

Mining and exploration: diamond drilling tools

Impregnated core bits, ZENESIS and Explorer, reaming shells, casing shoes and core-sample blades.

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Contents

Tools and application	3
Explorer and waterway design	3
ZENESIS and diamond-matrix design	4
Core bits: speed and water flow	5
Impregnated core bits: standard and RSG dimensions	5
Additional dimensional variants from the older source	7
Zenesis and Explorer: rock selection	7
Explorer and Geo-Pro: supplementary matrix mapping	8
Core-sample cutting blades	9
Casing shoes and reaming shells	10
Source variant OE30P: wet concrete drilling	12
Source variant OA30P: wet asphalt drilling	14
Source variant SB10UT: wet core-sample cutting	14
Match your application	15

Tools and application

EHWA DIAMOND - since 1975

EHWA offers impregnated core bits for exploration drilling, reaming shells for borehole guidance, casing shoes for advancing casing and diamond blades for core samples. Matrix, diamond distribution, waterways and inner/outer gauge protection are matched to the formation, drilling rig and flushing conditions. Supplementary source editions retain further documented dimensional designs.



Impregnated core bits.



Reaming shell.



Casing shoe for advancing casing.



Diamond blade for core samples.

Explorer and waterway design

Impregnated Explorer core bits combine diamond and matrix for the formation. Turbo, pie and face-discharge designs are illustrated. Waterways, crown profile and inner/outer gauge protection are selected with flushing and borehole guidance. Further crown profiles are available on enquiry; the supplementary source lists profiles for Explorer and Geo-Pro.

Technical source: Q139 p4 and Q061 p3.



Explorer: Turbo design.

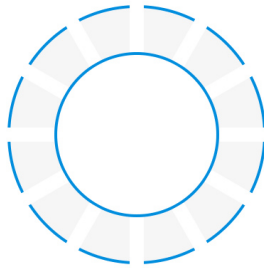


Explorer: Pie design.

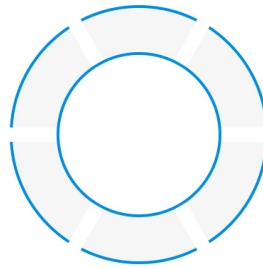


Explorer: detail of the face-discharge design.

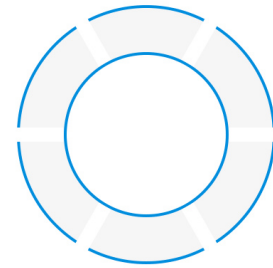
Waterways: three design examples



Turbo



Pie



Face Discharge

Schematic; not a dimensioned product drawing.

Waterways: three design examples.

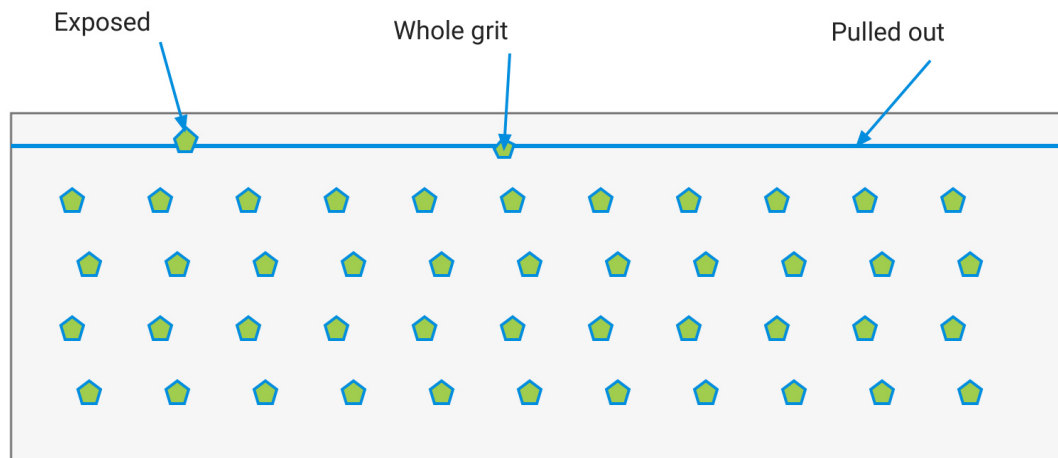
ZENESIS and diamond-matrix design

ZENESIS technology uses application-specific diamond patterns. Controlled diamond distribution, a preconditioned matrix and engineered waterways support a consistent machining process. The source lists a standard diamond depth of 13 mm. Natural diamonds, carbide pads and TSP diamond protect the inner and outer gauge.

The mechanism diagram distinguishes exposed, fully embedded and pulled-out diamond grits. It supplies no specified grit sizes, spacing or matrix percentages. Cutting speed, tool life and tool design are matched to the actual formation.

Technical source: Q139 p5 and Q061 p3.

ZENESIS: controlled diamond distribution



Symbolic mechanism; grit size, spacing and matrix are not dimensioned.

Schematic; not a dimensioned product drawing.

ZENESIS: controlled diamond distribution.

Core bits: speed and water flow

Values are catalogue guidance for the listed sizes. Water flow remains in GPM because the source does not explicitly define the gallon type. Rock, drilling machine and flushing conditions determine the actual setup.

Size	Range [rpm]	Optimum [rpm]	Water flow [GPM]
A	1500-1700	1600	4-5
B	1200-1450	1350	8-10
N	900-1200	1100	10-12
H	750-950	850	13-16
P	600-750	650	20-22

Technical source: Q139, page 2.

Impregnated core bits: standard and RSG dimensions

Original designations and both dimension columns are retained. The table heading states ± 0.005 without a separate unambiguous unit definition; it is not interpreted as a general ± 0.005 mm tolerance.

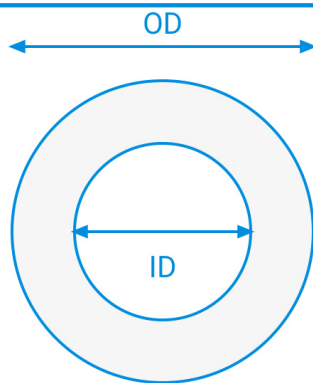
Source designation	Bit OD [in]	OD [mm]	ID [in]	ID [mm]	Reaming-shell OD [in]	OD [mm]
AO	1.875	47.6	1.062	27.0	1.890	48.0
BO	2.345	59.6	1.433	36.4	2.360	59.9
NO-3	2.965	75.3	1.775	45.1	2.980	75.7
NO	2.965	75.3	1.875	47.6	2.980	75.7
NO-2	2.965	75.3	1.995	50.7	2.980	75.7
NO-2 Oversize	3.032	77.0	1.995	50.7	3.032	77.0
HO-3	3.763	95.6	2.406	61.1	3.783	96.1
HO-3 Oversize	3.830	97.3	2.406	61.1	3.830	97.3
HO	3.763	95.6	2.500	63.5	3.783	96.1
HO-Oversize	3.830	97.3	2.500	63.5	3.830	97.3
HO-Oversize	3.850	97.8	2.500	63.5	3.850	97.8
PO-3	4.805	122.0	3.270	83.1	4.828	122.6
PO	4.805	122.0	3.345	85.0	4.828	122.6

Technical source: Q139, page 3.



Core bits and reaming shells from the exploration programme.

Core bit: outside and inside diameters



Example NO-3

OD: 2.965 in / 75.3 mm

ID: 1.775 in / 45.1 mm

Reaming Shell OD:

2.980 in / 75.7 mm

Tolerance designation ± 0.005 : agree its unit with the tool drawing.

Schematic; not a dimensioned product drawing.

Core bit: outside and inside diameters.

Additional dimensional variants from the older source

The following five rows are absent from the newer 13-row table. They remain distinct dimensional variants with source provenance.

Source designation	Bit OD [in]	OD [mm]	ID [in]	ID [mm]	Reaming-shell OD [in]	OD [mm]
AWG, AWM	1.875	47.6	1.185	30.1	1.890	48.0
ADBGM	1.875	47.6	1.193	30.3	1.890	48.0
BWG, BWM	2.345	59.6	1.655	42.0	2.360	59.9
NWD-4	2.980	75.7	2.060	52.3	2.980	75.7
NWG, NWM	2.965	75.3	2.155	54.7	2.980	75.7

Technical source: Q061, page 7.

Zenesis and Explorer: rock selection

The map connects rock characteristics with Zenesis and Explorer series. Abrasive formations are on the left, competent rock on the right. The two hardest Explorer columns share Zenesis #10; the six comparison ranges remain separate.

Hardness class	Zenesis	Explorer	Rock formations	Series comparison
Soft	#2	1	Claystone, Calcite, Sandstone, Serpentine	1-3
Medium	#4	2	Dolomite, Schist, Peridotite, Barite	4-5
Medium-hard	#6	3	Basalt, Diorite, Quartz, Volcanics	6-7
Hard	#8	4	Pegmatite, Gneiss, Granite, Porphyry	8-10
Extremely hard	#10	5	Jasterite, Rhyolite, Quartzite, Chert	11-12
Extremely hard	#10	6	Jasterite, Rhyolite, Quartzite, Chert	13-15

Technical source: Q139, page 7.

ZENESIS / Explorer: series selection

Soft	Medium	Medium hard	Hard	Extremely hard	Extremely hard
ZENESIS #2	ZENESIS #4	ZENESIS #6	ZENESIS #8	ZENESIS #10	ZENESIS #10
Explorer 1	Explorer 2	Explorer 3	Explorer 4	Explorer 5	Explorer 6
1-3	4-5	6-7	8-10	11-12	13-15

Abrasive

Competent

Schematic; not a dimensioned product drawing.

ZENESIS / Explorer: series selection.

Explorer and Geo-Pro: supplementary matrix mapping

The older source gives separate mappings for five Explorer and four Geo-Pro series. This matrix is not identical to the six-column Explorer/Zenesis comparison. The programmes remain separate. Explorer and Geo-Pro list sizes A, B, N, H and P, with oversize options on request.

Programme	Series	Formation description
Explorer	I	Extremely abrasive, broken, coarse, fractured: shales, limestone, sandstone
Explorer	II	Abrasive, medium/coarse grain, solid/fractured: dolomite, granite, peridotite
Explorer	III	Moderately abrasive, medium/fine grain: basalt, diorite, quartz, volcanics
Explorer	IV	Low abrasive, hard/very hard: diorite, granite, gneiss, quartzite
Explorer	V	Extremely hard, non-abrasive: jasterite, rhyolite, quartzite
Geo-Pro	I	Extremely abrasive, fractured, coarse grain
Geo-Pro	II	Abrasive to moderately abrasive, fractured
Geo-Pro	III	Slightly abrasive, medium hard
Geo-Pro	IV	Extremely hard, low abrasive, solid

Technical source: Q061, page 3.



Explorer turbo design from the supplementary source edition.



Geo-Pro pie design from the supplementary source edition.

Core-sample cutting blades

For core samples on table or bridge saws. The source length field 40 is retained as the source field "Length"; the table lists height values of 10/12 and maximum operating speed 63 m/s. Length, thickness and height have no explicitly printed unit in the header and are checked against the drawing.

Nominal diameter	Length	Thickness	Height	Max. peripheral speed
12 in (300 mm)	40	2.8 / 3.2	10 / 12	63 m/s
14 in (350 mm)	40	2.8 / 3.2	10 / 12	63 m/s
16 in (400 mm)	40	3.2	10 / 12	63 m/s
18 in (450 mm)	40	3.2	10 / 12	63 m/s

Technical source: Q139, page 6.



ZENESIS blade for core samples.

Casing shoes and reaming shells

Explorer casing shoes combine concentrated diamond, natural diamonds and inner/outer gauge wear protection. Heavy-duty reaming shells add natural diamonds, carbide pads and TSP to the matrix. The older source additionally lists standard reaming shells, Geo-Pro casing shoes, and two-, three- or four-ring stabilisation designs.

Design	Sizes / dimensions
Explorer casing shoe standard	BW, NW, HW, PW; diamond depth 0.250 in
Explorer casing shoe oversize	NW, HW; diamond depth 0.315 in
NW oversize shoe	OD 3.875 in x 2.992 in
HW oversize shoe	OD 4.875 in x 3.975 in
Heavy-duty reaming shell standard	B, N, H, P
Heavy-duty reaming shell oversize	N 3.032 in; H 3.830 / 3.850 in; P 4.900 in
Geo-Pro casing shoe (Q061 p4)	BW, NW, HW, PW; diamond depth 0.250 in
Standard reaming shell (Q061 p5)	B, N, H, P
Reaming shell stabilisation (Q061 p5)	Two-, three-, four-ring designs

Technical source: Q139, page 6.



Explorer casing shoes.



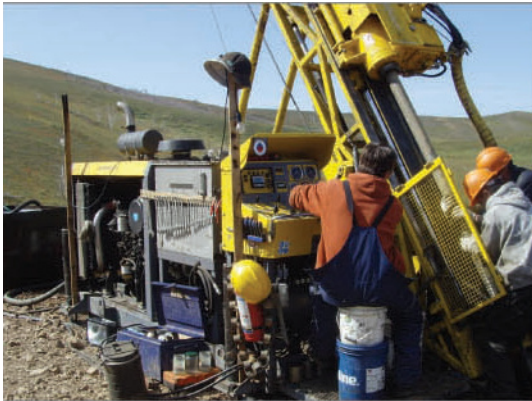
Heavy-duty reaming shells.



Geo-Pro casing shoes from the supplementary source edition.

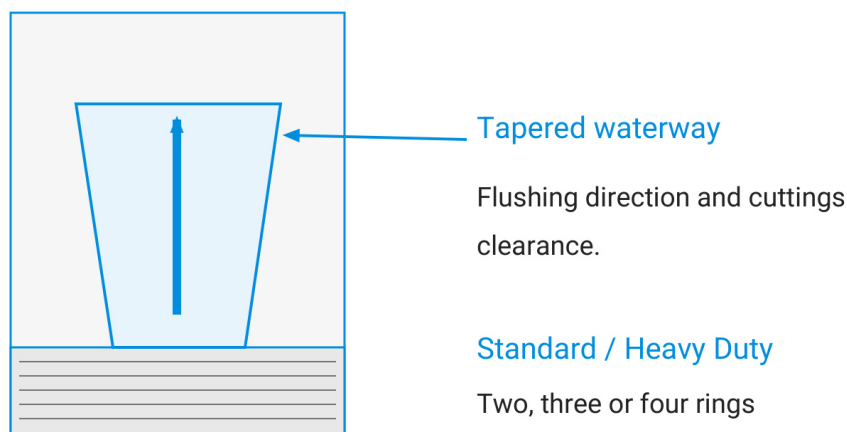


Reaming-shell designs including stabilisation.



Exploration drilling: application image.

Reaming shell: waterway and cuttings clearance



Schematic; not a dimensioned product drawing.

Reaming shell: waterway and cuttings clearance.

Source variant OE30P: wet concrete drilling

The older source lists OE30P for hard or cured concrete, reinforced concrete, concrete brick and blocks. Equipment: electric, gasoline or hydraulic core drills. Standard core length 14 inches; other lengths on request.

Code	Source dimensions [in]	Segment height
OE30P02014A	2 x .145 x 1 1/4-7	8 mm D
OE30P02214A	2 1/4 x .145 x 1 1/4-7	8 mm D
OE30P02514A	2 1/2 x .145 x 1 1/4-7	8 mm D
OE30P02714A	2 3/4 x .145 x 1 1/4-7	8 mm D
OE30P03014A	3 x .145 x 1 1/4-7	8 mm D
OE30P03214A	3 1/4 x .145 x 1 1/4-7	8 mm D
OE30P03514A	3 1/2 x .145 x 1 1/4-7	8 mm D
OE30P04014A	4 x .145 x 1 1/4-7	8 mm D
OE30P04214A	4 1/4 x .145 x 1 1/4-7	8 mm D
OE30P04514A	4 1/2 x .145 x 1 1/4-7	8 mm D
OE30P05014A	5 x .145 x 1 1/4-7	8 mm D
OE30P05514A	5 1/2 x .145 x 1 1/4-7	8 mm D
OE30P06014A	6 x .145 x 1 1/4-7	8 mm D
OE30P06214A	6 1/4 x .145 x 1 1/4-7	8 mm D

Technical source: Q061, page 6.



Wet core drills from the OE30P/OA30P source edition.

Source variant OA30P: wet asphalt drilling

For asphalt and abrasive concrete. The older source lists electric, gasoline or hydraulic core drills and standard core length 14 inches.

Code	Source dimensions [in]	Segment height
OA30P04214A	4 1/4 x .145 x 1 1/4-7	8 mm D
OA30P04514A	4 1/2 x .145 x 1 1/4-7	8 mm D
OA30P05014A	5 x .145 x 1 1/4-7	8 mm D
OA30P06014A	6 x .145 x 1 1/4-7	8 mm D
OA30P06214A	6 1/4 x .145 x 1 1/4-7	8 mm D

Technical source: Q061, page 6.

Source variant SB10UT: wet core-sample cutting

These three coded blades remain separate from the newer Zenesis dimension table. Equipment: table or bridge saws.

Code	Source dimensions [in]	Segment height
SB10UT1409EN	14 x .090 x 1	10 mm D
SB10UT1812EN	18 x .125 x 1	10 mm D
SB10UT2012EN	20 x .125 x 1	10 mm D

Technical source: Q061, page 6.



SB10UT: core-sample blade from the supplementary source edition.

Match your application

State formation, drilling system, size designation, outside/inside diameter, matrix and waterway. Add spindle speed, flushing, required diamond depth and wear pattern. Supplementary regional source designs are checked for specification and current supply using their codes.

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