Packers
The heart of the completion
Packers support the weight of the tubing and serve as the primary barrier between the reservoir and surface. They play a critical role in enabling all parts of the completion system. Correct packer selection helps ensure that there is no loss of well integrity or resulting loss in production.

When you select a Schlumberger packer, you receive a customized packer solution and our project management team’s commitment to provide a best-in-class packer solution. As with all Schlumberger products and services, you benefit from the expertise, experience, and support of Schlumberger staff and the quality and integrity that we build into all our products. Because of the packer’s central role in every completion, the value of your assets will be protected throughout the life of your well.

At the heart of every completion is at least one packer. On that packer depends the integrity, longevity, and overall success of the completion.
Ensuring completion integrity

Schlumberger packer firsts:
- ISO 14310 V0-rated gravel-pack packer
- ISO 14310 V0-rated packer qualification as low as 40 degF
- ISO 14310 V0-rated 10¾-in packer
- 10¾-in × 6.75-in ID large bore retrievable seal bore packer
- 10¾-in × 7-in ID large bore hydrostatic packer
- Surface-set control line packer

Schlumberger key advantages:
- Latest slip and cone technology, for best-in-class packer load ratings and retrievability
- Independent slip and element setting mechanisms
- Positioning of the element above the slips
- V0 ratings and 100% volumetric scanning of the elements on the X-series

THE COMPLETION CORNERSTONE
Schlumberger packers and packer accessories have been developed through years of research, testing, and application. Continuously evolving to meet industry needs, our packers are designed or configured to meet a full range of pressure and temperature applications and, often, specific wellbore or reservoir conditions.

Delivering new technologies
The Schlumberger Reservoir Completions Technology Center in Texas specializes in new product development, sustained engineering for commercial products, rapid response project development to meet specific requirements, and reliability testing under simulated downhole conditions. In this collaborative, innovative environment, engineers with extensive educational profiles, technical training and expertise, and practical field experience deliver new packer technologies and directly support products and services.

Testing beyond ISO
Schlumberger adheres strictly to ISO standard 14310, which defines packer design validation grades. All new Schlumberger packers are designed and tested in accordance with this standard, and all existing packers are subject to ongoing design reviews and testing. All Schlumberger premium packers are qualified as V0, the strongest validation overall, and new packer designs must meet the minimum standard of V3, the most stringent standard for testing in liquid media.

In addition to the standard ISO testing, Schlumberger packers undergo design acceptance tests, including vibration and shock testing, standard flow-by testing, mill-up verification testing, and functional testing to failure. All X-series elements are 100% volumetrically scanned. Test records are available on request.

Defining performance parameters
Matching the best-performing packer with a well requires an understanding of the environment and its potential problems, along with the effects of differential pressure on tensile and compressive loading. Schlumberger completion engineers predict a packer’s performance on the basis of those effects using computer modeling, numerical simulation, and laboratory and field testing. A thorough analysis of the results defines the packer’s safe operating range and helps identify the most appropriate packer for the well.
Our packer product line has evolved into a broad, versatile offering through extensive engineering research and field-proven experience. Packers are available in a range of models and materials to suit most environments. They are rated up to 103.42 MPa [15,000 psi] and are tested beyond the requirements of ISO 14310.

**XHP packer**
The XHP premium packer, hydraulically set and retrievable, is used in vertical and deviated wells. The standard version is suitable for high-pressure, high-temperature environments but also qualified for low-temperature use in subsea injection wells. Designed to connect directly to well tubing, the XHP is installed with the completion tubing and set by applying pressure against a plug set in a nipple or a closed inline valve below the packer. Retrieval is by intervention with a through-tubing cutting tool and upward pull on the tubing.

**XMP MultiPort packer**
The XMP MultiPort packer, hydraulically set and retrievable, is designed for intelligent completions. It features a multiple-bypass configuration for hydraulic control lines or electric conduit applications. The XMP is installed with the completion tubing and set by applying pressure against a plug set in a nipple or a closed inline valve below the packer. Retrieval is by intervention with a through-tubing cutting tool and upward pull on the tubing.

Given the critical nature of packers and their importance in the completion system, we pride ourselves on our packer reliability, durability, and set-first-time approach in deepwater and other challenging environments.
MRP packer
The MRP packer is hydraulically set and retrievable. It is used in vertical and deviated wellbores and in applications in which single or multiple packers are set after the wellhead has been installed. The MRP is installed with the completion tubing and set by applying pressure to the tubing. Retrieval is by means of a straight upward pull on the tubing.

QUANTUM MAX packer
The QUANTUM MAX packer is a rugged, high-performance, retrievable gravel-pack packer that is deployed on drillpipe and hydraulically set. It is the core component of high-pressure, high-temperature gravel-pack systems and is suitable for high-pressure, high-volume fracturing and gravel-pack treatments. The QUANTUM MAX design optimizes all critical performance parameters. This packer is set by applying pressure to the setting tool used for deployment. Retrieval is by means of an intervention tool.

NIS packer
The nonintervention-set (NIS), hydrostatically set permanent packer is positioned without wire-line or coiled tubing intervention. It is set in a closed system such as a cased well before perforating. A contingency option whereby the packer can be set conventionally means that a plug is set below the packer on slickline and pressure is applied. The NIS packer is typically selected for applications for which reducing rig time and intervention costs is critical.

HSP-1 packer
The HSP-1 series single-string packers are hydraulically set, permanent, millable packers. Their design incorporates two full-circumference slips supported by two opposing tapered cones with a sealing element assembly positioned between. The lower slip is set before the sealing element assembly to eliminate tubing movement and to centralize the packer in the casing before the element fully packs off against the casing wall.

<table>
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<th>Packer Types</th>
<th>Setting Method</th>
<th>Conveyance Method</th>
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Packer Success in the North Sea

QUANTUM MAX PACKER HELPS PREVENT FORMATION DAMAGE

In its North Sea completions, an operator routinely included a packer that could be set on wireline and retrieved using an intervention tool. But because the cycle pressure for formation isolation valves was higher than the plugged rating for the packer, the risk of formation damage and leakage became a concern when the well was displaced with a low-density fluid. The operator needed to minimize these risks when replacing the drilling fluid.

Schlumberger engineers developed the QUANTUM MAX packer system with the FIV* formation isolation valve to enable wellbore fluid change-out with minimal intervention. The QUANTUM MAX packer’s barrel-type slips resulted in less stress on the casing, and the number of potential leak points was reduced because there were fewer active components. With only two O-rings, the packer greatly reduced the potential for leaks.

When used with the FIV valve, the QUANTUM MAX packer enabled fluid change-out with minimal intervention and reduced formation risks. This solution helped the operator achieve targeted production rates because the valve and packer system prevented reservoir contact by the weighted completion fluids. The greater capabilities offered by the QUANTUM MAX packer, coupled with increased flexibility in completion designs, have allowed operators to place QUANTUM MAX packers in Trinidad, Brazil, Malaysia, Angola, and Nigeria completions.

NIS PACKERS ELIMINATE SLICKLINE RUNS

An operator had successfully used millable production packers in its North Sea wells without installation or performance problems. During the completion operations, however, it was necessary to run a plug to set the packer, which required two additional, costly slickline runs—one to run the plug to set the packer and a second to remove the plug after the packer was set. The operator asked Schlumberger for packers that would help reduce rig time and costs.

The NIS permanent packer was selected. Because NIS packers are hydrostatically set without wireline or coiled tubing intervention, they eliminate the need to run a slickline. This feature allows the NIS packer to decrease overall rig costs, and since no intervention is required, they are well suited for extended-reach and deep wells. The packers are also easily adapted to specific completion designs and operations because no additional hardware is required.

The packers eliminated the two slickline runs required by the previous packer. To date, the operator has installed seven NIS packers. The packers have saved approximately 4 hours of rig time for each completion installation and reduced well intervention costs and risks. Based on these successes, the operator intends to use NIS packers for its other North Sea applications.
Operators of platforms and subsea wells in the North Sea needed to validate that their packers met strict ISO and NORSOK requirements. The operators also wanted a local inventory of packers readily accessible during completion operations and quick access to experts on operating and installing these products.

Schlumberger HSP permanent millable production packers were developed to meet operators’ needs for tubing pressure settings with the required load and temperature ratings. They are validated to the most stringent ISO 14310 design validation: V0, in which no gas leakage is allowed during each defined pressure test. They are used in a variety of applications, including high H₂S and CO₂ exposure. The HSP packer incorporates a 360°, one-piece, opposing-slip design. The lower and upper slips are set independently, eliminating tubing movement. ISO V0 validation of the HSP design confirmed that this packer met the strictest validation requirements.

The HSP series was developed especially for this geographical area, and a local inventory is maintained to respond quickly to operators’ requests and to provide flexibility in completion planning activities. Since 1993, the 449 HSP packers installed in North Sea fields have operated without issue. The continued success in this region, along with local Schlumberger expertise, has resulted in the HSP series becoming the packer most used by operators in the Norwegian North Sea.
Schlumberger packers are installed in challenging, high-profile completion projects around the world. With our long track record of innovation, quality, reliability, flexibility, and product support, our packers will protect the integrity and longevity of your completions and support the overall success of your project.

**Schlumberger Packer Portfolio**

- XHP packer
- XMP MultiPort packer
- MRP packer
- QUANTUM MAX packer
- NIS packer
- HSP-1 packer