲	▲		▲
11"	284												▲					
12 1/4"	311				▲		▲		▲			▲	▲		▲	▲		▲

Product offering

Pilot bits for Raise Boring		Mud Circulation			
Bit Diameter		IADC X-X-7			
Inch	mm	5-3	6-3	7-3	8-3
6 1/2"	165	▲	▲		▲
8 1/2"	216	▲			
9"	229				▲
9 7/8"	251	▲	▲	▲	▲
10 5/8"	267	▲			
11"	284		▲		▲
12 1/4"	311	▲	▲	▲	▲
12 7/8"	327				▲
13 3/4"	349	▲	▲	▲	▲
14 3/4"	375		▲	▲	▲
15"	381				▲
16"	406	▲			▲
17 1/2"	445				▲

MJB Exploration Subs		Air, Foam and Mud Circulation	
Bit Diameter		IADC X-X-7	
Inch	mm	5-3	6-3
4 ¾"	121	▲	▲
5"	127	▲	▲
5 ¼"	133	▲	▲
5 ⅝"	137	▲	▲
5 ⅞"	143	▲	▲
5 ¾"	146	▲	▲
6"	152	▲	▲
6 ¼"	159	▲	▲
6 ½"	165	▲	▲
6 ¾"	171	▲	▲

Reverse Circulation Bits			Air, Foam and Mud Circulation				
Bit Diameter		IADC X-X-7					
Inch	mm	5-1	5-3	5-4	6-1	6-3	6-4
4 3/4"	121	▲				▲	
5"	127		▲				
5 1/4"	133		▲	▲		▲	
5 3/8"	137		▲	▲		▲	
5 1/2"	140		▲	▲		▲	
5 5/8"	143		▲			▲	
5 3/4"	146					▲	
6 1/4"	159					▲	
6 3/4"	171		▲			▲	

Raise Boring Cutters	
14"	RB1001-5G
14"	RB1002-5N

Notes:

Reverse Circulation Bits		Air, Foam and Mud Circulation			
Bit Diameter					
Inch	mm	5-2-1	5-3-1	5-3-1	6-3-3
4 7/8"	124	▲			
5"	127		▲	▲	
5 1/4"	133		▲	▲	▲
5 3/8"	137		▲	▲	
5 3/4"	146				▲
5 7/8"	150				▲

Product offering

Waterwell Application		Open bearing – Air, Mud or Foam Circulation							
Bit Diameter		IADC X-X-1							
Inches	mm.	1-1	2-3	3-2	3-3	4-3	5-2	6-2	7-2
2 3/8	60	▲	▲	▲	▲		▲	▲	▲
2 1/2"	64	▲	▲	▲	▲		▲	▲	▲
2 5/8"	66	▲	▲	▲	▲		▲	▲	▲
2 7/8"	73	▲	▲	▲	▲		▲	▲	▲
2 15/16"	75	▲	▲	▲	▲		▲	▲	▲
3"	76	▲	▲	▲	▲		▲	▲	▲
3 1/8"	79	▲	▲	▲	▲		▲	▲	▲
3 1/4"	83	▲	▲	▲	▲		▲	▲	▲
3 3/8"	86	▲	▲	▲	▲		▲	▲	▲
3 1/2"	89	▲	▲	▲	▲		▲	▲	▲
3 5/8"	92	▲	▲	▲	▲		▲	▲	▲
3 3/4"	95	▲	▲	▲	▲		▲	▲	▲
3 7/8"	98	▲	▲	▲	▲		▲	▲	▲
4"	102	▲	▲	▲	▲		▲	▲	▲
4 1/8"	105	▲	▲	▲	▲		▲	▲	▲
4 1/4"	108	▲	▲	▲	▲		▲	▲	▲
4 3/8"	111	▲	▲	▲	▲		▲	▲	▲
4 1/2"	114	▲	▲	▲	▲		▲	▲	▲
4 5/8"	118	▲	▲	▲	▲		▲	▲	▲
4 3/4"	121	▲	▲	▲	▲		▲	▲	▲
4 7/8"	124	▲	▲	▲	▲		▲	▲	▲
5"	127	▲	▲	▲	▲		▲	▲	▲
5 1/8"	130	▲	▲	▲	▲		▲	▲	▲
5 1/4"	133	▲	▲	▲	▲		▲	▲	▲
5 3/8"	137	▲	▲	▲	▲		▲	▲	▲
5 1/2"	140	▲	▲	▲	▲		▲	▲	▲
5 5/8"	143	▲	▲	▲	▲		▲	▲	▲
5 3/4"	146	▲	▲	▲	▲	▲	▲	▲	▲
5 7/8"	149	▲	▲	▲	▲	▲	▲	▲	▲
6"	152	▲	▲	▲	▲		▲	▲	▲
6 1/8"	156	▲	▲	▲	▲		▲	▲	▲
6 1/4"	159	▲	▲	▲	▲		▲	▲	▲
6 3/8"	162	▲	▲	▲	▲		▲	▲	▲
6 1/2"	165	▲	▲	▲	▲		▲		▲
6 5/8"	168	▲	▲	▲	▲	▲	▲		▲
6 3/4"	172	▲	▲	▲	▲		▲	▲	▲
7"	178	▲		▲	▲		▲	▲	▲
7 1/4"	184			▲					▲
7 3/8"	187	▲	▲	▲	▲		▲	▲	▲
7 1/2"	191	▲	▲	▲	▲	▲	▲	▲	▲
7 5/8"	194	▲	▲	▲	▲	▲	▲	▲	▲
7 7/8"	200	▲	▲	▲	▲		▲	▲	▲
8"	203	▲	▲	▲	▲		▲	▲	▲
8 1/2"	216	▲	▲	▲	▲		▲	▲	▲
8 5/8"	219	▲	▲	▲	▲		▲	▲	▲
9 1/2"	241	▲	▲	▲	▲		▲		▲
9 5/8"	244	▲	▲	▲	▲	▲	▲		▲
9 7/8"	251	▲	▲	▲	▲		▲	▲	▲
10"	254	▲	▲	▲	▲		▲	▲	▲
10 5/8"	270			▲					▲
12 1/4"	311			▲					▲
14"	356							▲	
15"	381						▲	▲	
15 1/2"	394							▲	
16"	406		▲					▲	
17 1/2"	445							▲	

Notes:

Product offering

Waterwell, Utility Application																						Sealed Bearing- Mud Circulation										
Bit Diameter		IADC X-X-7																														
Inches	mm.	1-1	1-2	1-3	2-1	2-2	2-3	3-1	3-2	3-3	4-1	4-2	4-3	4-4	5-1	5-2	5-3	5-4	6-1	6-2	6-3	6-4	7-1	7-2	7-3	7-4						
3 7/8"	98	▲			▲											▲																
4 1/2"	114	▲			▲			▲																								
4 5/8"	118				▲																											
4 3/4"	121	▲			▲										▲	▲	▲				▲											
5"	127																▲															
5 1/8"	130															▲																
5 1/2"	140	▲													▲	▲	▲	▲			▲											
5 5/8"	143								▲												▲											
5 3/4"	146	▲																▲														
5 7/8"	149	▲																			▲											
6"	152	▲			▲										▲	▲	▲															
6 1/8"	156	▲			▲												▲															
6 1/4"	159	▲															▲															
6 1/2"	165	▲						▲							▲	▲	▲	▲														
6 3/4"	171	▲				▲									▲																	
7 1/4"	184								▲																							
7 3/8"	187								▲																							
7 1/2"	191																▲															
7 7/8"	200	▲															▲															
8 1/2"	216	▲			▲										▲		▲															
8 3/4"	222	▲		▲					▲								▲															
9 1/2"	241																▲															
9 7/8"	251	▲		▲	▲				▲						▲		▲															
10 5/8"	270	▲															▲								▲							
12 1/4"	311	▲	▲		▲								▲		▲		▲	▲	▲			▲										
13 3/4"	349															▲																
14 3/4"	375																									▲						
16"	406																									▲						

Make-up Torque Ranges for Roller Cone Drill Bits

Connection	Minimum Make up Torque ft-lb	Maximum Make up Torque ft-lb
2 3/8 API REG	3000	3500
2 7/8 API Reg	4500	5500
3 1/2 API REG	7000	9000
4 1/2 API REG	12000	16000
6 5/8 API REG	28000	32000
7 5/8 API REG	34000	40000
8 5/8 API REG	40000	60000

Notes:

Note: Send enquiry with size, IADC & Application details to marketing@cenerg.in

We can offer other sizes and IADCs on specific request

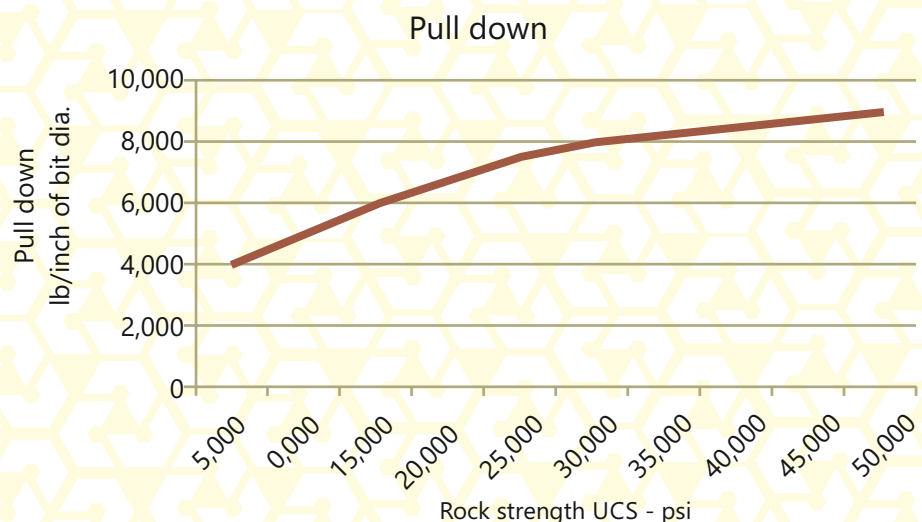
Useful Operating Information

- When a new bit is installed, drill at reduced weight for 30 minutes
- Select the correct nozzle size to provide adequate air to the bit for optimal bearing performance and reduced abrasion wear on cones & shirttails. (Recommended 40 – 45 psi at the bit checked with U tube gage)
- Turn the air on before lowering the bit to collar the hole. Continue to keep the air on until the bit finishes drilling and is out of the hole.
- Rotate the bit when moving in and out of the hole.
- Rotating the bit when moving out of the hole
 - Helps in cleaning the cuttings from the hole.
 - Prevents the cuttings from entering the bearings.
- Indications that the hole is not being properly cleaned are:
 - Increase in torque/ higher hydraulic pressure.
 - Increase in air pressure.
 - Heavy wear / damage on shirttails.
- Do not use the hydraulic pressure on the bit for leveling the machine
- When adding extra drill pipe in wet holes, run three or four clean passes to get a cleaner hole bottom.
- Bit cones should be checked periodically for temperature. An odd hot cone indicates that the air passage to the bearing is being obstructed. Clean this cone with water.
- When repairs require lowering of the head assembly to the deck, Bit should never be left down the hole.
- Also the bit should be substituted by a dull bit to protect the drill pipe threads.
- Drill pipe and its threaded connections should be maintained properly as a bent pipe will often lead to early failure.
- Blasthole bits drill most economically when sufficient weight is applied to cause fracture of the formation.
- Selecting correct rotary speed is a matter of trial and error, depends upon the formation being drilled.
- Alternatively use the factory recommended weight and rotation speeds.
- It is necessary to make an analysis of each discarded bit for dulling and its causes These findings help in determining the suitable bit design features for the application.

Pull Down & Rotation

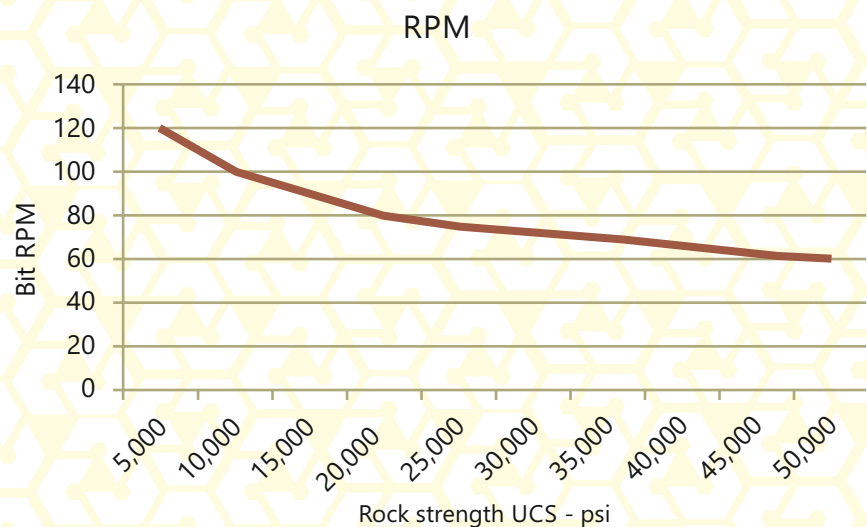
Pull down load is required to adequately push teeth into the rock to break in efficiently. It is the primary factor in rate of penetration. The unconfined compressive strength of the rock determines how much pull down is to be applied.

High UCS rocks may need time for the indenter to break it. Lower RPM is often required for efficient rock breakage.



Rotation is required to move the cutting teeth to the next rock cutting position. The faster you move the teeth to the next position, the faster you will drill. If the rock resists indentation by the teeth, there will be minimal rock breakage, and rate of penetration will not increase proportionally with higher rotation.

For softer rock high RPM is required as Soft rock responds to frequency and for harder rock low RPM is required as Hard rock responds to time



Air and Nozzle Selection

In rotary blasthole drilling, delivery of air in sufficient volume and at proper pressure is very essential to assure optimum bit performance.

Right amount of air ensures efficient cuttings removal from the hole bottom to the surface. It also reduces the cutting structure wear and bearing erosive wear by means of efficient bottom hole cleaning.

The right amount of back pressure is also required to cool the bearing and to keep the bearing clean from drilling debris.

The air volume provided must be good enough to produce a bailing velocity of 5,000-7,000 ft./min. for dry cuttings; and 7,000-10,000 ft./min. for wet cuttings.

To determine volumetric requirements, and bailing velocity the simple equation may be used.

Q = V/183.35 (D² – d²)

Q = cubic feet per minute of free air.

V = Annular Velocity feet / min

d = drill pipe outside diameter, inches.

D = hole diameter, inches.

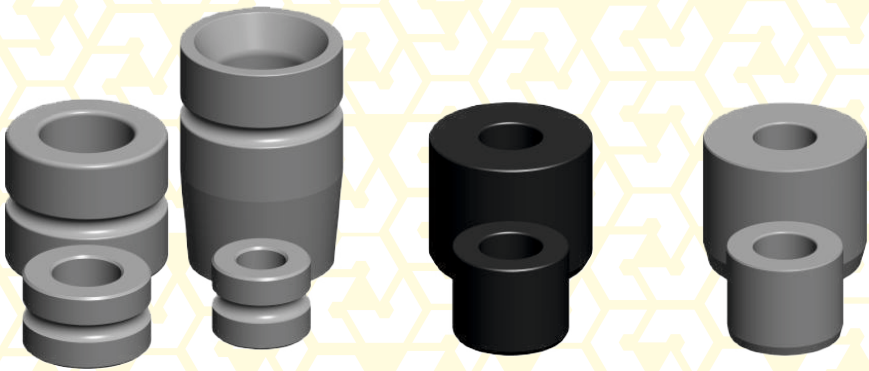
183.35 = Factor for conversion

Hence to determine the bailing velocity the equations is

V = Q x 183.35 / (D²- d²) feet per min

Nozzle selection

Nozzles should be selected so that the pressure inside the bit is 40-45 psi. The cab operating pressure inside the drills cabin could be higher, depending on the type of drill and CFM of air circulated. Typically, on compressors rated with 80-100 psi bit pressures can be 10 - 25 psi lower than the cab gauge reading.



Nozzle Selection Table

Bit size wise Nozzle selection for corresponding Air volumes - (CFM)

Bit Diameter		750		900		1050		1200		1400		1600		1900	
Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm
5 5/8"	143	8/16	12	8/16	13	9/16	14	10/16	16	11/16	17	11/16	18	12/16	20
5 7/8"	149	7/16	12	8/16	13	9/16	14	10/16	15	11/16	17	11/16	18	12/16	20
6"	152	7/16	12	8/16	13	9/16	14	10/16	15	10/16	17	11/16	18	12/16	20
6 1/4"	159	7/16	12	8/16	13	9/16	14	10/16	15	10/16	17	11/16	18	12/16	20
6 3/4"	171	7/16	11	8/16	13	9/16	14	9/16	15	10/16	16	11/16	18	12/16	19
7 3/8"	187	7/16	11	8/16	13	9/16	14	9/16	15	10/16	16	11/16	18	12/16	19
7 7/8"	200	7/16	11	8/16	12	8/16	13	9/16	14	10/16	16	11/16	17	12/16	19
8 1/2"	216	6/16	9	7/16	10	8/16	12	8/16	13	9/16	15	10/16	16	11/16	18
9"	229	6/16	9	7/16	10	8/16	12	8/16	13	9/16	15	10/16	16	11/16	18
9 7/8"	251	4/16	6	5/16	9	6/16	10	7/16	12	8/16	13	9/16	15	11/16	17
10 5/8"	270	2/16	4	4/16	7	6/16	9	7/16	10	8/16	12	9/16	14	10/16	16
11"	279			4/16	6	5/16	8	6/16	10	7/16	12	9/16	14	10/16	16
12 1/4"	311			4/16	6	5/16	8	6/16	10	7/16	12	9/16	14	10/16	16
13 3/4"	349					3/16	6	5/16	8	6/16	10	8/16	12	9/16	15
15"	381					3/16	4	4/16	7	6/16	10	7/16	12	9/16	14
16"	406							3/16	5	5/16	8	7/16	11	8/16	13
17 1/2"	445									3/16	5	5/16	8	7/16	12

Bit Diameter		2000		2500		2600		3000		3600		3800	
Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm
5 5/8"	143	13/16	20	14/16	23	15/16	23	1	25	1 1/16	28	1 2/16	28
5 7/8"	149	13/16	20	14/16	23	15/16	23	1	25	1 1/16	27	1 2/16	28
6"	152	13/16	20	14/16	23	15/16	23	1	25	1 1/16	27	1 2/16	28
6 1/4"	159	13/16	20	14/16	23	15/16	23	1	25	1 1/16	27	1 2/16	28
6 3/4"	171	13/16	20	14/16	22	14/16	23	1	25	1 1/16	27	1 2/16	28
7 3/8"	187	12/16	20	14/16	22	14/16	23	1	25	1 1/16	27	1 2/16	28
7 7/8"	200	12/16	19	14/16	22	14/16	23	15/16	24	1 1/16	27	1 1/16	28
8 1/2"	216	12/16	19	13/16	21	14/16	22	15/16	24	1 1/16	26	1 1/16	27
9"	229	12/16	19	13/16	21	14/16	22	15/16	24	1 1/16	26	1 1/16	27
9 7/8"	251	11/16	18	13/16	20	13/16	21	14/16	23	1	26	1 1/16	26
10 5/8"	270	11/16	17	12/16	20	13/16	20	14/16	22	1	25	1	26
11"	279	10/16	16	12/16	19	13/16	20	14/16	22	1	25	1	26
12 1/4"	311	10/16	16	12/16	19	13/16	20	14/16	22	1	25	1	26
13 3/4"	349	10/16	15	12/16	19	12/16	19	13/16	21	15/16	24	1	25
15"	381	9/16	15	11/16	18	12/16	19	13/16	21	15/16	24	1	25
16"	406	9/16	14	11/16	17	11/16	18	13/16	20	15/16	23	15/16	24
17 1/2"	445	8/16	13	10/16	16	11/16	17	12/16	19	15/16	22	15/16	23

