Schlumberger

StethoScope 675

Formation pressure-while-drilling service

APPLICATIONS

- Optimization of mud weight
- Selection of optimal casing points
- Estimation of reserves
- Identification of fluids and their contacts
- Reservoir model refinement
- Well placement

BENEFITS

- Mitigates risk through reservoir pressure management
- Improves prediction of reserves using fluid typing
- Enhances drilling performance through optimal mud weight
- Saves time and cost by eliminating need for tool orientation
- Minimizes NPT using TOP* time-optimized pretest

FEATURES

- Accurately measures formation pressure in drilling environment
- Provides direct pore pressure and mobility data for fluid typing and mud-weight optimization
- Performs in any hole orientation—vertical or deviated
- Optimizes pretest volume and drawdown to formation characteristics
- Provides validated real-time measurements with quality control indicators



The StethoScope 675 service uses a 6³/4-in collar with an 8¹/4-in integral blade stabilizer for 8¹/2-in boreholes. An optional collar with a 9¹/4-in stabilizer is available for 9⁷/8-in boreholes.

The StethoScope 675* formation pressure-whiledrilling (FPWD) service makes accurate measurements that provide direct pore pressure and mobility data for fluid typing, reservoir pressure management, and mud-weight control and optimization. It achieves time savings through a focus on operational efficiency and measurement versatility, accuracy, and quality.

RELIABILITY

The StethoScope 675 tool is highly reliable because it draws on the knowledge gained from leadership in the LWD industry and Schlumberger experience with the wireline MDT* modular formation dynamics tester. Mechanical components designed for field replacement save the time and cost of replacing the entire tool and eliminate time spent waiting on parts.

A mechanical setting piston seals the probe against the formation. This piston extends from the tool directly opposite the probe—a configuration that ensures the integrity of the seal by preventing tool movement while the probe sets and acquires pressure data. Because collar weight is not needed to establish and maintain the probe-to-formation seal, the StethoScope 675 tool can be set in any hole—vertical or deviated—regardless of tool orientation. The mechanical setting piston is effective in boreholes up to 2 in larger than the tool OD.

VERSATILITY

The StethoScope 675 tool is as versatile as it is reliable—pressure measurements can be made with the pumps off or on. A pumps-on, or circulating, test reduces the chance of sticking. It also provides real-time data monitoring, so the test sequence can be interrupted to avoid wasting time on a dry test or lost seal. A pumps-off, or static, measurement is made in a noise-free environment and reduces the supercharging effect evident in tight formations as a result of circulating. Static measurement data are sent uphole as soon as circulation is resumed.

ACCURATE PRESSURE GAUGES

Two principal pressure gauges are used in the StethoScope 675 FPWD service an ACQG* advanced crystal quartz gauge and a strain gauge. The ACQG gauge (also used in the MDT tester) is well known for its reliability and accuracy, and it is ruggedized to withstand the drilling environment. In addition, an annular pressure gauge continuously monitors mud column pressure in the annulus.

StethoScope 675

OPTIMIZED PRETESTS

Downhole controls and intelligent interpretation incorporated in the StethoScope 675 tool optimize pretest volume and drawdown rate to formation characteristics. Pretest volume is fully adjustable up to 25 cm³, and the drawdown rate can be set from 0.1 to 2.0 cm³/s. There are two pretest options customized and use of the fully automated TOP time-optimized pretest.

Settings for customized pretests are user defined. The fully automated TOP system adjusts to formation properties to optimize the pretest in the prescribed time. Although defined settings must be preset at surface, once the tool is downhole, either option is available at any time—and both options allow test length to be extended.

Power for the StethoScope 675 service comes from either the MWD turbine or a battery pack. Under normal conditions, the battery pack can provide power for up to 150 pretests. The tool's power management logic always reserves enough battery power for an emergency automatic retraction.

HIGH-QUALITY DATA IN REAL TIME

The StethoScope 675 FPWD service provides substantial quality indicators with the final formation pressure. These indicators include an analysis of the pretest to determine its validity and compute the final buildup rate and gauge variance. The indicators are available in real time to validate formation pressure data and provide the detail needed for confidence in the measurement. Real-time data can be transmitted to surface in three levels of detail to provide standard, intermediate, or advanced interpretation. Data is also stored in memory and can be downloaded at surface for further processing.

THREE MODES OF OPERATION

Changing from one of the three modes of StethoScope 675 tool operation (sleep, standby, and deploy) to another requires a downlink sequence. In sleep and standby modes, the tool can be rotated between pressure points. When the deploy mode is activated, the tool automatically sets, performs the pressure test, retracts after the specified time, and returns to standby mode, ready for the next pretest. This sequence takes approximately 5 minutes, with a short downlink to trigger the next measurement, if one is needed. Each step in the sequence provides feedback to surface. The deploy mode is canceled by simply cycling the pumps.

Because the BHA must be stationary for StethoScope 675 measurements, the tool design incorporates protection against accidental probe deployment while the BHA is moving.

StethoScope 675 Specifications	
Tool design	
Measurement type	Probe pretest
Pressure gauges	High-precision crystal and strain
Power supplies	Battery, MWD turbine power
Measurement specifications	
Probe dimensions, in [mm]	2.25 [57.15] OD × 0.56 [14.22] ID
Pretest	
Volume, cm ³	0 to 25, fully adjustable
Drawdown rate, cm ³ /s	0.1 to 2.0
Delta pressure, psi [MPa]	>6,000 [>41]
Setting piston diameter reach, in [mm]	2.00 [50.00] more than tool OD
Memory capacity	80 pretests of 5-min duration
Battery capacity	150 pretests (1 cm¾ at 3,200-psi [22-MPa] drawdown at 275 degF [125 degC])
General specifications	
Tool nominal diameter, in [mm]	6.75 [171.5]
Tool maximum OD, in [mm]	8.25 [209.6], 9.25 [234.95] with optional collar
Tool length, ft [m]	31 [9.4]
Weight, Ibm [kg]	2,800 [1,270]
Upper connection	51/2 FH box
Lower connection	51⁄2 FH box
Operating temperature, degF [degC]	300 [150]
Mechanical specifications	
Maximum dogleg severity	
Rotary mode, °/ft [°/m]	8/100 [8/30]
Sliding mode, °/ft [°/m]	16/100 [16/30]
Maximum shock	30 min at Shock Level 3 (50 g _n) 200,000 cumulative shocks above 50 g _n
Hydraulics	
Maximum external pressure, psi [MPa]	20,000 [138]; 25,000 [172] optional
Flow range, galUS/min [L/min]	0 to 800 [3,028] (standard) 0 to 1,000 [3,785] (limited conditions)

Note: Specifications are subject to change.

www.slb.com/StethoScope

