Quartet-HT
High-performance downhole reservoir testing system for ultrahigh-temperature conditions
**Testing** provides key answers for the challenges of today’s complex reservoirs. Merging the broadest portfolio of leading technologies with domain expertise, Schlumberger works with you to get the most accurate characterization of your reservoir.

Now, Schlumberger combines four leading downhole technologies into one advanced string design for measurably safer and more efficient ultrahigh-temperature reservoir tests that are in tune with your test objectives.
The Quartet-HT* high-performance downhole reservoir testing system allows you to isolate, control, measure, and sample your ultrahigh-temperature reservoir at temperatures to 410 degF [210 degC].

Each of the four technologies that make up the Quartet-HT system is engineered specifically for ultrahigh-temperature reservoir testing and offers multiple advantages over conventional technologies, including:

- shorter string design
- lower operating pressure
- less nitrogen
- no drill collars or slip joints
- multicycle flexibility
- fewer seals and connections
- single-trip efficiency
- high-resolution quartz measurements
- premium connections
- all-ceramic multichip module (MCM) electronics.

The Quartet-HT system lets you run the tools deeper and closer to your reservoir for more-accurate reservoir characterization and an altogether higher-performance reservoir test.
The Quartet-HT system’s simplified design offers multiple benefits over conventional string configurations. Lower operating pressure and less nitrogen increase safety during operations. Eliminated drill collars and slip joints, as well as fewer seals and connections, provide more-efficient handling for safer and more cost-effective downhole testing.

- 100% ceramic MCM electronics
- 100% quartz sensors
- 90% less nitrogen
- 75% shorter string
- 60% fewer connections
- 50% fewer seals
- 35% lower operating pressure

**Downhole string technology, simplified**

- Slip joint (fully open)
- Slip joint (half open)
- Slip joint (closed)
- Drill collars
- Circulating valve
- Drill collars
- Tester valve
- Reference tool
- Gauge carrier
- Sample carrier
- Jar
- Safety joint
- Hydraulic hold down
- Packer

**Conventional string**

**Quartet-HT string**

- Radioactive marker sub
- Single-shot reversing valve
- Tubing
- IRDV
- SCAR
- Signature
- CERTIS

**Quartet-HT string**

**Conventional string**

- Quartz sensors
- 100%
- 99%
- 90%
- 75%
- 60%
- 50%
- 35%
- MCM
- electronics
- less nitrogen
- fewer connections
- fewer seals
- lower operating pressure

**Isolate**

**HIGH-INTEGRITY WELL ISOLATION**
Reservoir test isolation to production standards

**SINGLE-RUN RETRIEVAIBILITY**
Single-trip testing and retrieval

---

**Control**

**GREATER COMMAND**
Independent, intelligent command without interference

**MORE CONTROL**
Fast-activating multicycle tester valve and circulating valve operations without indexing

---

**CERTIS**

**HIGH-INTEGRITY RESERVOIR TEST ISOLATION SYSTEM**

- Production-level isolation
- Rapid, reliable hydrostatic setting
- No string manipulation required to set
- Simplified, shorter string design
- Single-trip retrieval

---

**IRDV**

**INTELLIGENT REMOTE DUAL VALVE**

- Low-pressure commands
- Independent command and control
- Reduced operating time
- Powered by hydrostatic pressure—no nitrogen required
- Complete record of operations
- On-command override
RESERVOIR FLUID SAMPLING

REPRESENTATIVE SAMPLES
Contaminant-free samples captured inline and maintained at or above reservoir pressure in nonreactive chambers.

MULTIPLE SAMPLING OPTIONS
Independent or sequential sampling collection with reservoir-representative results.

INDEPENDENT SEMPLER ACTIVATION
Independent gas charges
High-shrinkage sample compensation
Nonreactive samplers
Inline conveyance

Sample

REPRESENTATIVE SAMPLER

SCAR

LINE INDEPENDENT

HIGH RESOLUTION

Accurate data
Quartz pressure measurements for consistent performance throughout your test.

Mature-leading methodology and reliability

Signature

QUARTZ GAUGES

High resolution
Reliable power and memory autonomy
Large memory capacity
Stable pressure measurement

CERTIS

Optimal seal integrity without compromise
Retrievable, single-trip, production-level isolation
The CERTIS® high-integrity reservoir test isolation system combines the features of a retrievable downhole packer with a hydraulic-set permanent packer for single-trip, production-quality well isolation. The system eliminates the need for drill collars and slip joints, and, when used as part of the Quartet-HT system, can significantly reduce the number of tools in the downhole test string, making operations safer and saving rig time.

High-integrity well isolation
When the CERTIS system reaches target depth, applied annulus pressure activates the hydraulic setting mechanism. No string manipulation is required for setting. Hydrostatic pressure sets the bidirectional slips, the bypass closes, and the sealing element energizes when hydraulic pressure is applied. A positive ratchet mechanism then locks the packer in the set position and retains the applied setting force.

Single-trip retrievability
Once the isolation system sets and the stringer is released from the packer body, the seals are free to move in the sealbore, operating much like a production packer with a floating seal assembly. At the end of the test, a straight pull moves the slips to a relaxed position within the packer body and releases the packer. Continued pulling reopens the packer bypass, eliminating swabbing when coming out of the well.
IRDV

Multicycle, independent command and control for reliable reservoir interaction


Fast-acting, independent dual valve control
The IRDV* intelligent remote dual valve is operated by the IRIS* intelligent remote implementation system, which uses low-intensity annular pressure-pulse commands measured by quartz sensors. The IRIS commands are implemented using downhole hydrostatic pressure to operate the dual valves. The high-temperature version has a proprietary 100% ceramic MCM design that ensures reliable operation at high temperatures.

Greater command
The IRDV flexible command system includes automatic valve sequences, optimizing downhole test design. Low-pressure commands make for easier communication with the tool and eliminate problems associated with high pressure in the annulus. The IRDV tool is not affected by pressure changes caused by other tool operations or common operational procedures. The hydraulic system is automatically referenced to the hydrostatic pressure, so the tool can function while descending or ascending in the wellbore.

More control
The IRDV tool combines two fullbore multicycle valves—a tester valve and a circulating valve—which can be cycled both independently or sequentially for increased flexibility. Its simplified mechanical section provides more-reliable control in environments with heavy mud or debris, with most of the seals and moving parts bathed in hydraulic oil at hydrostatic pressure. The tool has a proven record for fluids ranging from clear brines to heavyweight mud systems.

The high-temperature version of the IRDV uses an all-ceramic MCM design that ensures reliable multicycle operations at high temperatures.
Premium pressure measurements for accurate reservoir description
Accurate, high-resolution measurements
The Signature* quartz gauge consistently delivers high-quality downhole pressure measurements in any operating environment for the entire test duration. The Signature gauge has an all-ceramic MCM design to stand up to ultrahigh temperatures, delivering high-resolution measurements with improved accuracy for better reservoir characterization.

Robust, reliable design
With an all-ceramic MCM design and welded electronics housing, the Signature quartz gauge delivers dependable measurements to help you meet your reservoir test objectives.

High-integrity storage
Signature gauges have a large memory capacity that accommodates high data-sampling rates for a more-comprehensive dataset, and their long battery life means you acquire high-quality measurements continuously for the entire test duration. Testing longer lets you see farther into your reservoir and more clearly detect boundaries to better estimate your reserves.
SCAR

Cleanest, most representative reservoir samples
Sample

**Contaminant-free, representative fluid samples**
SCAR* inline independent reservoir fluid sampling delivers reservoir-representative fluid samples from deep within the reservoir. Samples are collected directly in the flow stream with no contamination for more-accurate reservoir characterization.

**Multiple sampling options**
Samplers are activated using annulus pressure, so samples can be collected at any time during the flow period. Activation can be simultaneous or selective for greater flexibility during operations.

**Reliable, safer collection**
Each Inconel sampler of the SCAR system has its own small, independent nitrogen gas charge to ensure individual high-shrinkage samples remain at or above reservoir pressure. Optional nonreactive coating of the sample chambers retains trace elements so that the SCAR system delivers the most-accurate, most-representative downhole fluid samples.

*From acquisition to analysis, chain-of-custody sample management from the well-site to the Schlumberger Reservoir Laboratory ensures that your reservoir fluid samples and analysis data are carefully managed.*
The Quartet-HT high-performance downhole reservoir testing system delivers the highest-quality pressure measurements and the most-representative fluid samples with maximum safety and efficiency—all in a single run. Use the Quartet-HT system to more accurately characterize your reservoir, reach a better basis for your decisions, and be certain.
**Quartet-HT**

![Image of Quartet-HT concept]

**Isolate**  **Control**  **Measure**  **Sample**

*Mark of Schlumberger; the rest is a mark of Schlumberger.
Other company, product, and service names are the properties of their respective owners.
Copyright © 2013 Schlumberger. All rights reserved. 13-TS-0002