

StethoScope 475

Slimhole formation pressure-while-drilling service

APPLICATIONS

- Mud-weight optimization
- Selection of optimal casing points
- Reserves estimation
- Identification of fluids and their contacts
- Reservoir model refinement
- Well placement

BENEFITS

- Mitigates risk
- Facilitates productive drilling
- Saves time and expense through minimized NPT

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



Two setting pistons—shearable and drillable—ensure perfect setting of this slimhole tool against the wellbore wall in any hole deviation, regardless of orientation.

The StethoScope 475* slimhole formation pressure-while-drilling (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. Time savings are achieved through a focus on operational efficiency and measurement versatility, accuracy, and quality.

RELIABILITY

The StethoScope 475 service is highly reliable. It draws on vast experience gained from the larger StethoScope* systems, as well as 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.

Two setting pistons set the tool against the formation. These pistons extend from the tool directly opposite the probe that extends to create the seal between the tool (packer) and the formation—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 475 tool can be set in any hole—vertical or deviated—regardless of tool orientation. The tool's shearable, drillable setting pistons are effective in boreholes up to 1.38 in larger than the tool OD.

VERSATILITY

The StethoScope 475 FPWD service 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.

In addition, the StethoScope 475 tool is designed to be run battery-less, which is an attractive option in high-temperature wells.

ACCURATE PRESSURE GAUGES

Two principal pressure gauges are used in the StethoScope 475 service—an ACQG* advanced crystal quartz gauge and a microsapphire gauge. The ACQG gauge—also used in the MDT tester—is well known for its reliability and accuracy and is ruggedized to withstand the drilling environment. A third gauge, a microsapphire, continuously monitors mud column pressure in the annulus.

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OPTIMIZED PRETESTS

Downhole controls and intelligent interpretation incorporated in the StethoScope 475 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 fully automated.

Settings for customized pretests are user defined. The fully automated pretest adjusts to formation properties to optimize the pretest in the prescribed time. 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 475 service comes from either the MWD turbine or an advanced field joint battery sub. Under normal conditions, the battery sub can provide power for up to 150 pretests.

HIGH-QUALITY DATA IN REAL TIME

The StethoScope 475 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 different phases, ranging from real-time present information to poststation data, analysis, and a decimated image of the entire pretest sequence. 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 475 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 475 measurements, the tool design incorporates protection against accidental probe deployment while the BHA is moving.

Contact your local Schlumberger representative to learn more.

StethoScope 475 Specifications

Tool design

Measurement type	Probe pretest
Pressure gauges	High-precision ACQG quartz and microsapphire
Power supplies	Battery, MWD turbine power

Measurement specifications

Probe dimension, in [mm]	1.75 [44.45] OD × 0.44 [11.18] 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]	1.38 [35.05] more than tool OD
Memory capacity	Up to 120 pretests, depending on time downhole
Battery capacity	150 pretests (1 cm ³ /s at 3,200-psi [22-MPa] drawdown at 275 degF [125 degC])

General specifications

Tool nominal diameter, in [mm]	4.82 [122.43]
Tool max. OD, in [mm]	5.75 [146.05], 5.50 [139.7] optional
Tool length	
With battery, ft [m]	40.2 [12.3]
Without battery, ft [m]	26.5 [8.1]
Weight	
With battery, lbm [kg]	2,000 [907]
Without battery, lbm [kg]	1,500 [689]
Upper connection	NC38 pin
Lower connection	NC38 box
Operating temperature, degF [degC]	347 [175] (200 h max.), 300 [150] (1,000 h)

Mechanical specifications

Max. dogleg severity	
Rotary mode, °/ft [°/m]	15/100 [15/30]
Sliding mode, °/ft [°/m]	30/100 [30/30]
Max. shock	30 min at shock level 3 (50 g _n) 200,000 cumulative shocks above 50 g _n

Hydraulics

Max. external pressure, psi [MPa]	25,000 [172]
Flow range, galUS/min [L/min]	0 to 400 [0 to 1,514]

Note: Specifications are subject to change.

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