

Multistage Packer

Reliable isolation in integrated hydraulic fracturing operations

APPLICATIONS

- Multistage hydraulic fracturing stimulation with the BroadBand Precision* integrated completion service
- Multizone isolation
- Acid stimulation operations

BENEFITS

- Maximizes reliability using proprietary bypass unloader
- Extends packer reach by minimizing the unsetting force in deep, high-pressure applications
- Avoids swabbing in the hole during conveyance with minimized OD
- Improves operational efficiency by eliminating proppant buildup and associated friction for repeated and reliable setting and unsetting

FEATURES

- Ability to be used in conjunction with the reclosable CT fracturing sleeve to perform selective single-point multistage fracturing treatments
- Ability to be deployed as part of an abrasive jet perforating BHA
- Advanced design that allows deployment in deep, high-pressure applications
- Full circulation path around and past slips for reliable and repeatable operation

The multistage packer was designed to overcome the limitations of adapting commoditized production-style mechanical packers to the harsh environment of hydraulic proppant-based fracturing. The multistage packer is a fit-for-service solution to increase reliability compared with standard mechanical packers.

Patented unloader

The unloader is the most important feature on a packer for hydraulic fracturing. The elements must be unloaded as quickly as possible, allowing the tool to be hoisted clear of the treated zone to a cleaner area of the wellbore. The bypass unloader determines the depth at which the packer can be successfully operated.

During operations the pressure above the packer can be considerably higher than below, which causes a differential that can become excessive as depth increases and lead to differential sticking. The multistage packer's proprietary unloader system extends the depth of operation without affecting the rate of pressure unloading. The unloader features redundant vulcanized sealing technology, which protects the primary seal from high-velocity abrasive fluids after instantaneous pressure relief. These features combine for reliable packoffs and rapid pressure equalization, both leading to more successful jobs.

Superior seal performance

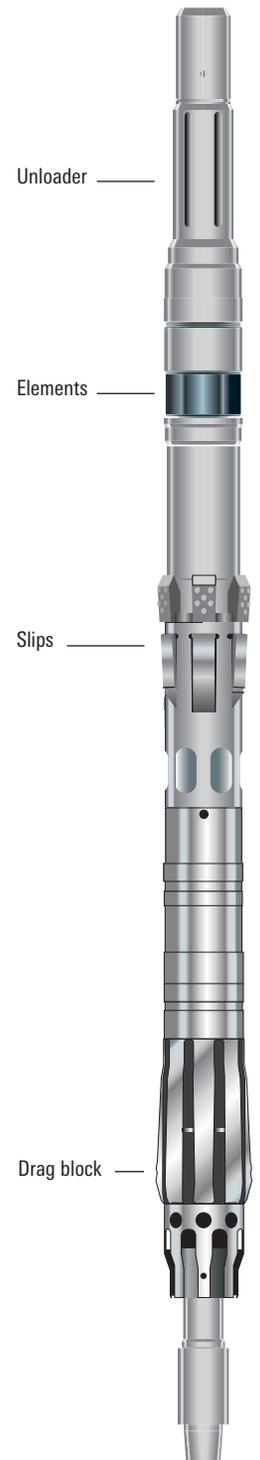
The multistage packer elements are designed to achieve full packoff with minimal compression forces. Only 1,000 lbf [4,448 N] of compression on the element stack is necessary to hold 10,000 psi [7 MPa], which extends the packer's reach into the horizontal as compared with conventional technology.

Each element is vulcanized and bonded to antiextrusion mechanisms to ensure the tool retains its small OD, eliminating risks of swabbing while running into the well and problems associated with overextrusion of the elements with repetitive setting.

Slips eliminate debris paths and maximize circulation

In conventional packers the drag block section of the rocker slips can fill with debris—especially proppant—causing excessive drag, poor circulation around the slips, weak slip-return mechanisms, slips hanging in collars, and severe operational problems and job failures.

The packer's proprietary slip design minimizes debris entry points, which maximizes circulation through the slip housing. The result is an ultrareliable setting and unsetting mechanism that adds minimal drag during conveyance and is completely isolated from debris.



Multistage packer.

Multistage Packer

4.5-in. Multistage Packer

Tool Specifications

Gauge ring max. OD	
for 11.6 lbm/ft [17.3 kg/m]	3.81-in OD
for 13.5 lbm/ft [20.1 kg/m]	3.75-in OD
for 15.1 lbm/ft [22.5 kg/m]	3.65-in OD
Top connection (PAC-DSI Box)	2.375 in [60.330 mm]
Bottom connection (PAC-DSI Pin)	2.375 in [60.330 mm]

Casing Specifications

Size	4.5 in [114.3 mm]
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Tool Operating Data

Tensile	100,000 lbf [444,482 N]
Burst	10,000 psi [69 MPa]
Collapse	10,000 psi [69 MPa]
Set force	1,000 lbf [4,448 N]
Movement required to set	21 in [553.4 mm]
Max. temperature	285 degF [141 degC]
Length in compression	70.5 in [1.79 m]
Length in tension	74.6 in [1.89 m]

5.5-in. Multistage Packer

Tool Specifications

Gauge ring max. OD	
for 17 lbm/ft [25.3 kg/m]	4.72-in OD
for 20 lbm/ft [29.7 kg/m]	4.60-in OD
for 23 lbm/ft [34.2 kg/m]	4.53-in OD
Top connection	2.375 in [60.330 mm] (PAC)
Bottom connection (EUE box)	2.375 in [60.330 mm] (PAC)

Casing Specifications

Size	5.5 in [139.70 mm]
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Tool Operating Data

Tensile	136,000 lbf [604,957 N]
Burst	10,000 psi [69 MPa]
Collapse	10,000 psi [69 MPa]
Set force	1,000 lbf [4,448 N]
Movement required	21 in [553.4 mm]
Max. temperature	285 degF [141 degC]
Length in compression	76.2 in [1.94 m]
Length in tension	80.0 in [2.03 m]

Enclosed J and drag block

The multistage packer's auto-J mechanism is enclosed and completely isolated from debris. As a result, the packer eliminates any risk of trapped proppant and detrimental friction that can cause issues when trying to activate the J and set the packer at subsequent zones.

Traditional drag blocks and casing collar locators (CCL) suffer from the same issues as conventional rocker-style slips. Cavities underneath the blocks combined with weak return mechanisms and a limited circulation path can result in extremely high drag forces over the course of a job. In the case of CCLs, which are required to expand radially as they pass through collars, the drag that is created can become detrimental to a successful job.

The multistage packer's integral drag block eliminates the cavities while providing a high rate of pass-through circulation. The result is more consistent drag and weight indication when pulling through sleeves.

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