



DRILL BITS CATALOGUE



ISC
PETRO
ENGINEERING

CONTENTS



COMPANY PROFILE	2
PETROBITS DRILL BITS	3
BIT RUNNING SUPPORT	4
ADDITIONAL SERVICE	5
DRILL BIT IDENTIFICATION CODE	6
DRILL BIT APPLICATION RANGE AND DESIGNS	7
TORNADO	8-9
GRIZZLY	10-11
TITAN	12
SHERE KHAN	13
CUTTERS VARIATIONS	14
SYMBIOSIS	15
SPECIAL PURPOSE DRILL BITS	16
BLADE REAMERS	17
REFERENCES	18-19

LLC Innovative Service Company «Petroengineering» - technology innovator, leading provider of engineering services to the oil and gas well drilling technology across Russian Federation and abroad. Over the past 10 years by connecting ourselves and our services with such well-known companies as «GAZPROM», «ROSNEFT», «Zarubezhneft», «EDC», «LUKOIL», «TOTAL», «NOVATEK», «STATOIL», as well as «ASIA DRILLING» our company achieves the leading position in the Russian Oil and gas services market.

More than 900 employees are joining a community of highly qualified engineering professionals with a broad set of experience that bring greater efficiency and wider the limits of drilling to deliver true results, enhance operational performance and safety. Our success comes from the hundreds of engineering experts who take the initiative to push our company forward.

We provide an integrated engineering service support in the area of oil and gas well drilling technology such as drill bits, drilling fluids, directional drilling (DD), coring, casing running and downhole tooling and well cementing. If necessary, emergency equipment and engineering support services may be secured when emergency operations are underway. There is 24/7 engineering support available from the Drilling Design and Support Center.

The Drilling Bit Department with manufacturing facility, which is located in Samara, successfully has been developing, producing and putting into operation its proprietary design solutions under the PetroBits trademark. Wide geography and product range allow to offer best possible products to our customers.

Our team of designers has the ability to quickly manufacture bits for specific drilling conditions with sizes from 2" to 20". Since its inception LLC «ISC PetroEngineering» produced over 10,500 bits, over 400 designs of ranging in size and drilled more than 28,300 wells, with the total footage exceeding 70.1 million meters.

We are fully committed to supporting and developing cooperation with a host of institutions and universities, including the Gubkin Russian State University of Oil and Gas, Ukhta State Technical University, KogalymNIPIneft, PermNIPIneft, VNIIFTRI, etc.

Collaboration between experienced field professionals and leading scientists leads to high standards of business and operational performance and workmanship in oil and gas well site construction across various geotechnical and geographical environments. This approach enables our team to steadfastly move forward towards the set goal.

PetroBits trademark is registered in the Federal Institute of Industrial Property of the Russian Federation.

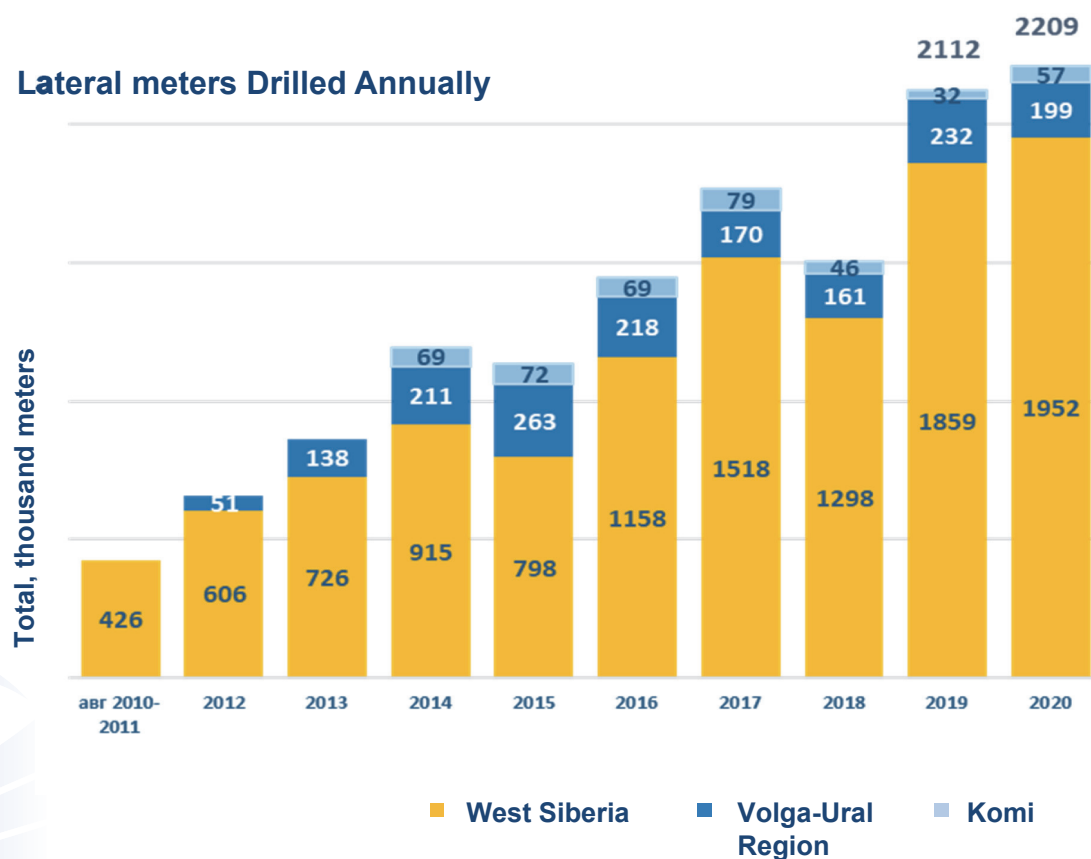




If required ISC PetroEngineering has a team of over 150 qualified bit running field engineers.

Over the 6 year period we successfully supervised drilling of more than 5700 wells with total length of > 13.1 MM meters. The maximum measured drilled depth makes 8,000 m within the Nenets Licensed Area (NAO) Russia.

Lateral meters Drilled Annually



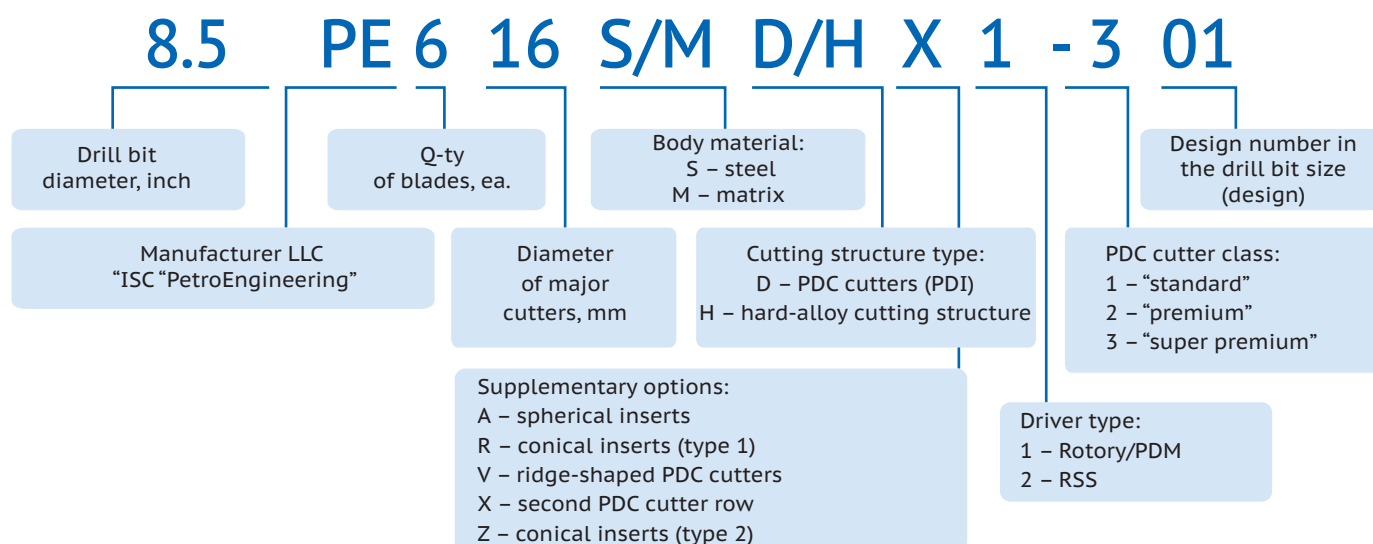


Manufacturing facility:

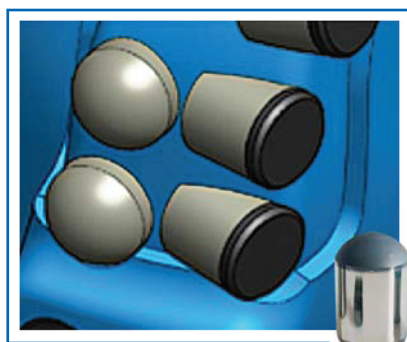
- Designing the drill bits and other BHA elements according to Client's technical specifications.
- Manufacturing drill bits and drill bit bodies in different completion degrees (weld depositing, soldering).
- Metal-working services.
- Repairing and revamping the Drill Bits.
- Selection of Drill bit cutting structure on the assumption of its condition (wear out).

- Designing the bit running programs, selection of optimum pair of drill bits and downhole motors.
- Selection of Drill bit running orders ensuring the best performance.
- Daily engineering inspection of facilities.
- Carrying out trials to enhance improvement of existing bit designs.
- Recommendations for re-run/rejection of the rock drilling tools.
- Drill bit rental.

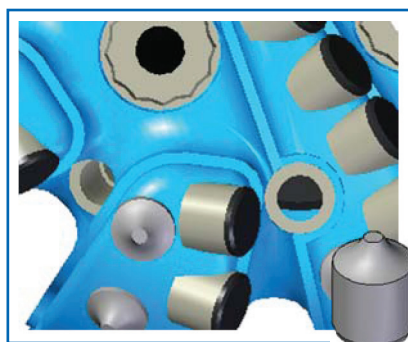




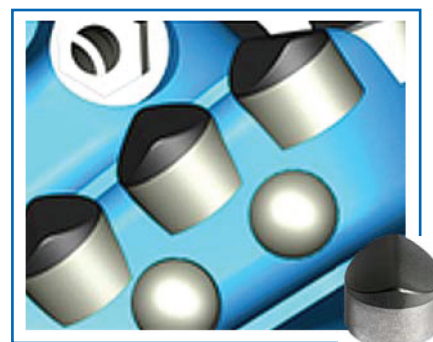
SUPPLEMENTARY OPTIONS



A – spherical inserts



R – conical inserts (type 1)



V – ridge-shaped PDC cutters



X – second PDC cutter row



Z – conical inserts (type 2)

DRILL BIT APPLICATION RANGE AND DESIGNS



Drill Bit Series Description	Description (eng)	Note
Drill bits for soft and medium-soft rocks with standard cutters with a focus on the high penetration rate, resistance and steering response (basic designs and technologies for soft-medium formations)	TORNADO	Single-row designs
Drill bits for medium and medium-hard rocks with the premium cutting structure with a focus on the high resistance, penetration rate and steering response (basic designs and technologies for medium-hard formations)	GRIZZLY	1.5-row and double-row designs
Drill bits for hard and firm formations with a focus on the higher resistance with the premium cutting structure for the most severe drilling conditions.	TITAN	Double-row extra-strong designs
Drill bits for different drilling conditions with a focus on innovations, implementation of special PDC cutter geometries and achievement of the highest performance indicators (PI)	SHERE KHAN	Drill bit designs with conical and ridge-shaped PDC cutters
Special-purpose drill bits for application with rotary steerable systems with focus on good compatibility of the rock drilling tools and hi-tech equipment for direction drilling (a set of adapted drill bit designs for operation with various RSS modifications)	SYMBIOSIS	Drill bit designs for operations with RSS: SLB, WF, BH, Hal



Drill bits of this series are used at the soft formation fields to a greater extent. The specific design feature is a large hard-faced area of the body to prevent wear resistance. The drill bits are designed for operation at the higher drilling parameters and with maximum rate of penetration using the standard cutting structure.

Series available options:

A - spherical inserts

Diameter mm	Diameter Inch	Name	IADC Code	Connection API	Weight
122	4 4/5	PE513SD1-201	S/M233	2 7/8	12,4
123,8	4 7/8	PE513SD1-201	S/M233	2 7/8	11,3
123,8	4 7/8	PE613SD1-201	S/M233	2 7/8	11,3
123,8	4 7/8	PE513SD1-202	S/M233	2 7/8	11,3
126	5	PE513SD1-201	S/M233	2 7/8	12
126	5	PE513SD1-202	S/M233	2 7/8	12
139,7	5 1/2	PE513SD1-201	S/M233	3 1/2	17
142,9	5 5/8	PE613SD1-201	S/M233	3 1/2	13
146	5 3/4	PE613SD1-201	S/M233	3 1/2	19
152,4	6	PE613SD1-301	S/M233	3 1/2	17
152,4	6	PE613SD1-201	S/M233	3 1/2	17
155,6	6 1/8	PE613SD1-201	S/M233	3 1/2	17
155,6	6 1/8	PE613SD1-101	S/M233	3 1/2	17
155,6	6 1/8	PE613SD1-202	S/M233	3 1/2	17

Diameter mm	Diameter Inch	Name	IADC Code	Connection API	Weight
215,9	8 1/2	PE516SD1-201	S/M223	4 1/2	42,4
215,9	8 1/2	PE616SD1-201	S/M223	4 1/2	44
215,9	8 1/2	PE613SD1-201	S/M233	4 1/2	44
215,9	8 1/2	PE613SD1-202	S/M233	4 1/2	44
215,9	8 1/2	PE513SD1-201	S/M223	4 1/2	44
222,3	8 3/4	PE516SD1-201	S/M223	4 1/2	42,4
222,3	8 3/4	PE613SD1-203	S/M223	4 1/2	44
222,3	8 3/4	PE616SD1-201	S/M223	4 1/2	44
222,3	8 3/4	PE513SD1-201	S/M233	4 1/2	42,4
222,3	8 3/4	PE613SD1-204	S/M233	4 1/2	44
311,1	12 1/4	PE616SD1-202	S/M223	6 5/8	97
311,1	12 1/4	PE616SD1-201	S/M223	6 5/8	97
311,1	12 1/4	PE519SD1-202	S/M223	6 5/8	97
311,1	12 1/4	PE519SD1-201	S/M223	6 5/8	97
311,1	12 1/4	PE516SD1-201	S/M223	6 5/8	98
311,1	12 1/4	PE419SD1-201	S/M223	6 5/8	98
444,5	17 1/2	PE619SD1-201	S/M223	7 5/8	187
444,5	17 1/2	PE419SD1-101	S/M223	7 5/8	187
444,5	17 1/2	PE619SD1-202	S/M223	7 5/8	186
444,5	17 1/2	PE519SD1-201	S/M223	7 5/8	182
444,5	17 1/2	PE516SD1-202	S/M223	7 5/8	182
490	19 2/7	PE419SD1-101	S/M223	7 5/8	218
508	20	PE619SD1-101	S/M223	7 5/8	250



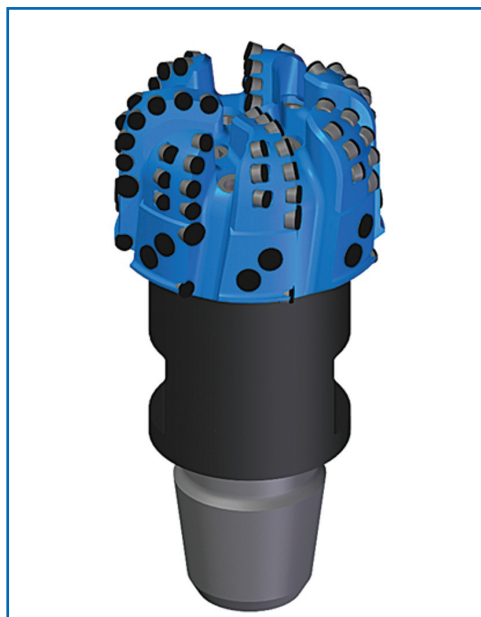
Drill bits of this series are mostly used at the fields with medium-hard formation. The specific design features are supplementation of the most loaded drill bit parts with the second cutter row and a focus on the higher rate of penetration. Super premium class cutters are installed on these bit types.

Series available options:

X - double cutting structure

Diameter mm	Diameter Inch	Name	IADC Code	Connection API	Weight
126	5	PE513SDX1-X01	S/M433	2 7/8	9,2
142,9	5 5/8	PE613SDX1-X01	S/M433	3 1/2	16
146	5 3/4	PE710SDX1-X01	S/M443	3 1/2	18
146	5 3/4	PE613SDX1-X01	S/M443	3 1/2	18
146	5 3/4	PE613SDX1-X02	S/M443	3 1/2	18
146	5 3/4	PE713SDX1-X01	S/M443	3 1/2	18
146	5 3/4	PE516SDX1-301	S/M343	3 1/2	18
149,2	5 7/8	PE713SDX1-X01	S/M443	3 1/2	18
149,2	5 7/8	PE516SDX1-X01	S/M343	3 1/2	18
152,4	6	PE613SDX1-X01	S/M443	3 1/2	18
152,4	6	PE710SDX1-X01	S/M443	3 1/2	18
152,4	6	PE710SDX1-X02	S/M443	3 1/2	18

Diameter mm	Diameter Inch	Name	IADC Code	Connection API	Weight
155,6	6 1/8	PE713SDX1-X01	S/M433	3 1/2	19,2
155,6	6 1/8	PE613SDX1-301	S/M433	3 1/2	19,2
155,6	6 1/8	PE710SDX1-301	S/M443	3 1/2	19,2
155,6	6 1/8	PE713SD1-X01	S/M433	3 1/2	19,2
215,9	8 1/2	PE616SDX1-301	S/M423	4 1/2	46
215,9	8 1/2	PE716SDX1-301	S/M423	4 1/2	46
215,9	8 1/2	PE816SDX1-301	S/M423	4 1/2	46
215,9	8 1/2	PE616SDX1-X02	S/M423	4 1/2	46
215,9	8 1/2	PE616SDX1-X01	S/M423	4 1/2	46
215,9	8 1/2	PE516SDX1-X01	S/M423	4 1/2	46
222,3	8 3/4	PE616SDX1-301	S/M423	4 1/2	46
222,3	8 3/4	PE716SDX1-301	S/M423	4 1/2	46
222,3	8 3/4	PE816SDX2-302	S/M423	4 1/2	46
222,3	8 3/4	PE716SDX1-302	S/M423	4 1/2	46
311,1	12 1/4	PE616SDX1-X01	S/M323	6 5/8	97
311,1	12 1/4	PE519SDX1-301	S/M223	6 5/8	98
444,5	17 1/2	PE619SDX1-X01	S/M223	7 5/8	162
444,5	17 1/2	PE516SDXH1-X01	S/M423	7 5/8	158
444,5	17 1/2	PE516SDXA1-X02	S/M423	7 5/8	158



This series has been designed for operation in hard abrasive formations. It has maximum density of the cutting structure, multiple coverage of each zone. Designed to operate in the challenging sections where the standard drill bits show critical body wear.

Series available options:

X - double cutting structure

Technical Features

- Super-premium class cutters. Deep leached cutters resistant to abrasive wear and impact loads allow for the higher drilling interval and penetration rate.
- Second row cutters. The second PDC cutter row allows for measurable increase of the drill bit lifetime.
- Hardened gauge. Special coating of the drill bit gauge prevents its wear and diameter loss.

Diameter mm	Diameter Inch	Name	IADC Code	Connection API	Weight
215,9	8 1/2	PE613SDX1-301	S/M433	4 1/2	48
215,9	8 1/2	PE813SDX1-301	S/M433	4 1/2	48
215,9	8 1/2	PE813SD1-X01	S/M433	4 1/2	48
215,9	8 1/2	PE816SDX1-X02	S/M423	4 1/2	48
215,9	8 1/2	PE816SDX1-X04	S/M423	4 1/2	48



The specific feature of this series is 3D shaped PDC cutters on the cutting drill bit structure.

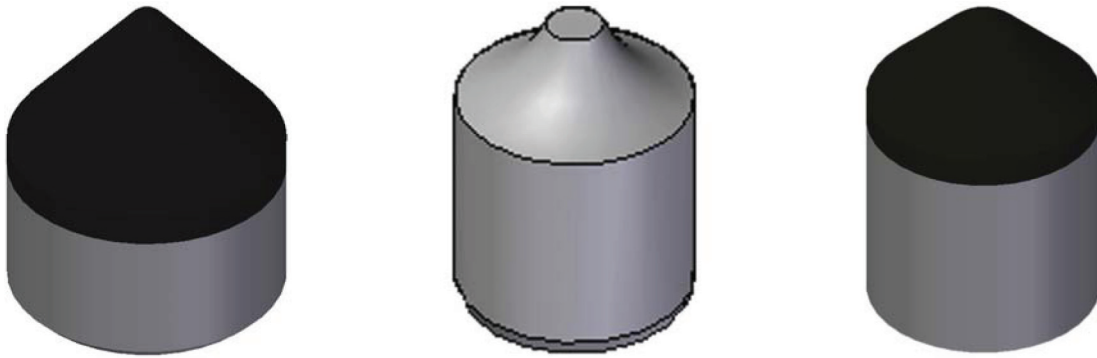
The 3D shaped cutters allow for modification of rock cutting/drilling technique, providing higher rate of penetration and higher cutting structure resistance.

Shere Khan series is recommended for complicated sections and critical projects.

Series available options:

- R** – conical inserts (type 1)
- V** – ridge-shaped PDC cutters
- X** – second PDC cutter row
- Z** – conical inserts (type 2)

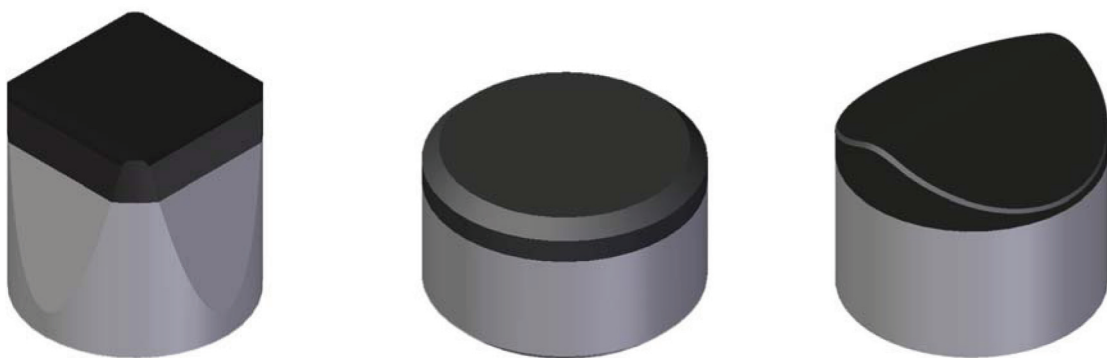
Diameter mm	Diameter Inch	Name	IADC Code	Connection API	Weight
146	5 3/4	PE613SDXZ1-301	S/M433	3 1/2	18
146	5 3/4	PE614SZ1-X01	S/M134	3 1/2	17
155,6	6 1/8	PE416SDV2-301	S/M224	3 1/2	18
215,9	8 1/2	PE616SDXZ1-301	S/M433	4 1/2	46
215,9	8 1/2	PE716SDXZ2-301	S/M424	4 1/2	46
215,9	8 1/2	PE816SDXZ2-301	S/M424	4 1/2	46
215,9	8 1/2	PE516SDV2-301	S/M223	4 1/2	46
215,9	8 1/2	PE516SDXZ1-X02	S/M433	4 1/2	46
311,1	12 1/4	PE616SDXZ1-301	S/M423	6 5/8	95



LLC “ISC “PetroEngineering” cooperates with all the major PDC cutters manufacturers including E6 and US Synthetics. We are not restricted by exclusive agreement which means we can offer what is the best on the market from all leading manufacturers.

All incoming cutters pass multiple quality check before being send to manufacturing. Our unique track record base allow to make optimum decision on cutting structure design to ensure best performance. Our professional bit runners across the world make sure we get the most up to date feedback from the field.

Our certified laboratory help to perform wear tests of PDC cutters as well as examine cause of any critical wear is happened in the field.





This drill bit series is designed to be used in line with the Rotary Steerable System (RSS). The final bit design can be agreed with the company – supplier of the RSS.

LLC “ISC “PetroEngineering” bits are compatible with all major RSS tools and has a successful experience with both “Push the bit” and “Point the bit” RSS modifications present at the market including: Baker Hughes, Schlumberger, Halliburton and Weatherford.

Series available options:

- R** – conical inserts (type 1)
- V** – ridge-shaped PDC cutters
- X** – second PDC cutter row
- Z** – conical inserts (type 2)

Diameter mm	Diameter Inch	Name	IADC Code	Connection API	Weight
152,4	6	PE710SDX2-X03	S/M443	3 1/2	18
155,6	6 1/8	PE416SD2-301	S/M233	3 1/2	17
155,6	6 1/8	PE516SDX2-X01	S/M333	3 1/2	18
155,6	6 1/8	PE513SD3-X01	S/M322	3 1/2	17
155,6	6 1/8	PE613SDX2-302	S/M323	3 1/2	18
155,6	6 1/8	PE710SDX2-X02	S/M443	3 1/2	18
155,6	6 1/8	PE416SD2-X02	S/M233	3 1/2	17
155,6	6 1/8	PE613SD2-X01	S/M333	3 1/2	17,5
155,6	6 1/8	PE513SD2-301	S/M333	3 1/2	17
155,6	6 1/8	PE513SD2-X01	S/M333	3 1/2	17
155,6	6 1/8	PE513SD2-X03	S/M333	3 1/2	17
155,6	6 1/8	PE516SD2-X02	S/M324	3 1/2	17
215,9	8 1/2	PE813SDX2-X02	S/M434	4 1/2	46
215,9	8 1/2	PE716SDX2-301	S/M424	4 1/2	46
215,9	8 1/2	PE616SDX2-X02	S/M423	4 1/2	46
215,9	8 1/2	PE513SD2-X02	S/M333	4 1/2	44,2
215,9	8 1/2	PE516SD2-X01	S/M323	4 1/2	44,2
215,9	8 1/2	PE816SDXZ1-X03	S/M423	4 1/2	46
215,9	8 1/2	PE813SD2-X01	S/M434	4 1/2	46
215,9	8 1/2	PE813SDX2-X01	S/M434	4 1/2	46
215,9	8 1/2	PE513SD2-X03	S/M334	4 1/2	42,4
311,1	12 1/4	PE516SDX2-X01	S/M323	6 5/8	91



The Company has launched production of auxiliary tools needed to our OFS business units to efficiently provide bit services. We successfully manufacture bits used to sidetrack wells and to ream wellbores as well as milling bits to cleanout bottom-hole area. There have been designed, manufactured and pilot tested small-diameter bicentric bits.

Currently it is planned to design an array of bicentric bits to drill hole sections for production strings as well as to expand our product line of downhole mills.

Basic difference between the PetroEngineering Drill Bit Series and the bits offered by other manufacturers is that our products could be tailor made to unique customers' needs with no reference to any specific product lines or bit types. Our buyers are free to select any cutters (e.g. PDC cutters) available in the Russian market irrespective of manufacturers thereof. Extensive geographic footprint of our bit services units as well as close interaction with other related in-house businesses enable us to analyze and to use advantages of the experience accumulated by other manufacturers and, therefore, to outperform our competitors.

ISC PetroEngineering actively collaborates with KingDream PLC., a leading drill bit manufacture in China, to jointly manufacture roller cone bits. Designed to meet the PetroEngineering requirements and manufactured under its supervision, such bits have been branded as PE-K. The PE-K roller cone bits are successfully used in the Usinsk Region, Perm Krai and East Siberia.

ISC PetroEngineering is an official dealer of KingDream PLC in Russia





Blade reamers are designed to enlarge pilot boreholes and earlier drilled intervals. They are manufactured either with replaceable or integral blades. Blade reamers are customizable to suit any specific needs including a variety of cutting structures and bottom-hole coverage. Depending on the cutting structure class and position of cutters, they can be used to drill both hard and soft rock.

Series available options:

- A** – spherical inserts
- X** – second PDC cutter row
- R** – conical inserts (type 1)

Optimum orientation of hydraulic nozzles and proper cutters sweeping ensure enhanced protection of equipment from thermal stress and eventually improved wear performance.

Purpose:

Blade reamers are intended to drill boreholes by using pilot bits and to ream earlier drilled intervals by enlarging wellbore diameter from 12.25" to 28".

Design Features:

A reamer consists of a shell, three integral blades with embedded diamond (PDC) cutters. Additionally, the reamer shell incorporates 6 replaceable nozzles.

РЛ 393.7/590 PE 319SDX	
Reamer type	steel, with three blades
External shell diameter, mm	393.7
Maximum reaming diameter, mm	590
Reamer length, mm, max	600
PDC cutter size, mm	19x19; 13x13
Water passages, ea.	6 (removable nozzles)
Connection thread	API Thread
Reamer weight, kg, max	427
Recommended axial load, t	3-5
Recommended rotor speed, rpm	60-12
Drilling fluid flow rate, l/s	55-65

DRILL BIT DIAMETER, API CONNECTION THREAD AND RECOMMENDED TORQUE

Drill bit size (inch)	API/GOST R connection thread	Recommended torque kN•m
3 7/8 ~ 4 1/2 / 98.4-114.3	2 3/8 / 3-66	4 ~ 4.8
4 7/8 ~ 5 / 120.6-127	2 7/8 / 3-76	8 ~ 9.5
5 7/8 ~ 6 3/4 / 142.9-171.4	3 1/2 / 3-88	9.5 ~ 12
7 1/2 ~ 8 3/4 / 190.5-222.3	4 1/2 / 3-117	16 ~ 22
9 1/2 ~ 14 1/2 / 241.3-368.3	6 5/8 / 3-152	38 ~ 43
14 3/4 ~ 20 / 374.6-508.0	7 5/8 / 3-177	46 ~ 54

DIAMOND DRILL BIT NOZZLE

TFA values for standard nozzles (mm²)

Designation (in -/32) inch	Nozzle diameter (mm)	Total area of leakage from the drill bit nozzles, mm ²								
		Q-ty of nozzles								
		1	2	3	4	5	6	7	8	9
06	4.76	17.81	35.63	53.44	71.26	89.07	106.88	124.70	142.51	160.33
07	5.56	24.25	48.49	72.74	96.99	121.23	145.48	169.73	193.97	218.22
08	6.35	31.67	63.34	95.01	126.68	158.35	190.02	221.68	253.35	285.02
09	7.14	40.08	80.16	120.24	160.33	200.41	240.49	280.57	320.65	360.73
10	7.94	49.48	98.97	148.45	197.93	247.42	296.90	346.38	395.87	445.35
11	8.73	59.87	119.75	179.62	239.50	299.37	359.25	419.12	479.00	538.87
12	9.53	71.26	142.51	213.77	285.02	356.28	427.53	498.79	570.05	641.30
13	10.32	83.63	167.25	250.88	334.51	418.13	501.76	585.39	669.01	752.64
14	11.11	96.99	193.97	290.96	387.95	484.93	581.92	678.91	775.90	872.88
15	11.91	111.34	222.67	334.01	445.35	556.69	668.02	779.36	890.70	1002.03
16	12.70	126.68	253.35	380.03	506.71	633.38	760.06	886.74	1013.41	1140.09
17	13.49	143.01	286.01	429.02	572.03	715.03	858.04	1001.04	1144.05	1287.06
18	14.29	160.33	320.65	480.98	641.30	801.63	961.95	1122.28	1282.60	1442.93
19	15.08	178.63	357.27	535.90	714.54	893.17	1071.81	1250.44	1429.07	1607.71
20	15.88	197.93	395.87	593.80	791.73	989.66	1187.60	1385.53	1583.46	1781.39
21	16.67	218.22	436.44	654.66	872.88	1091.10	1309.32	1527.54	1745.77	1963.99
22	17.46	239.50	479.00	718.50	957.99	1197.49	1436.99	1676.49	1915.99	2155.49

DULL BIT GRADING

Cutting structure				Bearing B	Gauge surface G	Note	
Cone / rows I	Outer cutters / heel cutters O	Wear behavior D	Location L	Bearing/seal B	Diameter, mm G	Other wear characteristics O	Reason drill bit was pulled R
<div>0 - No Wear 8 - Full Wear</div>				<div>I - In Gauge 1 - up to 1-mm wear 2 - up to 2-mm wear</div>			
<div> BC - Broken Cone^a BF - Bond Failure^b BT - Broken Teeth BU - Bailed Up Bit CC - Cracked Cone^a CD - Cone Dragged^a CI - Cone Interference^a CR - Cored Inner Cone Rows CT - Chipped Teeth ER - Erosion FC - Flat Crested Wear^a HC - Heat Checking JD - Junk Damage LC - Lost Cone^a LN - Lost Nozzle LT - Lost Teeth/Cutters OC - Off-Center Wear^a PB - Pinched Bit PN - Plugged Nozzle/Flow Passage RG - Rounded Gauge^a RO - Ring Out^b SD - Shirttail Damage^a SS - Self-Sharpening Wear^a TR - Tracking^a WO - Washed Out Bit WT - Worn teeth / Cutter NO - No Dull Characteristics NR - Not Rerunable RR - Rerunable <div>a - Roller Cone Dull Characteristics b - Diamond Drill Bits Dull Characteristics</div> </div>				<div> Unsealed bearing 0 - No Wear 8 - Full Wear Sealed bearing E - Seals Effective F - Seals Failed X - Diamond Drill Bit </div>		<div> BHA - Change Bottom Hole Assembly CM - Condition Mud CP - Core Point DP - Drill Plug DMF - Downhole Motor Failure DTF - Downhole Tool Failure DSF - Drill Stem Failure DST - Drill Stem Test HP - Hole Problems HR - Hours on Bit LOG - Run Logs PP - Pump Pressure PR - Penetration Rate RIG - Rig Repair TD - Tooth Depth / Casing Depth TQ - Torque TW - Twist Off WC - Weather Conditions WO - Washout - Drill String </div>	
<div> Roller Cones 1 - First Cone 2 - Second Cone 3 - Third Cone N - Nose Row M - Middle Row H - Heel Row A - All Rows PDC bits C - Cone N - Nose T - Taper S - Shoulder G - Gauge A - All Areas </div>							





Moscow, park Vorontsovsky, 4
Tel.: +7 (499) 372-00-77
fax: +7 (499) 372-01-11
E-mail: info@iscpetro.ru
iscpetro.ru