

1. Rock cutting tools

1.1 TYPICAL WELL DESIGN DRILL BITS PER SIZE CLASSIFICATION

New projects in Russia and CIS require extensive work on bit design providing wellbore verticality.

Drill bit design was adjusted to be run in certain conditions considering previous experience. Successful trial runs of new bits confirmed design adjustment efficiency.

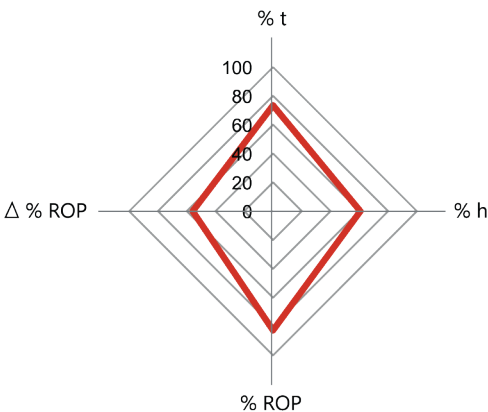
Drill bits are used to drill vertical and deviated sections thru soft to medium strength formation. 5 blades bits are most general in use. Having high ROP in soft and medium strength formations, the high impact and wear resistant PDC cutters might be used to provide good performance in hard and abrasive formations as well.

1.2 DRILL BITS FOR SURFACE CASING



BS-393,7 VD 519-003

BS-393,7 VD 519-003 bit directional control diagram



Being:

%t – slide time to total drilling time ratio

%h – slide distance to total run footage ratio

% ROP – slide ROP to average run ROP ratio

Δ%ROP – slide ROP to rotary ROP ratio

| Model | Diameter | |
|-------|------------|------|
| | millimeter | inch |
| VD419 | 393,7 | 15 ½ |
| VD519 | 393,7 | 15 ½ |
| VD616 | 393,7 | 15 ½ |
| VD619 | 393,7 | 15 ½ |

Drill bit BS-393,7 VD 519-003
Well 2019, pad 1B, Ety-Purovskoe field
Avg ROP = 71.6 mph, Max ROP = 165.3 mph

