

SwageSet Liner-Top Packer and WPHR Liner Hanger Incur Zero NPT While Running 7-in. Liner in HPHT, Offshore Well

Objectives

- Run and cement 7-in. liner at the total depth of 17,323 ft (5,280 m) in a 7-in. section of an openhole, offshore well with high-pressure, high-temperature (HPHT) conditions. In this well, pressure levels reached 12,000 psi (82.7 MPa) and temperature levels reached 311°F (155°C). This operation would also involve passing through multiple formations, the topmost of which was depleted.
- Successfully wipe the casing and bump the liner plug despite the combination of 29- and 35-lb/ft (43.2- and 52.1-kg/m) casing with a 6-in. special drift.
- Maintain a 37° inclination while running the liner through the depleted formation, and then revert to a vertical inclination at the end of the section.

Our Approach

- Weatherford deployed this premium liner-hanger system because it provided the operator a means to run the liner safely through the critical formation—while navigating the difficult well geometry—without compromising well integrity. This system can withstand pressure levels up to 12,500 psi (86.2 MPa) and temperatures up to 400°F (204°C).
- The unique swage technology included in this premium system consists of ridge-shaped Aflas® elastomers bonded to an expandable metal ring. The resulting V0-validated, anti-extrusion seal that is created between the outside diameter (OD) of the liner and the inside diameter (ID) of the host casing isolated annular pressures and helped to maintain well integrity throughout the liner-running and cementing operation. Additionally, the elastomers resisted swabbing off when running in hole, reaming, and circulating at high flow rates during well cementing.
- The WPHR liner hanger enabled liner rotation to improve cement quality.
- The team used a special, wide-range 20- to 32-lb/ft (29.8- to 47.6-kg/m) liner wiper plug to wipe both the 29- and 35-lb/ft (43.2- and 52.1-kg/m) casing—and accommodate the 6-in. drift—without compromising proper cement displacement or bumping the liner plug.
- This advanced liner-hanger technology enabled the entire operation to be executed flawlessly.
- This operation marked the client's first successful installation of a 7-in. liner in this HPHT formation. HPHT formations are challenging not only for the operating conditions, but also because they are uncommon in the United Arab Emirates and not frequently encountered by operators in the region.



A critical component of this premium liner-hanger system, the SwageSet liner-top packer (shown above) provides a V0-validated seal that isolates the annulus between the liner OD and the host casing ID. This helped to maintain well integrity while running and cementing liner in an HPHT formation.

CLIENT
TOTAL ABK

LOCATION
Abu Dhabi, United Arab Emirates

WELL TYPE
Offshore, exploration

HOLE SIZE AND ANGLE
7 in., 37°

TEMPERATURE
311°F (155°C)

PRESSURE
12,000 psi (82.7 MPa)

SECTION LENGTH
3,609 ft (1,100 m)

TOTAL DEPTH
17,323 ft (5,280 m)

PRODUCTS/SERVICES

- 7- x 9.875-in. SwageSet polished bore receptacle
- 7- x 9.875-in. SwageSet liner-top packer
- 7- x 9.875-in. WPHR liner hanger
- 7-in., 29-lb/ft landing collar
- 7-in., 29-lb/ft dual-valve float collar
- 7-in., 29-lb/ft dual-valve float shoe
- 20- to 32-lb/ft liner wiper plug
- Top drill dart



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Value to Client

- Weatherford completed the operation without incurring any nonproductive time (NPT).
- Without swage technology, running a liner through this HPHT formation would have been extremely challenging and would have likely incurred NPT along with associated rig time and costs. This technology also mitigated risks of overall well failure.
- Running the liner system was inherently less risky than running casing to the surface. Running long sections of casing can result in an inadequate cement job, poor well integrity, and the casing becoming stuck. Additionally, running 7-in. casing to the surface would have increased the load on the wellhead.



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