SuperFill™ Surge Reduction Equipment

Achieving safe trip velocities by optimizing the balance between operational efficiencies and surge pressure when tripping casing into the hole.

Running casing in the well at an operationally efficient speed without damaging the formation due to surge pressure is a long-standing challenge in the oil and gas industry. The pipe velocity has to be calculated according to variables such as mud properties, hole diameter size, and clearance; and unless the weighted drilling fluids are allowed to flow freely into and up the casing itself, the casing acts as a piston, pushing the fluids into weak formations. Hours of rig time can be consumed filling the casing conventionally or through slow running speeds. However, running speeds can be optimized while protecting the formation with Halliburton's SuperFill™ surge reduction equipment, a reliable auto-fill system.

With new frontiers such as ultra deepwater and slimhole well designs, downhole pressure management is increasingly challenged by ever narrowing margins between pore pressure and fracture gradients. When running and landing casing to depth, operating outside this safe pressure window, even if just for a short period of time, has historically led to costly well problems. These are problems such as fluid loss from a fractured formation, contamination of the mud either by flow of formation fluids or excessive formation debris due to sloughing, or even a pressure kick. Float equipment is imperative for mitigating damaging surge pressures. Halliburton’s SuperFill surge reduction equipment helps casing to be run in at an optimum speed and stay within the window between pore pressure and fracture gradient.

**Benefits**

- Complete and compatible surge reduction components designed for use together that include:
  - Surge Reduction Float Equipment
  - SSR® Plug Sets
  - Drill Pipe Diverter Tool
  - Commander 1000™ Top Drive Cementing Heads
- Reliable auto fill equipment that cannot be inadvertently deactivated
- Allows increased pipe running speeds
- Reduces surge pressures on weak formations
- Reduces costly mud losses when running tubular through tight clearance wellbores
- Configuration designs available that allow for multiple circulations
- High LCM fluid systems compatible
- PDC drillable

**Applications**

- Conventional “cement to surface” full-bore casing jobs
- Sub sea completions
- Running a liner and cementing the wellbore
SuperFill™ Float Collars and Float Shoes

Halliburton offers several SuperFill auto-fill assemblies that allow wellbore fluids to enter the casing as it is being run into the wellbore. The SuperFill family of products is Halliburton’s most versatile pressure deactivated auto-fill system for use in almost any wellbore configuration. Equipment can be supplied for use with most casing sizes (4-in. and larger), weight, grade or thread in either shoe or collar assemblies. Double SuperFill valve options are available and are standard in some configurations. The specific configurations available are listed below with their unique features.

SuperFill™ Type FV (Flapper Valve)
- Allows multiple circulations without auto fill deactivation while running casing
- Single valve equipment as standard
- Double valve equipment available in sizes 7-in. and larger
- Two deactivation ball sizes available: 1 3/8-in. and 2 3/8-in. balls
- Drop ball option available with surface launch applications or with a bottom plug displacement option
- Drop ball option compatible with SSR®-II two plug or SSR® top plug assemblies with small deactivation ball assuming deviation is no greater than 30° at the SuperFill FV assembly
- Available in Float Shoes and Float Collars

SuperFill™ Type FVB (Flapper Valve; Ball Retained)
- Deactivation of auto fill feature occurs with first circulation
- For applications where neither plugs nor deactivation balls can be dropped or circulated from the surface
- Retained deactivation ball is carried in with tool
- Suitable for use with conventional SSR plug sets (two plugs) or VersaFlex® liner plug assemblies
- Suitable for horizontal subsurface release applications
- Available with an NR plug seat (7-in. through 20-in.) is an optional feature for surface launch or sub-service applications
- Available in double valve float collar configuration only
- Utilizes a compatible full open guide shoe
SuperFill™ Type FVB Plus (Flapper Valve; Ball Retained: Plus Multiple Circulation Feature)

- Allows multiple circulations without auto fill deactivation while running casing
- For applications where neither plugs nor deactivation balls can be dropped or circulated from the surface
- Retained deactivation ball with circulation option
- Allows circulation while running in hole without deactivating auto-fill feature
- Increasing circulation rate deactivates auto-fill feature
- Circulation rates up to 4 BPM can be achieved without deactivation
- Circulation rates and time are determined by wellbore fluid rheological properties and cumulative total time of multiple circulations
- Retained deactivation ball option required for conventional SSR plug sets (two plugs)
- Available with an NR plug seat (7-in. through 20-in.) is an optional feature for surface launch or sub-service applications
- Available in double valve float collar configuration only
- Utilizes a compatible full open guide shoe

SuperFill™ Diverter Tool

The SuperFill diverter is the final component that completes the surge reduction package available from Halliburton. This tool enhances the SuperFill float valve systems by relieving additional pipe running surge pressures caused by frictional pressures inside the work string. Halliburton's SuperFill diverter is designed to be run just above the liner or subsea wellhead running tool to provide a flow path for the wellbore fluids inside the liner to exit the work string into the annular space around the work string and not up the smaller restricted diameter of the drill pipe.

- Used in subsurface applications
- Provides flow path from inside the drill pipe to the annulus outside the drill pipe
- Reduces frictional pressure loss
- Enables Increased pipe running speeds
- Reduces surge pressures on weak formations
- Reduces costly mud losses when running tubular
- Reduces formation damage caused by mud losses
- Tool cannot be inadvertently deactivated
- Tool is permanently closed with free fall activation ball or full bore rupture tube
- The ball drop version can be set up to carry in the ball, on the ball seat while running in hole, in case of well control issues
- Full bore ID after closure when configured for the full bore rupture tube
- Torque Ring allows LH and RH Torque up to 80,000 ft/lbs
- Load rated to 750 US ton at 10,000 psi
- Available in 6 5/8 drill pipe configuration.

Other sizes available on request

a. Allows fluid to exit into annular space between working string and previous casing while running in.

Ball can be carried in on the seat for quick deactivation in case of well control issues.

b. Tool closes at approximately 300 psi and provides a 1200-1800 psi spike when the ball extrudes.
**SuperFill™ Confirmation Sub**

- Designed to be run in conjunction with the SuperFill diverter tool
- Run in the drill pipe work string, and positioned 1-2 stands below the diverter tool
- Designed for confirmation that the diverter tool has been closed
- Temporarily detains diverter tool activation ball after closing the diverter sleeve
- Allows for second 1200-1800 psi pressure spike to be seen at surface
- Ball is discharged down the drill pipe to be retained in the liner plug set
- Torque Ring allows LH and RH Torque up to 80,000 ft/lbs

- Load rated to 750 US ton at 10,000 psi and matches the performance of the SuperFill diverter tool
- Available in 6 5/8-in. drill pipe configuration.

*Other sizes available on request*

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**Halliburton offers a complete string of compatible surge reduction components designed for use together, from the Commander™ 1000 Top-Drive Cementing Head to the Guide Shoe.**

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For more information on SuperFill™ Surge Reduction Equipment, please call your local Halliburton representation or email us at cementing@halliburton.com.

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