Swell Technology Systems for Well Construction

Enhance Well Integrity with Reliable Isolation Solutions
With over 75,000 installations globally, operators turn to Halliburton because of our experience and reliability, and because we find solutions for even the toughest challenges.

To ensure reliability and well integrity in every well, you need to have the right equipment, the right experience, and the right people. Halliburton Swellpacker® systems have been installed in over 60 different countries across the globe, each with their own unique reservoir challenges.

When tackling a new challenge, we don’t settle for what’s already been done - we listen to the customer, we size up the well and we get it done. That’s why we were chosen to install 90 Swellpacker Slip-On systems in a single wellbore in the Bakken. And why it was our Swellpacker system that was run to over 40,000 ft MD and over 22,000 ft TVD.

At Halliburton, we aren’t satisfied in just meeting requirements - we want to exceed expectations and define the limits.
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Well Construction

When designing the construction of your well, Halliburton knows the challenges you face. We offer the products, services and special expertise you need to optimize your well construction, no matter what the conditions.

Operators know that depleted or even overpressured reservoirs can hinder the ability to achieve optimal zonal isolation with conventional methods. Complicated wellbore geometry has pushed the limits of technology in perfecting annular pressure confinement and isolation of multiple zones. Depleted reservoirs have necessitated well designs with more casing setting points to isolate depleted reservoirs before drilling ahead to higher pressure areas. More casing setting points dictate smaller annular volumes between the casing and the open hole, or casing and casing. The smaller annular volumes create more difficulties for current methods to provide sufficient zonal isolation or to prevent sustained casing pressure. More casing setting points also can dictate larger annular volumes in under-reamed openhole sections.

So as operations move into deeper water and more severe environments, operators are faced with extreme and ever-changing conditions. Halliburton Swellpacker® isolation systems, along with swellable elastomers in cement, adapt to these difficult downhole conditions and provide a competent solution to many of today’s challenges.

Halliburton takes you from the initial planning stage, through completion and production of the well, with a custom construction plan flexible enough to adjust to constantly changing environments.

Well integrity during the well construction and completion process is a key component in the long-term economic viability of oil and gas production and injector wells. The swellable technology systems presented provide unique and complementary solutions to existing technologies to meet the ever-increasing demands and requirements placed on operators to create safe and competent wellbores. The simplicity inherent in swellable technology systems helps provide a reduced risk solution that can be used up and down the wellbore to enhance overall well integrity.

Here’s How Halliburton Can Help

Swellpacker systems are available in either chemically bonded to the pipe, or slip-on versions, and include end rings to both protect the element during the run-in-hole process and to act as extrusion limiters once the packer is set.

Swellpacker systems can be engineered to optimize the construction of your well using the following options:

- **Swellpacker Oil Swelling (OS) isolation systems** are a blend of polymers that react and swell when contact is made with any liquid hydrocarbon. Swellpacker OS systems can be rated up to 15,000 psi (1034 bar) and 390°F (200°C).
- **Swellpacker Water Swelling (WS) isolation systems** are a blend of polymers that react and swell when contact is made with water. Swellpacker WS systems can be rated up to 10,000 psi (690 bar) and 320°F (160°C).
- **Swellpacker Hybrid Swelling (HS) isolation systems** are a blend of polymers that react and swell when contact is made with water and/or liquid hydrocarbon. Swellpacker HS systems can be rated up to 10,000 psi (690 bar) and 390°F (200°C).

Swellpacker® Systems Above Top of Cement

Swellpacker isolation systems used above the top of cement (TOC) will help prevent pressure migration to surface (sustained casing pressure) from lower reservoirs, without regard to the competency of the original cement job. SwellpackerTOC systems work independently from other operations regardless of conditions as long as fuel is present.

The packers are normally placed in any upper casing string for a positive seal. The Swellpacker TOC system can also be adapted to include a one-way check valve in the element itself allowing the system to hold pressure from below (reservoir), while allowing any pressure buildup above the Swellpacker system to be relieved below the casing shoe.

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Swellpacker Isolation Systems on Liner Tiebacks

Conventional Method

When you run a tieback string, you normally tack-cement the tieback string in place. The cement is there simply to anchor the tieback string and seal assembly in place. When you cement the tieback string in place, you run the risk of needing to move the tieback string through unset cement to sting the seal assembly into the tieback receptacle. There is also the issue of having to drill and clean out the remnants of the cement, float equipment and cementing plugs before completing the well.

Swellpacker Systems

By using Swellpacker systems on the liner tiebacks, these issues can be avoided. Swellpacker systems are installed above the seal assembly and the tieback string is run in the hole to the tieback receptacle. The seal assembly is pressure tested and then raised so that fuel for the swellable element is circulated to the proper location (if fuel is not already in place). The seal assembly is lowered back into the tieback receptacle, and the Swellpacker system is allowed to swell.

The Swellpacker system gives you pressure-holding capability and creates an enormous anchoring force for the liner tieback string. There is no cement, float equipment or cement plugs to drill. Much of the risk has been reduced and days of operations have been eliminated.

Swellpacker Isolation Systems Below Liner Hangers

Swellpacker systems on liner casing, below a mechanical liner hanger inside the parent casing, create assurance that you will get a positive seal to isolate the openhole section from the surface.

The liner hanger Swellpacker system can be designed to swell either before the mechanical liner hanger is set, or after the mechanical liner hanger pack off is energized. Liner-top squeeze jobs can be eliminated, resulting in a substantial savings of time and money. Liner hanger Swellpacker systems can be employed with or without cement.
Swellpacker Isolation Systems in Production Zones with Cement

Swellpacker systems in production zones with cement have the added benefit of providing a reactive downhole means to address the microannulus that would occur when set cement de-bonds from the casing. The systems remain dormant while encased in the cement sheath. Once the microannulus has opened, and liquids or gas attempt to flow through the microannulus, the packer will then swell to close the flow path. The swellable rubber will conform to almost any irregular geometry in the casing or cement.

Swellpacker Systems at Shoe Joints

Swellpacker systems used on shoe joints create a competent pressure seal on the shoe joint and allow for a Formation Integrity Test (FIT), regardless of the condition of the tail cement. Swellpacker shoe joint systems are designed to swell by means of the base fluid used in the drilling fluid, generally water or oil. If competent tail cementation is achieved, the Swellpacker shoe joint system does not activate. If there is insufficient mud cleanout in the shoe joint area, the contaminated fluid is the fuel for the packer. The shoe joint Swellpacker system will swell and allow a competent FIT while facilitating drilling ahead.

Swellpacker Isolation Systems on Scab Liners

Swellpacker systems on scab liners are also a logical choice when scab liners are used. Scab liners are placed in the well to simply provide a casing conduit from the lower liner to the upper tieback casing string. Cementing a scab liner in place is time consuming and the risks are high. Using Swellpacker systems on scab liners helps reduce the risk of performing a competent cementing job in relatively small annuli. Swellpacker systems will provide high-pressure sealing capabilities.
At our Completion Tools’ technology centers of excellence located in Singapore and Carrollton, Texas, USA, Halliburton brings together key personnel, including product management, global technical support teams, and research personnel to enhance the collaborative effort with the customer during the design, testing and qualification of our Swellpacker systems.

These facilities provide the latest technologies in pressure monitoring, swell rate testing and fluid compatibility for both full scale and small scale tests. Testing can be performed in both static and dynamic temperature environments to accurately replicate downhole conditions. We work with our customers to design customized solutions and test protocols that meet their most stringent requirements.

For customer-specific tests, procedures are agreed between Halliburton and the customer before the test unit is built and the test is executed. These procedures contain the specifics of the test, timeline, reporting, and the testing budget. Our facilities include digital logging and recording systems to allow customers to evaluate the technology. Remote witnessing of the testing is available upon request.
For more information on Halliburton Swell Technology, contact your local Halliburton representative or email us at completions@halliburton.com.