Neyrfor Delta Series
High-Performance Directional Turbodrill

APPLICATIONS
- Curve, horizontal, and tangent directional drilling
- High-pressure, high-temperature (HPHT) directional drilling
- Openhole, cement-plug and whipstock sidetracks
- PDC and impregnated diamond bit applications
- Geothermal drilling

BENEFITS
- Extended downhole operating life
- 60% increase in dogleg capabilities
- Reduction in slide time over Neyrfor Traditional
- High-temperature capabilities, 260 degC
- Improved hole quality over other drive systems
- Consistent and predictable tool face control
- Low BHA vibration characteristics

FEATURES
- Shortest bit to bend in class
- Proprietary engineered stabilizer placement and profile software
- Concentric-balanced design
- Fluid-connect drive system
- Bearing housing contact and wear pads to eliminate left hand walk tendencies

Neyrfor Delta high-performance directional turbodrills are the second generation steerable turbodrill, designed specifically to meet demanding directional and precision horizontal drilling applications. The Neyrfor Delta turbodrill incorporates the shortest bit to bend in its class and the specifically engineered stabilizers enhance weight transfer to the bit for improved hole cleaning.

More efficient sliding
The Neyrfor Delta turbodrill is designed with a shorter bit-to-bend design versus the Neyrfor Traditional turbodrill system, enabling shorter radius-curve drilling and reducing time spent on course corrections while drilling horizontal and tangent sections, thereby increasing footage drilled in the targeted zone.

To eliminate the left hand walk tendencies of the high RPM bit speeds and low depth of cut typically seen with turbodrill systems, the Neyrfor Delta features a specifically designed bearing housing wear and contact pads, providing wellbore contact without the increase in torque normally associated with BHA components. This results in a lower percentage of slide time versus rotating time, increasing the overall rate of penetration.

Reduced slide time for walking tendencies

Stabilizer Design
The Neyrfor Delta stabilizers are engineered with a reduced spiral wrap design, deceased wellbore contact surface area and wider blades. The stabilizers are also designed with an optimal directional taper on the leading and trailing edge improving weight transfer to the bit while reducing hang-ups sliding. The concentric drive system coupled with the use of specifically engineered designed directional stabilizers deliver a wellbore with minimal rugosity, which enhances wellbore evaluation, casing running, running of production packers, cementing, and minimizes problems drilling ahead. The Neyrfor Delta stabilizers have an increased flow-by area over standard industry stabilizer designs, improving mud-flow and hole cleaning essential in high angle directional wells.

Neyrfor Delta stabilizers offer greater flow-by area and less surface contact area than standard turbodrill stabilizers.
Consistent and predictable tool face control and increased dogleg capabilities make the Neyrfor Delta turbodrill the premier tool for directional applications, as well for openhole sidetracking off cement plugs or whipstocks.

Neyrfor Delta BHAs are modeled with proprietary software to ensure stabilizer placement maximizes directional performance while minimizing BHA vibrations that could lead to NPT caused by downhole tool failures and other problems related to HPHT applications. Each application is modeled to optimize stabilizer diameter based on hole size and directional requirements. A lower bend setting can often be run to achieve the directional objectives, thus allowing the BHA to be rotated ahead after landing in the target zone, resulting in fewer trips seen when running larger bend setting positive displacement motors.

**Power and Bearing Section**
The power section of the tool converts hydraulic energy—delivered to the motor in the form of drilling fluid—to mechanical energy. The turbodrill is based on a concentric design with a fluid connect rotor and stator-power drive system. Additionally, a PDC thrust-bearing pack design reduces vibration and noise, which could interfere with downhole measurement tool mud-pulse signals. The power section consists of two components: the rotor and the stator, along with a specified number of stages dependent on the application. Neyrfor Delta turbodrill offers these components in different configurations to produce a range of power characteristics enabling turbodrills to be designed for specific applications. An all metallic option is available for HPHT environments. Extended- and high-flow power sections are available in standard tool sizes and configurations.

**Turbodrill components**
- Customized power section
- Engineered Neyrfor Delta directional stabilizers
- Pin down steerable-bearing section

**Available tool sizes**
- 4½ in
- 6¼ in
- 9½ in

---

**Neyrfor Delta Series**

---

Neyrfor, Neyrfor Delta, Neyrfor Traditional are marks of Schlumberger.
Other company, product, and service names are the properties of their respective owners.
Copyright © 2011 Schlumberger. All rights reserved. 11-SH-0040