

FORTRESS

Premium isolation valve

APPLICATIONS

- Bidirectional barrier for well control
- Fluid loss control
- Well suspension and temporary abandonment operations
- Completion fluid placement
- Multizone and intelligent completions
- Workover operations (with mechanical version of valve)
- Openhole and cased hole sand control operations
- Underbalanced perforating

BENEFITS

- Enhances well productivity by preventing formation damage and minimizing fluid loss
- Saves rig time and costs by minimizing interventions
- Increases safety by providing a downhole barrier against pressure reversals

FEATURES

- Ability to function in differential pressure conditions
- Less debris-induced variability of required actuation force
- Gas-tight, bidirectional-pressure-sealing ball
- 360° shifting profile to maximize engagement with the mechanical shifting tool
- Interventionless opening option using Trip Saver* one-time remote-opening mechanism
- API 19V/ISO 28781 V1 and Q1, C barrier valve qualified, API 19V monogram available[†]

The FORTRESS* premium isolation valve is a bidirectional barrier valve typically run with the lower (or intermediate) completion to isolate reservoir fluids. Its new design — based on field-proven experience and extensive testing — was developed to accommodate deepwater and other harsh environments where debris tends to accumulate and actuation requires greater force. Enhanced features provide additional flexibility and reliability. The valve meets and exceeds API 19V/ISO 28781 V1 standards.

Wide range of applications

The versatile FORTRESS valve provides a bidirectional barrier that enables operators to transition seamlessly — without intervention — from the lower completion to the upper completion. It works with all isolation requirements and applications: intelligent, multizone, gravel-pack, frac-pack, and stand-alone screen completions; suspension and temporary abandonment of a well; and remedial workovers.

The valve minimizes the frictional effects and shifting-force variability caused by debris and optimizes the actuation energy available. It is thus suitable for deepwater and other harsh, debris-laden environments, such as those created by underbalanced perforating and openhole and cased hole sand control operations.

Ability to open and close multiple times mechanically

The FORTRESS valve is opened and closed mechanically with the primary shifting tool (PST) run on the end of washpipe, a perforating string, or coiled tubing. When the shifting tool passes through the valve, it engages the shifting profile and the ball opens the valve or closes it to create a gas-tight seal. The washpipe and shifting tool are then retrieved.

Interventionless one-time remote opening option

The Trip Saver one-time remote-opening mechanism can be included to provide interventionless one-time opening of the FORTRESS valve using a predetermined number of tubing pressure cycles applied against the closed valve. When the opening cycle is reached, the Trip Saver mechanism provides the actuation energy to open the valve.

This mechanism enables the operator to pressure test the tubing, set and test the packer, and test the tubing hanger before reestablishing communication with the reservoir. Before the remote-opening mechanism is actuated, the FORTRESS valve can be opened and closed mechanically multiple times.



FORTRESS isolation valve.

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The FORTRESS valve can be selected with one of three options for activating the Trip Saver mechanism.

Option 1: N₂ trigger

Valves that use the N₂ trigger feature an integral indexing mechanism corresponding to 15 cycles. Applying and releasing pressure from the surface cycles the mechanism. The N₂ trigger can be used at downhole pressures up to 10,000 psi.

Option 2: S trigger

The S trigger uses two indexer sleeves and a total of 20 cycles to open the valve. The number of cycles can be physically confirmed prior to running in hole. In addition, the risk of unexpected cycling during gravel-pack operations is reduced.

The downhole atmospheric chamber design provides a greater opening force than other valves in the market; the available force is up to three times that of the N₂ trigger. Eliminating precharged downhole N₂ cylinders reduces safety concerns. The trigger internals operate in clean hydraulic fluid to prevent any debris effect. This trigger is suitable for high-pressure wells up to 13,000 psi.

Option 3: HP trigger

The HP trigger is similar to the S trigger but can be used in higher-pressure wells up to 25,000 psi.

Extensive debris testing

The force required to actuate a barrier valve is affected by the differential pressure across the barrier and the friction generated by debris in the well. Extensive testing by Schlumberger of 30 types of debris—various combinations of sand, metal, and scale—shows that this friction varies according to the type and amount of debris.

A special test fixture was built to measure the activation and translation energy expended in overcoming frictional forces during valve operation. These forces diminish the actuation energy available to operate the valve. Test results presented clear avenues for enhancing the valve's design by minimizing the friction generated by debris and optimizing the amount of available actuation energy.

FORTRESS Valve Specifications

Size (OD × Min. ID), in [mm] [†]	Differential pressure rating (body), psi [kPa]	Differential pressure rating (ball), psi [kPa]	Max. temperature, degF [degC]	Mechanical Valve	Valve with N ₂ Trigger	Valve with S Trigger	Valve with HP Trigger
5.500 × 2.940 [139.7 × 74.68]	9,000/10,000 [‡] [62,053/68,948]	6,000 [41,369]	300 [148.8]	X	X	X	
5.615 × 2.940 [142.6 × 74.68]	10,000 [68,948]	10,000 [68,948]	375 [190.6]	X			X
8.000 × 3.700 [203.2 × 93.98]	10,000 [68,948]	6,000 [41,369]	300 [148.8]	X	X	X	
8.000 × 4.245 [203.2 × 107.82]	15,000 [103,421]	10,000 [68,948]	350 [176.7]	X			X
8.000 × 4.600 [203.2 × 116.84]	6,000 [41,369]	6,000 [41,369]	300 [148.8]	X	X	X	

[†]Other sizes and temperature and pressure ratings available on request. Contact your local Schlumberger representative.

[‡]The higher rating is available with the mechanical valve and the S trigger version.

Design enhancements

The FORTRESS valve has no gaps or passages that would allow solids to accumulate in critical spaces and prevent the sealing ball from rotating. Optimized cage arms and wiper rings reduce the amount of solids entering the ball housing space, reducing friction.

The mechanical section has a full 360° shifting profile that maximizes the force applied by the PST. The displacement-type design and flush ID minimize contact of moving parts with wellbore fluids. The shifting mechanism is protected from the main flow path to minimize the locations where debris can collect. Wiper rings at both ends reduce the amount of solids entering the collet housing.

The PST has a large ID to reduce the friction created by fluids as they pass through the tool. An adjustable centralizer evenly distributes and reduces the stress in the collet and protects the opening and closing profiles in long horizontal intervals. The enhanced collet design enables predictable and repeatable shifting forces and provides a high, consistent emergency release load.

Alternative shifting tools

The ReSOLVE* instrumented wireline intervention service features shifting tools that can be used to open and close the FORTRESS valve. The service provides real-time monitoring, dynamic tool control, and verified downhole actuation.

For FORTRESS valves with an anchor profile, an optional hydraulically actuated contingency shifting tool (CST) can be deployed via slickline, braided line, or coiled tubing. The anchor profile ensures precise location and actuation of the CST.

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[†]A small fraction of valves are pending qualification. Contact your local Schlumberger representative for details.

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