

Drill Bits & Reaming Shell





GEO MRA Bit Series Selection Guide

ROCK Moh's Hardness	ROCK CONDITION	ROCK TYPE	MRA SERIES MATRIX
			(High) ---- Rock Abrasiveness Condition ---- (Low) (Fractured) ---- Rock Structure ---- (Compact) (High) ---- Power of Rig ---- (Low)
1 - 4	Soft, Medium hard, High abrasive to low abrasive, High fractured to low fractured	Shale Sandstone Limestone	
5	Medium hard, Abrasive, Medium fractured	Limestone Dolomite Weathered Granite Weathered Gneiss Serpentinite	
6	Medium hard, Partially abrasive, Partially fractured	Diorite Gabbro Peridotite Gneiss Basalt Andesite	
7	Medium hard - hard, Partially abrasive, Partially fractured - competent	Metabasalt Amfibolit Metamorphosed Diorite Metamorphosed Gabbro Diabase	
8	Hard, Low abrasive, Competent	Quartz rich skarn Granite Pegmatite	
9	Very hard, Very high abrasive, Very competent	Metamorphosed Granite Quartz Rich Gneiss	
10	Very hard, Non abrasive, Fine grained - massive, Very competent	Chert Jasperoid Quartzite Very highly metamorphosed volcanic rock	



GEO AZT Reaming Shell Selection Guide

ROCK Moh's Hardness	ROCK CONDITION	ROCK TYPE	AZT SERIES MATRIX <i>(Low) Abrasiveness Condition (High)</i>
1 - 4	Soft, Medium hard, High abrasive to low abrasive, High fractured to low fractured	Shale Sandstone Limestone	<p>1</p> <p>2</p>
5	Medium hard, Abrasive, Medium fractured	Limestone Dolomite Weathered Granite Weathered Gneiss Serpentinite Metaperidotite	
6	Medium hard, Partially abrasive, Partially fractured	Diorite Gabbro Peridotite Gneiss Basalt Andesite	
7	Medium hard - hard, Partially abrasive, Partially fractured - competent	Metabasalt Amfibolit Metamorphosed Diorite Metamorphosed Gabbro Diabase	
8	Hard, Low abrasive, Competent	Quartz rich skarn Granite Pegmatite	
9	Very hard, Very high abrasive, Very competent	Metamorphosed Granite Quartz Rich Gneiss	
10	Very hard, Non abrasive, Fine grained - massive, Very competent	Chert Jasperoid Quartzite Very highly metamorphosed volcanic rock	



Part No	Description	Part No	Description
N Size Diamond Products		P Size Diamond Products	
G3522860	NWL Reaming Shell without Reinforcement	G4101563-7	HWL Impregnated Bit, MRA-7 RED
G3522861	NWL Reaming Shell, Hard Welding	G4101563-7.T	HWL Impregnated Bit, MRA-7.T, RED TURBO
G3522862	NWL Reaming Shell, Using Synthetic Diamond and Tungsten Carbide	G4101563-8	HWL Impregnated Bit, MRA-8, YELLOW
G3522863	NWL Reaming Shell, Tungsten Carbide Gauges	G4101563-9	HWL Impregnated Bit, MRA-9, PINK
G49448-1	NWL Impregnated Bit, MRA-1, BLACK	G4101563-T.C	HWL Tungsten Carbide Bit
G49448-2	NWL Impregnated Bit, MRA-2, GREEN	G4101796	HW Impregnated Casing Shoe
G49448-3	NWL Impregnated Bit, MRA-3, BLUE	G4101795	HWL Impregnated Casing Shoe
G49448-4	NWL Impregnated Bit, MRA-4, BROWN	G4101797	HW Tungsten Carbide Casing Shoe
G49448-5	NWL Impregnated Bit, MRA-5, PURPLE	G4101798	HWL Tungsten Carbide Casing Shoe
G49448-6	NWL Impregnated Bit, MRA-6, WHITE	G41015633-1	HWL3 Impregnated Bit, MRA-1, BLACK
G49448-7	NWL Impregnated Bit, MRA-7, RED	G41015633-2	HWL3 Impregnated Bit, MRA-2, GREEN
G49448-7.T	NWL Impregnated Bit, MRA-7.T, RED TURBO	G41015633-3	HWL3 Impregnated Bit, MRA-3, BLUE
G49448-8	NWL Impregnated Bit, MRA-8, YELLOW	G41015633-4	HWL3 Impregnated Bit, MRA-4, BROWN
G49448-9	NWL Impregnated Bit, MRA-9, PINK	G41015633-5	HWL3 Impregnated Bit, MRA-5, PURPLE
G49448-1.OS	NWL Impregnated Bit, MRA-1, BLACK, O/SIZE	G41015633-6	HWL3 Impregnated Bit, MRA-6, WHITE
G49448-T.C	NWL Tungsten Carbide Bit	G41015633-7	HWL3 Impregnated Bit, MRA-7, RED
G4101793	NW Impregnated Casing Shoe	G41015633-7.T	HWL3 Impregnated Bit, MRA-7.T, RED TURBO
G4101794	NWL Impregnated Casing Shoe	G41015633-8	HWL3 Impregnated Bit, MRA-8, YELLOW
G4101795	NW Tungsten Carbide Casing Shoe	G41015633-9	HWL3 Impregnated Bit, MRA-9, PINK
G4101796	NWL Tungsten Carbide Casing Shoe	G41015633-1.OS	HWL3 Imp. Bit, MRA-1, BLACK, O/SIZE
G494483-1	NWL3 Impregnated Bit, MRA-1, BLACK	G41015633-T.C	HWL3 Tungsten Carbide Bit
G494483-2	NWL3 Impregnated Bit, MRA-2, GREEN	P Size Diamond Products	
G494483-3	NWL3 Impregnated Bit, MRA-3, BLUE	G3522870	PWL Remaining Shell without Reinforcement
G494483-4	NWL3 Impregnated Bit, MRA-4, BROWN	G3522871	PWL Reaming Shell, Hard Welding
G494483-5	NWL3 Impregnated Bit, MRA-5, PURPLE	G3522872	PWL Reaming Shell, Using Synthetic Diamond and Tungsten Carbide
G494483-6	NWL3 Impregnated Bit, MRA-6, WHITE	G3522873	PWL Reaming Shell, Tungsten Carbide Gauges
G494483-7	NWL3 Impregnated Bit, MRA-7, RED	G4101564-1	PWL Impregnated Bit, MRA-1, BLACK
G494483-7.T	NWL3 Impregnated Bit, MRA-7.T, RED TURBO	G4101564-2	PWL Impregnated Bit, MRA-2, GREEN
G494483-8	NWL3 Impregnated Bit, MRA-8, YELLOW	G4101564-3	PWL Impregnated Bit, MRA-3, BLUE
G494483-9	NWL3 Impregnated Bit, MRA-9, PINK	G4101564-4	PWL Impregnated Bit, MRA-4, BROWN
G494483-1.OS	NWL3 Impregnated Bit, MRA-1, BLACK, O/SIZE	G4101564-5	PWL Impregnated Bit, MRA-5, PURPLE
G3522866	NWL3 Tungsten Carbide Bit	G4101564-6	PWL Impregnated Bit, MRA-6, WHITE
H Size Diamond Products		G4101564-7	PWL Impregnated Bit, MRA-7, RED
G3522865	HWL Remaining Shell without Reinforcement	G4101564-7.T	PWL Impregnated Bit, MRA-7.T, RED TURBO
G3522866	HWL Reaming Shell, Hard Welding	G4101564-8	PWL Impregnated Bit, MRA-8, YELLOW
G3522867	HWL Reaming Shell, Using Synthetic Diamond and Tungsten Carbide	G4101564-9	PWL Impregnated Bit, MRA-9, PINK
G3522868	HWL Reaming Shell, Tungsten Carbide Gauges	G4101564-T.C	PWL Tungsten Carbide Bit
G4101563-1	HWL Impregnated Bit, MRA-1, BLACK	G4101798	PW Impregnated Casing Shoe
G4101563-2	HWL Impregnated Bit, MRA-2, GREEN	G4101799	PWL Impregnated Casing Shoe
G4101563-3	HWL Impregnated Bit, MRA-3, BLUE	G4101800	PW Tungsten Carbide Casing Shoe
G4101563-4	HWL Impregnated Bit, MRA-4, BROWN	G4101801	PWL Tungsten Carbide Casing Shoe
G4101563-5	HWL Impregnated Bit, MRA-5, PURPLE	G3543989	PW Impregnated Casing Drive Shoe
G4101563-6	HWL Impregnated Bit, MRA-6, WHITE		



Part No	Description	Part No	Description
G41015643-1	PWL3 Impregnated Bit, MRA-1, BLACK	G41015643-7	PWL3 Impregnated Bit, MRA-7, RED
G41015643-2	PWL3 Impregnated Bit, MRA-2, GREEN	G41015643-7.T	PWL3 Impregnated Bit, MRA-7.T, RED TURBO
G41015643-3	PWL3 Impregnated Bit, MRA-3, BLUE	G41015643-8	PWL3 Impregnated Bit, MRA-8, YELLOW
G41015643-4	PWL3 Impregnated Bit, MRA-4, BROWN	G41015643-9	PWL3 Impregnated Bit, MRA-9, PINK
G41015643-5	PWL3 Impregnated Bit, MRA-5, PURPLE	G4101563-1.OS	PWL3 Impregnated Bit, MRA-1, BLACK, O/SIZE
G41015643-6	PWL3 Impregnated Bit, MRA-6, WHITE	G41015643-T.C	PWL3 Tungsten Carbide Bit

Normal Wear Patterns



New Condition



Ideal New Pattern

The face wear pattern of an impregnated bit should be relatively flat with slightly chamfered sides. Bit feels sharp, comet tails have formed to support diamonds. Diamonds release from matrix as they are worn. Gauge stays within tolerance.



Normal Retirement

Full depth of impregnation evenly consumed. Gauge stays within tolerance.

Irregular Wear Patterns



Concave Face Wear

(Rounded to Inner Diameter)
Cause: Often caused by excessive penetration rate for the RPM used. This can also be caused by core grinding, overdrilling. Solution: Reduce penetration rate or increase RPM.



Concave Face Wear

(Rounded to Outer Diameter)
Cause: Insufficient water flow. Solution: Check pump and rod string for leaks; increase pump output.



Gauge Loss ID

Cause:
(A) Overfeeding
(B) Broken formations
(C) Drilling over lost core
(D) Insufficient drilling fluid
Solution:
(A) Reduce penetration rate
(B) Cement or change to a lower series bit
(C) Check core barrel/core lifter/core lifter case
(D) Check inner tube length adjustment; check pump and rod string for leaks



Gauge Loss Outer Diameter

Cause:

- (A) Lack of circulation
- (B) Bit being reamed down under-size hole
- (C) Vibration

Solution:

- (A) Increase coolant flow rate
- (B) Check reamer shell gauge and replace if under-sized
- (C) After RPM



Excessive Diamond Exposure

Matrix abraded away before diamonds have worn sufficiently, resulting in high diamond exposure and low bit life.

Cause: Caused by overfeeding/overdrilling

Solution: Increase RPM, change to a lower series bit, or reduce bit weight.



Face Glazed

Bit does not feel sharp; diamonds flush w matrix; no significant "comet tails" behind each diamond. Snad blast face or use other recommended methods to re-expose diamond. If the face glazes repeatedly, change to a higher bit.



Cracked Waterways

Cause:

- (A) Excessive bit load; dropped rods; free fall of (wireline) inner tube in dry hole
- (B) Bit crushed by rod holder, foot clamp or pipe wrench
- (C) Pushed down an undersized hole (i.e., reaming shell worn out).

Solution: Review proper operating procedures.



Burnt

Cause:

- (A) Lack of fluid.
- (B) Too high of weight on bit being used

Solution: Check pump and rod string for leaks, check inner tube adjustment, maintain coolant flow rates.



A series of horizontal dotted lines for writing notes.



PROFESSIONAL'S CHOICE



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