

# SingleCycle Alpha Sleeve pressure-actuated toe sleeve

## Access the formation without tubing conveyed perforation

### Applications

- Unconventional reservoirs
- Cemented or open hole
- Long string or liner completions in horizontal, deviated or vertical wells
- Plug-and-perf or frac sleeve completions
- Proppant or acid hydraulic fracturing

### Features and Benefits

- Provides interventionless access to the formation
  - Eliminates the need for a dedicated sand jetting or tubing conveyed perforation trip, or a wet shoetrack, to establish a communication path to the formation for pump-down operations
- Pressure balanced inner sleeve locked in place with shear screws
  - Prevents premature actuation due to vibration or internal pressure below the actuation pressure
- Inner sleeve shifts upwards when opening
  - Cement wiper plugs passing through the sleeve cannot cause premature opening

The **SingleCycle Alpha Sleeve™ pressure-actuated toe sleeve** from Baker Hughes provides interventionless access to the formation for pump-down operations or the first stage of hydraulic fracturing. Ideal applications are cemented or uncemented plug-and-perf and frac sleeve completions, as both completion methods require access to the formation in order to pump down a frac ball, frac plug or coiled tubing assembly. Using the Alpha Sleeve eliminates the need for a dedicated tubing conveyed perforation trip or a wet shoe. Activation of the sleeve is achieved through applied pressure at surface. Applied pressure acts on a frangible trigger device that, when activated, floods the sleeve's internal drive chamber and shifts the sleeve open.

The Sleeve design's uniquely engineered features provide a wide range of differentiating benefits, and the performance of each tool is verified by an extensive series of testing on each tool during manufacturing with inhibited water and nitrogen. The high-performance double seal stack of O-rings and backsprings provide redundant sealing that ensures the tool will not open prematurely or fail to open, even in the unlikely event of an internal seal leak. The inner sleeve is pressure balanced and locked in place with shear screws, which prevents premature actuation due to vibration or internal pressure below the desired actuation pressure.

Unlike most frac sleeves, the tool's inner sleeve shifts upwards to open.

In cemented applications, which require wiper plugs to pass through, this ensures the wiper plugs cannot accidentally shift the tool open during the cement job. Special material coatings and lubricants provides exceptional resistance to harsh downhole conditions and cement stringers, and a fit-for-purpose designed grease filling in the frac ports prevents cement from setting up inside the frac ports onto the inner insert. Unique engineered and extensively tested tolerance stack-up between the inner sleeve and housing eliminates deflection issues seen in similar tools at high pressure that can prevent proper activation due to mechanical lock-up (deflection induced metal-to-metal friction). Dual rupture disks phased 180° apart on the inner sleeve provides accurately controlled and predictable actuation device, and in the unlikely event cement stringers are present in the tool, the redundant activation mechanism means the tool is not prevented from opening as intended.

When the tool opens the large drive chamber piston area generates a significant shifting force which ensures instant actuation and eliminates issues with downhole debris and cement remnants, and an internal lock-ring locks the inner sleeve permanently in the open position. The large flow area through the open frac ports ensures a high debris tolerance and a low pressure drop when injecting into the formation. A stand-alone or integral ball seat can be used to perform up to a 12,500 psi casing test using a

disintegrating ball that is pumped down from surface to the ball seat and subsequently allowed to disintegrate.

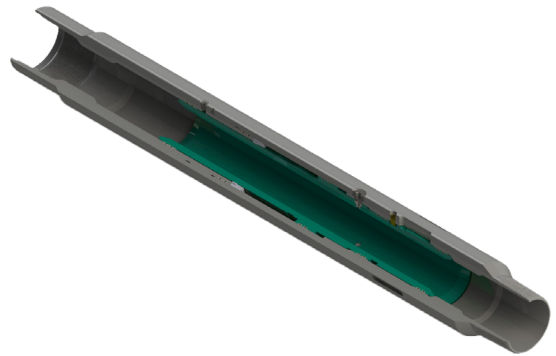
More than 13,000 Alpha Sleeves have been installed in cemented completions worldwide across a wide range of environments since its introduction in 2012, demonstrating the integrity of the design. The longest recorded time between installation and actuation is 1,297 days (3.6 years), and the operation was flawless. The demonstrated longevity of the design reduces the risk when used for planned

or unplanned DUC wells (drilled but uncompleted wells). The innovative design allows for accurate and reliable actuation in a broad range of conditions in unconventional oil and gas wells with reduced operational risk.

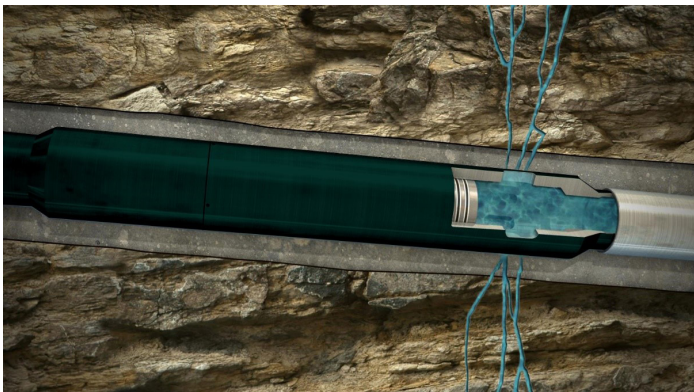
Contact your local Baker Hughes representative today to learn more about how you can access the formation without the need for tubing conveyed perforation using the SingleCycle Alpha Sleeve pressure-actuated toe sleeve.



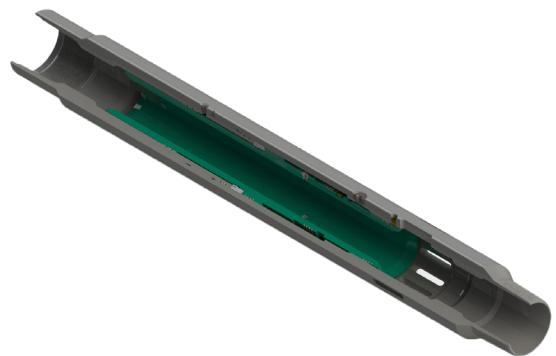
Sideview - Alpha Sleeve in the closed position



Quarter cut sideview - Alpha Sleeve in the closed position



Alpha Sleeve in the open position provides access to the formation



Quarter cut sideview - Alpha Sleeve in the open position