IPS ROCK BITS CATALOG

2016 - 2017

Bearing series

Content

X - Series Bearing (Sealed Journal, 4 - 3/4" to 17 - 1/2")
M - Series Bearing (Sealed Journal: Motor, 4 - 3/4" to 15 - 1/2")

Performance

1. This type has the best bearing performance of all the bit bearing types manufactured by TSK.
2. As this floating journal bearing is designed using bearing metal having excellent anti-galling properties, the bearing is highly resistant to shock loads.

Structure

1. This bearing has a nose-pin floating bushing, a thrust washer, a ball bearing, a journal floating bushing and a special seal.
2. The floating bushing and the thrust washer are made of bearing metal that has been correctly heat treated, polished, and coated with a solid lubricant.
3. The seal has been specially developed for high-speed rotary and motor drilling.

A grease reservoir with a rubber bellows is located in the bit body.

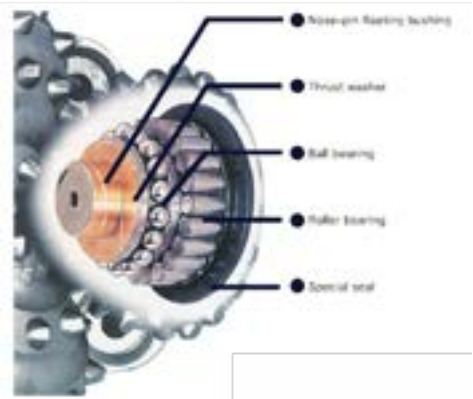
XZ - Series Bearing (Sealed Roller / Floating, 9 - 5/8" a 17 - 1/2")

Performance

This type is highly suited for high-speed rotary drilling.

Structure

1. This bearing has a nose-pin floating bushing, a thrust washer, a ball bearing, a journal roller bearing and a special seal.
2. As less heat is generated by flangeless roller bearings polished on all surfaces, this bearing is well suited for high-speed rotary drilling.
3. The seal has been specially developed for high-speed rotary drilling.

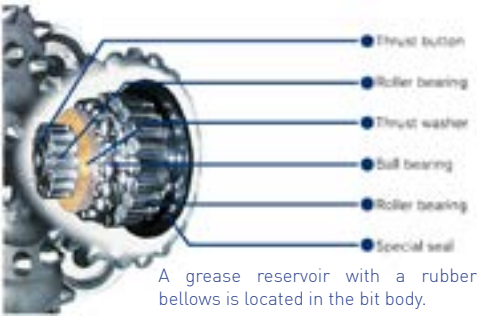


A grease reservoir with a rubber bellows is located in the bit body.

MZ - Series Bearing (Sealed Roller: Motor, 13-3/8" to 26")

Performance
This type has the performance needed for high-speed motor drilling.

Structure
1. The bearing has a thrust button, a roller bearing, a thrust washer, a ball bearing and a special seal.
2. Heat generation is minimized by the use of flangeless roller bearings polished on all surfaces. This bearing is well suited for motor drilling.
3. The seal has been specially developed for motor drilling.



A grease reservoir with a rubber bellows is located in the bit body.

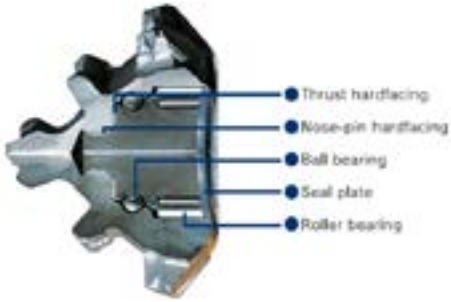
Z – Series Bearing (Sealed Roller: For Insert Bits)

1. Heat generation is minimized by the use of flangeless roller bearings with polished surfaces.

2. The thrust washer is made of bearing metal having excellent anti-galling properties.

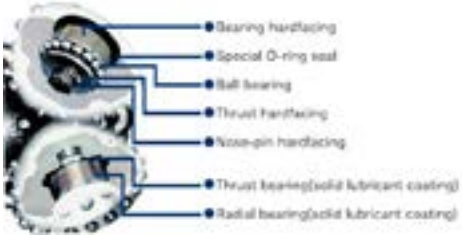
Z – Series Bearing (Sealed Roller: For Steel Tooth Bits)

This sealed roller bearing has a special seal plate structure that keeps out mud and cuttings. This type of bearing is used for steel tooth bits.



K – Series Bearing (Sealed Journal)

1. This type of bearings is well suited for high-load drilling at medium to low speeds.
2. The journal bearing faces are covered with a stellite layer (body section) and a silver alloy layer deposited over a carburized and hardened case (cutter section).



Non – Sealed Roller Bearing

This non-sealed roller bearing comprises a ball bearing and a roller bearing. It is mainly used with light loads, when drilling shallow wells, with either large-diameter bits or small-diameter bits that do not require sealing.

Insert Bits / 12 – ¼" X 30 G Y R F V P C – G

12 – ¼": Bit Diameter

X: Bearing Series
- X: Sealed Journal
- M: Sealed Journal (Motor Bits)
- K: Sealed Journal
- Z: Sealed Roller
- XZ: Sealed Roller / Floating
- MZ: Sealed Roller (Motor Bits)

30: Type (05, 08, 10, 15, 20, 25, 30, 40, 50, 60, 65, 70, 90)
IADC (41, 42, 43, 44, 51, 52, 53, 61, 62, 63, 72, 73, 83)

G: Shirttail Inserts
- G: Shirttail TC Inserts
- G2: Diamond Inserts on the Shirttail

Y: Inner Rows
- Y: Conical – Shaped

R: Gage Reinforcement
- H: Chisel – Shaped (Gage Row)
- R: Round – Shaped (Gage Row)

F: Gage Protection (Sub Gage Row)
- F: Side – Scraper

V: Gage Protection
- D: Diamond Gage Inserts (D1: 33%, D2: 50%, D3: 100%)
- V: Diamond Heel Inserts (V1: 33%, V2: 50%, V3: 100%)
- S: Diamond Particle Heel Inserts (S: 50%)

P: Leg Protection / Increased Stabilization
- P: Stabilizer Pads
- P2: Diamond Inserts to the Leading Edge of the Pads
- P3: Full Diamond Inserts of the Pads

C: Center Jet

-G: High Temperature Use

Steel Tooth Bits / 12 – ¼" MH – Q T X G P C –G

12 – ¼": Bit Diameter

MH: Type (SS, S, MSS, MS, MH, HS, H, HR)
IADC (11, 12 ,13, 21, 23, 31, 32, 34)

Q: Full Hardfacing on Teeth
(M, XZ, MZ – Series Bearing: Standard: Full Hardfacing on Teeth)

T: Gage Protection (Heel Row)
T: TC Inserts
V: Diamond Heel Inserts (V1: 33%, V2: 50%, V3: 100%)

X: Bearing Series
X: Sealed Journal
M: Sealed Journal (Motor Bits)
Z: Sealed Roller
XZ: Sealed Roller / Floating
MZ: Sealed Roller (Motor Bits)

G: Shirttail TC Inserts
No mark: Non Sealed Roller

P: Leg Protection / Increased Stabilization
P: Stabilizer Pads

C: Center Jet

-G: High Temperature Use

IADC Code Bit Classifications - Rock bits

Bearing / Gage

	Formations	Series	Type	Standard Roller Bearing	Roller Bearing, Air Cooled	Roller Bearing, Gage Protected	Sealed Roller Bearing	Sealed Roller Bearing, Gage Protected	Sealed Friction Bearing	Sealed Friction Bearing, Gage Protected
Steel Tooth Bits	Soft Formations	1	1	SS		SS - T	SS - (Z, XZ, MZ)	SS - (TZ,TXZ,TMZ)	SS- (X, M)	SS - (TX, TM)
			2	S		S - T	S - (Z, XZ, MZ)	S - (TZ,TXZ,TMZ)	S- (X, M)	S - (TX, TM)
			3	MSS		MSS - T	MSS - (Z, XZ, MZ)	MSS-(TZ,TXZ,TMZ)	MSS- (X, M)	MSS - (TX, TM)
			4							
	Medium Formations	2	1	MS		MS - T	MS - (Z, XZ, MZ)	MS-(TZ,TXZ, TMZ)	MS- (X, M)	MS - (TX, TM)
			2							
			3	MH		MH - T	MH - (Z, XZ)	MH - (TZ,TXZ)	MH - X	MH - TX
			4							
	Hard Formations	3	1	HS		HS - T	HS - (Z, XZ)	HS - (TZ, TXZ)	HS - X	HS - TX
			2	H		H - T	H - (Z, XZ)	H - (TZ, TXZ)	H - X	H - TX
			3							
			4	HR		HR - T	HR - (Z, XZ)	HR- (TZ, TXZ)	HR - X	HR - TX
Insert Bits	Soft Formations 4	4	1					Z05G XZ05G MZ05G		M04G X05G M05G
			2					XZ08G, MZ08G		X05GY, X08G,M08G
			3					Z10G XZ10G MZ10G		X10G X10GY M10G
			4					Z15G XZ15G MZ15G		X15G M15G
	Soft to Medium Formations	5	1					Z20G XZ20G MZ20G		X20G M20G
			2					XZ25G, MZ25G		X20GY, X25G, M25G
			3		A30			Z30G XZ30G MZ30G		X30G M30G
			4					XZ30GY		X30GY
	Medium Hard Formations	6	1		A40			Z40G XZ40G MZ40G		X40G M40G
			2		A50			Z50G, XZ50G		X50G
			3		A60			Z60G, XZ60G		X60G
			4							
	Hard Formations	7	1							
			2							X65G
			3		A70					X70G
			4							
	Extremely Hard Formations	8	1							
			2							
			3		A90					X90G
			4							

List of Products - Insert Bits

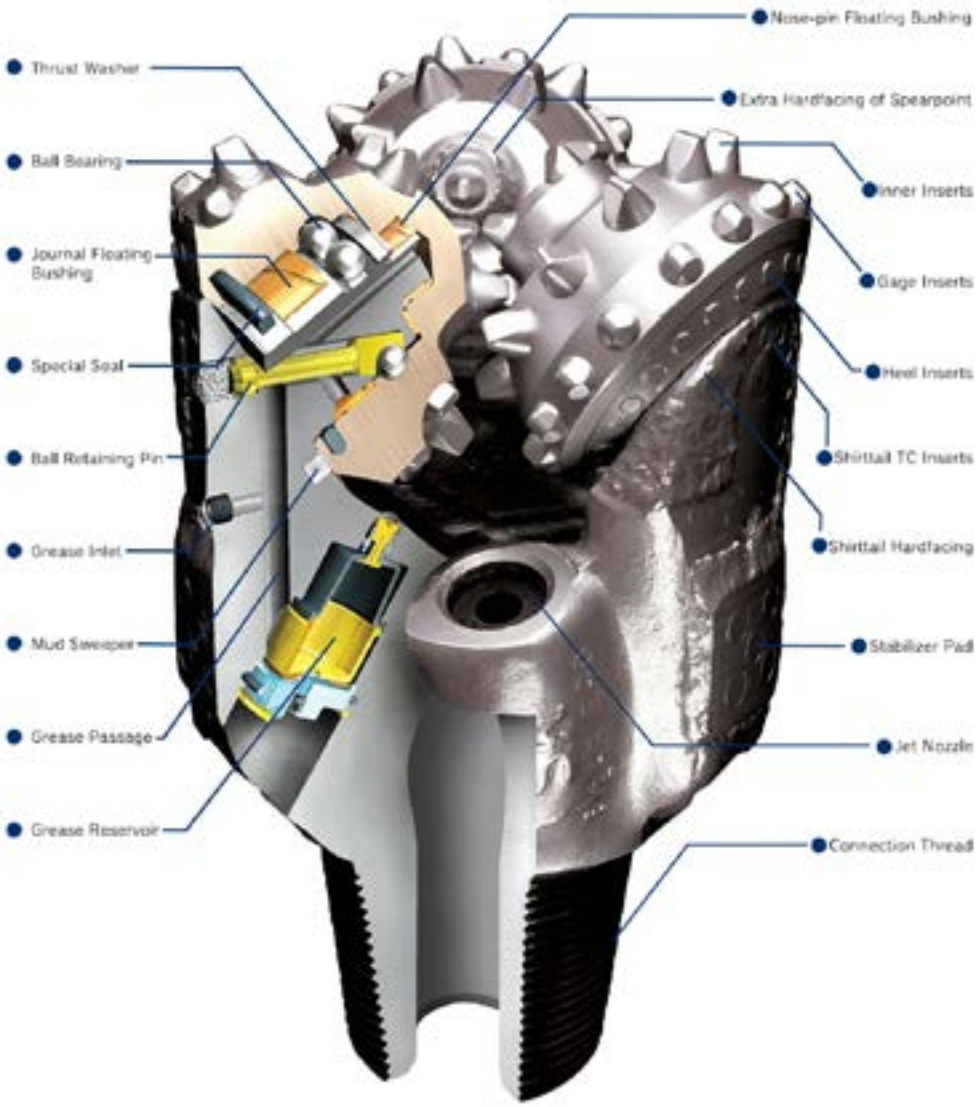
Bit Size mm	Bit Size in	Connection thread API Reg.	Sealed roller bearings	Sealed journal bearings	Air bearings	Weight (kgf)
98.4	3 - 7/8"	2 - 3/8"		K30G, K40G		3.8
101.6	4"	2 - 3/8"		K30G, K40G		4.4
114.3	4 - 1/2"	2 - 3/8"		K30G, K40G		5.3
120.7	4 - 3/4"	2 - 7/8"		X30G, X40G, M30G, M40G		9.6
123.8	4 - 7/8"	2 - 7/8"		X30G, X40G, M30G, M40G		9.7
142.9	5 - 5/8"	3 - 1/2"		X20G, X30G, X40G, M20G, M30G, M40G		16.0
149.2	5 - 7/8"	3 - 1/2"		X20G, X30G, X40G, M20G, M30G, M40G		17.0
152.4	6"	3 - 1/2"		X20G, X30G, X40G, M20G, M30G, M40G		17.5
155.6	6 - 1/8"	3 - 1/2"		X20G, X30G, X40G, M20G, M30G, M40G		18.0
158.8	6 - 1/4"	3 - 1/2"		X20G, X30G, X40G, M20G, M30G, M40G		18.0
165.1	6 - 1/2"	3 - 1/2"		X20G, X30G, X40G, M20G, M30G, M40G		20.0
171.5	6 - 3/4"	3 - 1/2"		X20G, X30G, X40G, M20G, M30G, M40G		22.0
190.5	7 - 1/2"	4 - 1/2"		X20G, X30G, X40G, M20G, M30G, M40G		32.3
193.7	7 - 5/8"	4 - 1/2"		X20G, X30G, X40G, M20G, M30G, M40G		33.3
200.0	7 - 7/8"	4 - 1/2"		X20G, X30G, X40G, X50G, X60G, X70G, M20G, M30G, M40G		34.8
212.7	8 - 3/8"	4 - 1/2"		X20G, X30G, M20G, M30G		42.0
215.9	8 - 1/2"	4 - 1/2"	Z20G, Z30G, Z40G, XZ20G, XZ30G, XZ40G	X10G, X20G, X30G, X40G, X50G, X60G, M10G, M20G, M30G, M40G, M50G	A30	44.3
219.1	8 - 5/8"	4 - 1/2"	Z20G, Z0G, XZ30G	X20G, X30G, X40G, M20G, M30G, M40G		45.0
222.3	8 - 3/4"	4 - 1/2"	Z20G, Z0G, XZ30G	X20G, X30G, M20G, M30G		46.0
244.5	9 - 5/8"	6 - 5/8"	Z20G, Z0G, XZ30G	X20G, X30G, X40G, M20G, M30G, M40G		62.0
250.8	9 - 7/8"	6 - 5/8"	Z20G, Z0G, XZ30G	X20G, X30G, X40G, M20G, M30G, M40G		65.0
269.9	10-5/8"	6 - 5/8"	Z20G, Z0G, XZ30G	X20G, X30G, X40G, M20G, M30G, M40G		77.0
279.4	11"	6 - 5/8"	Z20G, Z0G, XZ30G	X20G, X30G, M20G, M30G		80.0
295.3	11-5/8"	6 - 5/8"	Z20G, Z0G, XZ30G	X20G, X30G, M20G, M30G		101.0
304.8	12"	6 - 5/8"	Z20G, Z0G, XZ30G	X20G, X30G, M20G, M30G		106.0
311.2	12-1/4"	6 - 5/8"	Z10G,Z20G,Z30G, XZ05G,XZ10G, XZ20G, XZ30G, XZ40G	X05G, X10G, X20G, X30G, X40G, X50G, M05G, M10G, M20G, M30G, M40G	A30, A90	110.0
349.3	13-3/4"	6 - 5/8"	Z10G, Z20G, XZ20G	X10G, X20G, M10G, M20G		144.0
374.7	14-3/4"	7-5/8" (or 6-5/8")	Z10G, Z20G, MZ20G	X10G, X20G, M10G, M20G		166.0
381.0	15"	7 - 5/8"	Z10G, Z20G, MZ20G	X10G, X20G, M10G, M20G	A60, A90	182.0
393.7	15-1/2"	7 - 5/8"	Z10G, Z20G, MZ20G	X10G, X20G, M10G, M20G		190.0
406.4	16"	7 - 5/8"	Z10G, Z20G, MZ20G	X10G, X20G, M10G, M20G		194.0
444.5	17-1/2"	7 - 5/8"	Z10G, Z20G, Z30G, XZ05G, XZ10G, XZ20G, MZ05G, MZ10G, MZ20G	X05G, X10G, X15G, X20G, X30G, M05G,M10G, M15G, M20G, M30G		265.0
508.0	20"	7-5/8" (or 6-5/8")	Z20G, Z30G, MZ20G			340.0
527.1	20-3/4"	7-5/8" (or 6-5/8")	Z20G, Z30G, MZ20G			406.0
558.8	22"	7-5/8" (or 6-5/8")	Z20G, Z30G, MZ20G			434.0
584.2	23"	7-5/8" (or 6-5/8")	Z20G, Z30G, MZ20G			459.0
609.6	24"	7-5/8" (or 6-5/8")	Z10G, Z20G, Z30G, MZ05G, MZ10G, MZ20G			540.0
660.4	26"	7-5/8" (or 6-5/8")	Z20G, MZ20G			560.0

Bit Size in	Bit Size mm	Connection thread API Reg	Make-up torque ft.lbs	Make-up torque N.m
3-3/4" - 4-1/2"	95.2 - 114.3	2 - 3/8"	3000 - 3500	4000 - 4700
4 - 5/8" - 5"	117.5 - 127.0	2 - 7/8"	4500 - 5500	6100 - 7500
5 - 1/8" - 7-3/8"	130.2 - 187.3	3 - 1/2"	7000 - 9000	9500 - 12000
7- 1/2" - 9-3/8"	190.5 - 238.1	4 - 1/2"	12000 - 16000	16000 - 22000
9 - 1/2" - 14-3/4"	241.3 - 374.7	6 - 5/8"	28000 - 32000	38000 - 43000
14 - 5/8" - 26"	371.5 - 660.4	7 - 5/8"	34000 - 40000	46000 - 54000

M - Series (X - Series) Sealed Journal Bearing Bits Design

The TSK M - Series (X - Series), floating bearings are made of special copper alloy and silver plated having the lowest heat generation property as well as superior anti - galling property.

TSK has been developing new seals made of HNBR.



Type 05 IADC: 415, 417 05

Application:
For drilling in very soft formations with low compressive strength.

Tooth profile and arrangement:
The teeth have the largest tip diameter of all other bit types and the tallest and widest teeth can achieve higher ROP (Rate of Penetration).

The teeth are spaced widely and unevenly.
The cones have a large offset.

Type 10 IADC: 435, 437

Application:
For drilling in soft formations with low compressive strength.

Tooth profile and arrangement:
The teeth normally have smaller tip diameter and are shorter than type 05 bit, but taller and wider teeth can also achieve higher ROP.

The teeth are also spaced widely and unevenly.
The cones have a large offset.

Type 15 IADC: 445, 447

Application:
For drilling in soft formations with low compressive strength.

Tooth profile and arrangement:
The main teeth are normally with smaller tip diameter and are shorter than type 10 bit, but have the same sharpness.

The teeth are also spaced widely and unevenly.
The cones have a large offset.

Type 20 IADC: 515, 517

Application:
For drilling in soft to medium formations with low compressive strength.

Tooth profile and arrangement:
The main teeth normally have smaller tip diameter and are shorter than type 15 bit.

The teeth are also spaced unevenly and the cones have a large offset.

Type 30 IADC: 532, 535, 537

Application:
This type is generally used for drilling in medium formations with low compressive strength, but it also performs well in semi-abrassive formations.

Tooth profile and arrangement:
The tip diameter is similar to type 20 bit, but in order to avoid tip damaged during drilling, teeth height is set low.

The teeth are also spaced unevenly and the cones have moderate degree of offset.

Type 40 IADC: 612, 615, 617

Application:
For drilling in medium hard formations with high compressive strength.

Tooth profile and arrangement:
To minimize tip damage during crushing by main teeth in medium hard formations, teeth have a smaller diameter and lower height than type 30 bit.

The teeth are also spaced unevenly and the cones have moderate degree of offset.

Type 50 IADC: 622, 625, 627

Application:
For drilling in semi-abrasive, medium hard formations with high compressive strength.

Tooth profile and arrangement:
The teeth height is kept low to prevent tip damage during continous crushing under heavy WOB (Weight on BIt) conditions.

The teeth are also spaced unevenly but the cones have no offset.

Type 60 IADC: 632, 635, 637

Application:
For drilling in semi-abrasive, medium hard formations with high compressive strength.

Tooth profile and arrangement:
The main teeth have a conical shape to allow continuous crushing under heavy WOB conditions.

The cones have no offset.

Type 70 IADC: 732, 737

Application:
For drilling in abrasive and hard formations.

Tooth profile and arrangement:
The main teeth have a double conical shape to allow continuous crushing under heavy WOB conditions.

There is no cone offset.

Type 90 IADC: 832, 837

Application:
For drilling in abrasive and extremely hard formations.

Tooth profile and arrangement:
Both main and gage teeth have round shape to allow continuous crushing under heavy WOB conditions in order to prevent tip damage.

There is no cone offset.

Steel Tooth Bits Products

Type SS IADC: 111, 113, 114, 115, 116, 117

Application:
For drilling in very soft formations with low compressive strength.

Tooth profile and arrangement:
The SS type has the tallest and widest tooth. The wide tooth spacing and a large offset allows a higher ROP (Rate of Penetration).

Remarks:
Hardfacing areas are shown in blue in the diagram below.
The gage faces and the inner teeth back faces are also hardfaced.

Type S IADC: 121, 123, 124, 125, 126, 127

Application:
For drilling in soft formations with low compressive strength.

Tooth profile and arrangement:
This type has a similar tooth size to type SS bit.
The wide tooth spacing and a large offset allows a higher ROP.
This type has slightly more teeth than SS type.

Remarks:
Hardfacing areas are shown in blue in the diagram below.
The gage faces and the inner teeth back faces are also hardfaced.

Type MSS — IADC: 131, 133, 134, 135, 136, 137

Application:
For drilling in soft formations with low compressive strength.

Tooth profile and arrangement:
This type has a moderate tooth height and interruption on the inner and outer sides of the gage teeth. In addition, the gage teeth are reinforced by T-shape to obtain a stronger gage face than SS or S type. Tooth spacing is also adjusted for optional drilling of these types of formations.

Remarks:
Hardfacing areas are shown in blue in the diagram below.
The gage faces and the inner teeth back faces are also hardfaced.

Type MS — IADC: 211, 213, 214, 215, 216, 217

Application:
For drilling in medium formations with high compressive strength.

Tooth profile and arrangement:
This type has a moderate tooth size and closer tooth spacing. The gage teeth are reinforced by T-shape to obtain a stronger gage face.

Remarks:
Hardfacing areas are shown in blue in the diagram below.
The gage faces and the inner teeth back faces are also hardfaced.

Type MH — IADC: 231, 233, 234, 235, 236, 237

Application:
For drilling in medium hard formations with high compressive strength.

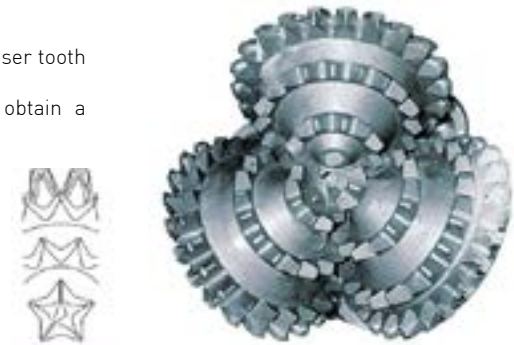
Tooth profile and arrangement:
This type has a moderate tooth size and closer tooth spacing. The gage teeth are reinforced by T-shaped to obtain a stronger gage face.

Remarks:
Hardfacing areas are shown in blue in the diagram below.
The gage faces and the inner teeth back faces are also hardfaced.

Type HS — IADC: 311, 313, 314, 315, 316, 317

Application:
For drilling in semi-abrasive and hard formations.

Tooth profile and arrangement:
This type has more and shorter teeth and also closer tooth spacing.
The gage teeth are reinforced by T-shape to obtain a stronger gage face.



Remarks:
As there is tendency for hardfacing on teeth to chip or break-off during crushing in hard and abrasive formations under heavy WOB conditions, the main teeth and sides of gage teeth are not hardfaced. However the gage faces are hardfaced.

Type H — IADC: 321, 323, 324, 325, 326. 327

Application:
For drilling in abrasive and hard formations.

Tooth profile and arrangement:
While the size and numbers of teeth are the same as type HS, a web connects 2 or 3 gage teeth to obtain a large hardfacing area.

Remarks:
For the same reason as type HS, only the gage faces are hardfaced.
However the inner teeth are not hardfaced.

Type HS — IADC: 341, 343, 344, 345, 346, 347

Application:
For drilling in abrasive and extremely hard formations.

Tooth profile and arrangement:
While gage teeth are the same as type H, the inner teeth have a curve shape for drilling of these types of formations.

Remarks:
For the same reason as type HS, only the gage faces are hardfaced.
However the inner teeth are not hardfaced.

Stabilizers

Welded Blade Stabilizer

Integral Blade Stabilizer

Sleeve Type Stabilizer

Hole Size	Body Diameter	Overal Length	Blade Length	Blade Width
7-3/8 - 7-7/8 8-3/8-9 9-3/8-9-7/8	5-3/4-6-1/ 6-7 6-3/4-8	47 47 55	10 10 12	1-3/4 1-3/4 1-3/4
10-5/8-11 11-1/2-12-1/4 14-3/4-15	7-8 7-9-5/8 7-3/4-10	55 55 63	12 12 15	1-3/4 1-3/4 2-3/16
17-17-1/2 22 26	7-3/4-11 8-11 8-11	63 67 67	18 18 18	2-3/8 2-1/2 2-1/2

All dimension are in inches.

Hole opener

Bracket Type

Hole Diameter (in)	Pilot Diameter (in)	Tool Joint	
		Box or Pin	Box
47	26	8-5/8 & 7-5/8REG	7-5/8REG
42	26	8-5/8 & 7-5/8REG	7-5/8REG
36	26	8-5/8 & 7-5/8REG	7-5/8REG
26	17	8-5/8 & 7-5/8REG	7-5/8REG
17 - 1/2	10 - 5/8	7-5/8REG	6-5/8REG
17	10 - 5/8	7-5/8REG	6-5/8REG
14 - 3/4	10 - 5/8	7-5/8REG	6-5/8REG
12 - 1/4	8 - 1/2	6-5/8REG	4 - 1/2REG
12	8 - 1/2	6-5/8REG	4 - 1/2REG
10 - 5/8	8 - 1/2	6-5/8REG	4 - 1/2REG
8 -5/8	5 - 5/8	4-1/2REG	3 - 1/2REG
8 - 1/2	5 - 5/8	4-1/2REG	3 - 1/2REG
7 -5/8	5 - 5/8	4-1/2REG	3 - 1/2REG

Pin Type
(Replaceable Cutters)

Type S

Type M

Type H

Type K-30

Roller Cutter

On the strength of our wide experience of manufacturing Rock Bits, we have developed and are also supplying a Roller Cutter for Shield Tunneling Machines, etc.

These are manufactured under strict quality control system, and these products are being supplied to major Heavy Engineering Enterprises.

Special Features of TIX-TSK Roller Cutter

1. In principle, production of Roller Cutter is on order to order basis and in this regard any enquiry will be highly appreciated.

2. The Tungsten Carbide material used for hardfacing has been developed by ourselves using the experience gained in making Rock Bits. It has an excellent reputation for wear resistance and durability and is much appreciated by its users.

3. The unit is normally supplied with a floating (metal) seal, but depending on design requirements, our own developed rectangular (rubber) seal can be supplied. This uses HNBR material, and has a better wear resistance performance.

For Shield Tunneling Machine & For T.B.M.

Tungsten Carbide Insert Disk Cutter

Cone Type Center Cutter

Ring Replaceable Disk Cutter

Ring Replaceable Center Cutter

For Tunneling Machine

Disk Type (Tungsten Carbide Insert Type)

Tungsten Carbide Insert Type

Disk Type (Steel Tooth Hardfacing Type)

Cone Cutter

Single Cone Type 2 and 3 Cone Type are available.