Atlas Copco Secoroc

Focus rotary drilling products

Product catalog

Sustainable Productivity

Atlas Copco

Atlas Copco Secoroc presents the Focus product line

The Atlas Copco Secoroc Focus product line includes bits designed to deliver competitive performance on current generation drill rigs. These bits are suited for a wide variety of drilling applications including Blasthole, Waterwell, HDD, Workover and Exploration drilling. The products are proven in varied formations including Very Hard Iron Ore, Hard to Medium formations of Gold/Copper mines and Soft overburden of Coal mines. The product line offers a broad range of sizes and designs for a professional driller to choose from for any application.

Focus rotary drill bits are available as Milled Tooth bits or as Tungsten Carbide Insert (TCI) bits.

Milled Tooth bits are ideal for very soft to medium hard rock. The teeth are hardfaced with Tungsten Carbide for good wear resistance.

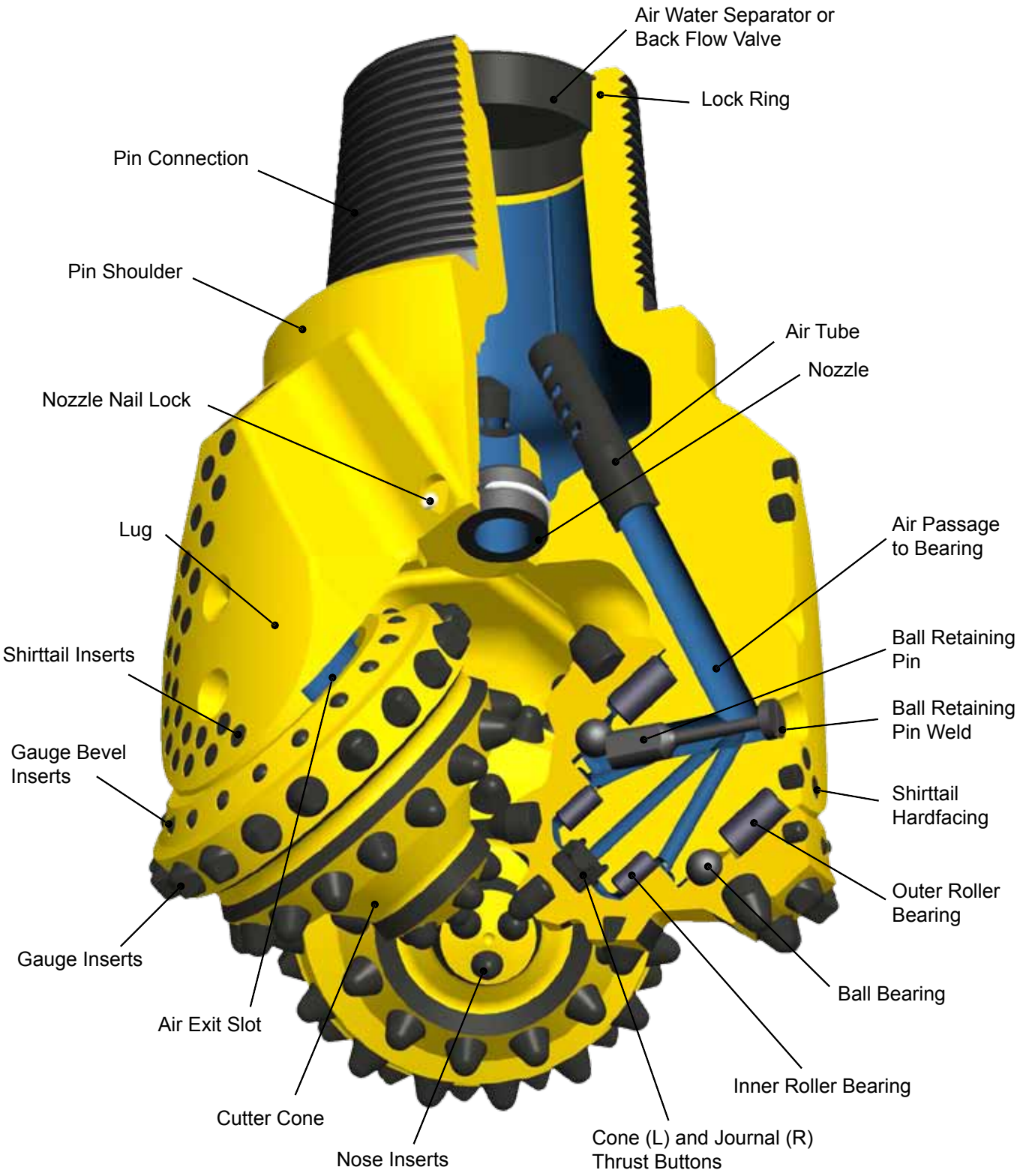
TCI drill bits are available in various cutting structure designs, ranging from aggressive long conical inserts for soft Sandstones/Shales to moderately blunt Conical inserts for compact Sandstones/Granordiorite/Basalts to Ogive shaped carbide inserts for very hard banded Iron Ore formations.

Focus rotary drill bits come in open bearing and sealed bearing configurations depending upon whether the application is Air circulation drilling or Mud circulation drilling.

Additional features include:

- Hardfacing on cone to overcome cone shell erosion.
- Shirttail protection options to handle different abrasive formations.
- Regular protection for soft overburdens.
- Armor protection for wet and abrasive formations like sandstone.
- Enhanced protection for dense and fractured formations like iron ore.

Tricone bit elements



Key applications

Blasthole Mining

Focus TCI bits have optimally designed bearing structures to withstand extreme pulldown loads typical of today's mining drill rigs. Controlled metallurgy and generous air passages for cooling ensure extended bearing hours. The robust bearing is matched with an aggressive cutting structure providing good penetration rates in a wide cross section of formations.

For overall wear protection, hardfacing is provided on shirttails and cones. Easily replaceable nozzles, with nail lock retention, enable drillers to select appropriate nozzle sizes ensuring correct back pressure.

Consistent manufacturing processes from raw material to final bit assembly ensures performance reliability bit after bit.

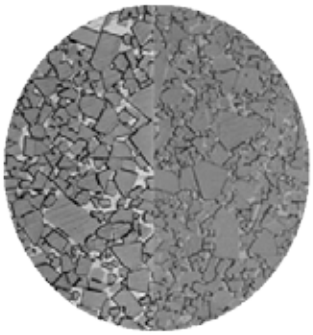
Waterwell

Drilling for water is a demanding activity on the driller, as well as the drill bit. No two waterwell bits are similar due to the variety of ground conditions. The key to a peaceful night, for a driller, is a consistent and reliable tool. Focus waterwell bits provide this.

Thanks to the same manufacturing procedures adopted for water well products, as for high performance mining products, Focus bits have delivered to the driller's content.

Bits are available in Milled Tooth and TCI versions from 2½" in diameter up to 5¾" in center flush and jet flush configurations. Larger diameter bits up to 12¼" are also available in the Focus range of Atlas Copco rotary drill bits.

Product features



Fast penetration

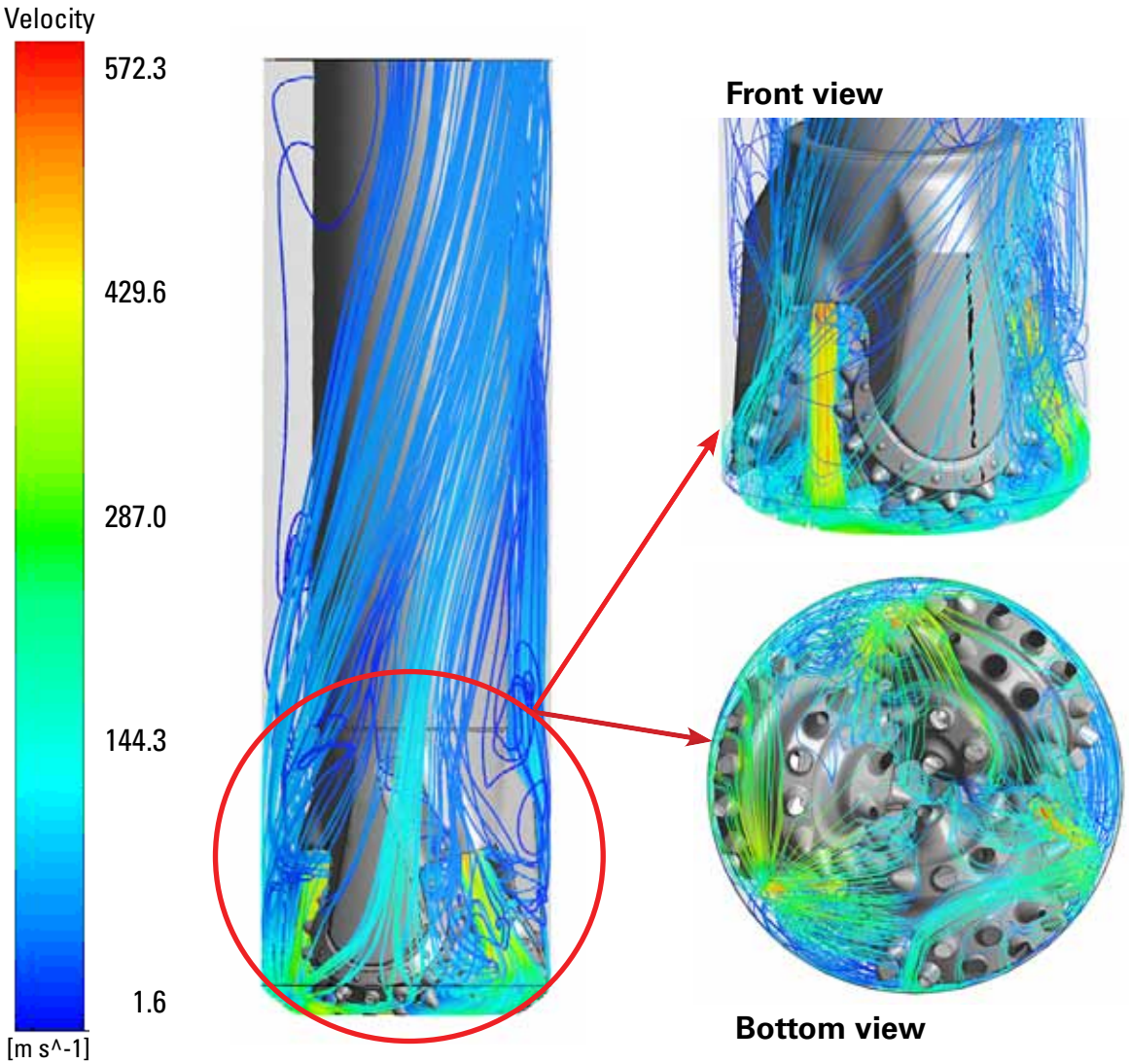
The cutting structures are designed to perform efficiently and increase the bit life with a variety of insert shapes.

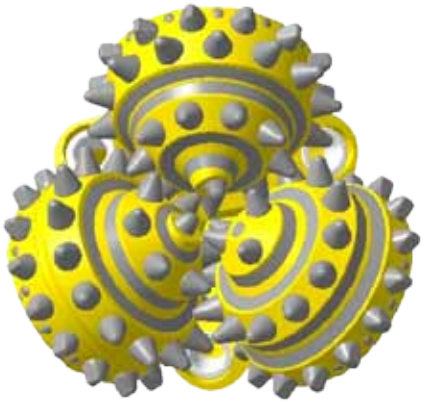
Carbide

Multiple grade selection for different rows of inserts based on function.

Optimized nozzle orientation

Nozzle size and orientation are optimized for efficient evacuation of cuttings.





Cone nose protection
Small spherical inserts and hard metal welding on the nose portion for durability and wear resistance in abrasive formations.

Regular shirttail protection
Regular shirttail protection for normal drilling.

Armor shirttail protection
Armor shirttail protection for abrasive drilling.

Enhanced shirttail protection
Deeply set spherical inserts on shirttail for effective grip during long runs in abrasive formation. Hard metal welding for superior wear resistance.

Cutting structures - TCI

Four basic classifications for Tungsten Carbide Insert (TCI) drill bits are divided into the F4, F5, F6, and F7 type series. The principal design differences are in tailoring the cutting structure of each type to most efficiently drill specific formations.

- The F4 series bits are characterized by large diameter, widely spaced chisel or conical inserts. This configuration promotes maximum penetration rates in softer formations that have a tendency to stick and ball up the cutting structure.

- Inserts become shorter and more closely spaced as you go through the F5 and F6 series. The F7 series has the most densely spaced and shortest projecting inserts. This configuration promotes maximum penetration rates in hard formations.

F4 Types

IADC: 4-1 to 4-4

Rock Strength/UCS: Very soft-soft, <10,000 psi / <83 mpa

Drilling RPM: 50 to 150 RPM

Weight on Bit: 1,000 to 4,000 (lbs/inch of bit diameter)

Super scoops, long conical inserts with sharp points are widely spaced for aggressive drilling and very high ROP at <100 m/hr typically used for coal overburden in formations like sandstone, siltstone, shale, limestone, alluvium, highly altered volcanics and schists.

F5 Types

IADC: 5-1 to 5-4

Rock Strength/UCS: Soft-medium hard rock, 6,000-10,000 psi / 41-207 mpa

Drilling RPM: 50 to 150 RPM

Weight on Bit: 3,000 to 6,000 (lbs/inch of bit diameter)

Chisel, conical inserts with blunt points and medium projection are moderately spaced for aggressive drilling and good penetration. Typically used for hard coal overburden in formations like volcanic rocks (rhyolite, dacite, andesite, etc.), Copper porphry, granite, diabase and “low grade” metamorphic rocks.

F6 Types

IADC: 6-1 to 6-4

Rock Strength/UCS: Medium hard rock, 24,000-44,000 psi / 166-303 mpa

Drilling RPM: 50 to 120 RPM

Weight on Bit: 4,000 to 7,000 (lbs/inch of bit diameter)

Conical, ogive, some chisel inserts with blunter points and shorter projections are closely spaced on increased number of rows per cone. Typically used in formations like volcanic rocks (rhyolite, dacite, andesite, etc.), hard limestone, hard shale, quartzite, granodiorite, granite, diabase, diorite, skarn, tactite and medium grade metamorphic.

F7 Types

IADC: 7-1 to 7-4

Rock Strength/UCS: Hard rock, 38,000-60,000 psi / 262-400 mpa

Drilling RPM: 50 to 80 RPM

Weight on Bit: 5,000 to 9,000 (lbs/inch of bit diameter)

Strong conical, ogive inserts with short projections are densely packed. Typically used in formations like taconite, quartzite, banded iron formations and high grade metamorphic rocks like skarns, tacite, hornfels, etc.

Cutting structures - Steel tooth

The three basic classifications of steel tooth bits are divided into the F1, F2 and F3 Series.

- Type F1 steel tooth bits are designed for optimum performance in formations of low compressive strength. Soft formation bits are designed with long slim, strong teeth to permit deep penetration in the formation with comparatively light weight on bit.

- Type F2 steel tooth bits are designed for medium formations and have more closely spaced teeth with more gage surface to resist wear.

- Type F3 steel tooth bits are designed to drill hard formations. This bit has higher capacity bearings and more closely spaced teeth with increased tooth angles to allow the use of heavier weights required to effectively drill hard formations.

F1 Types

IADC: 1-1 to 1-4

Rock Strength/UCS: Less than 5,000 psi / <35 mpa

Weight on Bit: 1,000 to 4,000 (lbs/inch of bit diameter)

Large widely space teeth with interruptions, removals and deletions on gage. Full tooth hardfacing in both sealed and open bearing configurations. Primary application is Waterwell drilling.

F2 Types

IADC: 2-1 to 2-4

Rock Strength/UCS: 3,000-10,000 psi / 20-79 mpa

Weight on Bit: 3,000 to 6,000 (lbs/inch of bit diameter)

More teeth and rows than F1 class bits. Teeth are smaller and shorter, with larger included angle for strength. Similar hardfacing to F1 class bits, except no hardfacing on lead side of teeth. Available in sealed and open bearing configuration. Primary application is Waterwell drilling.

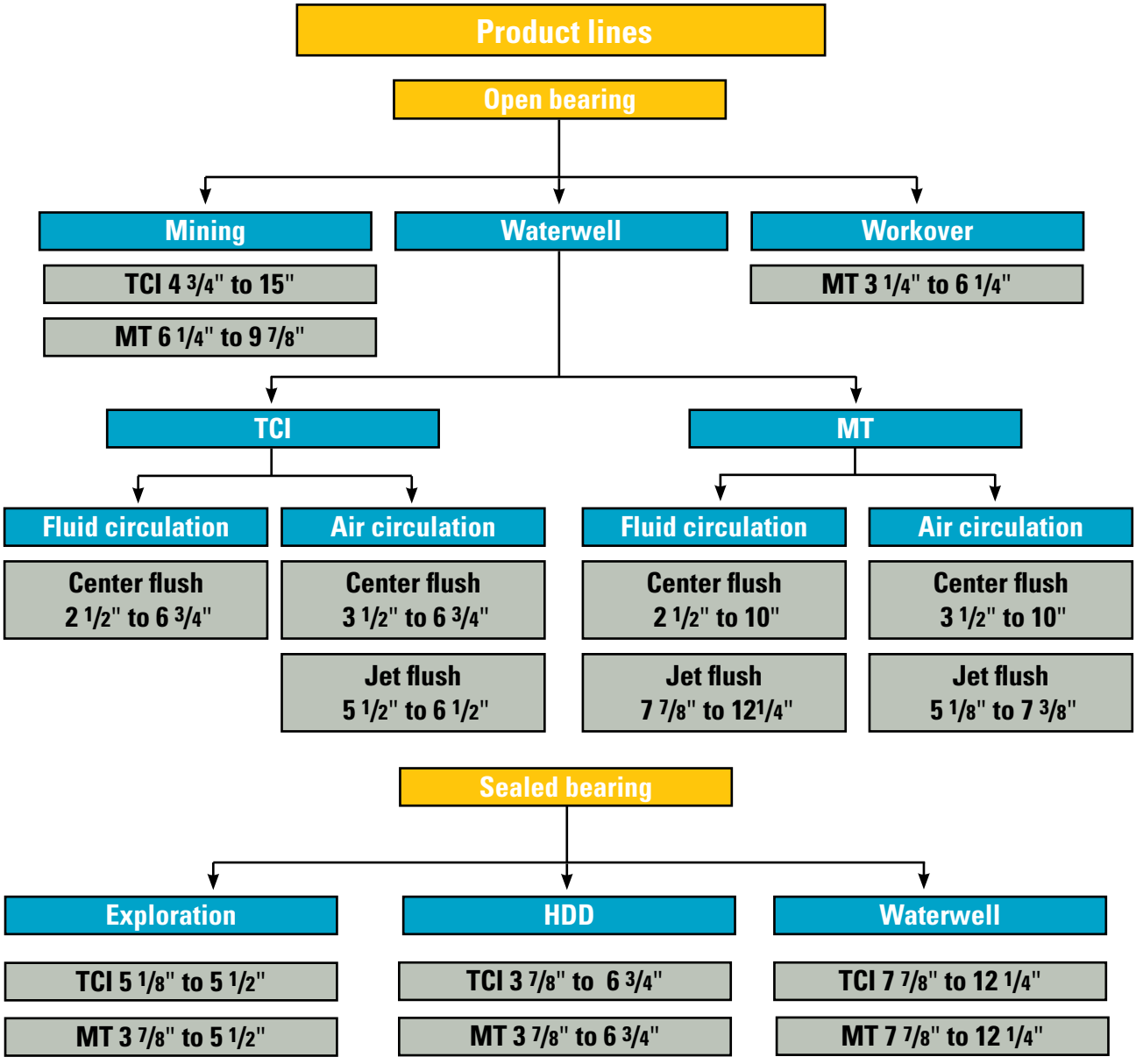
F3 Types

IADC: 3-1 to 3-4

Rock Strength/UCS: 8,000-14,000 psi / 55-100 mpa

Weight on Bit: 4,000 to 7,000 (lbs/inch of bit diameter)

Short, small closely spaced teeth for maximum bottom hole coverage. Tooth hardfacing only on gage and spear point. Maximum gage protection with optional carbide inserts. Available in sealed and open bearing configurations. Primary applications are Waterwell and Oil field Workover.



Air requirements

In rotary blasthole drilling, there is always a concern with delivery of air in sufficient volume and at the proper pressure to assure optimum bit performance when drilling with recommended bit weight and RPM.

Sufficient air volume should be provided to produce an annular return velocity of 5,000-7,000 ft./min. for light, dry materials; and 7,000-9,000 ft./min. for materials that are wet and/or heavy, and when drilling at penetration rates of 35m per hour or higher.

To determine volumetric requirements, the simple flow equation Q = AV may be used. Since friction losses in the annulus of relatively shallow holes of blasthole drilling are negligible, this becomes:

$$Q = \frac{V}{183.35} (D^2 - d^2)$$

The table on this page shows volumetric requirements in cubic feet of free air per minute necessary to provide both 5,000 and 7,000 ft. per min. annular velocity for various possible combinations of hole size and drill pipe size.

The equation used is the simple flow equation: Q = AV.

With all constants combined and area expressed as difference between hole and pipe areas, this equation becomes:
$Q = 27.27 (D^2 - d^2)$.

Q = cubic feet per minute free air necessary to obtain 5,000 feet per minute annular velocity

d = drill pipe outside diameter, inches

D = hole diameter, inches

Should Q be desired for some annular return velocity "V" other than 5,000 feet per minute, the result obtained above or from the table should be multiplied by the factor: V/5000.

Example: A 9 7/8" hole being drilled with 7 ¾" drill pipe at a desired annular velocity of 5,000 ft. per minute.

Solution: $Q = 27.27 [(9\ 7/8)^2 - (7\ ¾)^2]$
$= 27.27 [97.52 - 60.06]$
= 1022 cu. ft. per min. (shown in table)

Had 7,000 ft. per min. velocity been desired:

$$Q = (1022) \quad \frac{7000}{5000} = 1431 \text{ cu. ft./min.}$$

The above equation may also be rewritten to solve for annular velocity "V" when available compressor capacity, hole size and pipe size are known.

Air Volume requirements for various hole diameter and drill pipe combinations - for 5,000 ft. and 7,000 ft. per min. annular velocity.

D hole diameter (in)	d drill pipe O.D. (in)	Q. - 5,000 CuFt/min free air	Q. - 7,000 CuFt/min free air
4 1/2	2 7/8	327	458
	3 1/2	218	305
	4	116	162
4 3/4	2 7/8	390	546
	3 1/2	282	395
	4	178	249
5 1/8	2 7/8	491	687
	3 1/2	382	535
	4	280	392
5 5/8	2 7/8	637	892
	3 /12	530	742
	4	426	596
6 1/4	3 1/2	732	1,025
	4 1/2	513	718
	5	382	535
6 3/4	3 1/2	908	1,271
	4	805	1,127
	4 1/2	690	966
	5	560	784
7 3/8	3 1/2	1358	1,900
	4 1/2	932	1,305
	5 1/2	658	921
7 7/8	3 1/2	1358	1,900
	4 1/2	1138	1,503
	5 1/2	867	1,214
	6 1/2	625	875
	6 5/8	493	690
	7	355	497
9	4 1/2	1665	2,331
	5 1/2	1383	1,936
	6 5/8	1063	1,488
	7	873	1,222
	7 3/4	570	798
9 7/8	7	1323	1,852
	7 3/4	1022	1,431
	8 5/8	627	878
	9	450	630
11	7	1964	2,749
	7 3/4	1662	2,323
	8 5/8	1272	1,779
	9	1090	1,526
12 1/4	8 5/8	2063	2,888
	9	1882	2,635
	10	1365	1,911
	10 3/4	941	1,317
13 3/4	10	2429	3,400
	10 3/4	2004	2,806
15	10	3409	4,772
	10 3/4	2985	4,179
	12	2209	3,093
	13	1527	2,138
17 1/2	10	3743	5,240
	14	3007	4,210
	16	1370	1,918

Air circulation

Air is the “life blood” of a rotary blasthole tricone bit. Air cleans and cools the bearings, keeping contaminants out. Air pressure should be maintained at the manufacturers recommended level for best performance.

Jet circulation bit with air bearing:
Air pathway through the nozzles and lugs.

Regular circulation bit with open bearing:
Air pathway through the center of bit.

Using pressure drop tables

Procedure for using pressure drop tables:

1. Establish maximum operating pressure and air volume delivered for the air compressor being used. Consideration should be given to altitude, volumetric efficiency, ambient temperature and mechanical condition of the compressor when establishing these values, if actual volume is not known.
   NOTE: An air test is the best way to determine actual delivery of air volume and pressure.

2. From the table, choose the "air volume delivered" column nearest the actual volume established under item 1.

3. Proceed down the proper "air volume delivered" column to the "bit size range" for the bit being used.

4. Read the air pressure required for forcing air through the bit. The pressure required depends on the size of the air blast nozzles.

5. Select the smallest nozzle diameter available within the given bit size range that can be used without exceeding the maximum operating pressure of the compressor.
   NOTE: 10-50 psi should be reserved for a safety buffer and other pressure losses in the system depending on drill type and manufacturer.

   Example 1
   a. Bit size: 7 7/8"
   b. Air volume delivered: 800 cfm
   c. Maximum operating pressure rig: 65 psi
      From the table, select 7/16" nozzle (49 psi), this allows 16 psi for safety buffer and system losses.

   Example 2
   a. Bit size: 9"
   b. Air volume delivered: 1200 cfm
   c. Maximum operating pressure rig: 50 psi.
      From the table, select 11/16" nozzle (39 psi).

Bit size range	API Pin size	Air course size 3 each					
			200	300	400	500	600
5" to 6"	2 7/8" 3 1/2"	5/16"	10	22	47	62	77
		3/8"		16	35	47	59
		1/2"		10	25	35	45
		9/16"			18	26	34
					11	18	24
6 1/4" to 7 3/8"	3 1/2"	5/16"			42	52	62
		3/8"			33	43	51
		7/16"			27	34	41
		1/2"			23	29	33
		9/16"			18	23	29
7 7/8" to 9"	4 1/2"	3/8"			27	36	45
		7/16"			21	28	35
		1/2"				21	27
		9/16"					20
		5/8"					
		11/16"					
		3/4"					
9 7/8" to 11"	6 5/8"	3/8"			26	36	46
		7/16"			19	27	35
		1/2"				21	27
		9/16"					20
		5/8"					
		11/16"					
		3/4"					
		7/8"					
		1"					
12 1/4" to 15"	6 5/8" to 7 5/8"	7/16"					19
		1/2"					
		9/16"					
		5/8"					
		11/16"					
		3/4"					
		7/8"					
		1"					
		1 1/8"					
		1 1/4"					

Nozzle selection																				
Air pressure drop across Atlas Copco Secoroc blasthole bits with various nozzle size. Air volume delivered - cubic feet per minute																				
700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2600	2800	3000
71																				
55	65	75																		
42	50	58	66	74																
31	38	44	58	58	64	71														
72	81																			
61	69	78																		
48	57	65	73	79																
41	48	54	61	67	73	79														
34	41	47	51	56	62	67	73	79												
55	66	75	83																	
42	49	55	63	69	75	81														
33	39	45	51	59	67	76	84													
26	32	37	43	49	55	61	67	73	80											
21	26	31	36	41	47	52	57	62	69	73	79									
	20	25	29	34	39	44	50	55	60	65	71	77								
		21	25	29	34	37	41	47	51	55	60	65	70	75	79					
54	62	70	77																	
42	50	58	65	72	79															
33	39	45	53	60	66	71	77													
26	32	38	43	49	54	59	64	68	73	78										
19	25	32	36	41	46	49	53	58	62	66	70	74	78							
	20	24	29	34	39	43	47	51	54	58	62	66	70	74	78					
		19	22	26	31	36	40	43	47	50	54	57	61	64	68	71	75	79		
				20	24	26	30	32	35	38	41	44	46	49	52	55	59	63	69	75
							19	21	23	25	28	30	33	35	38	40	42	47	52	57
25	30	35	41	46	53	58	63	69	75											
18	23	27	33	38	43	47	52	56	60	65	70	75								
	19	23	27	31	34	38	42	46	50	55	59	63	67	72						
		19	22	25	27	31	34	38	42	46	49	53	57	61	64	68	72			
				20	23	26	29	32	35	39	42	45	48	52	55	58	62	66	70	
					19	22	25	28	31	34	37	40	42	45	48	51	53	57	61	65
						17	19	21	23	25	27	28	30	33	35	37	40	42	44	47
											17	19	21	23	25	27	29	33	37	41
														17	19	21	25	27	29	31
																	17	19	23	25

Actual air volumes delivered to the bit is a key factor in preventing early bearing failure and providing proper cleaning of the tool. Pressure drops listed above are approximate for use as guidelines only. Actual pressures will depend on bit condition, bearing type, and air piping conditions.

Please contact your Atlas Copco Secoroc representative for assistance in determining the best nozzle size for individual bits and mine site condition.

Nozzles

Nozzle size selection

Nozzles should be selected so that the pressure inside the bit is 40-45 psi. The cab operating pressure will be somewhat higher, depending on the type of drill and CFM of air circulated. Typically, on compressors rated at 65 psi, pressure inside the bit will be 8-15 psi lower than what the cab gauge shows. On drills with 80-100 psi rated compressors, bit pressures can be 25-50 psi lower than the cab gauge reading.

The proper procedure for determining the correct nozzle size is as follows:

1. Remove the bit and perform an air test. Record all pressure readings. Be sure to use at least one orifice plate in the air test that will give 40-45 psi at the tool.

2. Determine what the cab pressure is when the tool pressure is 40-45 psi.

3. Re-install the bit with the original nozzles. Run the air compressor and record the cab air pressure.

4. If you do not get the cab air pressure that you saw with 40-45 psi tool air pressure during the air test, continue to install and check different sets of nozzles in the bit until you do get the cab pressure that corresponds to 40-45 psi at the tool.

5. Once you get the same cab air pressure with nozzles that you got during the air test with 40-45 psi tool pressure, you have found the correct size nozzles to use in the bit.

The table on the previous page shows approximate bit air pressure that can be expected with the listed nozzles and CFM. This can be used as a starting point for determining correct nozzle size.

Nozzle removal

1. Use a screwdriver to pry up the head of the nail locking the nozzle into place.

2. When the nail head is pried up, grab the nail with pliers and pull the nail completely out of the bit.

3. Remove the nozzle.

Nozzle installation

1. Put the nozzle into the nozzle boss, with the beveled edge to the inside, the flat end to the outside.

2. Place a nozzle nail into the nozzle hole.

3. With a hammer, pound this nozzle nail down until the nail head contacts the bit.

4. DO NOT flatten the head of the nozzle nail against the bit.

Bit selection guide

Tricone carbide insert rock bit series vs. rock hardness

Rock UCS (psi)	Tungsten carbide insert Tricone bit series						Rock type
Rock Strength		Bit Type					
UCS (psi)	UCS (mpa)	F4	F5	F6	F7		
Lower	Lower	IADC 4-1 to 4-4					Claystone, Mudstone
8,000	55						Soft Shale & Sandstone
10,000	69		IADC 5-1 to 5-4				Consolidates Sandstone
12,000	83						Medium Shale
14,000	97						Tuff, Soft Schist
16,000	110						Andesite, Rhyolite
18.000	124						Quartzite (Sand, Silt)
20,000	138						Limestone, Marble
22,000	152						Monzonite, Granite
24,000	165						Gneiss
26,000	179						Diorite, Diabase
28,000	193						Hard Shale, Slate
30,000	207			IADC 6-1 to 6-4			Limestone, Dolomite
32,000	221						Basalt
34,000	234						Tactite, Skarn
36,000	248						Granodiorite
38,000	262						Taconite
40,000	276						Quartzite
42,000	290						Syenite
44,000	303						Gabbro
46,000	317						
48,000	331				IADC 7-1 to 7-4		Banded Iron
50,000	345						Taconite
52,000	359						Chert
54,000	372						
56,000	386						Quartzite
58,000	400						
60,000	414						Amphibolite
Higher	Higher						Hornfels, Hematite Ore

Rock UCS hardness (Unconfined Compressive Strength) is only one factor that contributes to the "drillability" of any rock. Hardness and elasticity will also effect bit selection.

Steel tooth Tricone rock bit type vs. rock hardness

Rock UCS (psi)	Steel tooth Tricone bit series			Rock type
	F1	F2	F3	
0	IADC 1-1 to 1-4			Unconsolidated Sands
				Limestone, Siltstone
2,000				Clay Stone, Mudstone
4,000				Marl, Chalky Limestone
6,000		IADC 2-1 to 2-4		Soft Shales
8.000			IADC 3-1 to 3-4	Consolidated Sandstones
				Soft Marble, Dolomite
10,000				
12,000				Medium Shales
14,000				Tuff, Soft Schist

Rock UCS hardness (Unconfined Compressive Strength) is only one factor contributing to the "drillability" of any rock. Other factors influencing drillability are fracture toughness, shear strength, Young's modulus of elasticity, Poisson's ratio of stress vs. strain & internal angle of friction. Any particular bit may be used in harder or softer rock than this chart indicates.

Catalog code key

Type of product	Thread		–	Bit type		Bit diameter/ mm's		–	IADC Cutting Structure	–	Tricone product line		–	Major tooth shape, TCI or Steel Tooth		Lug prote
1	**18**			**3**		**311**			**54**		**FB**			**C**		
Rock bit 1	2 3/8	10		Steel Tooth	0	2 7/8	073		1-1		Focus Blasthole	FB		Conical Inserts	C	Armor
	2 7/8	12		TCI	3	2 15/16	075		1-2		Focus Waterwell	FW		Round Top Inserts if TCI	R	Backreaming
	3 1/2	14				3 1/8	079		1-3		Focus Workover	FO		Ogive Inserts if TCI	O	Shirttail Protection
	4 3/4	17				3 1/4	083		1-4		Focus Exploration	FE		Chisel Inserts if TCI	F	Enhanced Shirttail
	5 1/2	31				3 7/8	098		2-1		Focus Petroleum	FP		Conventional Gage Tooth, Steel Tooth	1	
	6 5/8	18				4	102		2-2		Focus Engineering	FE		Tapered Gage Tooth, Steel Tooth	2	
	7 5/8	32				4 1/8	105		2-3		Focus Hole Opener	FH		"T" Gage Tooth, Steel Tooth	3	
	8 5/8	63				4 1/4	108		2-4		Focus HDD	FD		"L" Gage Tooth, Steel Tooth	4	
	4n-Rod	61				4 1/2	114		3-1					"Web" Gage Tooth, Steel Tooth	5	
						4 5/8	117		3-2							
						4 3/4	121		3-3							
						4 7/8	124		3-4							
						5 1/8	130		4-1							
						5 1/4	133		4-2							
						5 1/2	140		4-3							
						5 5/8	143		4-4							
						5 3/4	146		5-1							
						5 7/8	149		5-2							
						6	152		5-3							
						6 1/8	156		5-4							
						6 1/4	159		6-1							
						6 1/2	165		6-2							
						6 3/4	171		6-3							
						7	178		6-4							
						7 3/8	187		7-1							
						7 1/2	191		7-2							
						7 7/8	200		7-3							
						8 1/2	216		7-4							
						8 3/4	222		8-1							
						9	229		8-2							
						9 7/8	251		8-3							
						10 5/8	270		8-4							
						11	279									
						12 1/4	311									
						13 3/4	349									
						14 3/4	375									

ction features		Lug type features		Other features		Gage carbide feathers		IADC Bearing type	
A				**H**		**W**		**02**	
	A	Center Jet equipped	K	Hard Nose on Cones	H	"Standard" Carbide has no code		Standard Roller (Fluid) Bearing	01
	B	Streamlined Lug, Jet Only	L	Combination AWS-BFV	J	Gage Bevel on Tooth Bits	G	Air Bearing	02
in Steel Tooth bits	ST	Regular Circulation	R	Aggressive Cutting Structure	V	Tough Carbide (Breakage Resistant)	T	Roller Bearing Gage Protected (Non Air Bearing)	03
	Y					Wear Resistant Carbide (Hard)	W	Sealed Roller Bearing	04
								Sealed Roller Bearing, Gage Protected	05
								Sealed Journal Bearing	06
								Sealed Journal Bearing, Gage protected	07

The catalog code represented in this example, **118-331-54-FB-CA-HW-02** identifies the following about a Focus blasthole drill bit:

- Threading is 6 5/8" **18**
- 12 1/4" (311 mm) in diameter **311**
- IADC of 5-4-2 **54 + 02**
- Conical inserts **C**
- Armor on shirttail **A**
- Hardnose feature on cone **H**
- Wear resistant carbide grades **W**
- Air bearings **02**

Blasthole Tricone Bits

4 3/4" - 7 7/8"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB/RPM
							lbs	kgs		
4 3/4" 121 mm	93001000	112-3121-62-FB-C-02	6-2-2	F6	Conical Inserts	Jet	20	9	2 7/8" API	21,400-35,600 lbs WOB 70 to 120 RPM
5 1/8" 130 mm	93001001	112-3130-52-FB-C-02	5-2-2	F5	Conical Inserts	Jet	22	10	2 7/8" API	17,900-33,300 lbs WOB 70 to 120 RPM
5 7/8" 149 mm	93001002	114-3149-62-FB-F-02	6-2-2	F6	Chisel Inserts	Jet	26	12	3 1/2" API	26,400-44,100 lbs WOB 70 to 120 RPM
6 1/4" 159 mm	93001052	114-0159-23-FB-1-02	2-3-2	F23	Conventional Gage Tooth	Jet	32	14.5	3 1/2" API	21,900-34,400 lbs WOB 50 to 120 RPM
6 1/4" 159 mm	93001051	114-0159-33-FB-5-02	3-3-2	F33	"Web" Gage Tooth	Jet	32	14.5	3 1/2" API	28,100-46,900 lbs WOB 50 to 100 RPM
6 1/4" 159 mm	93001003	114-3159-52-FB-C-02	5-2-2	F5	Conical Inserts	Jet	29	13	3 1/2" API	21,900-40,600 lbs WOB 70 to 120 RPM
6 1/4" 159 mm	93001004	114-3159-62-FB-F-02	6-2-2	F6	Chisel Inserts	Jet	29	13	3 1/2" API	28,100-46,900 lbs WOB 70 to 120 RPM
6 1/4" 159 mm	93001005	114-3159-64-FB-F-02	6-4-2	F65	Chisel Inserts	Jet	29	13	3 1/2" API	28,100-46,900 lbs WOB 70 to 120 RPM
6 3/4" 171 mm	93001006	114-3171-42-FB-C-02	4-2-2	F4	Conical Inserts	Jet	39	17.5	3 1/2" API	10,100-37,100 lbs WOB 70 to 150 RPM
6 3/4" 171 mm	93001007	114-3171-52-FB-OA-02	5-2-2	F5	Ogive Inserts, Armor	Jet	39	17.5	3 1/2" API	23,600-43,900 lbs WOB 70 to 120 RPM
6 3/4" 171 mm	93001008	114-3171-62-FB-FA-02	6-2-2	F6	Chisel Inserts, Armor	Jet	39	17.5	3 1/2" API	30,400-50,600 lbs WOB 70 to 120 RPM
6 3/4" 171 mm	93001083	114-3171-64-FB-CYH-02	6-4-2	F67	Conical Inserts, Enhanced Shirttail, Hard Nose on Cones	Jet	39	17.5	3 1/2" API	30,400-57,400 lbs WOB 50 to 90 RPM
6 3/4" 171 mm	93001009	114-3171-73-FB-CA-02	7-3-2	F7	Conical Inserts, Armor	Jet	39	17.5	3 1/2" API	30,400-57,400 lbs WOB 50 to 90 RPM
6 3/4" 171 mm	93001090	114-3171-73-FB-CAH-02	7-3-2	F7	Conical Inserts, Armor, Hard Nose on Cones	Jet	39	17.5	3 1/2" API	30,400-57,400 lbs WOB 50 to 90 RPM
7 3/8" 187 mm	93001061	114-3187-53-FB-C-02	5-3-2	F5	Conical Inserts	Jet	58.3	26.5	3 1/2" API	25,100-48,000 lbs WOB 70 to 120 RPM
7 3/8" 187 mm	93001062	114-3187-73-FB-C-02	7-3-2	F7	Conical Inserts	Jet	58.3	26.5	3 1/2" API	33,100-62,700 lbs WOB 50 to 90 RPM
7 1/2" 191 mm	93001063	114-3191-73-FB-C-02	7-3-2	F7	Conical Inserts	Jet	58.3	26.5	3 1/2" API	33,800-63,800 lbs WOB 50 to 90 RPM
7 7/8" 200 mm	93001010	117-3200-41-FB-CA-02	4-1-2	F35	Conical Inserts, Armor	Jet	61	27.5	4 1/2" API	11,800-43,300 lbs WOB 70 to 150 RPM
7 7/8" 200 mm	93001011	117-3200-43-FB-CA-02	4-3-2	F4	Conical Inserts, Armor	Jet	61	27.5	4 1/2" API	11,800-43,300 lbs WOB 70 to 150 RPM
7 7/8" 200 mm	93001012	117-3200-42-FB-CA-02	4-2-2	F4	Conical Inserts, Armor	Jet	61	27.5	4 1/2" API	11,800-43,300 lbs WOB 70 to 150 RPM

Blasthole Tricone Bits

7 7/8" - 9"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB/RPM
							lbs	kgs		
7 7/8" 200 mm	93001014	117-3200-52-FB-CA-02	5-2-2	F5	Conical Inserts, Armor	Jet	61	27.5	4 1/2" API	27,600-51,200 lbs WOB 70 to 120 RPM
7 7/8" 200 mm	93001076	117-3200-52-FB-CAHW-02	5-2-2	F5	Conical Inserts, Armor, Hard Nose on Cones, Wear Resistant Carbide	Jet	61	27.5	4 1/2" API	27,600-51,200 lbs WOB 70 to 120 RPM
7 7/8" 200 mm	93001013	117-3200-53-FB-CA-02	5-3-2	F5	Conical Inserts, Armor	Jet	61	27.5	4 1/2" API	27,600-51,200 lbs WOB 70 to 120 RPM
7 7/8" 200 mm	93001064	117-3200-53-FB-CY-02	5-3-2	F5	Conical Inserts, Enhanced Shirttail	Jet	61	27.5	4 1/2" API	27,500-51,200 lbs WOB 70 to 120 RPM
7 7/8" 200 mm	93001077	117-3200-53-FB-CAH-02	5-3-2	F5	Conical Inserts, Armor, Hard Nose on Cones	Jet	61	27.5	4 1/2" API	27,600-51,200 lbs WOB 70 to 120 RPM
7 7/8" 200 mm	93001015	117-3200-54-FB-CA-02	5-4-2	F55	Conical Inserts, Armor	Jet	61	27.5	4 1/2" API	27,600-51,200 lbs WOB 70 to 120 RPM
7 7/8" 200 mm	93001065	117-3200-54-FB-CYV-02	5-4-2	F55	Conical Inserts, Enhanced Shirttail, Aggressive Cutting Structure	Jet	61	27.5	4 1/2" API	27,500-51,200 lbs WOB 70 to 120 RPM
7 7/8" 200 mm	93001085	117-3200-54-FB-CAW-02	5-4-2	F55	Conical Inserts, Armor, Wear Resistant Carbide	Jet	61	27.5	4 1/2" API	27,600-51,200 lbs WOB 70 to 120 RPM
7 7/8" 200 mm	93001016	117-3200-63-FB-CA-02	6-3-2	F6	Conical Inserts, Enhanced Shirttail	Jet	61	27.5	4 1/2" API	35,400-59,100 lbs WOB 70 to 120 RPM
7 7/8" 200 mm	93001017	117-3200-64-FB-CY-02	6-4-2	F65	Conical Inserts, Enhanced Shirttail	Jet	61	27.5	4 1/2" API	35,400-59,100 lbs WOB 70 to 120 RPM
7 7/8" 200 mm	93001018	117-3200-73-FB-CY-02	7-3-2	F7	Conical Inserts, Enhanced Shirttail	Jet	61	27.5	4 1/2" API	35,400-66,900 lbs WOB 50 to 90 RPM
8 1/2" 216 mm	93001094	117-3216-41-FB-CA-02	4-1-2	F35	Conical Inserts, Armor	Jet	91	41.5	4 1/2" API	11,800-43,300 lbs WOB 70 to 150 RPM
8 1/2" 216 mm	93001093	117-3216-52-FB-CA-02	5-2-2	F5	Conical Inserts, Armor	Jet	91	41.5	4 1/2" API	27,600-51,200 lbs WOB 70 to 120 RPM
8 1/2" 216 mm	93001092	117-3216-63-FB-CA-02	6-3-2	F6	Conical Inserts, Armor	Jet	91	41.5	4 1/2" API	35,400-59,100 lbs WOB 70 to 120 RPM
8 1/2" 216 mm	93001095	117-3216-73-FB-CA-02	7-3-2	F7	Conical Inserts, Armor	Jet	91	41.5	4 1/2" API	35,400-66,900 lbs WOB 50 to 90 RPM
9" 229 mm	93001019	117-3229-41-FB-CA-02	4-1-2	F35	Conical Inserts, Armor	Jet	96	43.5	4 1/2" API	13,500-49,500 lbs WOB 70 to 150 RPM
9" 229 mm	93001021	117-3229-42-FB-CA-02	4-2-2	F4	Conical Inserts, Armor	Jet	96	43.5	4 1/2" API	13,500-49,500 lbs WOB 70 to 150 RPM
9" 229 mm	93001020	117-3229-43-FB-CA-02	4-3-2	F4	Conical Inserts, Armor	Jet	96	43.5	4 1/2" API	13,500-49,500 lbs WOB 70 to 150 RPM
9" 229 mm	93001067	117-3229-52-FB-C-02	5-2-2	F5	Conical Inserts	Jet	96	43.5	4 1/2" API	31,500-58,500 lbs WOB 70 to 120 RPM
9" 229 mm	93001023	117-3229-52-FB-CA-02	5-2-2	F5	Conical Inserts, Armor	Jet	96	43.5	4 1/2" API	31,500-58,500 lbs WOB 70 to 120 RPM
9" 229 mm	93001022	117-3229-53-FB-CA-02	5-3-2	F5	Conical Inserts, Armor	Jet	96	43.5	4 1/2" API	31,500-58,500 lbs WOB 70 to 120 RPM

Blasthole Tricone Bits 9" - 9 7/8"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB/RPM
							lbs	kgs		
9" 229 mm	93001066	117-3229-53-FB-C-02	5-3-2	F5	Conical Inserts	Jet	96	43.5	4 1/2" API	31,500-58,500 lbs WOB 70 to 120 RPM
9" 229 mm	93001084	117-3229-53-FB-CAW-02	5-3-2	F5	Conical Inserts, Armor, Wear Resistant Carbide	Jet	96	43.5	4 1/2" API	31,500-58,500 lbs WOB 70 to 120 RPM
9" 229 mm	93001024	117-3229-54-FB-CA-02	5-4-2	F55	Conical Inserts, Armor	Jet	96	43.5	4 1/2" API	31,500-58,500 lbs WOB 70 to 120 RPM
9" 229 mm	93001025	117-3229-63-FB-CY-02	6-3-2	F6	Conical Inserts, Enhanced Shirttail	Jet	96	43.5	4 1/2" API	40,500-67,500 lbs WOB 70 to 120 RPM
9" 229 mm	93001057	117-3229-63-FB-CYW-02	6-3-2	F6	Conical Inserts,Enhanced Shirttail, Wear Resistant Carbide	Jet	96	43.5	4 1/2" API	40,500-67,500 lbs WOB 70 to 120 RPM
9" 229 mm	93001026	117-3229-73-FB-CY-02	7-3-2	F7	Conical Inserts, Enhanced Shirttail	Jet	96	43.5	4 1/2" API	40,500-67,500 lbs WOB 70 to 120 RPM
9 7/8" 251 mm	93001053	118-0251-33-FB-5-02	3-3-2	F33	"Web" Gage Tooth	Jet	124	56.5	6 5/8" API	44,400-74,100 lbs WOB 50 to 100 RPM
9 7/8" 251 mm	93001027	118-3251-41-FB-CA-02	4-1-2	F37	Conical Inserts, Armor	Jet	122	55.5	6 5/8" API	14,800-54,300 lbs WOB 70 to 150 RPM
9 7/8" 251 mm	93001028	118-3251-42-FB-CA-02	4-2-2	F4	Conical Inserts, Armor	Jet	122	55.5	6 5/8" API	14,800-54,300 lbs WOB 70 to 150 RPM
9 7/8" 251 mm	93001029	118-3251-52-FB-CA-02	5-2-2	F5	Conical Inserts, Armor	Jet	122	55.5	6 5/8" API	34,600-64,200 lbs WOB 70 to 120 RPM
9 7/8" 251 mm	93001068	118-3251-52-FB-C-02	5-2-2	F5	Conical Inserts	Jet	122	55.5	6 5/8" API	34,500-64,200 lbs WOB 70 to 120 RPM
9 7/8" 251 mm	93001030	118-3251-54-FB-CA-02	5-4-2	F55	Conical Inserts, Armor	Jet	122	55.5	6 5/8" API	34,600-64,200 lbs WOB 70 to 120 RPM
9 7/8" 251 mm	93001069	118-3251-54-FB-C-02	5-4-2	F55	Conical Inserts	Jet	122	55.5	6 5/8" API	34,500-64,200 lbs WOB 70 to 120 RPM
9 7/8" 251 mm	93001033	118-3251-62-FB-CY-02	6-2-2	F67	Conical Inserts, Enhanced Shirttail	Jet	122	55.5	6 5/8" API	44,400-74,100 lbs WOB 70 to 120 RPM
9 7/8" 251 mm	93001031	118-3251-63-FB-CA-02	6-3-2	F6	Conical Inserts, Armor	Jet	122	55.5	6 5/8" API	44,400-74,100 lbs WOB 70 to 120 RPM
9 7/8" 251 mm	93001058	118-3251-63-FB-C-02	6-3-2	F6	Conical Inserts	Jet	122	55.5	6 5/8" API	44,400-74,100 lbs WOB 70 to 120 RPM
9 7/8" 251 mm	93001078	118-3251-63-FB-CAH-02	6-3-2	F6	Conical Inserts, Armor, Hard Nose on Cones	Jet	122	55.5	6 5/8" API	44,400-74,100 lbs WOB 70 to 120 RPM

Blasthole Tricone Bits 9 7/8" - 10 5/8"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB/RPM
							lbs	kgs		
9 7/8" 251 mm	93001059	118-3251-64-FB-C-02	6-4-2	F65	Conical Inserts	Jet	122	55.5	6 5/8" API	44,400-74,100 lbs WOB 70 to 120 RPM
9 7/8" 251 mm	93001032	118-3251-64-FB-CA-02	6-4-2	F65	Conical Inserts, Armor	Jet	122	55.5	6 5/8" API	44,400-74,100 lbs WOB 70 to 120 RPM
9 7/8 " 251 mm	93001055	118-3251-71-FB-CY-02	7-1-2	F68	Conical Inserts, Enhanced Shirttail	Jet	126	57	6 5/8" API	44,400-83,900 lbs WOB 50 to 90 RPM
9 7/8 " 251 mm	93001054	118-3251-71-FB-CYV-02	7-1-2	F67	Conical Inserts, Enhanced Shirttail, Aggressive Cutting Structure	Jet	111	50.5	6 5/8" API	44,400-74,100 lbs WOB 70 to 120 RPM
9 7/8" 251 mm	93001087	118-3251-71-FB-CYHV-02	7-1-2	F67	Conical Inserts, Enhanced Shirttail, Hardnose on Cones, Wear Resistant Carbide	Jet	122	55.5	6 5/8" API	44,400-74,100 lbs WOB 70 to 120 RPM
9 7/8" 251 mm	93001089	118-3251-72-FB-CY-HW-02	7-2-2	F72	Conical Inserts, Enhanced Shirttail, Hardnose on Cones, Aggressive Cutting Structure	Jet	122	55.5	6 5/8" API	44,400-83,900 lbs WOB 50 to 90 RPM
9 7/8" 251 mm	93001034	118-3251-73-FB-CY-02	7-3-2	F7	Conical Inserts, Enhanced Shirttail	Jet	122	55.5	6 5/8" API	44,400-83,900 lbs WOB 50 to 90 RPM
9 7/8" 251 mm	93001035	118-3251-73-FB-CYH-02	7-3-2	F7	Conical Inserts, Enhanced Shirttail, Hardnose on Cones	Jet	122	55.5	6 5/8" API	44,400-83,900 lbs WOB 50 to 90 RPM
10 5/32" 258 mm	93001091	118-3258-73-FB-CYH-02	7-3-2	F7	Conical Inserts, Enhanced Shirttail, Hardnose on Cones	Jet	130	59	6 5/8" API	44,400-83,900 lbs WOB 50 to 90 RPM
10 5/8" 270 mm	93001036	118-3270-41-FB-CAV-02	4-1-2	F33	Conical Inserts, Armor, Aggressive Cutting Structure	Jet	143	65	6 5/8" API	15,900-58,400 lbs WOB 70 to 150 RPM
10 5/8" 270 mm	93001070	118-3270-41-FB-CA-02	4-1-2	F35	Conical Inserts, Armor	Jet	143	65	6 5/8" API	10,600-47,800 lbs WOB 70 to 120 RPM
10 5/8" 270 mm	93001082	118-3270-41-FB-CAHV-02	4-1-2	F33	Conical Inserts, Armor, Hard Nose on Cones, Aggressive Cutting Structure	Jet	143	65	6 5/8" API	15,900-58,400 lbs WOB 70 to 150 RPM
10 5/8" 270 mm	93001037	118-3270-42-FB-CA-02	4-2-2	F4	Conical Inserts, Armor	Jet	143	65	6 5/8" API	15,900-58,400 lbs WOB 70 to 150 RPM
10 5/8" 270 mm	93001038	118-3270-53-FB-CA-02	5-3-2	F5	Conical Inserts, Armor	Jet	143	65	6 5/8" API	37,200-69,100 lbs WOB 70 to 120 RPM

Blasthole Tricone Bits

10 5/8" - 12 1/4"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB/RPM
							lbs	kgs		
10 5/8" 270 mm	93001039	118-3270-54-FB-CA-02	5-4-2	F55	Conical Inserts, Armor	Jet	143	65	6 5/8" API	37,200-69,100 lbs WOB 70 to 120 RPM
10 5/8" 270 mm	93001040	118-3270-63-FB-CA-02	6-3-2	F6	Conical Inserts, Armor	Jet	143	65	6 5/8" API	47,800-79,700 lbs WOB 70 to 120 RPM
10 5/8" 270 mm	93001071	118-3270-63-FB-CAW-02	6-3-2	F6	Conical Inserts, Armor, Wear Resistant Carbide	Jet	143	65	6 5/8" API	47,800-79,700 lbs WOB 70 to 120 RPM
10 5/8" 270 mm	93001041	118-3270-64-FB-CY-02	6-4-2	F65	Conical Inserts, Enhanced Shirttail	Jet	143	65	6 5/8" API	47,800-79,700 lbs WOB 70 to 120 RPM
10 5/8" 270 mm	93001072	118-3270-64-FB-C-02	6-4-2	F6	Conical Inserts	Jet	143	65	6 5/8" API	47,800-79,700 lbs WOB 70 to 120 RPM
10 5/8" 270 mm	93001081	118-3270-64-FB-CYV-02	6-4-2	F67	Conical Inserts, Enhanced Shirttail, Aggressive Cutting Structure	Jet	143	65	6 5/8" API	47,800-79,700 lbs WOB 70 to 120 RPM
10 5/8" 270 mm	93001042	118-3270-73-FB-CY-02	7-3-2	F7	Conical Inserts, Enhanced Shirttail	Jet	143	65	6 5/8" API	47,800-90,300 lbs WOB 50 to 90 RPM
11" 279 mm	93001043	118-3279-53-FB-CY-02	5-3-2	F5	Conical Inserts, Enhanced Shirttail	Jet	154	70	6 5/8" API	38,500-71,500 lbs WOB 70 to 120 RPM
11" 279 mm	93001044	118-3279-63-FB-CY-02	6-3-2	F6	Conical Inserts, Enhanced Shirttail	Jet	154	70	6 5/8" API	49,500-82,500 lbs WOB 70 to 120 RPM
11" 279 mm	93001045	118-3279-73-FB-CY-02	7-3-2	F7	Conical Inserts, Enhanced Shirttail	Jet	154	70	6 5/8" API	49,500-93,500 lbs WOB 50 to 90 RPM
12 1/4" 311 mm	93001046	118-3311-53-FB-CA-02	5-3-2	F5	Conical Inserts, Armor	Jet	205	93	6 5/8" API	42,900-79,600 lbs WOB 70 to 120 RPM
12 1/4" 311 mm	93001047	118-3311-63-FB-CY-02	6-3-2	F6	Conical Inserts, Enhanced Shirttail	Jet	205	93	6 5/8" API	55,100-91,900 lbs WOB 70 to 120 RPM
12 1/4" 311 mm	93001060	118-3311-63-FB-CYV-02	6-3-2	F67	Conical Inserts, Enhanced Shirttail, Aggressive Cutting Structure	Jet	205	93	6 5/8" API	55,100-91,900 lbs WOB 70 to 120 RPM
12 1/4" 311 mm	93001073	118-3311-63-FB-C-02	6-3-2	F6	Conical Inserts	Jet	205	93	6 5/8" API	55,100-91,900 lbs WOB 70 to 120 RPM
12 1/4" 311 mm	93001048	118-3311-64-FB-CY-02	6-4-2	F65	Conical Inserts, Enhanced Shirttail	Jet	205	93	6 5/8" API	55,100-91,900 lbs WOB 70 to 120 RPM

Blasthole Tricone Bits 12 1/4" - 15"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB/RPM
							lbs	kgs		
12 1/4" 311 mm	93001080	118-3311-64-FB-CYV-02	6-4-2	F66	Conical Inserts, Enhanced Shirttail, Aggressive Cutting Structure	Jet	205	93	6 5/8" API	55,100-91,900 lbs WOB 70 to 120 RPM
12 1/4" 311 mm	93001049	118-3311-73-FB-CY-02	7-3-2	F7	Conical Inserts, Enhanced Shirttail	Jet	205	93	6 5/8" API	55,100-104,100 lbs WOB 50 to 90 RPM
12 1/4" 311 mm	93001074	118-3311-73-FB-C-02	7-3-2	F7	Conical Inserts	Jet	205	93	6 5/8" API	55,100-91,900 lbs WOB 70 to 120 RPM
12 1/4" 311 mm	93001079	118-3311-73-FB-CW-02	7-3-2	F7	Conical Inserts, Wear Resistant Carbide	Jet	205	93	6 5/8" API	55,100-91,900 lbs WOB 70 to 120 RPM
12 1/4" 311 mm	93001050	118-3311-74-FB-CY-02	7-4-2	F75	Conical Inserts, Enhanced Shirttail	Jet	205	93	6 5/8" API	55,100-104,100 lbs WOB 50 to 90 RPM
12 1/4" 311 mm	93001075	118-3311-74-FB-C-02	7-4-2	F75	Conical Inserts	Jet	205	93	6 5/8" API	55,100-91,900 lbs WOB 70 to 120 RPM
15" 381 mm	93001088	132-3381-63-FB-C-02	6-3-2	F6	Conical Inserts	Jet	297	135	7 5/8" API	67,500-112,500 lbs WOB 70 to 120 RPM

TCI Waterwell Bits

2 31/64" - 3 1/2"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB / RPM
							lbs	kgs		
2 31/64" 63 mm	93002252	161-3063-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	3.3	1.5	4n-Rod	8.700-16,100 lbs WOB 70 to 120 RPM
2 31/64" 63 mm	93002253	161-3063-71-FW-CR-01	7-1-1	F7	Conical Inserts	Regular	3.3	1.5	4n-Rod	30,400-57,400 lbs WOB 50 to 90 RPM
2 1/2" 64 mm	93002149	161-3064-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	3.3	1.5	4n-Rod	8,800-16,300 lbs WOB 70 to 120 RPM
2 1/2" 64 mm	93002150	161-3064-71-FW-CR-01	7-1-1	F7	Conical Inserts	Regular	3.3	1.5	4n-Rod	11,300-21,300 lbs WOB 50 to 90 RPM
2 5/8" 67 mm	93002151	161-3067-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	3.3	1.5	4n-Rod	9,200-17,100 lbs WOB 70 to 120 RPM
2 5/8" 67 mm	93002152	161-3067-71-FW-CR-01	7-1-1	F7	Conical Inserts	Regular	3.3	1.5	4n-Rod	11,800-22,300 lbs WOB 50 to 90 RPM
2 7/8" 73 mm	93002153	161-3073-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	3.3	1.5	4n-Rod	10,100-18,700 lbs WOB 70 to 120 RPM
2 15/16" 75 mm	93002154	161-3075-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	4.4	2	4n-Rod	10,300-19,100 lbs WOB 70 to 120 RPM
2 15/16" 75 mm	93002155	161-3075-71-FW-CR-01	7-1-1	F7	Conical Inserts	Regular	4.4	2	4n-Rod	13,200-25,000 lbs WOB 50 to 90 RPM
3" 76 mm	93002157	161-3076-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	4.4	2	4n-Rod	10,500-19,500 lbs WOB 70 to 120 RPM
3" 76 mm	93002156	161-3076-71-FW-CR-01	7-1-1	F7	Conical Inserts	Regular	4.4	2	4n-Rod	13,500-25,500 lbs WOB 50 to 90 RPM
3 1/8" 79 mm	93002158	161-3079-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	4.4	2	4n-Rod	10,900-20,300 lbs WOB 70 to 120 RPM
3 1/4" 83 mm	93002159	161-3083-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	4.4	2	4n-Rod	11,400-21,100 lbs WOB 70 to 120 RPM
3 1/2" 89 mm	93002160	110-3089-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	7.1	3.2	2 3/8" API	12,300-22,800 lbs WOB 70 to 120 RPM
3 1/2" 89 mm	93002255	161-3089-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	7.1	3.2	4n-Rod	12,300-22,800 lbs WOB 70 to 120 RPM
3 1/2" 89 mm	93002185	110-3089-52-FW-FR-02	5-2-2	F5	Chisel Inserts	Regular	7.1	3.2	2 3/8" API	12,300-22,800 lbs WOB 70 to 120 RPM
3 1/2" 89 mm	93002187	161-3089-52-FW-FR-02	5-2-2	F5	Chisel Inserts	Regular	7.1	3.2	4n-Rod	12,300-22,800 lbs WOB 70 to 120 RPM
3 1/2" 89 mm	93002161	110-3089-71-FW-CR-01	7-1-1	F7	Conical Inserts	Regular	7.1	3.2	2 3/8" API	15,800-29,800 lbs WOB 50 to 90 RPM
3 1/2" 89 mm	93002254	161-3089-71-FW-CR-01	7-1-1	F7	Conical Inserts	Regular	7.1	3.2	4n-Rod	15,750-29,750 lbs WOB 50 to 90 RPM
3 1/2" 89 mm	93002186	110-3089-71-FW-CR-02	7-1-2	F7	Conical Inserts	Regular	7.1	3.2	2 3/8" API	15,800-29,800 lbs WOB 50 to 90 RPM

TCI Waterwell Bits

3 21/32" - 4 1/2"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB / RPM
							lbs	kgs		
3 21/32" 93 mm	93002162	110-3093-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	7.1	3.2	2 3/8" API	12,800-23,800 lbs WOB 70 to 120 RPM
3 21/32" 93 mm	93002163	110-3093-71-FW-CR-01	7-1-1	F7	Conical Inserts	Regular	7.1	3.2	2 3/8" API	16,500-31,100 lbs WOB 50 to 90 RPM
3 3/4" 95 mm	93002256	110-3095-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	7.7	3.5	2 3/8" API	13,100-24,400 lbs WOB 70 to 120 RPM
3 3/4" 95 mm	93002188	110-3095-52-FW-FR-02	5-2-2	F5	Chisel Inserts	Regular	7.7	3.5	2 3/8" API	13,100-24,400 lbs WOB 70 to 120 RPM
3 7/8" 98 mm	93002164	110-3098-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	8.8	4	2 3/8" API	13,600-25,200 lbs WOB 70 to 120 RPM
3 7/8" 98 mm	93002189	110-3098-52-FW-FR-02	5-2-2	F5	Chisel Inserts	Regular	8.8	4	2 3/8" API	13,600-25,200 lbs WOB 70 to 120 RPM
3 7/8" 98 mm	93002165	110-3098-71-FW-CR-01	7-1-1	F7	Conical Inserts	Regular	8.8	4	2 3/8" API	17,400-32,900 lbs WOB 50 to 90 RPM
3 7/8" 98 mm	93002190	110-3098-71-FW-CR-02	7-1-2	F7	Conical Inserts	Regular	8.8	4	2 3/8" API	17,400-32,900 lbs WOB 50 to 90 RPM
4" 102 mm	93002166	110-3102-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	8.8	4	2 3/8" API	14,000-26,000 lbs WOB 70 to 120 RPM
4" 102 mm	93002191	110-3102-52-FW-FR-02	5-2-2	F5	Chisel Inserts	Regular	8.8	4	2 3/8" API	14,000-26,000 lbs WOB 70 to 120 RPM
4" 102 mm	93002167	110-3102-71-FW-CR-01	7-1-1	F7	Conical Inserts	Regular	8.8	4	2 3/8" API	18,000-34,000 lbs WOB 50 to 90 RPM
4" 102 mm	93002192	110-3102-71-FW-CR-02	7-1-2	F7	Conical Inserts	Regular	8.8	4	2 3/8" API	18,000-34,000 lbs WOB 50 to 90 RPM
4 1/8" 105 mm	93002303	110-3105-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	8.8	4	2 3/8" API	14,400-26,800 lbs WOB 70 to 120 RPM
4 1/8" 105 mm	93002193	110-3105-52-FW-FR-02	5-2-2	F5	Chisel Inserts	Regular	8.8	4	2 3/8" API	14,400-26,800 lbs WOB 70 to 120 RPM
4 1/4" 108 mm	93002257	110-3108-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	8.8	4	2 3/8" API	14,900-27,600 lbs WOB 70 to 120 RPM
4 1/4" 108 mm	93002194	110-3108-52-FW-FR-02	5-2-2	F5	Chisel Inserts	Regular	8.8	4	2 3/8" API	14,900-27,600 lbs WOB 70 to 120 RPM
4 3/8" 111 mm	93002258	110-3111-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	8.8	4	2 3/8" API	15,300-28,400 lbs WOB 70 to 120 RPM
4 1/2" 114 mm	93002168	110-3114-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	12.1	5.5	2 3/8" API	15,800-29,300 lbs WOB 70 to 120 RPM
4 1/2" 114 mm	93002195	110-3114-52-FW-FR-02	5-2-2	F5	Chisel Inserts	Regular	12.1	5.5	2 3/8" API	15,800-29,300 lbs WOB 70 to 120 RPM
4 1/2" 114 mm	93002169	110-3114-71-FW-CR-01	7-1-1	F7	Conical Inserts	Regular	12.1	5.5	2 3/8" API	20,300-38,300 lbs WOB 50 to 90 RPM
4 1/2" 114 mm	93002196	110-3114-71-FW-CR-02	7-1-2	F7	Conical Inserts	Regular	12.1	5.5	2 3/8" API	20,300-38,300 lbs WOB 50 to 90 RPM

TCI Waterwell Bits

4 5/8" - 5 3/8"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB / RPM
							lbs	kgs		
4 5/8" 117 mm	93002323	110-3117-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	13.2	6	2 3/8" API	15,800-29,300 lbs WOB 70 to 120 RPM
4 5/8" 117 mm	93002324	110-3117-71-FW-CR-01	7-1-1	F7	Conical Inserts	Regular	13.2	6	2 3/8" API	20,300-38,300 lbs WOB 50 to 90 RPM
4 3/4" 121 mm	93002170	112-3121-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	18.7	8.5	2 7/8" API	16,600-30,900 lbs WOB 70 to 120 RPM
4 3/4" 121 mm	93002197	112-3121-52-FW-FR-02	5-2-2	F5	Chisel Inserts	Regular	18.7	8.5	2 7/8" API	16,600-30,900 lbs WOB 70 to 120 RPM
4 3/4" 121 mm	93002171	112-3121-71-FW-CR-01	7-1-1	F7	Conical Inserts	Regular	18.7	8.5	2 7/8" API	21,400-40,400 lbs WOB 50 to 90 RPM
4 3/4" 121 mm	93002198	112-3121-71-FW-CR-02	7-1-2	F7	Conical Inserts	Regular	18.7	8.5	2 7/8" API	21,400-40,400 lbs WOB 50 to 90 RPM
4 7/8" 124 mm	93002172	112-3124-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	18.7	8.5	2 7/8" API	17,100-31,700 lbs WOB 70 to 120 RPM
4 7/8" 124 mm	93002199	112-3124-52-FW-FR-02	5-2-2	F5	Chisel Inserts	Regular	18.7	8.5	2 7/8" API	17,100-31,700 lbs WOB 70 to 120 RPM
4 7/8" 124 mm	93002297	112-3124-71-FW-CR-01	7-1-1	F7	Conical Inserts	Regular	18.7	8.5	2 7/8" API	21,400-40,400 lbs WOB 50 to 90 RPM
5" 127 mm	93002173	112-3127-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	18.7	8.5	2 7/8" API	17,500-32,500 lbs WOB 70 to 120 RPM
5" 127 mm	93002200	112-3127-52-FW-FR-02	5-2-2	F5	Chisel Inserts	Regular	18.7	8.5	2 7/8" API	17,500-32,500 lbs WOB 70 to 120 RPM
5" 127 mm	93002259	112-3127-71-FW-CR-01	7-1-1	F7	Conical Inserts	Regular	19.8	9	2 7/8" API	22,500-42,500 lbs WOB 50 to 90 RPM
5 1/8" 130 mm	93002201	112-3130-51-FW-FR-02	5-1-2	F5	Chisel Inserts	Regular	22	10	2 7/8" API	5,125-20,500 lbs WOB 70 to 130 RPM
5 1/8" 130 mm	93002174	112-3130-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	22	10	2 7/8" API	5,125-20,500 lbs WOB 70 to 130 RPM
5 1/8" 130 mm	93002202	112-3130-52-FW-FR-02	5-2-2	F5	Chisel Inserts	Regular	22	10	2 7/8" API	7,688-23,063 lbs WOB 70 to 120 RPM
5 1/8" 130 mm	93002260	112-3130-71-FW-CR-01	7-1-1	F7	Conical Inserts	Regular	19.8	9	2 7/8" API	23,100-43,600 lbs WOB 50 to 90 RPM
5 1/4" 133 mm	93002175	112-3133-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	22	10	2 7/8" API	5,250-21,000 lbs WOB 70 to 130 RPM
5 1/4" 133 mm	93002278	112-3133-52-FW-FR-02	5-2-2	F5	Chisel Inserts	Regular	22	10	2 7/8" API	18,400-34,100 lbs WOB 70 to 120 RPM
5 1/4" 133 mm	93002261	112-3133-71-FW-CR-01	7-1-1	F7	Conical Inserts	Regular	22	10	2 7/8" API	23,600-44,600 lbs WOB 50 to 90 RPM
5 3/8" 137 mm	93002279	112-3137-52-FW-FR-02	5-2-2	F5	Chisel Inserts	Regular	23.1	10.5	2 7/8" API	18,800-34,900 lbs WOB 70 to 120 RPM

TCI Waterwell Bits

5 1/2" - 6 1/8"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB / RPM
							lbs	kgs		
5 1/2" 140 mm	93002176	112-3140-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	23.1	10.5	2 7/8" API	19,300-35,800 lbs WOB 70 to 120 RPM
5 1/2" 140 mm	93002280	112-3140-52-FW-F-02	5-2-2	F5	Chisel Inserts	Jet	23.1	10.5	2 7/8" API	19,300-35,800 lbs WOB 70 to 120 RPM
5 1/2" 140 mm	93002203	112-3140-52-FW-FR-02	5-2-2	F5	Chisel Inserts	Regular	23.1	10.5	2 7/8" API	19,300-35,800 lbs WOB 70 to 120 RPM
5 1/2" 140 mm	93002281	112-3140-62-FW-C-02	6-2-2	F6	Conical Inserts	Jet	24.2	11	2 7/8" API	24,800-41,300 lbs WOB 70 to 120 RPM
5 1/2" 140 mm	93002262	112-3140-71-FW-CR-01	7-1-1	F7	Conical Inserts	Regular	23.1	10.5	2 7/8" API	24,800-46,800 lbs WOB 50 to 90 RPM
5 5/8" 143 mm	93002177	114-3143-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	24.3	11	3 1/2" API	19,700-36,600 lbs WOB 70 to 120 RPM
5 5/8" 143 mm	93002204	114-3143-53-FW-FR-02	5-3-2	F5	Chisel Inserts	Regular	24.2	11	3 1/2" API	19,700-36,600 lbs WOB 70 to 120 RPM
5 5/8" 143 mm	93002282	114-3143-62-FW-C-02	6-2-2	F6	Conical Inserts	Jet	25.3	11.5	3 1/2" API	19,700-36,600 lbs WOB 70 to 120 RPM
5 5/8" 143 mm	93002315	114-3143-71-FW-CR-01	7-1-1	F7	Conical Inserts	Regular	24.2	11	3 1/2" API	20,100-37,400 lbs WOB 70 to 120 RPM
5 3/4" 146 mm	93002263	114-3146-43-FW-CR-01	4-3-1	F4	Conical Inserts	Regular	25.3	11.5	3 1/2" API	8,600-31,600 lbs WOB 70 to 150 RPM
5 3/4" 146 mm	93002265	114-3146-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	25.7	11.7	3 1/2" API	20,100-37,400 lbs WOB 70 to 120 RPM
5 3/4" 146 mm	93002264	114-3146-71-FW-CR-01	7-1-1	F7	Conical Inserts	Regular	26.2	11.9	3 1/2" API	25,900-48,900 lbs WOB 50 to 90 RPM
5 7/8" 149 mm	93002206	114-3149-43-FW-CR-02	4-3-2	F4	Conical Inserts	Regular	26.5	12	3 1/2" API	8,400-30,100 lbs WOB 70 to 150 RPM
5 7/8" 149 mm	93002178	114-3149-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	26.5	12	3 1/2" API	20,500-38,200 lbs WOB 70 to 120 RPM
5 7/8" 149 mm	93002205	114-3149-52-FW-FR-02	5-2-2	F5	Chisel Inserts	Regular	26.5	12	3 1/2" API	19,700-33,100 lbs WOB 70 to 120 RPM
5 7/8" 149 mm	93002179	114-3149-62-FW-FR-01	6-2-1	F6	Chisel Inserts	Regular	26.5	12	3 1/2" API	23,500-44,100 lbs WOB 70 to 120 RPM
5 7/8" 149 mm	93002266	114-3149-71-FW-CR-01	7-1-1	F7	Conical Inserts	Regular	26.4	12	3 1/2" API	26,400-50,000 lbs WOB 50 to 90 RPM
6" 152 mm	93002180	114-3152-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	26.5	12	3 1/2" API	21,000-39,000 lbs WOB 70 to 120 RPM
6" 152 mm	93002207	114-3152-52-FW-FR-02	5-2-2	F5	Chisel Inserts	Regular	26.5	12	3 1/2" API	21,000-39,000 lbs WOB 70 to 120 RPM
6" 152 mm	93002181	114-3152-62-FW-FR-01	6-2-1	F6	Chisel Inserts	Regular	26.5	12	3 1/2" API	27,000-45,000 lbs WOB 70 to 120 RPM
6" 152 mm	93002267	114-3152-71-FW-CR-01	7-1-1	F7	Conical Inserts	Regular	26.4	12	3 1/2" API	27,000-51,000 lbs WOB 50 to 90 RPM
6 1/8" 156 mm	93002268	114-3156-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	27.5	12.5	3 1/2" API	21,400-39,800 lbs WOB 70 to 120 RPM

TCI Waterwell Bits

6 1/4" - 6 3/4"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB / RPM
							lbs	kgs		
6 1/4" 159 mm	93002269	114-3159-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	29.7	13.5	3 1/2" API	21,900-40,000 lbs WOB 70 to 120 RPM
6 1/2" 165 mm	93002182	114-3165-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	26.5	12	3 1/2" API	22,800-42,300 lbs WOB 70 to 120 RPM
6 1/2" 165 mm	93002208	114-3165-52-FW-FR-02	5-2-2	F5	Chisel Inserts	Regular	26.5	12	3 1/2" API	22,800-42,300 lbs WOB 70 to 120 RPM
6 1/2" 165 mm	93002284	114-3165-62-FW-C-02	6-2-2	F6	Conical Inserts	Jet	29.7	13.5	3 1/2" API	29,300-48,800 lbs WOB 70 to 120 RPM
6 1/2" 165 mm	93002270	114-3165-71-FW-CR-01	7-1-1	F7	Conical Inserts	Regular	30.8	14	3 1/2" API	29,300-55,300 lbs WOB 50 to 90 RPM
6 1/2" 165 mm	93002283	114-3165-71-FW-C-02	7-1-2	F7	Conical Inserts	Jet	30.8	14	3 1/2" API	29,300-55,300 lbs WOB 50 to 90 RPM
6 5/8" 168 mm	93002183	114-3168-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	26.5	12	3 1/2" API	23,200-43,100 lbs WOB 70 to 120 RPM
6 3/4" 171 mm	93002184	114-3171-52-FW-FR-01	5-2-1	F5	Chisel Inserts	Regular	35.3	16	3 1/2" API	23,600-43,900 lbs WOB 70 to 120 RPM
6 3/4" 171 mm	93002209	114-3171-52-FW-FR-02	5-2-2	F5	Chisel Inserts	Regular	35.3	16	3 1/2" API	23,600-43,900 lbs WOB 70 to 120 RPM

Steel Tooth Waterwell Bits 2 1/2" - 3 1/4"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB/ RPM
							lbs	kgs		
2 1/2" 64 mm	93002003	161-0064-11-FW-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	3.3	1.5	4n-Rod	3,800-8,800 lbs WOB 60 to 140 RPM
2 1/2" 64 mm	93002002	161-0064-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	3.3	1.5	4n-Rod	11,300-18,800 lbs WOB 50 to 100 RPM
2 1/2" 64 mm	93002218	161-0064-32-FW-1R-01	3-2-1	F32	Conventional Gage Tooth	Regular	3.3	1.5	4n-Rod	11,300-18,800 lbs WOB 50 to 100 RPM
2 1/2" 64 mm	93002001	161-0064-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	3.3	1.5	4n-Rod	8,800-13,800 lbs WOB 50 to 120 RPM
2 5/8" 67 mm	93002005	161-0067-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	3.3	1.5	4n-Rod	9,200-14,400 lbs WOB 50 to 120 RPM
2 5/8" 67 mm	93002004	161-0067-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	3.3	1.5	4n-Rod	11,800-19,700 lbs WOB 50 to 100 RPM
2 7/8" 73 mm	93002006	161-0073-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	4	1.8	4n-Rod	10,100-15,800 lbs WOB 50 to 120 RPM
2 7/8" 73 mm	93002007	161-0073-32-FW-1R-01	3-2-1	F32	Conventional Gage Tooth	Regular	4	1.8	4n-Rod	12,900-21,600 lbs WOB 50 to 100 RPM
2 7/8" 73 mm	93002299	161-0073-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	4	1.8	4n-Rod	12,900-21,600 lbs WOB 50 to 100 RPM
2 15/16" 75 mm	93002009	161-0075-21-FW-1R-01	2-1-1	F21	Conventional Gage Tooth	Regular	4.4	2	4n-Rod	10,300-16,200 lbs WOB 50 to 120 RPM
2 15/16" 75 mm	93002008	161-0075-32-FW-1R-01	3-2-1	F32	Conventional Gage Tooth	Regular	4.4	2	4n-Rod	13,200-22,000 lbs WOB 50 to 100 RPM
2 15/16" 75 mm	93002010	161-0075-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	4.4	2	4n-Rod	13,200-22,000 lbs WOB 50 to 100 RPM
3" 76 mm	93002012	161-0076-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	4.4	2	4n-Rod	10,500-16,500 lbs WOB 50 to 150 RPM
3" 76 mm	93002219	161-0076-32-FW-1R-01	3-2-1	F32	Conventional Gage Tooth	Regular	4.4	2	4n-Rod	13,500-22,500 lbs WOB 50 to 100 RPM
3" 76 mm	93002011	161-0076-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	4.4	2	4n-Rod	13,500-22,500 lbs WOB 50 to 100 RPM
3 1/8" 79 mm	93002013	161-0079-32-FW-1R-01	3-2-1	F32	Conventional Gage Tooth	Regular	4.4	2	4n-Rod	14,100-23,400 lbs WOB 50 to 100 RPM
3 1/8" 79 mm	93002014	161-0079-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	4.4	2	4n-Rod	14,100-23,400 lbs WOB 50 to 100 RPM
3 1/4" 83 mm	93002017	161-0083-11-FW-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	4.4	2	4n-Rod	4,900-11,400 lbs WOB 60 to 140 RPM
3 1/4" 83 mm	93002016	161-0083-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	4.4	2	4n-Rod	11,400-17,900 lbs WOB 50 to 120 RPM
3 1/4" 83 mm	93002015	161-0083-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	4.4	2	4n-Rod	14,600-24,400 lbs WOB 50 to 100 RPM

Steel Tooth Waterwell Bits 3 1/2" - 3 7/8"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB/ RPM
							lbs	kgs		
3 1/2" 89 mm	93002018	110-0089-11-FW-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	7.1	3.2	2 3/8" API	5,300-12,300 lbs WOB 60 to 140 RPM
3 1/2" 89 mm	93002221	110-0089-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	7.1	3.2	2 3/8" API	12,250-19,250 lbs WOB 50 to 120 RPM
3 1/2" 89 mm	93002290	161-0089-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	7.1	3.2	4n-Rod	12,250-19,250 lbs WOB 50 to 120 RPM
3 1/2" 89 mm	93002073	161-0089-23-FW-1R-02	2-3-2	F23	Conventional Gage Tooth	Regular	7.1	3.2	4n-Rod	12,250-19,250 lbs WOB 50 to 120 RPM
3 1/2" 89 mm	93002074	110-0089-23-FW-1R-02	2-3-2	F23	Conventional Gage Tooth	Regular	7.1	3.2	2 3/8" API	12,250-19,250 lbs WOB 50 to 120 RPM
3 1/2" 89 mm	93002076	110-0089-32-FW-1R-02	3-2-2	F32	Conventional Gage Tooth	Regular	7.1	3.2	2 3/8" API	15,750-26,300 lbs WOB 50 to 100 RPM
3 1/2" 89 mm	93002217	110-0089-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	7.1	3.2	2 3/8" API	15,750-26,300 lbs WOB 50 to 100 RPM
3 1/2" 89 mm	93002220	161-0089-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	7.1	3.2	4n-Rod	15,750-26,300 lbs WOB 50 to 100 RPM
3 1/2" 89 mm	93002075	110-0089-33-FW-5R-02	3-3-2	F33	"Web" Gage Tooth	Regular	7.1	3.2	2 3/8" API	15,750-26,300 lbs WOB 50 to 100 RPM
3 5/8" 92 mm	93002320	110-0092-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	7.3	3.3	2 3/8" API	15,750-26,300 lbs WOB 50 to 100 RPM
3 3/4" 95 mm	93002021	110-0095-11-FW-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	8.8	4.0	2 3/8" API	5,600-13,100 lbs WOB 60 to 140 RPM
3 3/4" 95 mm	93002020	110-0095-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	8.8	4.0	2 3/8" API	13,100-20,600 lbs WOB 50 to 120 RPM
3 3/4" 95 mm	93002078	110-0095-23-FW-1R-02	2-3-2	F23	Conventional Gage Tooth	Regular	8.8	4.0	2 3/8" API	13,100-20,600 lbs WOB 50 to 120 RPM
3 3/4" 95 mm	93002222	110-0095-32-FW-2R-01	3-2-1	F32	Tapered Gage Tooth	Regular	8.8	4.0	2 3/8" API	16,900-28,100 lbs WOB 50 to 100 RPM
3 3/4" 95 mm	93002079	110-0095-32-FW-2R-02	3-2-2	F32	Tapered Gage Tooth	Regular	8.8	4.0	2 3/8" API	16,900-28,100 lbs WOB 50 to 100 RPM
3 3/4" 95 mm	93002019	110-0095-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	8.8	4.0	2 3/8" API	16,900-28,100 lbs WOB 50 to 100 RPM
3 3/4" 95 mm	93002077	110-0095-33-FW-5R-02	3-3-2	F33	"Web" Gage Tooth	Regular	8.8	4.0	2 3/8" API	16,900-28,100 lbs WOB 50 to 100 RPM
3 7/8" 98 mm	93002223	110-0098-11-FW-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	9.9	4.5	2 3/8" API	5,800-13,600 lbs WOB 60 to 140 RPM
3 7/8" 98 mm	93002083	110-0098-11-FW-1R-02	1-1-2	F11	Conventional Gage Tooth	Regular	8.8	4.0	2 3/8" API	5,800-13,600 lbs WOB 60 to 140 RPM
3 7/8" 98 mm	93002081	110-0098-23-FW-1R-02	2-3-1	F23	Conventional Gage Tooth	Regular	8.8	4.0	2 3/8" API	13,600-21,300 lbs WOB 50 to 120 RPM
3 7/8" 98 mm	93002224	110-0098-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	9.9	4.5	2 3/8" API	13,500-21,300 lbs WOB 50 to 120 RPM
3 7/8" 98 mm	93002022	110-0098-32-FW-1R-01	3-2-1	F32	Conventional Gage Tooth	Regular	8.8	4.0	2 3/8" API	17,400-29,100 lbs WOB 50 to 100 RPM
3 7/8" 98 mm	93002080	110-0098-32-FW-1R-02	3-2-2	F32	Conventional Gage Tooth	Regular	8.8	4	2 3/8" API	17,400-29,100 lbs WOB 50 to 100 RPM

Steel Tooth Waterwell Bits 3 7/8" - 4 1/4"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB/ RPM
							lbs	kgs		
3 7/8" 98 mm	93002023	110-0098-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	8.8	4	2 3/8" API	17,400-29,100 lbs WOB 50 to 100 RPM
3 7/8" 98 mm	93002082	110-0098-33-FW-5R-02	3-3-2	F33	"Web" Gage Tooth	Regular	8.8	4	2 3/8" API	17,400-29,100 lbs WOB 50 to 100 RPM
4" 102 mm	93002026	110-0102-11-FW-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	8.8	4	2 3/8" API	6,000-14,000 lbs WOB 60 to 140 RPM
4" 102 mm	93002024	110-0102-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	8.8	4	2 3/8" API	14,000-22,000 lbs WOB 50 to 120 RPM
4" 102 mm	93002084	110-0102-23-FW-1R-02	2-3-2	F23	Conventional Gage Tooth	Regular	8.8	4	2 3/8" API	14,000-22,000 lbs WOB 50 to 120 RPM
4" 102 mm	93002025	110-0102-32-FW-1R-01	3-2-1	F32	Conventional Gage Tooth	Regular	8.8	4	2 3/8" API	18,000-30,000 lbs WOB 50 to 100 RPM
4" 102 mm	93002085	110-0102-32-FW-1R-02	3-2-2	F32	Conventional Gage Tooth	Regular	8.8	4	2 3/8" API	18,000-30,000 lbs WOB 50 to 100 RPM
4" 102 mm	93002225	110-0102-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	9.9	4	2 3/8" API	18,000-30,000 lbs WOB 50 to 100 RPM
4" 102 mm	93002086	110-0102-33-FW-5R-02	3-3-2	F33	"Web" Gage Tooth	Regular	8.8	4	2 3/8" API	18,000-30,000 lbs WOB 50 to 100 RPM
4 1/8" 105 mm	93002321	110-0105-11-FW-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	8.8	4	2 3/8" API	6,200-14,400 lbs WOB 60 to 140 RPM
4 1/8" 105 mm	93002090	110-0105-11-FW-1R-02	1-1-2	F11	Conventional Gage Tooth	Regular	8.8	4	2 3/8" API	6,200-14,400 lbs WOB 60 to 140 RPM
4 1/8" 105 mm	93002027	110-0105-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	8.8	4	2 3/8" API	14,400-22,700 lbs WOB 50 to 120 RPM
4 1/8" 105 mm	93002089	110-0105-23-FW-1R-02	2-3-2	F23	Conventional Gage Tooth	Regular	8.8	4	2 3/8" API	14,400-22,700 lbs WOB 50 to 120 RPM
4 1/8" 105 mm	93002304	110-0105-32-FW-1R-01	3-2-1	F32	Conventional Gage Tooth	Regular	8.8	4	2 3/8" API	18,600-30,900 lbs WOB 50 to 100 RPM
4 1/8" 105 mm	93002087	110-0105-32-FW-1R-02	3-2-2	F32	Conventional Gage Tooth	Regular	8.8	4	2 3/8" API	18,600-30,900 lbs WOB 50 to 100 RPM
4 1/8" 105 mm	93002088	110-0105-33-FW-5R-02	3-3-2	F33	"Web" Gage Tooth	Regular	8.8	4	2 3/8" API	18,600-30,900 lbs WOB 50 to 100 RPM
4 1/4" 108 mm	93002029	110-0108-11-FW-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	8.8	4	2 3/8" API	6,400-14,900 lbs WOB 60 to 140 RPM
4 1/4" 108 mm	93002092	110-0108-11-FW-1R-02	1-1-2	F11	Conventional Gage Tooth	Regular	8.8	4	2 3/8" API	6,400-14,900 lbs WOB 60 to 140 RPM
4 1/4" 108 mm	93002226	110-0108-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	8.8	4	2 3/8" API	14,900-23,400 lbs WOB 50 to 120 RPM
4 1/4" 108 mm	93002093	110-0108-23-FW-1R-02	2-3-2	F23	Conventional Gage Tooth	Regular	8.8	4	2 3/8" API	14,900-23,400 lbs WOB 50 to 120 RPM
4 1/4" 108 mm	93002305	110-0108-32-FW-2R-01	3-2-1	F32	Tapered Gage Tooth	Regular	8.8	4	2 3/8" API	19,100-31,900 lbs WOB 50 to 100 RPM
4 1/4" 108 mm	93002028	110-0108-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	8.8	4	2 3/8" API	19,100-31,900 lbs WOB 50 to 100 RPM
4 1/4" 108 mm	93002091	110-0108-33-FW-5R-02	3-3-2	F33	"Web" Gage Tooth	Regular	8.8	4	2 3/8" API	19,100-31,900 lbs WOB 50 to 100 RPM

Steel Tooth Waterwell Bits 4 3/8" - 4 3/4"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB/ RPM
							lbs	kgs		
4 3/8" 111 mm	93002030	110-0111-11-FW-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	8.8	4	2 3/8" API	6,600-15,300 lbs WOB 60 to 140 RPM
4 3/8" 111 mm	93002094	110-0111-11-FW-1R-02	1-1-2	F11	Conventional Gage Tooth	Regular	8.8	4	2 3/8" API	6,600-15,300 lbs WOB 60 to 140 RPM
4 1/2" 114 mm	93002032	110-0114-11-FW-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	12.1	5.5	2 3/8" API	6,800-15,800 lbs WOB 60 to 140 RPM
4 1/2" 114 mm	93002096	110-0114-11-FW-1R-02	1-1-2	F11	Conventional Gage Tooth	Regular	12.1	5.5	2 3/8" API	6,800-15,800 lbs WOB 60 to 140 RPM
4 1/2" 114 mm	93002031	110-0114-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	12.1	5.5	2 3/8" API	15,800-24,800 lbs WOB 50 to 120 RPM
4 1/2" 114 mm	93002095	110-0114-23-FW-1R-02	2-3-2	F23	Conventional Gage Tooth	Regular	12.1	5.5	2 3/8" API	15,800-24,800 lbs WOB 50 to 120 RPM
4 1/2" 114 mm	93002033	110-0114-32-FW-1R-01	3-2-1	F32	Conventional Gage Tooth	Regular	12.1	5.5	2 3/8" API	20,300-33,800 lbs WOB 50 to 100 RPM
4 1/2" 114 mm	93002097	110-0114-32-FW-1R-02	3-2-2	F32	Conventional Gage Tooth	Regular	12.1	5.5	2 3/8" API	20,300-33,800 lbs WOB 50 to 100 RPM
4 1/2" 114 mm	93002034	110-0114-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	12.1	5.5	2 3/8" API	20,300-33,800 lbs WOB 50 to 100 RPM
4 1/2" 114 mm	93002098	110-0114-33-FW-5R-02	3-3-2	F33	"Web" Gage Tooth	Regular	12.1	5.5	2 3/8" API	20,300-33,800 lbs WOB 50 to 100 RPM
4 5/8" 117 mm	93002035	110-0117-11-FW-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	12.1	5.5	2 3/8" API	6,900-16,200 lbs WOB 60 to 140 RPM
4 5/8" 117 mm	93002099	110-0117-11-FW-1R-02	1-1-2	F11	Conventional Gage Tooth	Regular	12.1	5.5	2 3/8" API	6,900-16,200 lbs WOB 60 to 140 RPM
4 5/8" 117 mm	93002036	110-0117-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	12.1	5.5	2 3/8" API	20,800-34,700 lbs WOB 50 to 100 RPM
4 5/8" 117 mm	93002227	110-0117-32-FW-2R-01	3-2-1	F32	Tapered Gage Tooth	Regular	12.1	5.5	2 3/8" API	20,800-34,700 lbs WOB 50 to 100 RPM
4 5/8" 117 mm	93002322	112-0117-23-FW-1R-02	2-3-2	F23	Conventional Gage Tooth	Regular	12.1	5.5	2 7/8" API	15,800-24,800 lbs WOB 50 to 120 RPM
4 3/4" 121 mm	93002039	112-0121-11-FW-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	18.7	8.5	2 7/8" API	7,100-16,600 lbs WOB 60 to 140 RPM
4 3/4" 121 mm	93002102	112-0121-11-FW-1R-02	1-1-2	F11	Conventional Gage Tooth	Regular	18.7	8.5	2 7/8" API	7,100-16,600 lbs WOB 60 to 140 RPM
4 3/4" 121 mm	93002037	112-0121-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	18.7	8.5	2 7/8" API	16,600-26,100 lbs WOB 50 to 120 RPM
4 3/4" 121 mm	93002100	112-0121-23-FW-1R-02	2-3-2	F23	Conventional Gage Tooth	Regular	18.7	8.5	2 7/8" API	16,600-26,100 lbs WOB 50 to 120 RPM
4 3/4" 121 mm	93002103	112-0121-32-FW-2R-02	3-2-2	F32	Tapered Gage Tooth	Regular	18.7	8.5	2 7/8" API	21,400-35,600 lbs WOB 50 to 100 RPM
4 3/4" 121 mm	93002038	112-0121-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	18.7	8.5	2 7/8" API	21,400-35,600 lbs WOB 50 to 100 RPM
4 3/4" 121 mm	93002101	112-0121-33-FW-5R-02	3-3-2	F33	"Web" Gage Tooth	Regular	18.7	8.5	2 7/8" API	21,400-35,600 lbs WOB 50 to 100 RPM
4 3/4" 121 mm	93002228	112-0121-32-FW-2R-01	3-2-1	F32	Tapered Gage Tooth	Regular	18.7	8.5	2 7/8" API	21,400-35,600 lbs WOB 50 to 100 RPM

Steel Tooth Waterwell Bits 4 7/8" - 5 1/4"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB/ RPM
							lbs	kgs		
4 7/8" 124 mm	93002106	112-0124-11-FW-1R-02	1-1-2	F11	Conventional Gage Tooth	Regular	18.7	8.5	2 7/8" API	7,300-17,100 lbs WOB 60 to 140 RPM
4 7/8" 124 mm	93002229	112-0124-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	19.8	9.0	2 7/8" API	17,100-26,800 lbs WOB 50 to 120 RPM
4 7/8" 124 mm	93002104	112-0124-23-FW-1R-02	2-3-2	F23	Conventional Gage Tooth	Regular	18.7	8.5	2 7/8" API	17,100-26,800 lbs WOB 50 to 120 RPM
4 7/8" 124 mm	93002288	112-0124-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	18.7	8.5	2 7/8" API	21,900-36,600 lbs WOB 50 to 100 RPM
4 7/8" 124 mm	93002105	112-0124-33-FW-5R-02	3-3-2	F33	"Web" Gage Tooth	Regular	18.7	8.5	2 7/8" API	21,900-36,600 lbs WOB 50 to 100 RPM
5" 127 mm	93002043	112-0127-11-FW-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	18.7	8.5	2 7/8" API	7,500-17,500 lbs WOB 60 to 140 RPM
5" 127 mm	93002110	112-0127-11-FW-1R-02	1-1-2	F11	Conventional Gage Tooth	Regular	18.7	8.5	2 7/8" API	7,500-17,500 lbs WOB 60 to 140 RPM
5" 127 mm	93002040	112-0127-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	18.7	8.5	2 7/8" API	17,500-27,500 lbs WOB 50 to 120 RPM
5" 127 mm	93002107	112-0127-23-FW-1R-02	2-3-2	F23	Conventional Gage Tooth	Regular	18.7	8.5	2 7/8" API	17,500-27,500 lbs WOB 50 to 120 RPM
5" 127 mm	93002041	112-0127-32-FW-1R-01	3-2-1	F32	Conventional Gage Tooth	Regular	18.7	8.5	2 7/8" API	22,500-37,500 lbs WOB 50 to 100 RPM
5" 127 mm	93002108	112-0127-32-FW-2R-02	3-2-2	F32	Tapered Gage Tooth	Regular	18.7	8.5	2 7/8" API	22,500-37,500 lbs WOB 50 to 100 RPM
5" 127 mm	93002042	112-0127-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	18.7	8.5	2 7/8" API	22,500-37,500 lbs WOB 50 to 100 RPM
5" 127 mm	93002109	112-0127-33-FW-5R-02	3-3-2	F33	"Web" Gage Tooth	Regular	18.7	8.5	2 7/8" API	22,500-37,500 lbs WOB 50 to 100 RPM
5 1/8" 130 mm	93002230	112-0130-11-FW-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	20.2	9.2	2 7/8" API	7,700-17,800 lbs WOB 60 to 140 RPM
5 1/8" 130 mm	93002111	112-0130-11-FW-1R-02	1-1-2	F11	Conventional Gage Tooth	Regular	22.0	10.0	2 7/8" API	7,700-17,900 lbs WOB 60 to 140 RPM
5 1/8" 130 mm	93002291	112-0130-11-FW-1-02	1-1-2	F11	Conventional Gage Tooth	Jet	20.2	9.2	2 7/8" API	7,700-17,800 lbs WOB 60 to 140 RPM
5 1/8" 130 mm	93002045	112-0130-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	22.0	10.0	2 7/8" API	17,900-28,200 lbs WOB 50 to 120 RPM
5 1/8" 130 mm	93002113	112-0130-23-FW-1R-02	2-3-2	F23	Conventional Gage Tooth	Regular	22.0	10.0	2 7/8" API	17,900-28,200 lbs WOB 50 to 120 RPM
5 1/8" 130 mm	93002306	112-0130-32-FW-1R-02	3-2-2	F32	Conventional Gage Tooth	Regular	22.0	10.0	2 7/8" API	23,100-38,400 lbs WOB 50 to 100 RPM
5 1/8" 130 mm	93002044	112-0130-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	22.0	10.0	2 7/8" API	23,100-38,400 lbs WOB 50 to 100 RPM
5 1/8" 130 mm	93002112	112-0130-33-FW-5R-02	3-3-2	F33	"Web" Gage Tooth	Regular	22.0	10.0	2 7/8" API	23,100-38,400 lbs WOB 50 to 100 RPM
5 1/4" 133 mm	93002047	112-0133-11-FW-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	22.0	10.0	2 7/8" API	7,900-18,400 lbs WOB 60 to 140 RPM
5 1/4" 133 mm	93002114	112-0133-11-FW-1R-02	1-1-2	F11	Conventional Gage Tooth	Regular	22.0	10.0	2 7/8" API	7,900-18,400 lbs WOB 60 to 140 RPM

Steel Tooth Waterwell Bits 5 1/4" - 5 5/8"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB/ RPM
							lbs	kgs		
5 1/4" 133 mm	93002048	112-0133-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	22.0	10	2 7/8" API	18,400-28,900 lbs WOB 50 to 120 RPM
5 1/4" 133 mm	93002115	112-0133-23-FW-1R-02	2-3-2	F23	Conventional Gage Tooth	Regular	22.0	10	2 7/8" API	18,400-28,900 lbs WOB 50 to 120 RPM
5 1/4" 133 mm	93002298	112-0133-32-FW-2R-01	3-2-1	F32	Tapered Gage Tooth	Regular	22.0	10	2 7/8" API	23,600-39,400 lbs WOB 50 to 100 RPM
5 1/4" 133 mm	93002307	112-0133-32-FW-2R-02	3-2-2	F32	Tapered Gage Tooth	Regular	22.0	10	2 7/8" API	23,600-39,400 lbs WOB 50 to 100 RPM
5 1/4" 133 mm	93002046	112-0133-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	22.0	10	2 7/8" API	23,600-39,400 lbs WOB 50 to 100 RPM
5 1/4" 133 mm	93002215	112-0133-33-FW-5R-02	3-3-2	F33	"Web" Gage Tooth	Regular	22.0	10	2 7/8" API	23,600-39,400 lbs WOB 50 to 100 RPM
5 3/8" 137 mm	93002049	112-0137-11-FW-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	22.0	10.0	2 7/8" API	8,100-18,800 lbs WOB 60 to 140 RPM
5 3/8" 137 mm	93002116	112-0137-11-FW-1R-02	1-1-2	F11	Conventional Gage Tooth	Regular	22.0	10.0	2 7/8" API	8,100-18,800 lbs WOB 60 to 140 RPM
5 3/8" 137 mm	93002216	112-0137-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	22	10.0	2 7/8" API	8,100-18,800 lbs WOB 60 to 140 RPM
5 3/8" 137 mm	93002050	112-0137-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	22.0	10.0	2 7/8" API	24,200-40,300 lbs WOB 50 to 100 RPM
5 1/2" 140 mm	93002053	112-0140-11-FW-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	23.1	10.5	2 7/8" API	8,300-19,300 lbs WOB 60 to 140 RPM
5 1/2" 140 mm	93002119	112-0140-11-FW-1R-02	1-1-2	F11	Conventional Gage Tooth	Regular	23.1	10.5	2 7/8" API	8,300-19,300 lbs WOB 60 to 140 RPM
5 1/2" 140 mm	93002054	112-0140-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	23.1	10.5	2 7/8" API	19,300-30,300 lbs WOB 50 to 120 RPM
5 1/2" 140 mm	93002120	112-0140-23-FW-1R-02	2-3-2	F23	Conventional Gage Tooth	Regular	23.1	10.5	2 7/8" API	19,300-30,300 lbs WOB 50 to 120 RPM
5 1/2" 140 mm	93002051	112-0140-32-FW-2R-01	3-2-1	F32	Tapered Gage Tooth	Regular	23.1	10.5	2 7/8" API	24,800-41,300 lbs WOB 50 to 100 RPM
5 1/2" 140 mm	93002117	112-0140-32-FW-2R-02	3-2-2	F32	Tapered Gage Tooth	Regular	23.1	10.5	2 7/8" API	24,800-41,300 lbs WOB 50 to 100 RPM
5 1/2" 140 mm	93002052	112-0140-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	23.1	10.5	2 7/8" API	24,800-41,300 lbs WOB 50 to 100 RPM
5 1/2" 140 mm	93002118	112-0140-33-FW-5R-02	3-3-2	F33	"Web" Gage Tooth	Regular	23.1	10.5	2 7/8" API	24,800-41,300 lbs WOB 50 to 100 RPM
5 5/8" 143 mm	93002055	114-0143-11-FW-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	23.1	11.0	3 1/2" API	8,400-19,700 lbs WOB 60 to 140 RPM
5 5/8" 143 mm	93002121	114-0143-11-FW-1R-02	1-1-2	F11	Conventional Gage Tooth	Regular	23.1	10.5	3 1/2" API	8,400-19,700 lbs WOB 60 to 140 RPM
5 5/8" 143 mm	93002289	114-0143-11-FW-1-02	1-1-2	F11	Conventional Gage Tooth	Jet	23.1	11	3 1/2" API	8,400-19,700 lbs WOB 60 to 140 RPM
5 5/8" 143 mm	93002122	114-0143-23-FW-1R-02	2-3-2	F23	Conventional Gage Tooth	Regular	23.1	10.5	3 1/2" API	19,700-30,900 lbs WOB 50 to 120 RPM
5 5/8" 143 mm	93002231	114-0143-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	22	10.0	3 1/2" API	25,300-42,200 lbs WOB 50 to 100 RPM
5 5/8" 143 mm	93002248	114-0143-33-FW-5R-02	3-3-2	F33	"Web" Gage Tooth	Regular	24.2	11.0	3 1/2" API	25,300-42,200 lbs WOB 50 to 100 RPM

Steel Tooth Waterwell Bits 5 5/8" - 6"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB/ RPM
							lbs	kgs		
5 5/8" 143 mm	93002286	114-0143-32-FW-2R-01	3-2-1	F32	Tapered Gage Tooth	Regular	22	10	3 1/2" API	25,300-42,200 lbs WOB 50 to 100 RPM
5 3/4" 146 mm	93002125	114-0146-11-FW-1R-02	1-1-2	F11	Conventional Gage Tooth	Regular	26.5	12	3 1/2" API	8,600-20,100 lbs WOB 60 to 140 RPM
5 3/4" 146 mm	93002124	114-0146-23-FW-1R-02	2-3-2	F23	Conventional Gage Tooth	Regular	26.5	12	3 1/2" API	20,100-31,600 lbs WOB 50 to 120 RPM
5 3/4" 146 mm	93002316	114-0146-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	26.5	12	3 1/2" API	25,900-43,100 lbs WOB 50 to 100 RPM
5 3/4" 146 mm	93002123	114-0146-33-FW-5R-02	3-3-2	F33	"Web" Gage Tooth	Regular	26.5	12	3 1/2" API	25,900-43,100 lbs WOB 50 to 100 RPM
5 7/8" 149 mm	93002057	114-0149-11-FW-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	26.5	12	3 1/2" API	8,800-20,600 lbs WOB 60 to 140 RPM
5 7/8" 149 mm	93002232	114-0149-11-FW-1RV-01	1-1-1	F11	Conventional Gage Tooth, Aggressive Cutting Structure	Regular	23.8	10.8	3 1/2" API	8,800-20,600 lbs WOB 60 to 140 RPM
5 7/8" 149 mm	93002249	114-0149-11-FW-1V-02	1-1-2	F11	Conventional Gage Tooth, Aggressive Cutting Structure	Jet	30.4	13.8	3 1/2" API	8,800-20,600 lbs WOB 60 to 140 RPM
5 7/8" 149 mm	93002233	114-0149-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	24	10.9	3 1/2" API	20,600-32,300 lbs WOB 50 to 120 RPM
5 7/8" 149 mm	93002126	114-0149-23-FW-1R-02	2-3-2	F23	Conventional Gage Tooth	Regular	26.5	12	3 1/2" API	20,600-32,300 lbs WOB 50 to 120 RPM
5 7/8" 149 mm	93002146	114-0149-23-FW-1-02	2-3-2	F23	Conventional Gage Tooth	Jet	26.5	12	3 1/2" API	20,600-32,300 lbs WOB 50 to 120 RPM
5 7/8" 149 mm	93002308	114-0149-32-FW-2R-01	3-2-1	F32	Tapered Gage Tooth	Regular	26.5	12	3 1/2" API	26,400-44,100 lbs WOB 50 to 100 RPM
5 7/8" 149 mm	93002127	114-0149-32-FW-2R-02	3-2-2	F32	Tapered Gage Tooth	Regular	26.5	12	3 1/2" API	26,400-44,100 lbs WOB 50 to 100 RPM
5 7/8" 149 mm	93002056	114-0149-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	26.5	12	3 1/2" API	26,400-44,100 lbs WOB 50 to 100 RPM
5 7/8" 149 mm	93002128	114-0149-33-FW-5R-02	3-3-2	F33	"Web" Gage Tooth	Jet	26.5	12	3 1/2" API	26,400-44,100 lbs WOB 50 to 100 RPM
6" 152 mm	93002059	114-0152-11-FW-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	26.5	12	3 1/2" API	9,000-21,000 lbs WOB 60 to 140 RPM
6" 152 mm	93002314	114-0152-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	26.5	12	3 1/2" API	21,000-33,000 lbs WOB 50 to 120 RPM
6" 152 mm	93002250	114-0152-23-FW-1-02	2-3-2	F23	Conventional Gage Tooth	Jet	24.3	11	3 1/2" API	21,000-33,000 lbs WOB 50 to 120 RPM
6" 152 mm	93002129	114-0152-23-FW-1R-02	2-3-2	F23	Conventional Gage Tooth	Regular	26.5	12	3 1/2" API	21,000-33,000 lbs WOB 50 to 120 RPM
6" 152 mm	93002130	114-0152-32-FW-2R-02	3-2-2	F32	Tapered Gage Tooth	Regular	26.5	12	3 1/2" API	27,000-45,000 lbs WOB 50 to 100 RPM
6" 152 mm	93002131	114-0152-33-FW-5R-02	3-3-2	F33	"Web" Gage Tooth	Jet	26.5	12	3 1/2" API	27,000-45,000 lbs WOB 50 to 100 RPM
6" 152 mm	93002058	114-0152-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	26.5	12	3 1/2" API	27,000-45,000 lbs WOB 50 to 100 RPM

Steel Tooth Waterwell Bits 6 1/8" - 6 5/8"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB/ RPM
							lbs	kgs		
6 1/8" 156 mm	93002285	114-0156-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	27.5	12.5	3 1/2" API	21,400-33,700 lbs WOB 50 to 120 RPM
6 1/8" 156 mm	93002132	114-0156-23-FW-1R-02	2-3-2	F23	Conventional Gage Tooth	Regular	26.5	12	3 1/2" API	21,400-33,700 lbs WOB 50 to 120 RPM
6 1/8" 156 mm	93002147	114-0156-23-FW-1-02	2-3-2	F23	Conventional Gage Tooth	Jet	26.5	12	3 1/2" API	21,400-33,700 lbs WOB 50 to 120 RPM
6 1/8" 156 mm	93002309	114-0156-32-FW-2R-01	3-2-1	F32	Tapered Gage Tooth	Regular	26.5	12	3 1/2" API	28,100-46,900 lbs WOB 50 to 100 RPM
6 1/8" 156 mm	93002293	114-0156-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	26.5	12	3 1/2" API	28,100-46,900 lbs WOB 50 to 100 RPM
6 1/4" 159 mm	93002234	114-0159-11-FW-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	26.5	11	3 1/2" API	9,400-21,900 lbs WOB 60 to 140 RPM
6 1/4" 159 mm	93002133	114-0159-11-FW-1R-02	1-1-2	F11	Conventional Gage Tooth	Regular	26.5	12	3 1/2" API	9,400-21,900 lbs WOB 60 to 140 RPM
6 1/4" 159 mm	93002235	114-0159-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	24.6	11.2	3 1/2" API	21,900-34,400 lbs WOB 50 to 120 RPM
6 1/4" 159 mm	93002135	114-0159-23-FW-1R-02	2-3-2	F23	Conventional Gage Tooth	Regular	26.5	12	3 1/2" API	21,900-34,400 lbs WOB 50 to 120 RPM
6 1/4" 159 mm	93002251	114-0159-23-FW-1-02	2-3-2	F23	Conventional Gage Tooth	Jet	24.6	11.2	3 1/2" API	21,900-34,400 lbs WOB 50 to 120 RPM
6 1/4" 159 mm	93002236	114-0159-32-FW-2R-01	3-2-1	F32	Tapered Gage Tooth	Regular	25.3	11.5	3 1/2" API	28,100-46,900 lbs WOB 50 to 100 RPM
6 1/4" 159 mm	93002237	114-0159-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	25.7	11.7	3 1/2" API	28,100-46,900 lbs WOB 50 to 100 RPM
6 1/4" 159 mm	93002134	114-0159-33-FW-5R-02	3-3-2	F33	"Web" Gage Tooth	Regular	26.5	12	3 1/2" API	28,100-46,900 lbs WOB 50 to 100 RPM
6 1/2" 165 mm	93002061	114-0165-12-FW-1R-01	1-2-1	F12	Conventional Gage Tooth	Regular	26.5	12	3 1/2" API	9,800-22,800 lbs WOB 60 to 140 RPM
6 1/2" 165 mm	93002136	114-0165-12-FW-1R-02	1-2-2	F12	Conventional Gage Tooth	Regular	26.5	12	3 1/2" API	9,800-22,800 lbs WOB 60 to 140 RPM
6 1/2" 165 mm	93002238	114-0165-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	29.7	13.5	3 1/2" API	22,800-35,800 lbs WOB 50 to 120 RPM
6 1/2" 165 mm	93002137	114-0165-23-FW-1R-02	2-3-2	F23	Conventional Gage Tooth	Regular	26.5	12	3 1/2" API	22,800-35,800 lbs WOB 50 to 120 RPM
6 1/2" 165 mm	93002239	114-0165-32-FW-2R-01	3-2-1	F32	Tapered Gage Tooth	Regular	30.8	14	3 1/2" API	29,300-48,800 lbs WOB 50 to 100 RPM
6 1/2" 165 mm	93002138	114-0165-32-FW-2R-02	3-2-2	F32	Tapered Gage Tooth	Regular	26.5	12	3 1/2" API	29,300-48,800 lbs WOB 50 to 100 RPM
6 1/2" 165 mm	93002240	114-0165-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	30.8	14	3 1/2" API	29,300-48,800 lbs WOB 50 to 100 RPM
6 1/2" 165 mm	93002139	114-0165-33-FW-5R-02	3-3-2	F33	"Web" Gage Tooth	Regular	26.5	12	3 1/2" API	29,300-48,800 lbs WOB 50 to 100 RPM
6 5/8" 168 mm	93002062	114-0168-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	26.5	12	3 1/2" API	23,200-36,400 lbs WOB 50 to 120 RPM

Steel Tooth Waterwell Bits 6 3/4" - 8 1/8"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB/ RPM
							lbs	kgs		
6 3/4" 171 mm	93002064	114-0171-11-FW-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	35.3	16	3 1/2" API	10,100-23,600 lbs WOB 60 to 140 RPM
6 3/4" 171 mm	93002141	114-0171-11-FW-1R-02	1-1-2	F11	Conventional Gage Tooth	Regular	35.3	16	3 1/2" API	10,100-23,600 lbs WOB 60 to 140 RPM
6 3/4" 171 mm	93002063	114-0171-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	35.3	16	3 1/2" API	23,600-37,100 lbs WOB 50 to 120 RPM
6 3/4" 171 mm	93002140	114-0171-23-FW-1R-02	2-3-2	F23	Conventional Gage Tooth	Regular	35.3	16	3 1/2" API	23,600-37,100 lbs WOB 50 to 120 RPM
6 3/4" 171 mm	93002065	114-0171-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	35.3	16	3 1/2" API	30,400-50,600 lbs WOB 50 to 100 RPM
6 3/4" 171 mm	93002142	114-0171-33-FW-5R-02	3-3-2	F33	"Web" Gage Tooth	Regular	35.3	16	3 1/2" API	30,400-50,600 lbs WOB 50 to 100 RPM
7" 178 mm	93002292	114-0178-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	37.4	17	3 1/2" API	30,400-50,600 lbs WOB 50 to 100 RPM
7 3/8" 187 mm	93002241	114-0187-23-FW-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	58.3	26.5	3 1/2" API	25,800-40,600 lbs WOB 50 to 120 RPM
7 3/8" 187 mm	93002287	114-0187-32-FW-2R-01	3-2-1	F32	Tapered Gage Tooth	Regular	58.3	26.5	3 1/2" API	33,200-55,300 lbs WOB 50 to 100 RM
7 3/8" 187 mm	93002148	114-0187-33-FW-5-02	3-3-2	F33	"Web" Gage Tooth	Jet	48.5	22	3 1/2" API	33,200-55,300 lbs WOB 50 to 100 RM
7 1/2" 191 mm	93002317	117-0191-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	48.5	22	4 1/2" API	33,200-55,300 lbs WOB 50 to 100 RM
7 5/8" 194 mm	93002143	117-0194-33-FW-5R-02	3-3-2	F33	"Web" Gage Tooth	Regular	52.9	24	4 1/2" API	34,300-57,200 lbs WOB 50 to 100 RM
7 7/8" 200 mm	93002243	117-0200-11-FW-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	58.3	26.5	4 1/2" API	11,800-27,600 lbs WOB 60 to 140 RPM
7 7/8" 200 mm	93002311	117-0200-11-FW-1-01	1-1-1	F11	Conventional Gage Tooth	Jet	58.3	26.5	4 1/2" API	11,800-27,600 lbs WOB 60 to 140 RPM
7 7/8" 200 mm	93002310	117-0200-32-FW-2-01	3-2-1	F32	Tapered Gage Tooth	Jet	58.3	26.5	4 1/2" API	35,400-59,100 lbs WOB 50 to 100 RPM
7 7/8" 200 mm	93002242	117-0200-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	58.3	26.5	4 1/2" API	35,400-59,100 lbs WOB 50 to 100 RPM
8" 203 mm	93002066	117-0203-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	74.8	34	4 1/2" API	36,000-60,000 lbs WOB 50 to 100 RPM
8" 203 mm	93002144	117-0203-33-FW-5R-02	3-3-2	F33	"Web" Gage Tooth	Regular	74.8	34	4 1/2" API	36,000-60,000 lbs WOB 50 to 100 RPM
8" 203 mm	93002302	117-0203-33-FW-5-01	3-3-1	F33	"Web" Gage Tooth	Jet	74.8	34	4 1/2" API	36,000-60,000 lbs WOB 50 to 100 RPM
8 1/8" 206 mm	93002295	117-0206-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	74.8	34	4 1/2" API	36,000-60,000 lbs WOB 50 to 100 RPM

Steel Tooth Waterwell Bits 8 1/2" - 12 1/4"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB/ RPM
							lbs	kgs		
8 1/2" 216 mm	93002244	117-0216-11-FW-1-01	1-1-1	F11	Conventional Gage Tooth	Jet	95.7	43.5	4 1/2" API	12,750-29,750 lbs WOB 60 to 140 RPM
9" 229 mm	93002301	117-0229-33-FW-5-01	3-3-1	F33	"Web" Gage Tooth	Jet	99	45	4 1/2" API	36,000-60,000 lbs WOB 50 to 100 RPM
9 1/2" 241 mm	93002318	118-0241-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	110	50	6 5/8" API	45,000-75,000 lbs WOB 50 to 100 RPM
9 7/8" 251 mm	93002300	118-0251-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	121	55	6 5/8" API	45,000-75,000 lbs WOB 50 to 100 RPM
9 7/8" 251 mm	93002313	118-0251-33-FW-5-01	3-3-1	F33	"Web" Gage Tooth	Jet	121	55	6 5/8" API	45,000-75,000 lbs WOB 50 to 100 RPM
10" 254 mm	93002067	118-0254-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	125	57	6 5/8" API	45,000-75,000 lbs WOB 50 to 100 RPM
10" 254 mm	93002145	118-0254-33-FW-5R-02	3-3-2	F33	"Web" Gage Tooth	Regular	125	57	6 5/8" API	45,000-75,000 lbs WOB 50 to 100 RPM
10 1/8" 257 mm	93002294	118-0257-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	125	57	6 5/8" API	45,000-75,000 lbs WOB 50 to 100 RPM
10 5/8" 270 mm	93002245	118-0270-33-FW-5-01	3-3-1	F33	"Web" Gage Tooth	Jet	143	65	6 5/8" API	47,800-79,700 lbs WOB 50 to 100 RPM
11 1/2" 292 mm	93002319	118-0292-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	150	68	6 5/8" API	47,800-79,700 lbs WOB 50 to 100 RPM
12" 305 mm	93002296	118-0305-33-FW-5R-01	3-3-1	F33	"Web" Gage Tooth	Regular	176	80	6 5/8" API	55,125-91,875 lbs WOB 50 to 100 RPM
12 1/4" 311 mm	93002246	118-0311-33-FW-5-01	3-3-1	F33	"Web" Gage Tooth	Jet	201	91.5	6 5/8" API	55,125-91,875 lbs WOB 50 to 100 RPM

Exploration Bits

3 7/8" - 5 1/2"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB / RPM
							lbs	kgs		
3 7/8" 98 mm	93004007	110-0098-21-FE-1AR-06	2-1-6	F21J	Conventional Gage Tooth, Armor	Regular	8.8	4	2 3/8" API	13,600-21,300 lbs WOB 50 to 120 RPM
4 3/4" 121 mm	93004008	112-0121-21-FE-1AR-06	2-1-6	F21J	Conventional Gage Tooth, Armor	Regular	9.9	4.5	2 7/8" API	16,600-26,100 lbs WOB 50 to 120 RPM
5 1/8" 130 mm	93004001	112-0130-11-FE-1AR-06	1-1-6	F11J	Conventional Gage Tooth, Armor	Regular	18	8.2	2 7/8" API	5,100-20,500 lbs WOB 70-140 RPM
5 1/8" 130 mm	93004004	112-3130-52-FE-FAR-07	5-2-7	F52J	Chisel Inserts, Armor	Regular	19.4	8.8	2 7/8" API	15,400-28,200 lbs WOB 60-90 RPM
5 1/4" 133 mm	93004002	112-0133-11-FE-1AR-06	1-1-6	F11J	Conventional Gage Tooth, Armor	Regular	20.7	9.4	2 7/8" API	5,300-21,000 lbs WOB 70-140 RPM
5 1/4" 133 mm	93004005	112-3133-52-FE-FAR-07	5-2-7	F52J	Chisel Inserts, Armor	Regular	20.5	9.3	2 7/8" API	15,800-28,900 lbs WOB 60-90 RPM
5 1/2" 140 mm	93004003	112-0140-11-FE-1AR-06	1-1-6	F11J	Conventional Gage Tooth, Armor	Regular	21.6	9.8	2 7/8" API	5,500-22,000 lbs WOB 70-140 RPM
5 1/2" 140 mm	93004006	112-3140-52-FE-FAR-07	5-2-7	F52J	Chisel Inserts, Armor	Regular	23.1	10.5	2 7/8" API	16,500-30,300 lbs WOB 70-140 RPM

Workover Bits

3 1/4" - 6 1/4"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB / RPM
							lbs	kgs		
3 1/4" 83 mm	93005008	110-0083-11-FO-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	4	1.8	2 3/8" API	4,875-11,375 lbs WOB 60-140 RPM
3 1/4" 83 mm	93005007	110-0083-32-FO-2R-01	3-2-1	F32	Tapered Gage Tooh	Regular	4.4	2	2 3/8" API	14,625-24,375 lbs WOB 50-100 RPM
3 3/8" 86 mm	93005001	110-0086-32-FO-2R-01	3-2-1	F32	Tapered Gage Tooth	Regular	6.2	2.8	2 3/8" API	15,200-25,300 lbs WOB 50-100 RPM
3 1/2" 89 mm	93005009	110-0089-32-FO-2R-01	3-2-1	F32	Tapered Gage Tooth	Regular	7	3.2	2 3/8" API	15,750-26,250 lbs WOB 50-100 RPM
3 5/8" 92 mm	93005002	110-0092-32-FO-2R-01	3-2-1	F32	Tapered Gage Tooth	Regular	7	3.2	2 3/8" API	16,300-27,200 lbs WOB 50-100 RPM
3 3/4" 95 mm	93005003	110-0095-11-FO-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	7.7	3.5	2 3/8" API	5,625-13,125 lbs WOB 60-140 RPM
3 7/8" 98 mm	93005004	110-0098-11-FO-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	9.2	4.2	2 3/8" API	5,800-13,600 lbs WOB 60-140 RPM
3 7/8" 98 mm	93005010	110-0098-23-FO-1R-01	2-3-1	F23	Conventional Gage Tooth	Regular	7.5	3.4	2 3/8" API	5,800-13,600 lbs WOB 60-140 RPM
3 7/8" 98 mm	93005005	110-0098-32-FO-2R-01	3-2-1	F32	Tapered Gage Tooth	Regular	9.5	4.3	2 3/8" API	17,400-29,100 lbs WOB 50-100 RPM
4" 102 mm	93005011	110-0102-11-FO-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	7.7	3.5	2 3/8" API	6,000-14,000 lbs WOB 60-140 RPM
4 3/4" 121 mm	93005012	112-0121-11-FO-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	12.5	5.7	2 7/8" API	7,125-16,625 lbs WOB 60-140 RPM
4 3/4" 121 mm	93005006	112-0121-32-FO-2R-01	3-2-1	F32	Tapered Gage Tooth	Regular	13	5.9	2 7/8" API	21,375-35,625 lbs WOB 50-100 RPM
4 3/4" 121 mm	93005017	112-0121-31-FO-1R-01	3-1-1	F31	Conventional Gage Tooth	Regular	12.5	5.7	2 7/8" API	21,375-35,625 lbs WOB 50-100 RPM
4 7/8" 124 mm	93005013	112-0124-11-FO-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	12.8	5.8	2 7/8" API	7,300-17,100 lbs WOB 60-140 RPM
6" 152 mm	93005014	114-0152-11-FO-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	24.2	11	3 1/2" API	9,000-21,000 lbs WOB 60-140 RPM
6 1/8" 156 mm	93005015	114-0156-11-FO-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	26	11.8	3 1/2" API	9,200-21,400 lbs WOB 60-140 RPM
6 1/4" 159 mm	93005016	114-0159-11-FO-1R-01	1-1-1	F11	Conventional Gage Tooth	Regular	26.4	12	3 1/2" API	9,375-21,875 lbs WOB 60-140 RPM

Horizontal Directional Drilling Bits 3 7/8" - 5 1/4"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB / RPM
							lbs	kgs		
3 7/8" 98 mm	93006001	110-0098-21-FD-1A-06	2-1-6	F21J	Conventional Gage Tooth, Armor	Jet	9.2	4.2	2 3/8" API	5,800-13,600 lbs WOB 60-140 RPM
3 7/8" 98 mm	93006009	110-3098-52-FD-FA-07	5-2-7	F52J	Chisel Inserts, Armor	Jet	9.5	4.3	2 3/8" API	4,875-11,375 lbs WOB 60-140 RPM
3 7/8" 98 mm	93006029	110-0098-11-FD-1A-06	1-1-6	F11J	Conventional Gage Tooth, Armor	Jet	9.2	4.2	2 3/8" API	5,800-11,400 lbs WOB 70-120 RPM
4" 102 mm	93006030	110-0102-11-FD-1A-06	1-1-6	F11J	Conventional Gage Tooth, Armor	Jet	9.5	4.3	2 3/8" API	5,800-13,400 lbs WOB 70-120 RPM
4 1/4" 108 mm	93006010	110-3108-53-FD-FA-07	5-3-7	F53J	Chisel Inserts, Armor	Jet	10.6	4.8	2 3/8" API	6,000-25,500 lbs WOB 50-90 RPM
4 1/2" 114 mm	93006026	110-0114-11-FD-1AG-07	1-1-7	F11J	Conventional Gage Tooth, Armor, Gage Bevel	Jet	12.1	5.5	2 3/8" API	4,750-15,800 lbs WOB 60 to 140 RPM
4 5/8" 117 mm	93006025	112-0117-11-FD-1AG-07	1-1-7	F11J	Conventional Gage Tooth, Armor, Gage Bevel	Jet	13.2	6	2 7/8" API	4,750-16,200 lbs WOB 60 to 140 RPM
4 3/4" 121 mm	93006002	112-0121-11-FD-1AG-07	1-1-7	F11J	Conventional Gage Tooth, Armor, Gage Bevel	Jet	8.8	4	2 7/8" API	4,750-19,000 lbs WOB 70-140 RPM
4 3/4" 121 mm	93006003	112-0121-21-FD-1A-06	2-1-6	F21J	Conventional Gage Tooth, Armor	Jet	9.9	4.5	2 7/8" API	7,125-21,375 lbs WOB 70-120 RPM
4 3/4" 121 mm	93006028	112-0121-21-FD-1AG-07	2-1-7	F21J	Conventional Gage Tooth, Armor, Gage Bevel	Jet	9.9	4.5	2 7/8" API	7,125-21,375 lbs WOB 70-120 RPM
4 3/4" 121 mm	93006011	112-3121-52-FD-FA-07	5-2-7	F52J	Chisel Inserts, Armor	Jet	14.3	6.5	2 7/8" API	14,250-26,125 lbs WOB 60-90 RPM
4 7/8" 124 mm	93006012	112-3124-52-FD-FA-07	5-2-7	F52J	Chisel Inserts, Armor	Jet	19.8	9	2 7/8" API	14,625-26,800 lbs WOB 60-90 RPM
5 1/8" 130 mm	93006013	112-3130-52-FD-FA-07	5-2-7	F52J	Chisel Inserts, Armor	Jet	20.9	9.5	2 7/8" API	15,375-28,200 lbs WOB 60-90 RPM
5 1/4" 133 mm	93006014	112-3133-52-FD-FA-07	5-2-7	F52J	Chisel Inserts, Armor	Jet	23.1	10.5	2 7/8" API	15,750-28,875 lbs WOB 60-90 RPM

Horizontal Directional Drill Bits 5 1/2" - 6 1/4"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB / RPM
							lbs	kgs		
5 1/2" 140 mm	93006015	112-3140-52-FD-FA-07	5-2-7	F52J	Chisel Inserts, Armor	Jet	22.4	10.2	2 7/8" API	16,500-30,250 lbs WOB 60-90 RPM
5 1/2" 140 mm	93006027	112-0140-11-FD-1AG-07	1-1-7	F11J	Conventional Gage Tooth, Armor, Gage Bevel	Jet	22.4	10.2	2 7/8" API	7,125-21,375 lbs WOB 70-120 RPM
5 1/2" 140 mm	93006031	112-0140-21-FD-1AG-07	2-1-7	F21J	Conventional Gage Tooth, Armor, Gage Bevel	Jet	22.4	10.2	2 7/8" API	7,125-21,375 lbs WOB 70-120 RPM
5 7/8" 149 mm	93006016	114-3149-52-FD-FA-07	5-2-7	F52J	Chisel Inserts, Armor	Jet	27.5	12.5	3 1/2" API	17,625-32,300 lbs WOB 60-90 RPM
6" 152 mm	93006004	114-0152-11-FD-1AG-07	1-1-7	F11J	Conventional Gage Tooth, Armor, Gage Bevel	Jet	27.5	12.5	3 1/2" API	6,000-24,000 lbs WOB 70-140 RPM
6" 152 mm	93006017	112-3152-52-FD-FA-07	5-2-7	F52J	Chisel Inserts, Armor	Jet	27.9	12.7	2 7/8" API	18,000-33,000 lbs WOB 60-90 RPM
6" 152 mm	93006018	114-3152-52-FD-FA-07	5-2-7	F52J	Chisel Inserts, Armor	Jet	29	13.2	3 1/2" API	18,000-33,000 lbs WOB 60-90 RPM
6 1/8" 156 mm	93006005	114-0156-11-FD-1AG-07	1-1-7	F11J	Conventional Gage Tooth, Armor, Gage Bevel	Jet	28.6	13	3 1/2" API	6,125-24,500 lbs WOB 70-140 RPM
6 1/8" 156 mm	93006019	114-3156-52-FD-FA-07	5-2-7	F53J	Chisel Inserts, Armor	Jet	30.6	13.9	3 1/2" API	18,375-36,750 lbs WOB 50-90 RPM
6 1/4" 159 mm	93006006	114-0159-11-FD-1AG-07	1-1-7	F11J	Conventional Gage Tooth, Armor, Gage Bevel	Jet	25.3	11.5	3 1/2" API	6,250-25,000 lbs WOB 70-140 RPM
6 1/4" 159 mm	93006020	114-3159-51-FD-CA-07	5-1-7	F51J	Conical Inserts, Armor	Jet	31.5	14.3	3 1/2" API	15,625-34,375 lbs WOB 70-100 RPM
6 1/4" 159 mm	93006021	114-3159-53-FD-FA-07	5-3-7	F53J	Chisel Inserts, Armor	Jet	31.5	14.3	3 1/2" API	18,750-37,500 lbs WOB 50-90 RPM

Horizontal Directional Drilling Bits 6 1/2" - 6 3/4"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.	Operating Suggestions WOB / RPM
							lbs	kgs		
6 1/2" 165 mm	93006007	114-0165-11-FD-1AG-07	1-1-7	F11J	Conventional Gage Tooth, Armor, Gage Bevel	Jet	31.2	14.2	3 1/2" API	6,500-26,000 lbs WOB 70-140 RPM
6 1/2" 165 mm	93006022	114-3165-52-FD-FA-07	5-2-7	F52J	Chisel Inserts, Armor	Jet	32.3	14.7	3 1/2" API	19,500-35,750 lbs WOB 60-90 RPM
6 1/2" 165 mm	93006024	114-3165-53-FD-FA-07	5-3-7	F53J	Chisel Inserts, Armor	Jet	32.3	14.7	3 1/2" API	19,500-35,750 lbs WOB 60-90 RPM
6 3/4" 171 mm	93006008	114-0171-11-FD-1AG-07	1-1-7	F11J	Conventional Gage Tooth, Armor, Gage Bevel	Jet	34.1	15.5	3 1/2" API	6,750-27,000 lbs WOB 70-140 RPM
6 3/4" 171 mm	93006023	114-3171-52-FD-FA-07	5-2-7	F52J	Chisel Inserts, Armor	Jet	32.8	14.9	3 1/2" API	20,250-37,125 lbs WOB 60-90 RPM

Sealed Bearing Bits

7 7/8" - 9 7/8"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.
							lbs	kgs	
7 7/8" 200 mm	93003015	117-0200-11-FP-1G-07	1-1-7	F11J	Conventional Gage Tooth, Gage Bevel	Jet	60.5	27.5	4 1/2" API
7 7/8" 200 mm	93003001	117-3200-51-FP-C-07	5-1-7	F51J	Conical Inserts	Jet	58.3	26.5	4 1/2" API
7 7/8" 200 mm	93003002	117-3200-52-FP-F-07	5-2-7	F52J	Chisel Inserts	Jet	61.6	28	4 1/2" API
7 7/8" 200 mm	93003003	117-3200-53-FP-C-07	5-3-7	F53J	Conical Inserts	Jet	58.7	26.7	4 1/2" API
7 7/8" 200 mm	93003005	117-3200-63-FP-C-07	6-3-7	F63J	Conical Inserts	Jet	63.8	29	4 1/2" API
8 1/2" 216 mm	93003023	117-3216-51-FP-FA-07	5-1-7	F51J	Chisel Inserts, Armor	Jet	95.7	43.5	4 1/2" API
8 1/2" 216 mm	93003004	117-3216-61-FP-C-07	6-1-7	F61J	Conical Inserts	Jet	95.7	43.5	4 1/2" API
9 7/8" 251 mm	93003016	118-0251-11-FP-1KG-07	1-1-7	F11J	Conventional Gage Tooth, Center Jet equipped, Gage Bevel	Jet	110	50	6 5/8" API
9 7/8" 251 mm	93003017	118-0251-11-FP-1KG-05	1-1-5	F11R	Conventional Gage Tooth, Center Jet equipped, Gage Bevel	Jet	111.1	50.5	6 5/8" API
9 7/8" 251 mm	93003009	118-3251-53-FP-F-05	5-3-5	F53R	Chisel Inserts	Jet	125	56.8	6 5/8" API
9 7/8" 251 mm	93003006	118-3251-52-FP-F-07	5-2-7	F52J	Chisel Inserts	Jet	122.1	55.5	6 5/8" API
9 7/8" 251 mm	93003007	118-3251-53-FP-F-07	5-3-7	F53J	Chisel Inserts	Jet	122.1	55.5	6 5/8" API
9 7/8" 251 mm	93003008	118-3251-63-FP-C-07	6-3-7	F63J	Conical Inserts	Jet	122.1	55.5	6 5/8" API

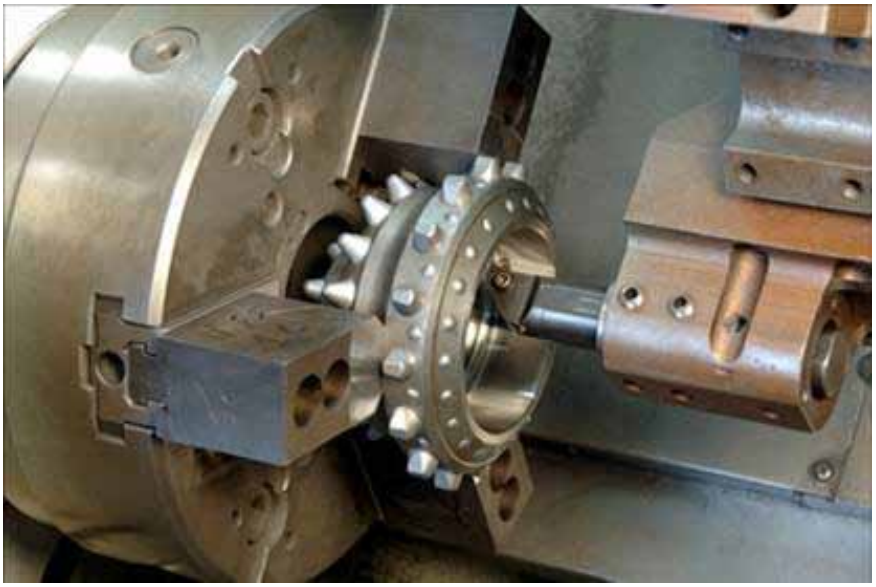
Operating Suggestions for WOB/RPM have not yet been established.

Sealed Bearing Bits

11" - 12 1/4"

Bit Diam.	Product No.	Product Code	IADC	Product	Special Features	Circ.	Weight		Pin Conn.
							lbs	kgs	
11" 279mm	93003018	118-0279-11-FP-1KG-07	1-1-7	F11J	Conventional Gage Tooth, Center Jet equipped, Gage Bevel	Jet	144.1	65.5	6 5/8" API
11" 279mm	93003010	118-3279-41-FP-FKG-07	4-1-7	F41J	Chisel Inserts, Center Jet equipped, Gage Bevel	Jet	145.2	66	6 5/8" API
11" 279mm	93003011	118-3279-53-FP-C-07	5-3-7	F53J	Conical Inserts	Jet	147.2	66.9	6 5/8" API
12 1/4" 311mm	93003019	118-0311-11-FP-1K-04	1-1-4	F11R	Conventional Gage Tooth, Center Jet equipped	Jet	201.3	91.5	6 5/8" API
12 1/4" 311mm	93003021	118-0311-11-FP-1KG-05	1-1-5	F11R	Conventional Gage Tooth, Center Jet equipped, Gage Bevel	Jet	192.5	87.5	6 5/8" API
12 1/4" 311mm	93003020	118-0311-11-FP-1KG-07	1-1-7	F11J	Conventional Gage Tooth, Center Jet equipped, Gage Bevel	Jet	199.1	90.5	6 5/8" API
12 1/4" 311mm	93003022	118-3311-43-FP-FG-07	4-3-7	F43J	Chisel Inserts, Gage Bevel	Jet	204.6	93	6 5/8" API
12 1/4" 311mm	93003012	118-3311-52-FP-F-07	5-2-7	F52J	Chisel Inserts	Jet	201.3	91.5	6 5/8" API
12 1/4" 311mm	93003013	118-3311-53-FP-C-07	5-3-7	F53J	Conical Inserts	Jet	202.4	92	6 5/8" API
12 1/4" 311mm	93003014	118-3311-63-FP-C-07	6-3-7	F63J	Conical Inserts	Jet	203.5	92.5	6 5/8" API

Operating Suggestions for WOB/RPM have not yet been established.



Guide for best bit performance

- When a new bit is installed, drill at reduced weight for a short break-in period. Use the 1/3 – 2/3 rule: 1/3rd of normal weight and RPM for 1/3 first hole, 2/3rd of normal weight and RPM for next 1/3rd of hole. Use normal drilling parameters to finish the hole.

- After the break-in period, bit cones should be checked to be sure that all are about the same temperature. One hot cone generally indicates that the air passage to that particular bearing has become obstructed.

- Provide adequate air to the bit to insure trouble free bearing performance and reduced abrasion wear on cones and shirttails.

- Turn the air on before lowering the bit to collar the hole. Keep the air on until the bit is finished drilling and is out of the hole. Always rotate the bit when moving in or out of the hole.

- Some indications that the hole is not being properly cleaned are:

    1. Increase in torque indication through higher hydraulic pressure or higher amp meter reading.
    2. Increase in air pressure.
    3. Excess cuttings in the bottom of the hole (more than one foot—after completion of hole and after making a cleaning pass).
    4. Heavy wear and /or damage indications on shirttails.

- Always rotate when coming out of the hole to:

    1. Help in cleaning the cuttings from the hole.
    2. Keeps cuttings from entering the bearings around the back face of the cone.

- Never use the hydraulic down pressure on the bit to aid in leveling the machine.

- Maintain as high a pressure drop across the bit as possible when in wet holes, or when water injection is used.

- When adding extra drill steel in wet holes, always make three or four cleaning passes to get the bottom of the hole as clean as possible.

- Never allow the bit to drop while on the end of the drill steel, even for distance of a few inches – dropping the bit can cause cracking of the welds, and/or indentations in the bearing races. Results will be premature bearing failure.

- A partially dull bit should never be left down the hole when repairs require lowering the head assembly to the deck. This bit should be substituted by a dull bit to protect the drill steel threads.

- Properly maintain the drill steel and its threaded connections. A bent steel will often cause early failure.

- Blasthole bits drill most economically when sufficient weight is applied to cause spalling of the formation. Selecting correct rotary speed is usually a matter of trial-and-error, depending upon the formation being drilled or use the factory recommended weight and rotation speeds.

- Always record footage drilled, time in the hole, RPM, WOB (weight on bit), psi, formation drilled and any unusual drilling conditions.

- After the bit is discarded it is necessary to make a comparative analysis of each bit type dulling and causes. Evaluating those findings can increase drilling efficiency while reducing drilling cost and will precisely determine what bit design features are required for the application.

Total drilling cost (TDC)

A careful study of bit performance records can be of considerable help toward reducing operating costs. The goal is to determine the most economical bit types to use for each operating condition.

Rock drill bit performance has traditionally been evaluated by tracking meters drilled and penetration rates for an individual bit. Unfortunately, many erroneous conclusions can be drawn from looking at these two factors separately. However, when these two measurements are combined, the resulting Total Drilling Cost per meter (TDC/meter) is a much more accurate performance measurement.

Total drilling cost is the cost of the bit plus the cost of operating the drill. The traditional and simplistic cost/meters drilled makes up one half of the TDC/meter equation. The speed at which the bit drills is included by dividing the cost of the drill/hour by the penetration rate of the bit. Hence total drilling cost expressed in dollar cost per meter drilled depends on bit life and productivity and can be expressed as:

Total Drilling Cost =

$$\frac{\text{Cost of drill bit}}{\text{Meters drilled}} + \frac{\text{Drill cost per hour}}{\text{Meters drilled per hour}}$$

Dull bit grading

Examining and grading the condition of a dull rock bit when it comes out of the hole is an important field operation that is often overlooked.

At many mines, the decision regarding when to change the bit is left up to the driller, with very little guidance given. This results in most bits being changed only after they have been completely worn out, and when they have been operating at low efficiency for a length of time. You can save a great deal of money by establishing a program of close examination and grading of your used bits, and by applying some simple rules based on this information.

At the end of a bit's life, penetration rate is significantly reduced as the cutting structure becomes ineffective either through breakage or wear. Bit grading provides an evaluation of the performance and dulling characteristics of the bit based on the drilling practices used. When done as a matter of routine, this simple procedure yields data that can significantly lower drilling costs and increase efficiency.

Dull bit valuations can be made quickly, but it is important that this data be gathered by someone with reasonable judgment and accuracy.

Examinations include consideration of both the cutting structure and the bearings. Bit life does not need to be totally exhausted before grading occurs. The purpose of grading is to both determine the condition of the dull bit and to assess what is happening to the bit while it is in use.

In grading a dull bit, its condition is best recorded using a simple but accurate code that has been developed by Atlas Copco engineers. The easy-to-use system measures the life of both the teeth and the bearings, permitting anyone to later visualize the dull bit with reasonable accuracy. Contact your Atlas Copco representative for information.

The bottom line: when properly collected and recorded, data gathered from dull rock drill bits yield exceptionally valuable information about what should be done to correct unprofitable practices, including helping to choose proper bits in the future.

Service, support and training
– the basis for efficient use of our products!

You can count on us for training, support, service...or just some friendly advice! In addition to offering world-class products, we have created the industry's most complete and comprehensive support program.

When it comes to products, service, and support, our goal at Atlas Copco Secoroc is not just to meet your expectations, but to exceed them. Because as we see it, in the best of all business worlds, everybody wins. So, if you're in the market for the strongest rock drilling partner, you'll want to read this section very carefully.

Being in the rock drilling business, you know that drilling costs and productivity are influenced by a host of factors beyond the price and performance of the drill steel or bit. You've learned that rock characteristics and hole deviation significantly impact drilling efficiency. You know that operator experience or misuse and loss of drilling tools can have a significant impact.

You are aware of the tremendous amount of time spent on administration and inventory management that enables you to have the tools to do the job over the next few days. And to top it all off, you are faced with the constant care and maintenance required for a well-tuned drill string. Of course, your decision to choose world class rock drilling tools is a good place to begin the process of improving productivity and reducing costs.

But to get maximum productivity from a drilling operation, many of our customers have learned that it's also vitally important to have access to the value-added support and extensive world-wide practical know-how that is exclusively available through Atlas Copco Secoroc.

Lowering your total drilling cost (TDC)

For dozens of years, Atlas Copco Secoroc has been known for a consistent dedication in finding ways to reduce total drilling costs while maintaining the highest standards of quality. In fact, over the years, we have helped hundreds of customers realize that a more productive bit, though sometimes more expensive, will substantially reduce the cost of the drilled hole. When you take into account the total cost per hour of a drill's operation, we've proven beyond doubt that the simplest way to cut costs is to be able to make holes faster. For this reason refining the technology to make faster holes has been the constant focus of our product development. And we're proud to note that the industry recognizes that we maintain the lead in this area today.

When you look at our whole program of service and support, it's pretty impressive. As stated at the outset, we offer the industry's most complete and comprehensive support and training program. When this is coupled with our recognized leadership in product performance and reliability, it's understandable why so many successful drillers choose Atlas Copco Secoroc.

Technical support

As one of our customers, you'll discover that Atlas Copco Secoroc sales technicians and engineers are available to work closely with you to provide optimum solutions to your drilling needs. How do we do this? It's simple. We give you access to the industry's most knowledgeable technical sales force. And we tailor our tools and services to your specific applications.

Our experience and network stretches into every mining market in the world, and all of this technical knowledge is on call to apply to your application.

Whether it's developing bits, monitoring onsite product performance, performing failure analysis, or calculating product performance, our highly trained technical staff is available to apply their expertise to your drilling applications.

We also maintain a series of thorough and systematic product failure analysis systems to insure that our products are constantly improved. Frequently updated performance information is quickly fed into our design and production loop. We're driven to constantly look for ways to make our products drill faster and more efficiently.

It's all part of our commitment to continuous improvement.

- **Drilling equipment overview**
  We help you optimize your choice of rock drilling tools.

- **Bit selection**
  We help you evaluate your conditions, and then assist in your selection of just the right bit for your application.

- **Application trouble shooting**
  Using the experience we've gained from mines and quarries throughout the world, we'll help you learn to drill better and faster.

- **Operating parameter analysis**
  By slightly changing operating parameters you can often get more out of each drill bit. Again - let our experience help you succeed.

- **Rock strength analysis and drillability**
  We perform the Handewith Indenter Test on samples, producing a report showing: estimated rock strength (UCS) and specific gravity; suggest bit type(s) and operating parameters; expected rate of penetration and bit life.

- **Drill operations audits**
  We have developed a drill audit database for internal and external use. Collected data efficiently records a visual inspection of a drill and its drilling tools in order to monitor the condition of the drill. You can access individual drill audits for internal use, in either printed or electronic format.

- **Drill air compressor testing**
  Since air volume and pressure are critical to drilling and drill bit performance, Atlas Copco Secoroc personnel are trained and available to perform air volume and pressure tests on your drill air compressors. These tests will determine the delivered volume of air and the air pressure at the drill bit. This calculation is then used to evaluate and optimize hole bailing performance.

- **Drill pulldown force testing**
  This test evaluates the amount of weight actually being applied to a drill bit.

- **On-site training**
  Local sales personnel and product company representatives can provide on-site training programs designed to enhance mine personnel skill levels. Training can be provided at regularly scheduled intervals, or on a “where needed, when needed" basis.

- **Seminars**
  In addition to on-site training, we also offer access to the most comprehensive drilling seminars in the industry covering topics such as:
  – Theory and design of rock drilling tools
  – Optimal operating conditions
  –Trouble shooting and failure analysis
  – Dull bit grading
  – How to select the optimal rock drill tools

Call us today. We’d like to include you in the best of all business worlds. Because in our world, everybody wins.

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