

RockLock mechanical packer

Extreme capabilities made possible
with industry's first printed packer

For over sixty years, Baker Hughes has led the global industry in annular isolation, technology. The vast majority of the hundreds of thousands of installations were for repeat customers, proof that Baker Hughes delivers a safe, reliable, and cost-effective solution for any wellbore construction requirements.

A key component in annular isolation is the openhole mechanical packer. These packers optimize production, delay water/gas coning, minimize or eliminate annular flow, get more uniform inflow along the lateral of the well, and provide positive isolation in multi-stage frac applications.

The **RockLock™ openhole packer** is the next generation in openhole mechanical packers. Available in both a standard and a 15K version, the packer provides reliable zonal isolation in frac and zonal isolation applications with differential pressure ratings up to 15,000 psi (1035 bar) and in temperatures up to 350°F (177°C). Using the first additively manufactured backup system and the Baker Hughes proprietary **Aptum™ seal**, the RockLock packer creates a long-lasting, reliable seal in irregular openhole wellbores regardless of fluid type or temperature ranges.

With double the expansion percentage of the typical packer and four times the number of casing weights and sizes sealed with a single design, the standard RockLock packer leaves a fullbore inside diameter (ID) for unrestricted production.

Case history

An operator in the Middle East needed to cement a liner hanger in place in a horizontal well while leaving an openhole production zone below. The primary seal was provided by the inflatable Baker Hughes **PAYZONE™ external casing packer (ECP)**. But the operator needed to run a reliable backup seal to ensure cement would not migrate through the annulus into the production zone.

In previous wells, the operator had used a variety of openhole packers to create the required redundant zonal isolation. But these packers had a restrictive ID, so the operator was forced to make two cleanup runs after cementing—the first using a fullbore bit size above the packer, and another using a smaller bit size below. On average, the second drift run added 32 hours of additional rig time that the operator hoped to eliminate.

Applications

- Conventional oil and gas
- Deep wells
- Extreme conditions
- HP/HT
- Extended reach
- Shallow gas
- Deep gas
- Shale oil and gas
- Multi-stage frackings

Benefits

- Provides larger expansion
- Operates at a lower setting pressure
- Withstands higher pressure ratings up to 15,000 psi
- Operates at temperatures up to 350°F
- Improves swab rates

After examining the problem, Baker Hughes built on a proven short-radius openhole packer design to develop a new packer, the RockLock openhole packer, to set at 2,200 psi (152 bar). The standard version of the RockLock packer minimized the risk of interference with the pressure-actuated cement valve—which was designed to open at 3,600 psi (248 bar). The upgraded packer was tested to withstand 5,000 psi (345 bar) differential pressure in a 7 1/8-in. openhole ID, and up to 12,500 psi (863 bar) in a 6 1/4-in. ID, and it was run as part of the completion, below the PAYZONE ECP, cement valve, and production liner.

The production liner was run to the toe of the well at 13,787 ft (4202 m), positioning the RockLock packer at

13,640 ft (4157 m). A 1 1/2-in. ball was dropped to pressure up the fluid in the wellbore, causing the **HMC™ hydraulic-set liner hanger** to set and lock the liner in place when the pressure reached 1,500 psi (103 bar). When the pressure reached 2,200 psi, the packer actuated and expanded to create a reliable backup seal in the irregular openhole wellbore. The operator continued increasing pressure to inflate the ECP and open the cement valve, diverting the slurry into the annulus to cement the liner hanger in place.

After the liner hanger setting tool was pulled out of hole, the operator ran a 3 7/8-in. bit to clean out any remaining cement from the production string. Because the RockLock packer left a fullbore ID, the operator was able to

complete the drift run to the toe of the well using a single bit size, eliminating at least 32 hours that would have been needed for a second drift run with a smaller bit.

While the RockLock packer was used in this application as a redundant cement barrier, it is ideal for providing a primary barrier in off-bottom cemented liner completions. It can also be used to deliver reliable isolation between production zones in horizontal openhole completions, while leaving a fullbore ID for unrestricted production.

Specifications

	Standard	15ksi
Casing size(in.)	4.500	4.500
OD (in.)	5.830	5.630
ID (in.)	3.905	3.530
Maximum hole size (in.)	7.100	6.500
Pressure rating at maximum hole size (psi)	5,000	10,000
Minimum hole size (in.)	6.250	5.875
Pressure rating at minimum hole size (psi)	12,000	15,000
Temperature rating (°F)	350	350