



# DIAMOND CORE DRILLING REFERENCE

## Dimensions, Weights and Volumes

 **BOART LONGYEAR**™

[www.BoartLongyear.com](http://www.BoartLongyear.com)

**Genuine Q™ Coring Systems**  
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## Bit Selection Guide

Hardness	Soft	Soft	Soft
Mohs Scale	1-2.5	3-3.5	4
Characteristic Rocks	Soapstone, Coal, Rock Salt, Amber	Marble, Shale, Kimberlite, Dolomite	Slate
Specialty Bits	PCD, TSD, Surface Set	PCD, TSD, Surface Set	PCD, TSD, Surface Set
BLY Alpha		02	02, 06ABR, 07ABR
BLY UMX	SSUMX	SSUMX, 07UMX	SSUMX, 07UMX, 09UMX
Atlas Copco		3AC	7AC
Fordia		Hero 3	Hero 7
Hayden		H3	KS5
Dimatec		D3	HR7

## Bit Selection Guide

Hardness	Medium Hard	Medium Hard	Medium Hard
Mohs Scale	4.5	5-5.5	6-6.5
Characteristic Rocks	Sandstone	Pegmatite, Pumice, Gabbro, Norite, Obsidian, Basalt	Diorite, Magnetite, Hematite, Granite, Rhyolite
Specialty Bits	Surface Set		
BLY Alpha	02, 06ABR, 07ABR	06ABR, 07ABR	06ABR, 07ABR, 08ABR, 08COM
BLY UMX	SSUMX, 07UMX, 09UMX	SSUMX, 07UMX, 09UMX	SSUMX, 07UMX, 09UMX
Atlas Copco	7AC	7AC, 11AC	11AC
Fordia	Hero 7	9-11, Hero 7	9-11, Hero 9
Hayden	KS5	H9, KS5	H9, H11
Dimatec	HR7	HR7	HR10

## Bit Selection Guide

Hardness	Hard	Hard	Ultra Hard
Mohs Scale	7-7.5	8	8.5
Characteristic Rocks	Quartzite, Gneiss, Chert	Taconite	Jaspilite, Banded Iron For- mation
Specialty Bits			
BLY Alpha	08ABR, 08COM, 09, 09COM	09, 09COM, 10COM	09, 09COM, 10 COM
BLY UMX	07UMX, 09UMX, 10UMX	09UMX, 10UMX	09UMX, 10UMX
Atlas Copco	11AC, 13AC	13AC	15AC
Fordia	9-11, Hero 11	11-14	11-14
Hayden	H11, H12-14	H12-14, H14-15	H14-15
Dimatec	HR10, HR12	HR12, HR13	HR13

## Bit Gauges - Q™ Wireline

### Imperial Measurements

Size	BQ™	NQ™	HQ™	PQ™
Core Dia. (in)	1.433	1.875	2.500	3.345
Bit OD STD (in)	2.345	2.965	3.763	4.805
Bit OD RSG (in)	2.360	2.980	3.782	4.827
Bit OD OS (in)	N/A	3.032	3.830, 3.895	4.950
Hole Volume (gal/100 ft)	22.7	36.3	58.3	95.1

### Metric Measurements

Size	BQ™	NQ™	HQ™	PQ™
Core Dia. (mm)	36.4	47.6	63.5	85.0
Bit OD (mm)	59.6	75.3	95.6	122.0
Bit OD (mm)	59.9	75.7	96.1	122.6
Bit OD OS (mm)	NA	77.0	97.3, 98.9	125.7
Hole Volume (L/100 m)	282	451	724	1180

## Bit Gauges - Q™ Thin Kerf

### Imperial Measurements

Size	AQ™TK	BQ™TK	NQ™TK*
Core Dia. (in)	1.202	1.601	1.995
Bit OD STD (in)	1.875	2.345	2.965
Bit OD RSG (in)	1.890	2.360	2.980
Bit OD OS (in)	N/A	N/A	3.032
Hole Volume (gal/100 ft)	14.6	22.7	36.3

### Metric Measurements

Size	AQ™TK	BQ™TK	NQ™TK
Core Dia. (mm)	30.5	40.7	50.7
Bit OD STD (mm)	47.6	59.6	75.3
Bit OD RSG (mm)	48.0	59.9	75.7
Bit OD OS (mm)	N/A	N/A	77.0
Hole Volume (L/100 m)	181	282	451

\* Also known as NQ™2

## Bit Gauges - Q™ Triple Tube

### Imperial Measurement

Size	NQ™3, NQTT	HQ™3, HQTT	PQ™3, PQTT
Core Dia. (in)	1.775	2.406	3.270
Bit OD STD (in)	2.965	3.763	4.805
Bit OD RSG (in)	2.980	3.782	4.827
Bit OD OS (in)	3.032	3.830, 3.895	4.950
Hole Volume (gal/100 ft)	36.3	58.3	95.1

### Metric Measurement

Size	NQ™3, NQTT	HQ™3, HQTT	PQ™3, PQTT
Core Dia. (mm)	45.1	61.1	83.1
Bit OD STD (mm)	75.3	95.6	122.0
Bit OD RSG (mm)	75.7	96.1	122.6
Bit OD OS (mm)	77.0	97.3, 98.9	125.7
Hole Volume (L/100 m)	451	724	1180

## Bit Gauges - Conventional

### Imperial Measurement

Size	LTK 48	LTK 60
Core Dia. (in)	1.390	1.732
Bit OD STD (in)	1.875	2.345
Bit OD RSG (in)	1.890	2.360
Bit OD OS (in)	N/A	N/A
Hole Volume (gal/100 ft)	14.6	22.7

### Metric Measurement

Size	LTK 48	LTK 60
Core Dia. (mm)	35.3	44.0
Bit OD STD (mm)	47.6	59.6
Bit OD RSG (mm)	48.0	59.9
Bit OD OS (mm)	N/A	N/A
Hole Volume (L/100 m)	282	451



## Drilling Parameters - Q™ Wireline

Size		BQ™	NQ™	HQ™	PQ™
Speed (rpm)		1,200	950	750	600
<b>Indicative Bit Weight Range</b>	Imperial Measurement				
	Low (lbf)	2,000	3,000	4,500	7,000
	High (lbf)	5,500	8,500	12,500	19,000
	Metric Measurement				
	Low (kN)	9	13	20	31
	High (kN)	24	37	56	84
<b>Fluid Flow Range</b>	Imperial Measurement				
	Low (gpm)	6	10	14	20
	High (gpm)	8	13	20	30
	Metric Measurement				
	Low (lpm)	20	35	50	80
	High (lpm)	30	50	70	100

See Drilling Parameter Notes

## Drilling Parameters - Q™ Thin Kerf

Size		AQ™ TK	BQ™ TK	NQ™ TK*
Speed (rpm)		1,500	1,200	950
<b>Indicative Bit Weight Range</b>	<b>Imperial Measurement</b>			
	Low (lbf)	1,200	1,500	2,500
	High (lbf)	3,000	5,000	8,000
	<b>Metric Measurement</b>			
	Low (kN)	5	8	12
	High (kN)	13	20	34
<b>Fluid Flow Range</b>	<b>Imperial Measurement</b>			
	Low (gpm)	3	5	9
	High (gpm)	5	7	12
	<b>Metric Measurement</b>			
	Low (lpm)	12	20	32
	High (lpm)	20	26	44

\* Also known as NQ™2 See Drilling Parameter Notes

## Drilling Parameters - Q™ Triple Tube

Size		NQ™3, NQ™TT	HQ™3, HQ™TT	PQ™3, PQTT
Speed (rpm)		950	750	600
Indicative Bit Weight Range	Imperial Measurement			
	Low (lbf)	3,000	5,000	7,000
	High (lbf)	8,000	12,000	18,000
	Metric Measurement			
	Low (kN)	14	20	32
	High (kN)	36	54	80
Fluid Flow Range	Imperial Measurement			
	Low (gpm)	10	15	22
	High (gpm)	13	20	28
	Metric Measurement			
	Low (lpm)	35	55	80
	High (lpm)	50	75	105

See Drilling Parameter Notes

## Drilling Parameters - Conventional

Size		LTK 48	LTK 60
Speed (rpm)		1,500	1,200
Indicative Bit Weight Range	<b>Imperial Measurement</b>		
	Low (lbf)	1,000	1,500
	High (lbf)	2,500	3,500
	<b>Metric Measurement</b>		
	Low (kN)	4	6
	High (kN)	10	16
Fluid Flow Range	<b>Imperial Measurement</b>		
	Low (gpm)	2.5	4
	High (gpm)	4	6
	<b>Metric Measurement</b>		
	Low (lpm)	9	15
	High (lpm)	15	23

See Drilling Parameter Notes

## Drilling Parameter Notes

- 1. All dimensions, weights and volumes shown are nominal**
- 2. Rotation Speed:** in extremely broken, hard, ground, run at half RPM and weight on bit (WOB) sufficient to reach 1 - 2 ipm (3 - 5 cpm).
- 3. WOB:** Constant WOB on bit will require changing holdback pressure. Check off bottom weight as rods are added.
- 4. Water Flow:** Flow rate is recommended based on amount of cuttings at 6 - 8 ipm (15 - 20 cpm). Higher penetration rates should have higher flow rates.
- 5. Calculate water flow:** High water pressure is not an indication of water flow. Measure pump rpm with tachometer. Pump output will be proportional to output at max speed e.g. FMC LO918 Nameplate, Max Speed: 625 rpm Output Flow: 20.2 GPM Measured rpm of 240 rpm. Output flow is equal to  $625 \text{ rpm} / 240 \text{ rpm} \times 20.2 \text{ GPM} = 7.5 \text{ GPM}$

## UMX™ Guidelines

### **Sharpening: Two method of exposing diamond to regain penetration**

1. Add WOB until torque rises, once penetration rate increases, reduce WOB to maintain desired penetration rate.

2. Reduce RPM by 1/2, wait until torque and penetration rate rise. Return speed to normal operation.

If 1 and 2 are insufficient (upholes, under powered rigs or too low a series bit), reduce RPM by 1/2 and reduce waterflow. Wait until torque and penetration rate rise. Return speed and waterflow to normal operation.

**UMX has a greater rise in torque on initial sharpening. WOB needs to be held until penetration rate increases. Reduce WOB to maintain desired penetration rate once sharp.**

### **WOB: Weight on bit is the main method to control bit life and penetration rate**

WOB is too low if the bit polishes and torque drops. Results in low life and penetration rate.

WOB is too high if added weight does not increase penetration rate. Results in constant sharpening and rapid wear.

## UMX™ Guidelines (Continued)

### **Torque: Result of WOB and the sharpness of the bit**

Decreasing torque and penetration rate indicate bit polishing.

Max bit torque will occur during bit sharpening. Only be concerned with torque rise when restricting water or in lost circulation

If RPM drops during sharpening then a lower gear or RPM should be used to increase available torque

**UMX can drop RPM or stall head due to increased torque. See 'Sharpening #2', if speed drops/stalls.**

### **Penetration rate: Result of WOB, sharpness, bit formula and ground conditions.**

Penetration rates vary anywhere from 2 - 12 ipm (5 - 30 cpm) based on bit and formation.

In extremely broken, hard ground, run at half RPM and WOB sufficient to reach 1 - 2 ipm (3 - 5 cpm)

**The penetration rate to prevent polishing mode may be higher in UMX**

## **UMX™ Guidelines (Continued)**

**Water Flow: Required to keep the bit cool, flush chips and achieve good bit life.  
(See Drilling Parameter Notes - 4)**

High penetration rates require additional flow

There is no maximum water flow rate. At high pressures the bit can be lifted off the rock face, causing it to polish.

**Free-cutting bits, especially UMX, obtain maximum life and penetration using plenty of water.**



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