Oilfield Bits

MICON-DRILLING

Drilling Equipment Made in Germany

MICON-Drilling GmbH
Im Nordfeld 14, 29336 Nienhagen, Germany
www.micon-drilling.de

Specifications are current at the time of printing.

Contents

Company Profile

The MICON-Drilling GmbH is a worldwide operating service company, specialized in sales and rental of drilling equipment. Decades of experience, high quality standards and focused customer orientation are our unique selling points.

We are a member of the MICON Group, established in Nienhagen/Germany, in 1994. The privately owned company specializes in design, production, inspection and repair of drill string components, drill bits, sophisticated directional drilling systems and additional equipment. Our main focus lies on the technical service for drilling applications in the mining, oil & gas, tunneling and geothermal industries.

An innovative engineering department ensures continuous optimization of all MICON products. Additionally, we are in close contact with a network of several German universities to foster research and development activities.

The MICON Group manufactures drilling equipment in two independent facilities on state-of-the-art CNC milling, turning and welding machines. Latest technology and implementation of German engineering guarantee the highest degree of efficiency and quality.

MICON-Drilling GmbH

Im Nordfeld 14 · 29336 Nienhagen · Germany
Tel. +49.5144.4936 0 · Fax +49.5144.4936 20
sales@micon-drilling.de

MICON Mining and Construction Products GmbH & Co. KG

Im Nordfeld 14 · 29336 Nienhagen · Germany
Tel. +49.5144.4936 0 · Fax +49.5144.4936 20
manufacturing@micon-drilling.de

MICON Downhole-Tools GmbH

Breite Horst 19 · 29336 Nienhagen · Germany
Tel. +49.5144.4936 71 · Fax +49.5144.4936 77
service@micon-drilling.de

Eastman Whipstock GmbH

Im Nordfeld 14 · 29336 Nienhagen · Germany
Tel. +49.5144.4936 0 · Fax +49.5144.4936 20
sales@whipstock-instruments.de

Visit our homepage **www.micon-drilling.de** for additional information and recent updates.

MICON Buildings "Im Nordfeld", Nienhagen/Germany

MICON Buildings "Breite Horst", Nienhagen/Germany

Quality Policy

MICON stands for high quality products Made in Germany. This high quality standard builds the basis for our success and is an integral part of the company policy. This is reflected by long-term and trustful cooperation with our customers.

In order to achieve our high quality objectives the MICON Group manufacturing companies have implemented quality management systems certified according to international standards. The actual certification status of the Group companies is as follows:

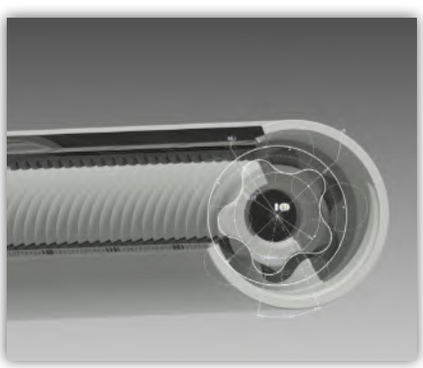
MICON Downhole-Tools GmbH:
- ISO 9001:2015 - 0019058
- API Spec. Q1 (No. Q1-4689)
- API Spec. 7-1 (Monogram License 7-1-1271)

MICON GmbH & Co.KG:
- ISO 9001:2015 - 00007159
- ISO3834-2:2006 (D-ZE-16083-01-00-ISO3834-2019.0013.002)

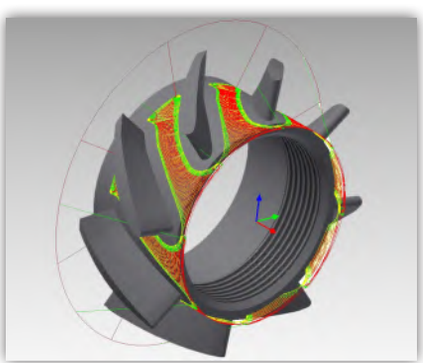
7-1-1271

Q1-4689

Our global quality objectives lead to specific targets, which are defined by the top management in cooperation with the quality manager. The fulfilment of these specific quality targets is evaluated at least every 12 months in the management review. Our ambition is product reliability and quality that meets the customer requirements as well as your high quality standards. The MICON product cycle includes different process steps. Rigorous acceptance criteria at every process step ensure a consistent high quality level of each product.

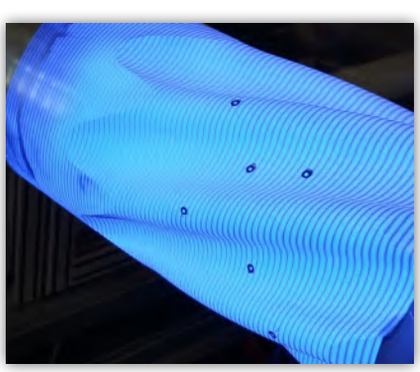


CAD based product development

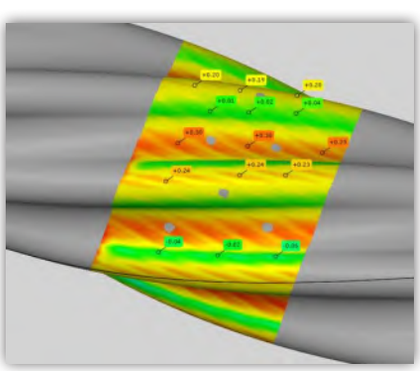


CAD – CAM manufacturing

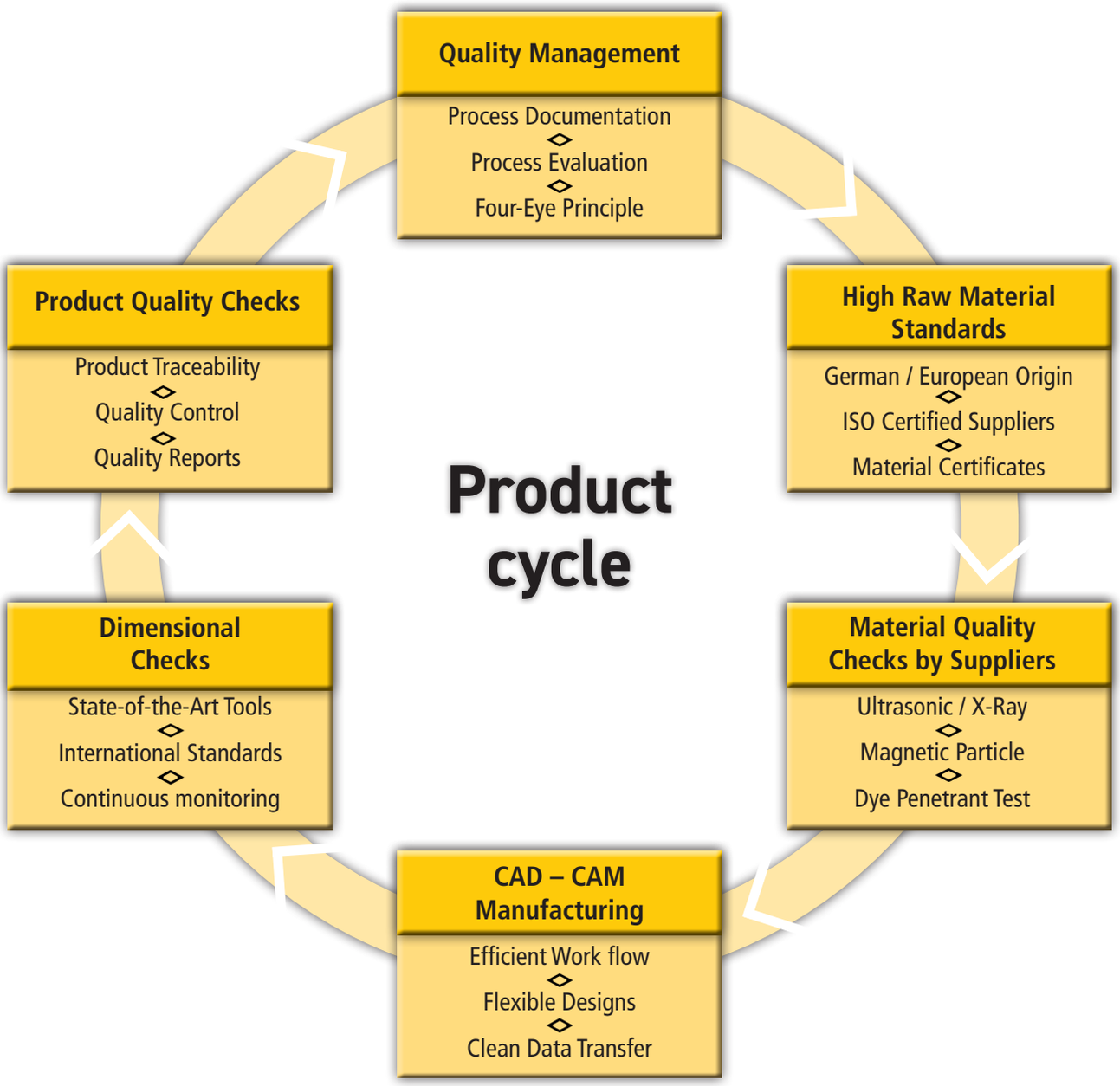
Permanent quality checks



High resolution 3-D scanning



3-D scan evaluation


Quality Management
Process Documentation
Process Evaluation
Four-Eye Principle
High Raw Material Standards
German / European Origin
ISO Certified Suppliers
Material Certificates
Material Quality Checks by Suppliers
Ultrasonic / X-Ray
Magnetic Particle
Dye Penetrant Test
CAD – CAM Manufacturing
Efficient Work flow
Flexible Designs
Clean Data Transfer
Dimensional Checks
State-of-the-Art Tools
International Standards
Continuous monitoring
Product Quality Checks
Product Traceability
Quality Control
Quality Reports
Product cycle

PDC Drill Bits Oil & Gas

MICON-Drilling PDC drill bits are exclusively manufactured in Germany, made for drilling under roughest conditions. The use of high-grade materials, German engineering and continuous product development guarantee a maximum rate of penetration and wear resistance.

We supply steel and matrix body drill bits equipped with high quality PDC cutter. The MICON Directional Series (MR) provides outstanding performance for directional drilling applications. For all other purposes our MICON Drilling Series (MD) bits are the tools of choice. The MICON Coring Series (MC) offers reliable and well established tools for your coring project.

Beside our established product line ranging from 2" to 17 ½", we also manufacture customized drill bits according to customer's specifications. Additionally, we offer a repair and rental service for our PDC drill bits. Please contact us for further details.

8 ½" MD613DBX, IADC: M433

Functional Elements of PDC Drill Bits

Polycrystalline Diamond Compact (PDC)

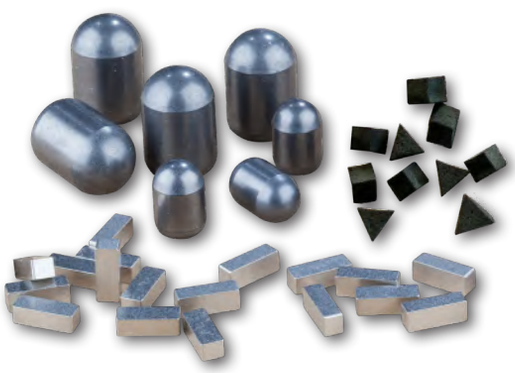
Polycrystalline diamond compacts (or polycrystalline diamond cutter) comprise a polycrystalline diamond (PCD) top layer, integrally sintered onto a tungsten carbide substrate by using a high-pressure, high-temperature process. The polycrystalline diamond layer offers controlled wear during the drilling operation, which leads to the retention of a sharp cutting edge. The tungsten carbide substrate provides a strong and tough support for the PCD layer, while facilitating attachment to the drill bit body. This feature combination allows consistently high drilling performance.

PDC cutter (8 and 13 mm)

Other Components

Shock and rind studs ensure the protection of the PDC cutter from impact shocks. Additionally, they limit the vibration, improve bit stability and provide a smooth cutting action by preventing the PDC cutter from entering too deep into the formation.

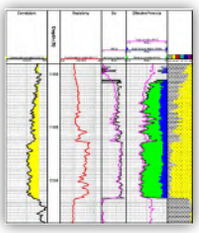
The bit gage is abrasion protected by inserts of thermally stable diamonds (TSD) and/or T2A steel plates. TSD is a tough, self-sharpening, thermally stable product. A high pressure, high temperature manufacturing process creates diamond-to-diamond bonding, resulting in a polycrystalline structure of uniform hardness and wear resistance. T2A is a metal matrix composite of tungsten carbide aggregates with a specific amount of additional cobalt matrix. It offers extremely high abrasion and temperature resistance.


TC Shock Studs, TSD Prisms and T2A Plates

Drill Bit Design Optimization

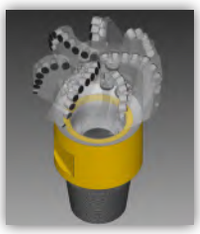
The development of MICON-Drilling PDC drill bits is based on profound knowledge and state-of-the-art technology. A close customer contact results in the optimum solution in terms of production times and performance parameters. Our drill bits are continuously optimized in oder to match precisely to the specific application. The resulting product provides outstanding performance and will significantly lower your drilling costs per foot.

I. Application Evaluation



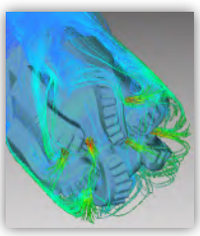
A full understanding for the needs of a given application is the starting point for choosing the right tool. A close customer relation at the beginning of a project results in optimal solutions in terms of performance parameters and drilling costs per foot.

II. Design



Our drill bit design is based on all relevant information such as BHA configuration, operating parameters, well path and formation characteristics. Cutter layout, gage length, blade profile and hydraulics are adjusted accordingly. This ensures an optimal combination of bit steerability, stability and aggressiveness.

III. Simulation and Optimization



Sophisticated software solutions enable to simulate and improve the bit performance. Force balancing is used to fine tune the cutter layout. Bit hydraulics and nozzle configuration are optimized by using Computational Fluid Dynamics (CFD). Thereby, bit life and ROP performance are maximized.

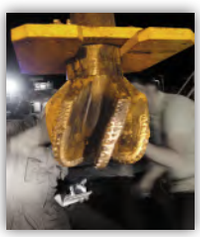
IV. Manufacturing

State-of-the-art machinery in combination with CAD-CAM technology provide a fast data transfer, efficient work flows and flexible machining programs. This enables a highly reliable and time efficient development and production of MICON-Drilling PDC drill bits.

V. Quality Control

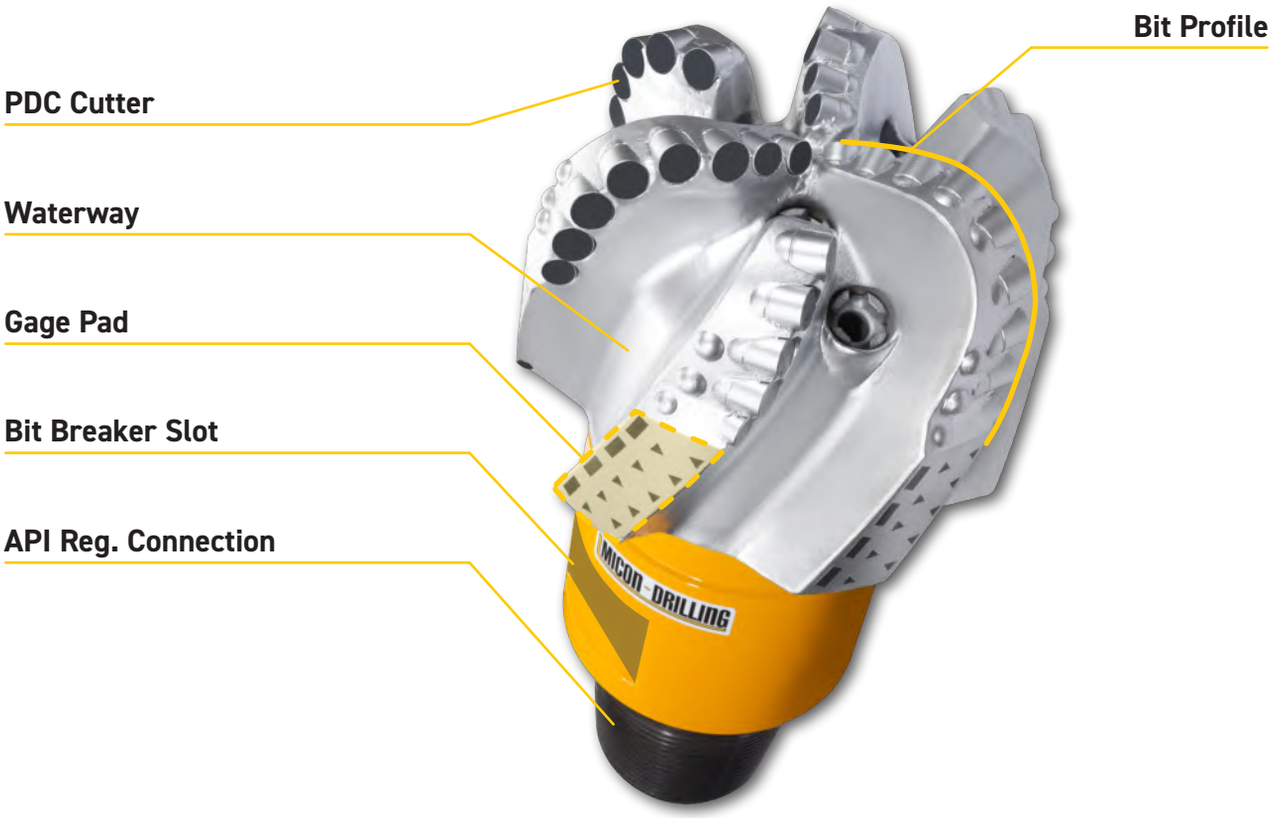
The Zero-Defect principle ensures the incessant high quality of our products. Stringent checks before, during and after the manufacturing are a MICON principle. Each drill bit has It's own serial number and is inspected by using dye penetrant crack detection, ultrasonic testing and API gage ring checks.

VI. Post Run Analysis



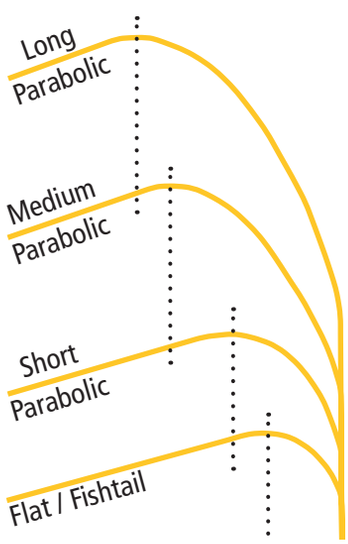
The drill bit's performance is analysed in detail, including all known application details (Drilling parameter, BHA, etc.). Understanding the performance data of each run is the key to maximize the lessons learned from the run. All that information is utilized to drive further optimizations.

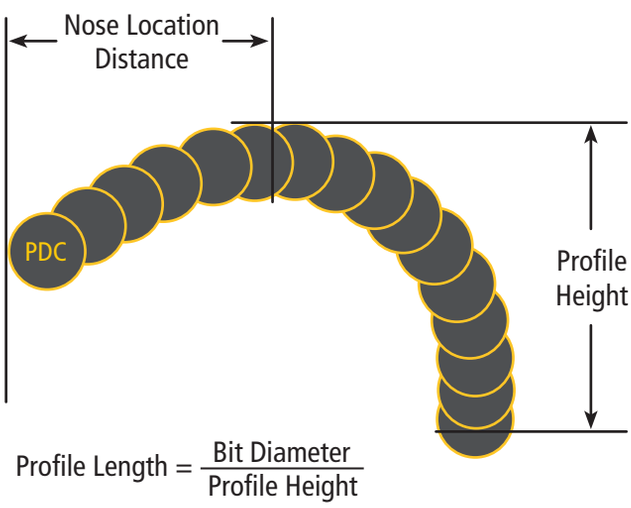
PDC Bit Fundamentals



Bit Profiles

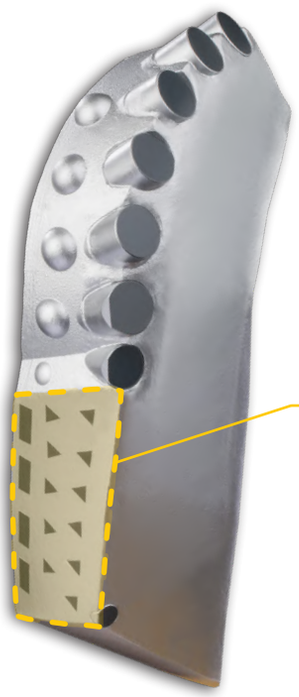
The bit profile shape is one of the most important features of PDC drill bits. It controls the cutter placement, cutter density, hydraulics, aggressivity, stability and steerability of the bit.





Gage Design

The gage area is a key element of PDC drill bits. It provides wear protection, which is essential to maintain the borehole diameter. Additionally, the gage length and design controls the directionality and steerability of the drill bit.

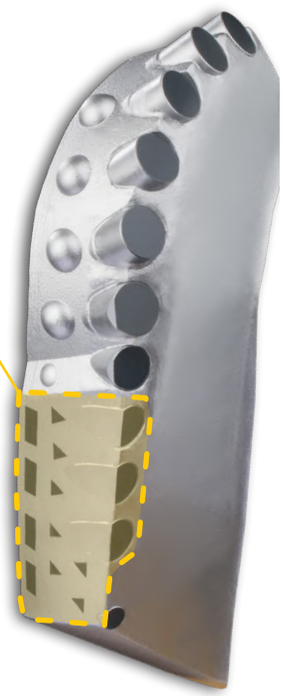


Active Gage

PDC cutter placed in the gage area (trimmers or gage cutter) increase the directional steerability of the bit.

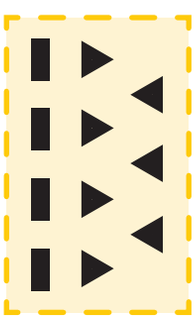
Passive Gage

A high contact surface to the formation rock enables optimal directional stability.

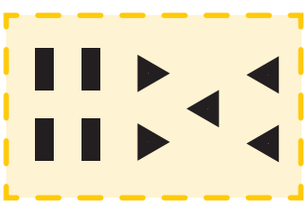


Gage Pad Geometry

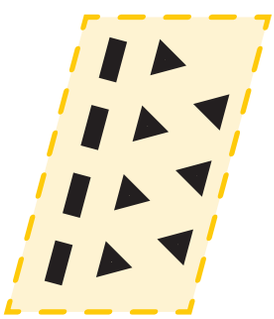
A long gage pad geometry (GPL) leads to a predominantly lateral vibration mitigation, strong holding and good borehole quality, whereas a wide gage pad geometry (GPW) geometry applies a predominantly torsional vibration mitigation and good steering capability. Inclined gage pads (GPI) offer a higher circumferential borehole wall coverage and good bit stability.



Gage Pad Long (GPL)



Gage Pad Wide (GPW)



Gage Pad Inclined (GPI)

Matrix Body PDC Bits

MICON-Drilling matrix body PDC bits show extreme wear and abrasion resistance. They are the first choice for hard and/or abrasive formations.

Matrix Body

Sintered carbide offers an extreme resistance against abrasion and erosion.

TC Shock Studs

Tungsten carbide exaltations enable protection from impact shocks. They limit vibrations, control the depth of cut and provide a smooth cutting action.

T2A and TSP Wear Protection

Tungsten carbide (T2A) plates and inserts of thermally stable diamonds (TSD) ensure an extremely high durability and wear resistance.

Back Ream Cutter

Additional PDC cutter provide reaming support while pulling out the bit.

12 ¼" MD616DBX, IADC: M323

Steel Body PDC Bits

MICON-Drilling steel body PDC bits are designed with a high blade stand-off, offering a superior cutting volume capacity. Thereby, bit hydraulics and drilling performance are optimized.

17 ½" MD619HDBXS, IADC: S223

Steel Body

Milled steel withstands impact loads and enables enhanced bit hydraulics.

Hardfacing

Abrasion resistant welded-on material offers enhanced wear protection.

TC Shock Studs

Tungsten carbide exaltations enable protection from impact shocks. They limit vibrations, control the depth of cut and provide a smooth cutting action.

T2A Plate Wear Protection

Tungsten carbide (T2A) plates ensure an extremely high durability and wear resistance.

Back Ream Cutter

Additional PDC cutter provide reaming support while pulling out the bit.

Nomenclature

MICON-Drilling PDC drill bits provide a comprehensible and systematic nomenclature. Together with bit size and IADC coding, a simple way of ordering is ensured.

Bit Size → IADC Code → MICON Suffix Features

IADC Code	
Type	**Description**
(1) Body Material	M: Matrix Body
	S: Steel Body
(2) Cutter Density Total number of 13 mm (½") cutter	1: ≤ 30 cutter
	2: 30 to 40
	3: 40 to 50
	4: ≥ 50 cutter
(3) Cutter Size	1: ≥ 24 mm
	2: 14 to 24 mm
	3: < 14 to > 8 mm
	4: ≤ 8 mm
(4) Bit Profile	1: Fishtail
	2: Short Parabolic
	3: Medium Parabolic
	4: Long Parabolic

MICON Suffix Features		
Type	**Suffix**	**Description**
(1) Series	MD	MICON Drilling Series
	MR	MICON Directional Series
	MC	MICON Coring Series
(2) Blade Count	x	Blade Count (single-digit)
(3) Cutter Size	xx	Cutter Size (double-digit) [mm]
(4) Characteristics	N	Nozzle Count less than Standard*
	H	Nozzle Count higher than Standard*
	D	Gage Protection TSD / T2A
	P	Gage Protection TSD / T2A and PDC
	B	Back Ream Cutter
	X	Tungsten Carbide (TC) Shock / Ring Studs
	XA	TC Shock / Ring Studs in all positions
	S	Steel Body
	K	Double Row

* Standard: one nozzle per blade

Examples:

12 ¼" IADC: S323 MD616PBXS

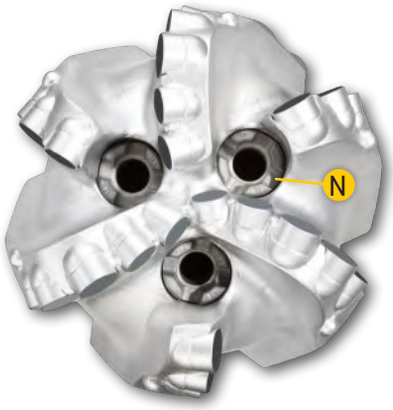
12 ¼", Steel Body, Medium Parabolic Profile, MICON Drilling Series, 6 Blades, 16 mm Cutter, 6 Nozzles, Gage Protection: TSD and PDC, Back Ream Cutter, TC Shock Studs, Steel Body

8 ½" IADC: M332 MR713NPBX

8 ½", Matrix Body, Short Parabolic Profile, MICON Directional Series, 7 Blades, 13 mm Cutter, 5 Nozzles, Gage Protection: TSD and PDC, Back Ream Cutter, Tungsten Carbide Shock Studs

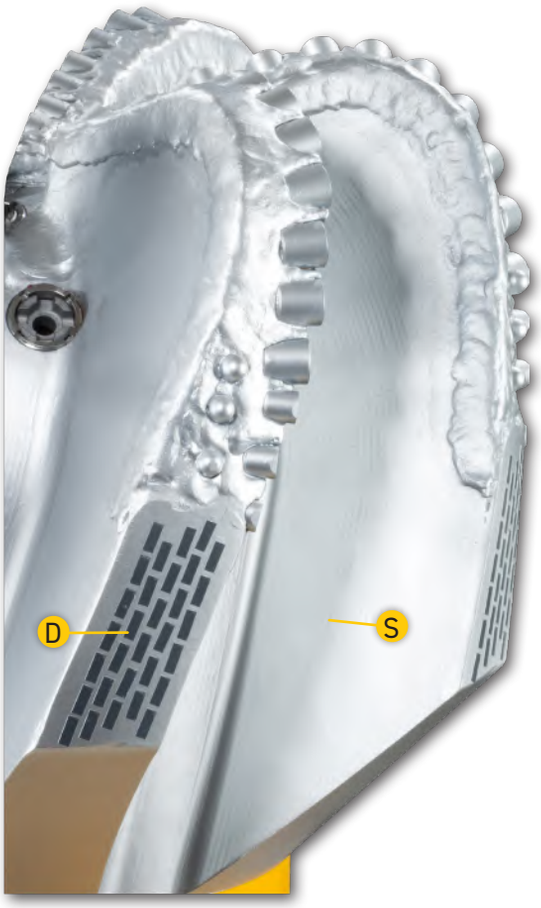
Suffix Feature Characteristics

Standard Nozzle Count

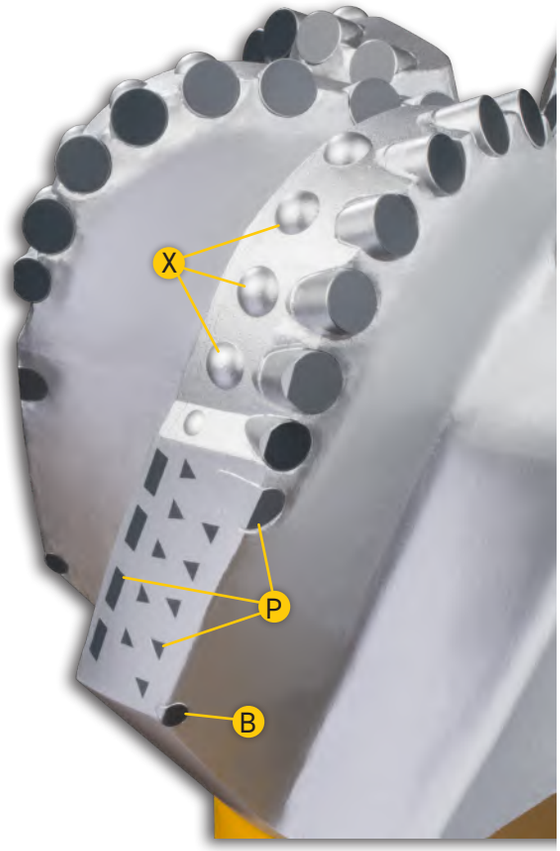


Nozzle Count is less than standard

Double Row Line-up



Gage Protection T2A , Steel Body



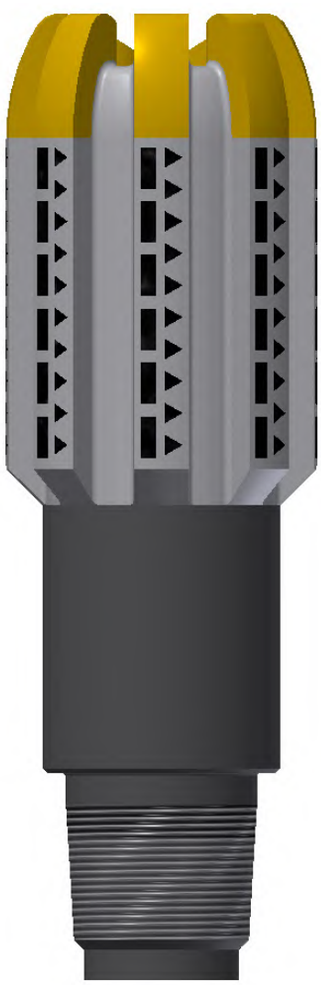
Tungsten Carbide Shock Studs,
Gage Protection TSD / T2A / PDC,
Back Ream Cutter

Special Tools

MICON-Drilling supplies a wide range of special type diamond drilling tools to accomplish challenging project demands. These customized tools come with a lot of design modification options to secure the maximum performance level for your project. Please contact us for further details. Some examples are:

- Milling Tools
- Excenter Bits
- TSD Bits
- Natural Diamond Bits
- Impregnated Bits
- Hole Opener

3 ½" PDC Scale Milling Tool



3 ½" Diamond Impregnated Scale Milling Tool

Bit Equipment

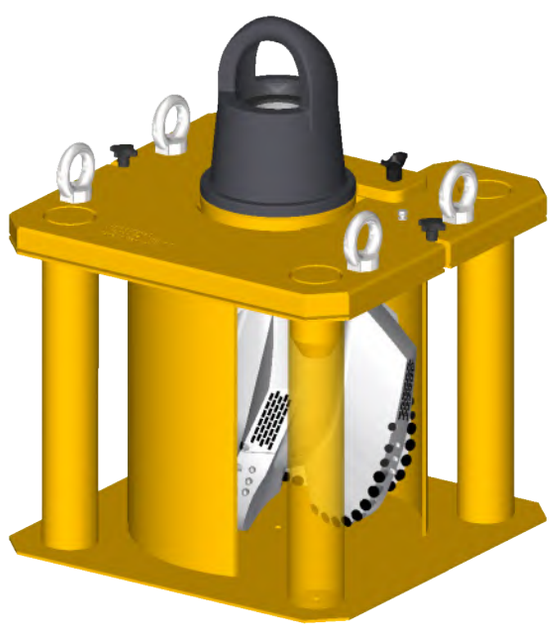
MICON-Drilling provides a variety of nozzle types to optimize the bit hydraulics for your drilling project. Nozzles are available in various sizes ranging from 8/32" to 22/32". They are shipped as a complete tool-box including nozzles, wrench, o-rings, picking-tool and Loc-Tite.

MICON Nozzle Box

Nozzle Specifications		
Nozzle Style	Min. Nozzle Size	Max. Nozzle Size
SP	8/32"	22/32"
CSP	8/32"	18/32"
MSP	9/32"	16/32"

MICON-Drilling bit breaker are available for all types of supplied PDC bits. They guarantee a safe tightening and breaking of the bit. Durable materials are the prerequisite for a long product life span. Beside standard types, we manufacture customized bit breaker according to customer's specifications.

MICON-Drilling Bit Breaker for 17 ½" PDC Bit



MICON-Drilling Bit Breaker and Storage for 17 ½" PDC Bit

Core Bits

MICON Drilling core bits are the key to recover high quality core samples in any formation type. Based on the MICON Drilling high performance drill bit designs, our core bits supply outstanding endurance and efficiency to reduce your costs per foot significantly.

PDC core bits cover various rock types and are the top performer in most formations. In soft rocks, fewer blades, larger cutter and more junk slot area provide maximal coring performance. In harder formations, an increased blade count in combination with reduced junk slot area and smaller cutter size are recommended. For extreme hard formations like granites, impregnated or natural diamond core bits are the tool of choice.

Most of our core bits come with ports to avoid mud invasion, core jamming and core erosion. Additionally, enhanced gage protection, back reaming cutters and many more customization features are available.

PDC Core Bit 8 ½ x 3" MC613DX Face

PDC Core Bit 8 ½ x 3" MC613DX Side

Standard Coring Systems										
System	Inner Barrel OD		Outer Barrel ID		Outer Barrel OD		Core Bit ID		Core Bit OD	
	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
250 P 4 ¾" x 2 ⅝"	98.43	3 ⅞	98.3	3 ¾	120.7	4 ¾	66.7	2 ⅝	149.2	5 ⅞
250 P 6 ¾" x 4"	120.7	4 ¾	136.5	5 ⅜	171.5	6 ¾	101.6	4	215.9	8 ½
250 P 8" x 5 ¼"	158.8	6 ¼	168.3	6 ⅝	203.2	8	133.4	5 ¼	311.2	12 ¼
HT 10 4 ¾" x 2 ⅝"	98.43	3 ⅞	98.3	3 ¾	120.7	4 ¾	66.7	2 ⅝	149.2	5 ⅞
HT 30 6 ¾" x 4"	120.7	4 ¾	136.5	5 ⅜	171.5	6 ¾	101.6	4	215.9	8 ½
HT 40 8" x 5 ¼"	158.8	6 ¼	168.3	6 ⅝	203.2	8	133.4	5 ¼	311.2	12 ¼

Optimized Bit Profiles

Based on our PDC drill bits, we supply different core bit profiles (long, medium, short) to ensure optimal performance and wear resistance in every formation type.

Broad Range of Cutter Types

MICON core bits can be equipped with a broad range of cutter types, including PDC, TSD, natural diamonds and diamond impregnated matrix materials.

Enhanced Gage Protection

The gage protection is maintained by a densely set combination of extremely wear resistant TSP diamonds, TC-plates and natural diamonds.

Low Invasion Features

Our core bits can be equipped with low invasion features, including face discharge ports, diamond-free inner gage, aggressive design and reduced inner gage length.

Assured Compatibility

Our core bits are suitable for most industry standard coring systems. Beside these, we supply customized core bits according to customer request.

Superior Cutters

The quality of each cutter is critical for the bit performance. Rigorous quality checks secure that each bit is equipped with cutters of premium oilfield quality.

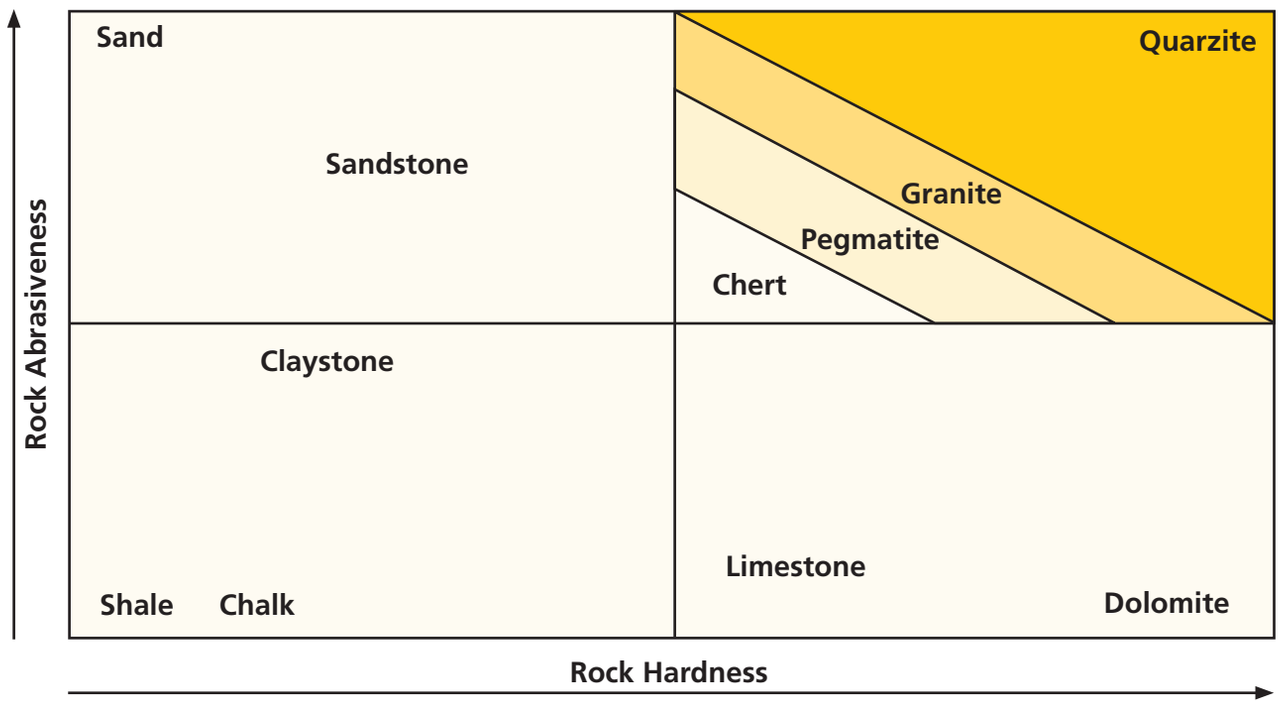
Extended Gage Length

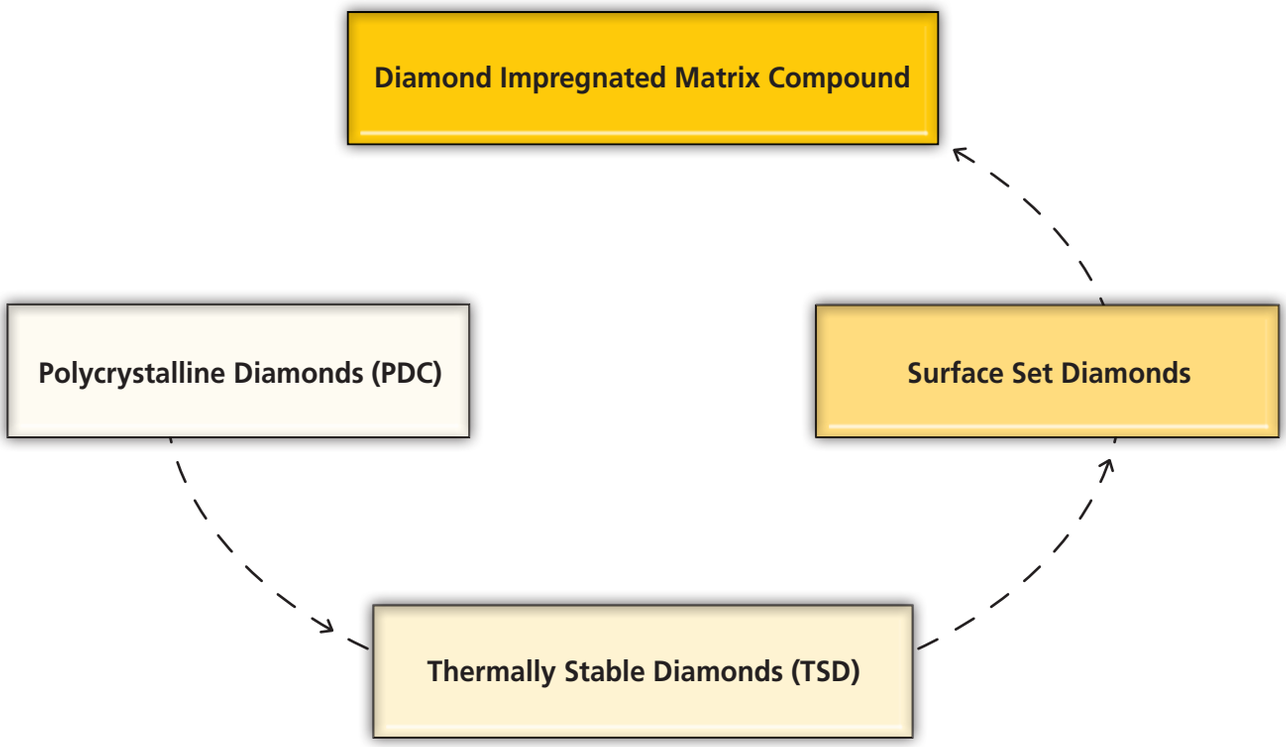
The core bit gage can be extended (please refer to picture on left page) to provide enhanced directional stability for special applications.

Superior Shank Material

Our core bits can be equipped with „weld-on“ shanks made of high strength steel in order to secure maximum torque capacity for the thread connection of the bit.

Cutter Selection





Data Tables

IADC Fixed Cutter Classification		
M344: Matrix body, 40-50 cutter (½"), mostly 8 mm cutter, long parabolic profile **S232:** Steel body, 30-40 cutter (½"), mostly 13 mm cutter, short parabolic profile		
(1) Body Material	M:	Matrix Body
	S:	Steel Body
(2) Cutter Density Total number of 13 mm (½") cutter	1:	≤ 30 cutter
	2:	30 to 40
	3:	40 to 50
	4:	≥ 50 cutter
(3) Cutter Size	1:	≥ 24 mm
	2:	14 to 24 mm
	3:	< 14 to > 8 mm
	4:	≤ 8 mm
(4) Bit Profile	1:	Fishtail
	2:	Short Parabolic
	3:	Medium Parabolic
	4:	Long Parabolic

Conversion Factors		
Multiply	**By**	**To Obtain**
Barrel [bbl]	0.158984	Cubic Meter [m³]
Barrel [bbl]	42	Gallons (US) [gal (US)]
Barrels per Day [bbl/d]	0.0066243	C. Meters p. Hour [m³/h]
Feet [ft]	0.3048	Meter [m]
Feet Pounds-Force [ft·lbf]	1.3558	Newton Meter [Nm]
Inches Pounds-Force [in·lbf]	0.1129848	Newton Meter [Nm]
Cubic Feet [ft³]	28.302	Liter [l]
Gallon (US) [gal (US)]	3.7854	Liter [l]
Gallon (US) [gal (US)]	0.02380952	Barrel [bbl]
Horsepower [hp]	0.7457	Kilowatts [kW]
Inch [in]	2.54	Centimeter [cm]
Square Inch [in²]	6.4516	Square Centimeter [cm²]
Cubic Inch [in³]	16.3871027	Cubic Centimeter [cm³]
Ton (metric) [t]	2204	Pounds [lbs]
Pounds [lbs]	0.453592	Kilogram [kg]

Total Flow Area (TFA)										
Nozzle Size	**Number of Nozzles**									
	1	2	3	4	5	6	7	8	9	10
7/32"	0.0376	0.0752	0.1128	0.1504	0.1880	0.2256	0.2632	0.3007	0.3382	0.3758
8/32"	0.0491	0.0982	0.1473	0.1964	0.2455	0.2946	0.3437	0.3927	0.4418	0.4909
9/32"	0.0621	0.1242	0.1863	0.2484	0.3105	0.3728	0.4349	0.497	0.5591	0.6213
10/32"	0.0767	0.1534	0.2301	0.3068	0.3835	0.4602	0.5369	0.6136	0.6903	0.7670
11/32"	0.0928	0.1856	0.2784	0.3712	0.4640	0.5568	0.6496	0.7424	0.8353	0.9281
12/32"	0.1104	0.2208	0.3312	0.4418	0.5522	0.6627	0.7731	0.8836	0.9940	1.1045
13/32"	0.1296	0.2592	0.3888	0.5184	0.6480	0.7776	0.9072	1.0370	1.1666	1.2962
14/32"	0.1503	0.3006	0.4509	0.6012	0.7515	0.9020	1.0523	1.2026	1.3530	1.5033
15/32"	0.1726	0.3452	0.5178	0.6904	0.8630	1.0354	1.2080	1.3806	1.5532	1.7257
16/32"	0.1963	0.3926	0.5889	0.7854	0.9817	1.1781	1.3744	1.5708	1.7671	1.9635
18/32"	0.2485	0.4970	0.7455	0.9940	1.2425	1.4910	1.7395	1.9880	2.2365	2.4850
20/32"	0.3068	0.6136	0.9204	1.2272	1.5340	1.8408	2.1476	2.4544	2.7612	3.0680
22/32"	0.3712	0.7424	1.1136	1.4848	1.8560	2.2272	2.5986	2.9698	3.3410	3.7122
24/32"	0.4418	0.8836	1.3254	1.7671	2.2089	2.6507	3.0925	3.5343	3.9761	4.4179
26/32"	0.5185	1.037	1.5555	2.0739	2.5924	3.1109	3.294	4.1479	4.6664	5.1849
28/32"	0.6013	1.2026	1.804	2.4053	3.0066	3.6079	4.2092	4.8105	5.4119	6.0132

Nozzle Series			
Diameter	MSP	CSP	SP
8/32"	✓	✓	✓
9/32"	✓	✓	✓
10/32"	✓	✓	✓
11/32"	✓	✓	✓
12/32"	✓	✓	✓
13/32"	✓	✓	✓
14/32"	✓	✓	✓
15/32"	✓	✓	✓
16/32"	✓	✓	✓
18/32"		✓	✓
20/32"			✓
22/32"			✓

Drill Bit Connections	
Bit Diameter	Connection
3 ½" - 4 ½"	2 ⅜" API Reg.
4 17/32" - 5"	2 ⅞" API Reg.
5 1/32" - 7 ⅜"	3 ½" API Reg.
7 13/32" - 9 ⅜"	4 ½" API Reg.
9 13/32" - 14 ½"	6 ⅝" API Reg.
14 9/16" - 18 ½"	6 ⅝" or 7 ⅝" API Reg.
≥ 18 9/16"	7 ⅝" or 8 ⅝" API Reg.

Recommended Make-Up Torque			
Connection	Max. Pin ID	Bit Sub OD	Min. Make-Up Torque [ft·lbs]
2 ⅜" API Reg.	1"	3"	1,800
		3 ⅛ "	2,450
		3 ¼"	3,100
2 ⅞" API Reg.	1 ¼"	3 ½"	3,100
		3 ¾"	4,650
		3 ⅞"	4,700
3 ½" API Reg.	1 ½"	4 ⅛"	5,200
		4 ¼"	6,350
		4 ½"	7,650
4 ½" API Reg.	2 ¼"	5 ½"	12,500
		5 ¾"	16,500
		≥ 6"	17,500
6 ⅝" API Reg.	2 13/16"	7 ½"	37,200
		≥ 7 ¾"	42,700
	3"	7 ½"	37,200
		≥ 7 ¾"	40,600
7 ⅝" API Reg.	3 ¼"	8 ½"	48,350
		8 ¾"	57,750
		≥ 9"	67,400
	3 ½"	8 ½"	48,350
		8 ¾"	57,750
		≥ 9"	63,650
8 ⅝" API Reg.	3 ½"	≥ 9 ¾"	94,900

Hydraulic Calculations:

Annular Velocity:

$$V_A = \frac{24.5\ Q}{d_h^2 - d_s^2}$$

Surface Equipment Pressure Losses:

$$\Delta P = c\rho \times (Q/100)^{1.86}$$

Drill Stem Bore Pressure Losses:

$$\Delta P = \frac{6.1 \times 10^{-5}\ \rho L Q^{1.86}}{d_i^{4.86}}$$

Jet Nozzle Pressure Losses:

$$\Delta P = \frac{\rho Q^2}{10858\ A_N}$$

Annular Pressure Losses:

$$\Delta P = \frac{(1.4327 \times 10^7)\rho L V^2}{d_h - d_s}$$

Jet Velocity:

$$V_N = \frac{0.32086\ Q}{A_N}$$

Jet Impact Force:

$$I_N = 5.16 \times 10^{-4}\ \rho Q V_N$$

Hydraulic Horsepower:

$$H_{hp} = \frac{PQ}{1714}$$

Nomenclature:

V_A ... Annular Velocity [ft / min]
Q ... Circulation Rate [gpm]
d_h ... Borehole Diameter [in]
d_s ... Drill String Outer Diameter [in]
d_i ... Drill Stem Inner Diameter [in]
ρ ... Mud Weight [lb / gal]
c ... Friction Factor
P ... Pressure [psi]
ΔP ... Pressure Drop [psi]
L ... Length [ft]
A_N ... Nozzle Area [in²]
V_N ... Jet Velocity [ft / sec]
I_N ... Jet Impact Force [lbf]
H_{hp} ... Hydraulic Horsepower [hp]

API Casing Dimensions and Bit Diameter

Dimensions					Bit Size	
Casing OD	Wall Thickness [in]	Casing ID [in]	Casing Coupling OD [in]	API Drift Diameter [in]	Recommended Bit Diameter [in]	[mm]
4 ½"	0.205	4.090	5.000	3.965	3 ⅞	98.4
	0.224	4.052		3.927		
	0.250	4.000		3.875		
	0.290	3.920		3.795	3 ¾	95.2
5"	0.220	4.560	5.563	4.435	4 ¼	107.9
	0.253	4.494		4.369		
	0.296	4.408		4.283		
	0.362	4.276		4.151	4 ⅛	104.8
5 ½"	0.244	5.012	6.050	4.887	4 ⅞	123.8
	0.275	4.950		4.825	4 ¾	120.7
	0.304	4.892		4.767		
	0.361	4.778		4.653	4 ⅝	117.5
	0.415	4.670		4.545	4 ½	114.3
6 ⅝"	0.288	6.049	7.390	5.924	5 ⅞	149.2
	0.352	5.921		5.796	5 ¾	146.1
	0.417	5.791		5.666	5 ⅝	142.8
	0.475	5.675		5.550	5 ¼	133.4
7"	0.231	6.538	7.656	6.413	6 ¼	158.7
	0.272	6.456		6.331		
	0.317	6.366		6.241		
	0.362	6.276		6.151	6 ⅛	155.5
	0.408	6.184		6.059	6	152.4
	0.453	6.094		5.969	5 ⅞	149.2
	0.498	6.004		5.879		
	0.540	5.920		5.795	5 ¾	146.1
7 ⅝"	0.300	7.025	8.500	6.900	6 ¾	171.4
	0.328	6.969		6.844		
	0.375	6.875		6.750		
	0.430	6.765		6.640	6 ½	165.1
	0.500	6.625		6.500		
8 ⅝"	0.264	8.097	9.625	7.972	7 ⅞	200.0
	0.304	8.017		7.892		
	0.352	7.921		7.796	7 ⅝	193.7
	0.400	7.825		7.700		
	0.450	7.725		7.600	6 ¾	171.4
	0.500	7.625		7.500		
	0.557	7.511		7.386		

Dimensions					Bit Size	
Casing OD	Wall Thickness [in]	Casing ID [in]	Casing Coupling OD [in]	API Drift Diameter [in]	Recommended Bit Diameter [in]	[mm]
9 ⅝"	0.312	9.001	10.635	8.845	8 ¾	222.2
	0.352	8.921		8.765		
	0.395	8.835		8.679	8 ½	215.9
	0.435	8.755		8.599		
	0.472	8.681		8.525		
	0.545	8.535		8.379	8 ⅜	212.7
10 ¾"	0.279	10.192	11.750	10.036	9 ⅞	250.8
	0.350	10.050		9.894		
	0.400	9.950		9.794	9 ⅝	244.5
	0.450	9.850		9.694		
	0.495	9.760		9.604	9 ½	241.3
	0.545	9.660		9.504		
	0.595	9.560		9.404	9	228.6
11 ¾"	0.333	11.084	12.750	10.928	10 ⅝	269.9
	0.375	11.000		10.844		
	0.435	10.880		10.724		
	0.489	10.772		10.616	9 ⅞	250.8
13 ⅜"	0.330	12.715	14.375	12.559	12 ¼	311.1
	0.380	12.615		12.459		
	0.430	12.515		12.359		
	0.480	12.415		12.259		
	0.514	12.347		12.191	12	304.8
16"	0.375	15.250	17.000	15.062	14 ¾	374.6
	0.438	15.125		14.936		
	0.495	15.010		14.822		
18 ⅝"	0.435	17.756	20.000	17.567	17 ½	444.5
20"	0.438	19.124	21.000	18.936	17 ½	444.5
	0.500	19.000		18.812		
	0.635	18.730		18.542		

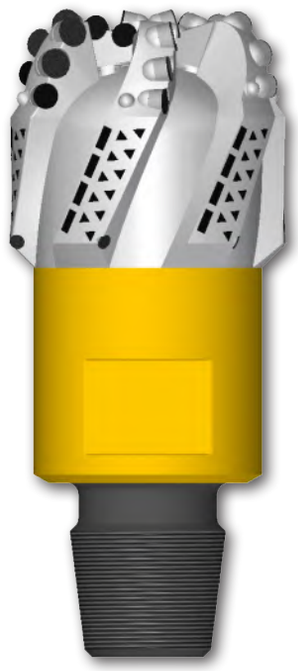
Data Sheets

4 ⅛" IADC: M342 MD608NDBX

Product Specifications	
Body Type	Matrix
Profile	Short Parabolic
Cutter Size	8 mm
Total Cutter Count	37
Cutter Backup	Shock Studs
Blade Count	6
Number of Ports	3
Number of Nozzles	-
API Pin Connection	2 ⅜" Reg
Gage Length	1.5" (38.1 mm)
Gage Protection	T2A / TSD
Blade Profile	Spiral
Order-No.	31-00001114
Operating Parameters	
Rotary Speed	Suitable for Rotary and PDM
Max Weight on Bit	20 klbs (9 t)
Flow Rate, Min - Max	80 - 160 gpm (400 - 800 l/min)
Max TFA	0.589
Make-Up Torque	2,600 - 3,100 ft·lb

Technical data and pictures for information only
Please contact us for recommendations for your individual well

5 ⅞" IADC: M323 MD613NDBX



Product Specifications	
Body Type	Matrix
Profile	Medium Parabolic
Cutter Size	13 mm / 16 mm
Total Cutter Count	32
Cutter Backup	Shock Studs
Blade Count	6
Number of Ports	-
Number of Nozzles	3
API Pin Connection	3 ½" Reg
Gage Length	2.5" (63.5 mm)
Gage Protection	T2A / TSD
Blade Profile	Spiral
Order-No.	31-00001806
Operating Parameters	
Rotary Speed	Suitable for Rotary and PDM
Max Weight on Bit	17.5 klbs (8 t)
Flow Rate, Min - Max	150 - 300 gpm (600 - 1,200 l/min)
Max TFA	1.1137
Make-Up Torque	7,000 - 8,500 ft·lb

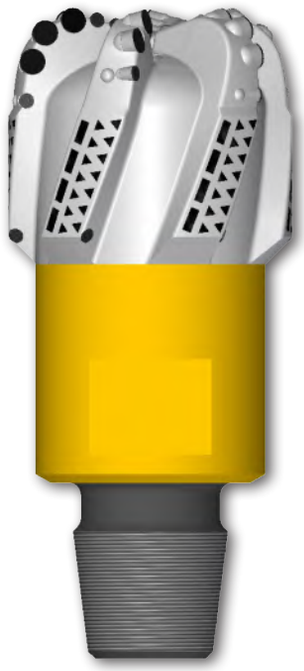
Technical data and pictures for information only
Please contact us for recommendations for your individual well

5 ⅞" IADC: M332 MD513NDBX

Product Specifications	
Body Type	Matrix
Profile	Short Parabolic
Cutter Size	13 mm
Total Cutter Count	26
Cutter Backup	-
Blade Count	5
Number of Ports	-
Number of Nozzles	3
API Pin Connection	3 ½" Reg
Gage Length	2.5" (63.5 mm)
Gage Protection	T2A / TSD
Blade Profile	Spiral
Order-No.	31-00001807
Operating Parameters	
Rotary Speed	Suitable for Rotary and PDM
Max Weight on Bit	16 klbs (7.3 t)
Flow Rate, Min - Max	150 - 300 gpm (600 - 1,200 l/min)
Max TFA	0.589
Make-Up Torque	7,000 - 8,500 ft·lb

Technical data and pictures for information only
Please contact us for recommendations for your individual well

5 ⅞" IADC: M432 MD613NDBX



Product Specifications	
Body Type	Matrix
Profile	Short Parabolic
Cutter Size	13 mm / 8 mm
Total Cutter Count	43
Cutter Backup	Shock Studs
Blade Count	6
Number of Ports	-
Number of Nozzles	3
API Pin Connection	3 ½" Reg
Gage Length	2.5" (63.5 mm)
Gage Protection	T2A / TSD
Blade Profile	Spiral
Order-No.	31-00001808
Operating Parameters	
Rotary Speed	Suitable for Rotary and PDM
Max Weight on Bit	24 klbs (11 t)
Flow Rate, Min - Max	200 - 300 gpm (600 - 1,200 l/min)
Max TFA	0.589
Make-Up Torque	7,000 - 8,500 ft·lb

Technical data and pictures for information only
Please contact us for recommendations for your individual well

6" IADC: M433 MD613NDBX

Product Specifications	
Body Type	Matrix
Profile	Medium Parabolic
Cutter Size	13 mm / 8 mm
Total Cutter Count	43
Cutter Backup	Shock Studs
Blade Count	6
Number of Ports	-
Number of Nozzles	3
API Pin Connection	3 ½" Reg
Gage Length	2.5" (63.5 mm)
Gage Protection	T2A / TSD
Blade Profile	Spiral
Order-No.	31-00001809
Operating Parameters	
Rotary Speed	Suitable for Rotary and PDM
Max Weight on Bit	25 klbs (11 t)
Flow Rate, Min - Max	300 - 500 gpm (1,100 - 1,900 l/min)
Max TFA	0.589
Make-Up Torque	7,000 - 8,500 ft·lb

Technical data and pictures for information only
Please contact us for recommendations for your individual well

6 ⅛" IADC: M433 MD613NDBX

Product Specifications	
Body Type	Matrix
Profile	Medium Parabolic
Cutter Size	13 mm / 8 mm
Total Cutter Count	43
Cutter Backup	Shock Studs
Blade Count	6
Number of Ports	-
Number of Nozzles	3
API Pin Connection	3 ½" Reg
Gage Length	2.5" (63.5 mm)
Gage Protection	T2A / TSD
Blade Profile	Spiral
Order-No.	31-00001810
Operating Parameters	
Rotary Speed	Suitable for Rotary and PDM
Max Weight on Bit	25 klbs (11 t)
Flow Rate, Min - Max	300 - 500 gpm (1,100 - 1,900 l/min)
Max TFA	0.589
Make-Up Torque	7,000 - 8,500 ft·lb

Technical data and pictures for information only
Please contact us for recommendations for your individual well

6 ½" IADC: M233 MD613DBK

Product Specifications	
Body Type	Matrix
Profile	Medium Parabolic
Cutter Size	13 mm
Total Cutter Count	52
Cutter Backup	-
Blade Count	6
Number of Ports	-
Number of Nozzles	6
API Pin Connection	3 ½" Reg
Gage Length	3" (76.2 mm)
Gage Protection	T2A / TSD
Blade Profile	Spiral
Order-No.	31-00001812
Operating Parameters	
Rotary Speed	Suitable for Rotary and PDM
Max Weight on Bit	25 klbs (11 t)
Flow Rate, Min - Max	200 - 500 gpm (900 - 1,900 l/min)
Max TFA	1.4910
Make-Up Torque	7,000 - 8,500 ft·lb

Technical data and pictures for information only
Please contact us for recommendations for your individual well

6 ½" IADC: M233 MD613NDK

Product Specifications	
Body Type	Matrix
Profile	Medium Parabolic
Cutter Size	13 mm
Total Cutter Count	52
Cutter Backup	-
Blade Count	6
Number of Ports	-
Number of Nozzles	3
API Pin Connection	3 ½" Reg
Gage Length	3" (76.2 mm)
Gage Protection	T2A / TSD
Blade Profile	Spiral
Order-No.	31-00001813
Operating Parameters	
Rotary Speed	Suitable for Rotary and PDM
Max Weight on Bit	25 klbs (11 t)
Flow Rate, Min - Max	200 - 500 gpm (900 - 1,900 l/min)
Max TFA	0.7455
Make-Up Torque	7,000 - 8,500 ft·lb

Technical data and pictures for information only
Please contact us for recommendations for your individual well

8 ½" IADC: M323 MD616DBX

Product Specifications	
Body Type	Matrix
Profile	Medium Parabolic
Cutter Size	16 mm / 13 mm
Total Cutter Count	46
Cutter Backup	Shock Studs
Blade Count	6
Number of Ports	-
Number of Nozzles	6
API Pin Connection	4 ½" Reg
Gage Length	3" (76.2 mm)
Gage Protection	T2A / TSD
Blade Profile	Spiral
Order-No.	31-00002401
Operating Parameters	
Rotary Speed	Suitable for Rotary and PDM
Max Weight on Bit	29 klbs (13 t)
Flow Rate, Min - Max	400 - 700 gpm (1,500 - 2,650 l/min)
Max TFA	2.2273
Make-Up Torque	12,500 - 17,500 ft·lb

Technical data and pictures for information only
Please contact us for recommendations for your individual well

8 ½" IADC: M433 MD613DBX

Product Specifications	
Body Type	Matrix
Profile	Medium Parabolic
Cutter Size	13 mm / 8 mm
Total Cutter Count	51
Cutter Backup	Ring Studs
Blade Count	6
Number of Ports	-
Number of Nozzles	6
API Pin Connection	4 ½" Reg
Gage Length	3" (76.2 mm)
Gage Protection	T2A / TSD
Blade Profile	Spiral
Order-No.	31-00004807
Operating Parameters	
Rotary Speed	Suitable for Rotary and PDM
Max Weight on Bit	25 klbs (11 t)
Flow Rate, Min - Max	400 - 700 gpm (1,500 - 2,650 l/min)
Max TFA	2.2273
Make-Up Torque	12,500 - 17,500 ft·lb

Technical data and pictures for information only
Please contact us for recommendations for your individual well

8 ½" IADC: M333 MD613DK

Product Specifications	
Body Type	Matrix
Profile	Medium Parabolic
Cutter Size	13 mm
Total Cutter Count	63
Cutter Backup	PDC
Blade Count	6
Number of Ports	-
Number of Nozzles	6
API Pin Connection	4 ½" Reg
Gage Length	3" (76.2 mm)
Gage Protection	T2A / TSD
Blade Profile	Straight
Order-No.	31-00004811

Operating Parameters	
Rotary Speed	Suitable for Rotary and PDM
Max Weight on Bit	28.7 klbs (13 t)
Flow Rate, Min - Max	300 - 700 gpm (1,135 - 2,650 l/min)
Max TFA	1.1781
Make-Up Torque	12,500 - 17,500 ft·lb

Technical data and pictures for information only
Please contact us for recommendations for your individual well

12 ¼" IADC: M323 MD616PBX

Product Specifications	
Body Type	Matrix
Profile	Medium Parabolic
Cutter Size	16 mm / 13 mm
Total Cutter Count	57
Cutter Backup	Shock Studs
Blade Count	6
Number of Ports	-
Number of Nozzles	6
API Pin Connection	6 ⅝" Reg
Gage Length	3" (76.2 mm)
Gage Protection	T2A / TSD / PDC
Blade Profile	Spiral
Order-No.	31-00005301
Operating Parameters	
Rotary Speed	Suitable for Rotary and PDM
Max Weight on Bit	46 klbs (21 t)
Flow Rate, Min - Max	500 - 1,200 gpm (1,890 - 4,540 l/min)
Max TFA	2.2273
Make-Up Torque	37,600 - 41,300 ft·lb

Technical data and pictures for information only
Please contact us for recommendations for your individual well

17 ½" IADC: M123 MD619HDBX

Product Specifications	
Body Type	Matrix
Profile	Medium Parabolic
Cutter Size	19 mm / 13 mm
Total Cutter Count	65
Cutter Backup	Shock Studs
Blade Count	6
Number of Ports	-
Number of Nozzles	9
API Pin Connection	7 ⅝" Reg
Gage Length	4" (101.6 mm)
Gage Protection	T2A / TSD / PDC
Blade Profile	Spiral
Order-No.	31-00005602
Operating Parameters	
Rotary Speed	Suitable for Rotary and PDM
Max Weight on Bit	41 klbs (18.6 t)
Flow Rate, Min - Max	600 - 1,300 gpm (2,270 - 4,920 l/min)
Max TFA	3.341
Make-Up Torque	64,800 - 66,200 ft·lb

Technical data and pictures for information only
Please contact us for recommendations for your individual well

12 ¼" IADC: S323 MD616PBXS

Product Specifications	
Body Type	Steel
Profile	Medium Parabolic
Cutter Size	16 mm / 13 mm
Total Cutter Count	63
Cutter Backup	Shock Studs
Blade Count	6
Number of Ports	-
Number of Nozzles	6
API Pin Connection	6 ⅝" Reg
Gage Length	3" (76.2 mm)
Gage Protection	T2A / PDC
Blade Profile	Spiral
Order-No.	31-00005304
Operating Parameters	
Rotary Speed	Suitable for Rotary and PDM
Max Weight on Bit	46 klbs (21 t)
Flow Rate, Min - Max	500 - 1,200 gpm (1,890 - 4,540 l/min)
Max TFA	2.2273
Make-Up Torque	37,600 - 41,300 ft·lb

Technical data and pictures for information only
Please contact us for recommendations for your individual well

17 ½" IADC: S223 MD619HDXS

Product Specifications	
Body Type	Steel
Profile	Medium Parabolic
Cutter Size	19 mm / 13 mm
Total Cutter Count	78
Cutter Backup	Shock Studs
Blade Count	6
Number of Ports	-
Number of Nozzles	9
API Pin Connection	7 ⅝" Reg
Gage Length	4" (101.6 mm)
Gage Protection	T2A / PDC
Blade Profile	Spiral
Order-No.	31-00005601
Operating Parameters	
Rotary Speed	Suitable for Rotary and PDM
Max Weight on Bit	62 klbs (28 t)
Flow Rate, Min - Max	600 - 1,300 gpm (2,270 - 4,920 l/min)
Max TFA	3.341
Make-Up Torque	64,800 - 66,200 ft·lb

Technical data and pictures for information only
Please contact us for recommendations for your individual well

8 ½" IADC: M332 MR713NPBX

Product Specifications	
Body Type	Matrix
Profile	Short Parabolic
Cutter Size	13 mm
Total Cutter Count	57
Cutter Back up	Shock Studs
Blade Count	7
Number of Ports	-
Number of Nozzles	6
API Pin Connection	4 ½" Reg
Gage Length	1 ½" (38.1 mm)
Gage Protection	T2A / TSD / PDC
Blade Profile	Spiral
Order-No.	31-00004808
Operating Parameters	
Rotary Speed	Suitable for Rotary and PDM
Max Weight on Bit	29 klbs (13 t)
Flow Rate, Min - Max	400 - 700 gpm (1,500 - 2,650 l/min)
Max TFA	2.2273
Make-Up Torque	12,500 - 17,500 ft·lb

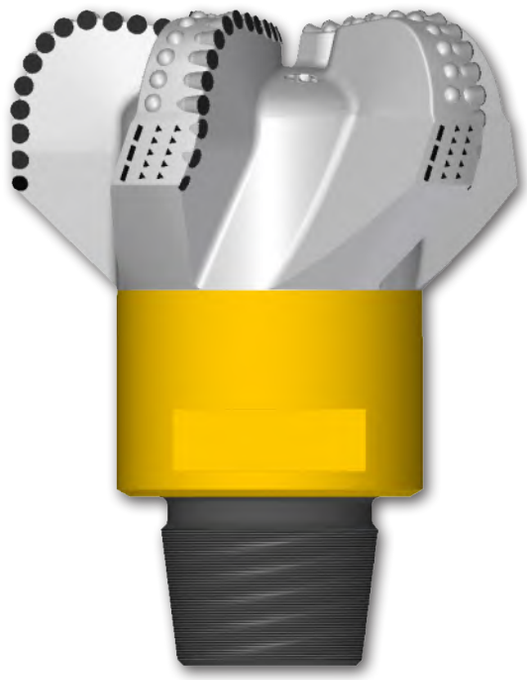
Technical data and pictures for information only
Please contact us for recommendations for your individual well

12 ¼" IADC: M422 MR616HPBXA

Product Specifications	
Body Type	Matrix
Profile	Short Parabolic
Cutter Size	16 mm
Total Cutter Count	62
Cutter Backup	Shock Studs
Blade Count	6
Number of Ports	-
Number of Nozzles	6
API Pin Connection	6 ⅝" Reg
Gage Length	2" (50.8 mm)
Gage Protection	T2A / PDC
Blade Profile	Spiral
Order-No.	31-00005305
Operating Parameters	
Rotary Speed	Suitable for Rotary and PDM
Max Weight on Bit	31.8 klbs (14.4 t)
Flow Rate, Min - Max	500 - 1,200 gpm (1,890 - 4,540 l/min)
Max TFA	2.2273
Make-Up Torque	37,600 - 41,300 ft·lb

Technical data and pictures for information only
Please contact us for recommendations for your individual well

16" IADC: M322 MR516HPBXA



Product Specifications	
Body Type	Matrix
Profile	Short Parabolic
Cutter Size	16 mm
Total Cutter Count	68
Cutter Backup	Shock Studs
Blade Count	6
Number of Ports	-
Number of Nozzles	9
API Pin Connection	7 ⅝" Reg
Gage Length	2" (50.8 mm)
Gage Protection	T2A / PDC
Blade Profile	Spiral
Order-No.	31-00005501
Operating Parameters	
Rotary Speed	Suitable for Rotary and PDM
Max Weight on Bit	41 klbs (18.6 t)
Flow Rate, Min - Max	500 - 1,200 gpm (1,890 - 4,540 l/min)
Max TFA	3.3410
Make-Up Torque	64,800 - 66,200 ft·lb

Technical data and pictures for information only
Please contact us for recommendations for your individual well

Notes

Notes

Notes

MICON-Drilling GmbH

Im Nordfeld 14 · 29336 Nienhagen · Germany
Tel. +49 . 5144 . 4936 . 0 · Fax +49 . 5144 . 4936 . 60
sales@micon-drilling.de · www.micon-drilling.de