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Wellbore Cleaning Technology



Introduction

Halliburton CleanWell® system technology specializes in rotational, single-trip mechanical wellbore cleaning solutions designed to deliver value-driven results throughout the well construction process. Understanding the evolution of this service and the limitations of existing technology in the market has driven our innovative tool designs.

CleanWell systems help reduce mechanical risk, promote rig time savings, and allow both technical and operational efficiencies.

Service quality, product reliability, commercial competitiveness, and superior project results are some of the reasons our clients have chosen and continue to use CleanWell system technology.

Casing Cleaning Tools

Drill Tech® Casing Scraper

The CleanWell® Drill Tech® casing scraper is designed with rotational features to mechanically assist in cleaning wellbore casings by scouring and removing mud film and other restrictive material from the inner casing wall diameters.

The tool can be run as a standalone device for cleanout runs where plugback total depth might need to be established or integrated into a single-trip system in combination with other wellbore cleaning tools. A rotational system is required to address debris and restrictions that might be encountered in downhole environments.

Features and Benefits

- » Robust, rotational cleaning
- » Integral mandrel
 - Smooth inner bore
 - No internal connections or upsets
- » Greater than 360° casing coverage without rotation
- » Casing-friendly blade design
- » Large ID to minimize pressure drop
- » Fixed and spring-loaded 25° blades
 - Independent finger action
- » API and premium connections available
- » Adaptable stabilizers
 - Standard stabilizers
 - Tapered mill sleeve
 - Top dress mill sleeve
- » Stress concentration management
- » No external bolts or fasteners
- » Technical specifications validated through finite element analysis modeling

Drill Tech® Casing Scrapers

| Casing Size in. | Maximum Trip Speed ft/min | Maximum Rotating Speed in Tension RPM | Maximum Rotating Speed in Compression RPM | Maximum Compression While Rotating klb |
|------------------|---------------------------|---------------------------------------|---|--|
| 16 to 20 | 200 | 120 | 90 | 50 |
| 11 3/4 to 13 5/8 | 200 | 120 | 90 | 50 |
| 9 5/8 to 10 3/4 | 200 | 120 | 90 | 50 |
| 7 to 8 5/8 | 200 | 120 | 90 | 35 |
| 5 to 5 1/2 | 200 | 120 | 90 | 15 |



HAL1889

Drill Tech®
Casing Scraper

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Completion Tools

Bristle Tech® Brush

The CleanWell® Bristle Tech® brush tool is designed to mechanically assist in cleaning wellbore casings by polishing and removing mud film and other restrictive material from inner casing wall diameters.

The brush can be run as a standalone device for cleanout runs when clear fluid is present in the wellbore or can be integrated into a single-trip system in combination with other wellbore cleaning tools for typical mud displacements.

Features and Benefits

- » Robust, rotational cleaning
- » Integral mandrel
 - Smooth inner bore
 - No internal connections or upsets
- » Casing-friendly blade design
- » Greater than 360° casing coverage without rotation
- » Large ID to maximize flow area
- » Fixed 25° blades
 - Independent finger action
 - Short, twisted, and crimped wire
 - Superior ovality and radial contact
- » API and premium connections available
- » Stress concentration management
- » No external bolts or fasteners
- » Technical specifications validated through finite element analysis modeling

Bristle Tech® Brush

| Casing Size in. | Maximum Trip Speed ft/min | Maximum Rotating Speed in Tension RPM | Maximum Rotating Speed in Compression RPM | Maximum Compression While Rotating klb |
|------------------|---------------------------|---------------------------------------|---|--|
| 11 3/4 to 13 5/8 | 200 | 120 | 90 | 50 |
| 9 5/8 to 10 3/4 | 200 | 120 | 90 | 50 |
| 7 to 8 5/8 | 200 | 120 | 90 | 35 |



HAL41897

Bristle Tech®
Brush

Combo Tech® Scraper/Brush

The CleanWell® Combo Tech® scraper/brush tool is designed to mechanically assist in cleaning wellbore casings by scouring, polishing, and removing mud film and other restrictive material from the inner casing wall diameters. The Combo Tech tool can be run as a standalone device for cleanout runs where plugback total depth might need to be established, or it can be integrated into a single-trip system in combination with other wellbore cleaning tools. The adaptable cleaning features and components allow the tool to be built as required for the application of use.

Features and Benefits

- » Robust
- » Integral mandrel
 - Smooth inner bore
 - No internal connections
- » Large ID to minimize pressure drop
- » Maximum radial total flow area
- » Non-rotating stabilizers available
- » Rotating cleaning features
- » Fixed and spring-loaded scraper blades

Combo Tech® Scraper/Brush

| Casing Size in. | Maximum Trip Speed ft/min | Maximum Rotating Speed in Tension RPM | Maximum Rotating Speed in Compression RPM | Maximum Compression While Rotating klb |
|-----------------|---------------------------|---------------------------------------|---|--|
| 9 5/8 | 200 | 120 | 90 | 50 |
| 7 to 7 5/8 | 200 | 120 | 90 | 35 |



Combo Tech®
Scraper/Brush

Drill Tech® Debur Mill

The CleanWell® Drill Tech® deburr mill is a specialized version of the standard Drill Tech scraper. It is designed to remove burrs and leftover materials on the casing ID as a result of perforating operations.

The stabilizer sleeves assist in restoring drift, while the carburized saw tooth blades restore the casing ID. The tool can be run as a standalone device for post-perforation deburring operations, although it is recommended to be run in combination with other wellbore cleaning tools for optimal debris removal. The tool is ideal for any operations that precede running a packer or multiple packers through a perforation zone.

Features and Benefits

- » Robust
- » Integral mandrel shared with the standard Drill Tech scraper
- » Hardened, carburized (8620) saw tooth blades
 - Cutting relief feature behind primary cutting edge
- » Tungsten carbide edged stabilizer sleeves
 - Narrow stabilizer blades to take smaller “bites” while milling and restoring drift and preventing torque spikes and hangups while deburring
 - Increased milling surface compared to regular stabilizer sleeves
- » Technical specifications validated through finite element analysis modeling



Drill Tech®
Debur Mill

Drill Tech® Debur Mills

| Casing Size in. | Maximum Trip Speed ft/min | Maximum Rotating Speed in Tension RPM | Maximum Rotating Speed in Compression RPM | Recommended Deburring Rotational Speed RPM | Maximum Compression While Rotating klb |
|-----------------|---------------------------|---------------------------------------|---|--|--|
| 9 5/8 to 10 3/4 | 200 | 120 | 90 | 30 to 60 | 50 |
| 7 to 7 5/8 | 200 | 120 | 90 | 30 to 60 | 35 |

Spiral Wrap String Mill

The CleanWell® Spiral Wrap String Mill is designed to restore casing drift and downsize debris generated during cased-hole milling or drilling applications. The mill design provides a 360° smooth overlap OD when descending or ascending in the wellbore. Both upper and lower lead-tapered edges are dressed with tungsten carbide, and the rotational edge of the maximum OD is also dressed with tungsten carbide for restriction engagement and removal.

The mill is offered in opposing pitch options (left and right hand). The mill is used in a variety of applications ranging from common single-trip drillout displacements to deburring post-perforation specialty runs. The mill can be run as a standalone device for cleanout runs or more commonly integrated with other mechanical wellbore cleanout tools during various phases of the well construction process.

Features and Benefits

- » Robust
- » Integral mandrel
 - Smooth inner bore
 - No internal connections or upsets
- » Full 360° wrap at maximum OD
- » Smooth, casing-friendly maximum OD
- » Tungsten carbide tapered ends
- » Specialty sizes and designs available
- » Stress concentration management

Spiral Wrap String Mill

| Casing Size in. | Maximum Trip Speed ft/min | Maximum Rotating Speed in Tension RPM | Maximum Rotating Speed in Compression RPM | Maximum Compression While Rotating klb |
|------------------|---------------------------|---------------------------------------|---|--|
| 16 to 20 | 200 | 120 | 90 | 50 |
| 11 3/4 to 13 5/8 | 200 | 120 | 90 | 50 |
| 9 5/8 to 10 3/4 | 200 | 120 | 90 | 50 |
| 7 to 8 5/8 | 200 | 120 | 90 | 35 |
| 5 to 5 1/2 | 200 | 120 | 90 | 15 |



HAL41869

Spiral Wrap String Mill

Debris Extraction Tools

Vali Tech® Downhole Mechanical Filter

The CleanWell® Vali Tech® downhole filter tool is designed to provide a mechanical alternative for collecting solid contaminants remaining in vertical or deviated wellbores. The robust filter tube design helps eliminate wire-wrapped screen concerns while allowing for improved operating specifications.

The Vali Tech filter includes a fluid interrupter sleeve (FIS) that provides a protected, redundant wiper diverter system designed to mitigate tearing, ripping, or damage concerns. The upper location of the FIS prevents potential debris loss.

The innovative modulating valve allows fluid bypass should the collection chamber become full and helps prevent swabbing concerns. This system is also designed to eliminate the need for other ball-drop bypass valves.

The Vali Tech filter is ideal for highly deviated wellbores where solids tend to settle on the low side or when unfavorable hydraulics are present. The tool can be run as a standalone device for specialty intervention runs or integrated into a single-trip system in combination with other wellbore cleaning tools.

Features and Benefits

- » Robust
- » Integral mandrel
- » Large ID to minimize pressure drop
- » Stabilized for positive centralization and protection
- » Allows for reverse circulating when required
- » No spring-loaded valves to remain lodged open below the filter chamber
- » Robust filter sleeve
 - Elimination of wire-wrapped screens
 - Increased operating specifications
- » FIS (diverter)
 - Shifting sleeve design
 - Self-centralizing
- » Self-modulating bypass
 - Helps eliminate swabbing potential
 - Provides regulated bypass



Vali Tech® Downhole
Mechanical Filter

Vali Tech® Downhole Mechanical Filters

| Casing Size in. | Maximum Trip Speed ft/min | Maximum Rotating Speed in Tension RPM | Maximum Rotating Speed in Compression RPM | Maximum Compression While Rotating klb | Tool Debris Capacity ft ³ (L) |
|------------------|---------------------------|---------------------------------------|---|--|--|
| 11 3/4 to 13 5/8 | 200 | 120 | 90 | 50 | 1.171 (33.16) |
| 9 5/8 to 10 3/4 | 200 | 120 | 90 | 50 | 0.984 (27.86) |
| 7 to 8 5/8 | 200 | 120 | 90 | 35 | 0.572 (16.2) |

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Completion Tools

Vor Tech® Casing Junk Basket

The CleanWell® Vor Tech® casing junk basket is designed to assist in capturing larger debris or solids that cannot be circulated out of the casing because of volume challenges or unfavorable hydraulics. This cost-effective solution is designed to create a vortex effect that promotes solids dropping out of circulation and into the large upper collection throat.

The Vor Tech basket is typically run in conjunction with other downhole tools, such as the Drill Tech® casing scraper or Bristle Tech® brush. It can be integrated into a single-trip system in combination with other wellbore cleaning tools during the displacement process or specialty intervention runs.

Features and Benefits

- » Robust
- » Integral mandrel
 - Smooth inner bore
 - No internal connections or upsets
- » Large ID to minimize pressure drop
- » Large upper throat/opening for easy debris entry
- » API and premium connections available

Vor Tech® Casing Junk Baskets

| Casing Size in. | Maximum Trip Speed ft/min | Maximum Rotating Speed in Tension RPM | Maximum Rotating Speed in Compression RPM | Maximum Compression While Rotating klb |
|-----------------|---------------------------|---------------------------------------|---|--|
| 9 5/8 to 10 3/4 | 200 | 120 | 90 | 50 |
| 7 to 8 5/8 | 200 | 120 | 90 | 35 |
| 5 to 5 1/2 | 200 | 120 | 90 | 15 |



Vor Tech®
Casing Junk Basket

Mag Tech® Casing Magnet

The CleanWell® Mag Tech® casing magnet is designed to assist in collecting ferrous or non-ferrous material that has become magnetically charged because of pipe rotation during the displacement process. The casing magnet is designed to run in conjunction with the Drill Tech® casing scraper, Bristle Tech® brush, Vali Tech® downhole filter, and other casing cleaning tools in displacement, drilling, or other intervention applications. The neodymium bar magnets are high-energy and extremely strong. Magnet strength combined with good stabilization and a large surface collection area provide for large volume recoveries.

Features and Benefits

- » Robust
- » Integral mandrel
 - Smooth inner bore
 - No internal connections or upsets
- » Large ID to minimize pressure drop
- » Large surface collection area
- » Stabilizers maximize debris retention volume
- » API and premium connections available
- » No external bolts or fasteners
- » Neodymium for standard service and samarium cobalt available for high-temperature applications

Mag Tech® Casing Magnets

| Casing Size in. | Maximum Trip Speed ft/min | Maximum Rotating Speed in Tension RPM | Maximum Rotating Speed in Compression RPM | Maximum Compression While Rotating klb |
|------------------|---------------------------|---------------------------------------|---|--|
| 11 3/4 to 13 5/8 | 200 | 120 | 90 | 50 |
| 9 5/8 to 10 3/4 | 200 | 120 | 90 | 50 |
| 7 to 8 5/8 | 200 | 120 | 90 | 35 |
| 4 1/2 to 5 1/2 | 200 | 120 | 90 | 15 |



HAL41864

Mag Tech®
Casing Magnet

PowerMag® and PowerMag II Magnets

The CleanWell® PowerMag® magnet is designed to assist in collecting ferrous or non-ferrous material that has become magnetically charged because of pipe rotation or movement during displacement, drilling, or intervention runs. Fashioned from integral drill collar bar stock with high-tensile, high-torsion strength, the tool has a large ID to minimize pressure loss. Recessed, flat magnet sections provide more than 2,800 in. of surface collection area. The tool is equipped with powerful neodymium bar magnets. Integral body water coursing provides high flow area but remains streamlined for safely exiting casing or use in various drilling or fishing operations.

The CleanWell PowerMag II magnet is a compact version of the field-proven Halliburton PowerMag magnet. The PowerMag II magnet includes all the features of the original PowerMag magnet, yet in a compact size to allow for quick and easy field installation. It is an economical solution for applications that does not compromise on performance or debris capacity.

Both PowerMag magnet tools can be deployed with other CleanWell systems in displacement cleanout runs, and it is ideal for operations where large amounts of ferrous material are produced or anticipated, such as window milling or post-perforation cleanouts, when flow rates are limited because of fluid loss.

Features and Benefits

- » Robust
- » Integral mandrel
 - Smooth inner bore
 - No internal connections or upsets
- » Large ID minimizes pressure loss
- » Neodymium for standard service and samarium cobalt available for high-temperature applications
- » Abundant total flow area provides optimal fluid flow, even when at full debris capacity, by alternating between its magnetic and non-magnetic surfaces
- » Undersized integral stabilizers maximize the flow area and the capability to operate in a wide range of casing sizes without changing components
- » Efficient, complete cleanup in minutes on the rig floor or after laying down



PowerMag® II
Magnet

PowerMag® and PowerMag II Magnets

| Casing Size in. | Integral Stabilizer Size in. | Maximum Trip Speed ft/min | Maximum Rotating Speed in Tension RPM | Maximum Rotating Speed in Compression RPM | Maximum Compression While Rotating klb |
|-----------------|------------------------------|---------------------------|---------------------------------------|---|--|
| 7 to 7 5/8 | 5.69 | 200 | 120 | 90 | 35 |
| 9 5/8 to 13 5/8 | 7.625 | 200 | 120 | 90 | 50 |

CleanWell® Vac Tech® and Vac Tech II Downhole Eductor System

The CleanWell® Vac Tech® and Vac Tech II downhole eductor system is designed to induce a reverse circulating system in an isolated area at the bottom of the workstring. This system addresses problematic debris, including fill, cement, formation residual, gun debris, etc., located in complicated well geometries or in situations where debris maintenance or retrieval is less than optimal. The tool is run in hole in the closed position, allowing conventional circulation from the surface to the bottom of the string. Once activated by dropping a ball, two flow loops are created. The lower flow loop lifts solids at the bottom of the string, which are captured in the Vac Tech system collection chambers. Multiple collection chambers can be incorporated depending on the amount of debris expected.

The CleanWell Vac Tech II downhole eductor system shows increased tool functionality compared to the original Vac Tech system. The tool activates with a ball drop like the Vac Tech; however, a second ball can be dropped to deactivate the tool and restore flow to the bit. This helps eliminate the need for a separate bypass tool. In addition to allowing a return to conventional circulation, pressure tests on sump packer cleanouts, with a dummy seal assembly, can be performed after Vac Tech system cleaning operations are complete. All sheared components and activation/deactivation balls are captured in an internal ball catcher.

Other mechanical cleaning tools are customarily incorporated into runs with Vac Tech systems to help ensure the successful completion of run objectives.

Features and Benefits

- » Isolates before and after cleaning operations (Vac Tech II system)
- » Adjustable nozzle size to modify lower flow loop and surface pressure during operations
- » Calculation sheet available for accurate pre-job planning
- » Eductor power head induces pressure differential to create the debris lifting loop
- » Helps eliminate long interval inefficiencies and limitations potentially created by tailpipe
- » Ideal for post-perforation cleanouts or isolation plug retrieval runs
- » Modular system for safe, efficient debris management
- » 7 7/8-in. and 5 1/4-in. OD eductor systems available



CleanWell® Vac Tech®
Downhole Eductor System

CleanWell® Vac Tech® II
Downhole Eductor System

CleanWell® Vac Tech® System Chambers

The CleanWell® Vac Tech® system is equipped with modular handling chambers for easy cleaning and safe rig management. The internal, sequential collection system allows mechanical retention ranging from large debris to formation sand.

The chambers are placed below the Vac Tech or Vac Tech II system eductor head. Knockout chambers are placed in the lower portion of the string and are the primary collection area for most debris lifted by the Vac Tech system. The screen chamber is run directly below the eductor head and is the secondary collection area for debris too small or moving at too great of a velocity to be captured in the knockout chamber.

In addition to the two different types of chambers, each knockout and screen chamber has a long and short version. Length selection is driven by the required chamber capacity for the application, as well as rig space/handling and storage capacity.

Finally, high-pressure chambers are also available and are primarily for use with the Vac Tech II systems. The Vac Tech II system toolstring can be used to pressure test a sump packer with a dummy seal assembly after cleaning operations are complete by isolating the tool in the closed position. To meet the high-pressure test requirements, thicker walled, higher-grade steel, and high-pressure collection chambers are required.

Features and Benefits

- » Robust, industry-proven knockout cone system
- » Adjustable debris chambers
- » Filter screen chamber for fine debris
- » Modular system for safe, efficient debris management

CleanWell® Vac Tech® Collection Chambers

| OD Size in. | Length | Type | Capacity ft ³ |
|-------------|--------|----------|--------------------------|
| 7 5/8 | Short | Screen | 1.48 |
| | Short | Knockout | 3.25 |
| | Long | Screen | 2.47 |
| | Long | Knockout | 5.87 |
| 5 | Short | Screen | 0.56 |
| | Short | Knockout | 1.43 |
| | Long | Screen | 1.08 |
| | Long | Knockout | 2.10 |



CleanWell®
Vac Tech® System
Screen Chamber

CleanWell®
Vac Tech® System
Knockout Chamber

Jetting and Bypass Tools

Jet Tech® Slimline Valve

The CleanWell® Jet Tech® slimline valve is designed to flush subsea blowout preventers and wellheads. Its slimline OD helps eliminate critical space out concerns when deploying single-trip mechanical displacements. The valve is equipped with jet nozzles for optimal impact forces for effective flushing of cavities or profiles.

The Jet Tech valve provides large ID benefits both before and after activation to minimize pressure drop when circulating during the displacement process.

Features and Benefits

- » Robust
- » One full open/close cycle available
- » Slimline body OD with eight phased jets
- » 5 1/16-in. and 7 1/16-in. jet nozzles available
- » Built in the open or closed position
- » When functioned, the tool locks in position so the valve cannot be shifted by fluid flow
- » Steel ball activation, dart or ball deactivation
- » Multiple tools can be run in line for additional cycles
- » Rated to 5,000-psi differential pressure
- » API and premium connections available

Jet Tech® Slimline Valves

| Tool Size OD in. | Ball OD in. | Activation Rate bbl/min | Deactivation Rate bbl/min | Ball Seat ID in. | Jetting Total Flow Area in. ² |
|------------------|-------------|-------------------------|------------------------------|------------------|--|
| 6 3/4 | 2.75 | 8 | 3 (Dart), 12 to 15 (Ball) | 2.382 | 1.199 |
| 6 3/4 | 2.25 | 8 | 12 to 15 (Ball) | 1.886 | 1.199 |



HAL4189Z

Jet Tech®
Slimline Valve

Jet Sub

The CleanWell® Jet Sub is typically used to jet and flush surface blowout preventer cavities or surface wear-bushing profiles. The tool remains in the open position and is equipped with a series of phased and nozzled ports. An internal flow choke can be used for flow-splitting applications and can be sized according to optimal hydraulics.

Features and Benefits

- » Simple, robust design
- » Integral body
- » Adjustable inner flow choke
- » Extended body sizes available for customized applications
- » Tool always in open/jetting position

Jet Subs

| Tool Body OD in. | Maximum OD in. | Nozzles | Total Flow Area in. ² |
|------------------|----------------|---------|----------------------------------|
| 7 | 11 | 12 | 1.325 |
| 7 | 10.5 | 12 | 1.325 |
| 7 | 7 | 9 | 0.994 |
| 4.75 | 4.75 | 9 | 0.994 |
| 3.125 | 3.125 | 6 | 0.663 |



Jet Subs

16-in. Jet Sub

The CleanWell® 16-in. Jet Sub is designed to flush subsea blowout preventers and is equipped with a 16-in. OD outer housing to help ensure optimal jet impact forces and effective cavity flushing. The lower landing nut is profiled to safely engage the wellhead for positive depth correlation.

Features and Benefits

- » Robust
- » Outer housing with phased jets
- » Lower landing nut designed to profile and “no-go” on the subsea wellhead (positive depth correlation)
- » Tool always in the open/jetting position

16-in. Jet Sub

| Tool Body OD in. | Maximum OD in. | Nozzles | Total Flow Area in. ² |
|------------------|----------------|---------|----------------------------------|
| 8.25 | 16 | 24 | 2.65 |



HAL121824

16-in.
Jet Sub

Turbo Tech® II Multi-Activation Bypass Valve

The CleanWell® Turbo Tech® II compression-activated bypass valve is designed to allow uphole boosting above liner tops during displacement or cleanout interventions. The Turbo Tech II valve promotes best practices for displacement, allowing optimal circulating rates, pipe rotation, and pipe reciprocation while circulating and boosting. It is not required to shut down circulation when activating the tool, which is critical during a displacement.

The Turbo Tech II valve can be activated as often as required and remains in the locked position until cycled again. The valve is typically used when long liners or smaller drillpipe restrictions exist downhole, thus restricting annular velocity and preventing turbulent flow in larger casings uphole.

The Turbo Tech II valve is typically integrated with other mechanical wellbore cleanout tools and can help manage non-productive time associated with poor hydraulics to help improve circulating and overall displacement timelines.

Features and Benefits

- » Robust
- » Compression activated
- » Unlimited cycles
- » Locks open allowing the string to be rotated and reciprocated
- » Repeatable and resettable metering system
 - Available in 20, 40, and 60 klb
- » Cycled under pressure — not required to shut pumps down to activate
- » 4.46-in.² bypass flow area
- » Rated to 8,000-psi differential pressure before shifting and 5,000-psi differential pressure after shifting
- » High flow rate capability when open in all fluid types



*Turbo Tech® II
Multi-Activation Bypass Valve*

Drain Sub

The CleanWell® Drain Sub is designed to offer a simple and reliable one-time fluid bypass. The tool offers split flow capability or full bypass with flow to the bit blocked, depending on the size of the activation ball used. The tool can be used as a standalone device or along with other CleanWell tools, most commonly with the CleanWell Vac Tech® downhole educator system, to provide an option for conventional circulation after cleanup operations are complete. The tool can be activated by pumping down the activation ball or landing the ball and applying pressure in the event that some portion of the string below the tool has become blocked or flow is impeded.

Features and Benefits

- » Simple, robust design
- » High-torque internal connection
- » Small (2.25 in.) activation ball to block flow to the bit and direct flow out of the ports
- » Large (2.75 in.) activation ball for split flow applications (ports and bit)
- » Rated to 8,000-psi differential pressure
- » 5.31-in.² port flow area
- » High flow rate capability when open in all fluid types



Drain
Sub

Riser Cleaning Tools

Riser Bristle Tech® Brush

The CleanWell® Riser Bristle Tech® brush is designed to mechanically assist in cleaning subsea risers by polishing and removing mud film and other restrictive material from the inner wall diameters. The brush provides superior riser wall cleaning without reducing circulating flow area. Fluid flow can either be directed around the tool OD, self cleaning the bristles, or under the brush sleeves helping eliminate the potential for pressure drop.

The Riser Bristle Tech brush can be integrated into a single-trip system in combination with other wellbore cleaning tools during the displacement process. It can also be run as a standalone device for offline riser cleanout runs.

Features and Benefits

- » Robust
- » Integral mandrel
 - Smooth inner bore
 - No internal connections or upsets
- » Large ID to minimize pressure drop
- » Non-rotational (independent from mandrel)
- » 360° riser coverage per bristle sleeve section (two bristle sleeve sections)
- » API and premium connections available
- » Synthetic or steel bristles available
- » Mitigates surge and swab concerns by maximizing flow area underneath brush carriers
- » Technical specifications validated through finite element analysis modeling

Riser Bristle Tech® Brush

| Riser ID in. | Maximum Trip Speed ft/min | Maximum Rotating Speed RPM |
|--------------|---------------------------|----------------------------|
| 15.25 to 20 | 200 | 120 |



Riser
Bristle Tech® Brush

Mag Tech® Riser Magnet

The CleanWell® Mag Tech® riser magnet is designed to assist in collecting ferrous or non-ferrous material, which has become magnetically charged because of pipe rotation during the displacement process.

The 16-in. OD riser magnet is designed to run in combination with riser equipment to assist in collecting material removed from the blowout preventer (BOP) cavities during a BOP flush or throughout the displacement process.

Strong, high-energy neodymium bar magnets enable the Mag Tech riser magnet to retain its collection force throughout the displacement process. Good stabilization and large surface collection area provide for high-volume recoveries.

Features and Benefits

- » Robust
- » Integral mandrel
 - Smooth inner bore
 - No internal connections or upsets
- » Large ID to minimize pressure drop
- » Maximum radial total flow area
- » Non-rotational (independent from mandrel)
- » Excellent standoff for debris retention
- » API and premium connections available
- » Technical specifications validated through finite element analysis modeling

Mag Tech® Riser Magnet

| Riser ID in. | Maximum Trip Speed ft/min | Maximum Rotating Speed RPM |
|--------------|---------------------------|----------------------------|
| 17 to 20 | 200 | 120 |



Mag Tech®
Riser Magnet

Riser Vali Tech® Filter

The CleanWell® Riser Vali Tech® filtering tool is designed to actively recover debris that was unable to be circulated out of the hole before, during, and after displacement from drilling mud to completion fluid. The tool utilizes a fluid interrupter sleeve (FIS) to switch the tool from bypass mode, while circulating conventionally or running the tool in-hole, to a filtering mode when reverse circulating or tripping out-of-hole.

The Riser Vali Tech filter features include a flexible FIS, which provides a redundant wiper diverter system designed to mitigate tearing, ripping, or damage concerns. The flexible design allows the tool to fit through restrictions near surface, while retaining the ability to properly make contact with the riser ID.

The innovative modulating valve allows fluid bypass should the collection chamber become full and helps prevent swabbing concerns. This system is also designed to help eliminate the need for other ball-drop bypass valves.

The Riser Vali Tech filter is typically run in conjunction with CleanWell technology riser systems. It can be run as a standalone device or integrated into a single-trip system in combination with other wellbore cleaning tools during the displacement process.

Features and Benefits

- » Robust
- » Integral mandrel
- » Stabilized for positive centralization and protection
- » Large volume capacity — 5.85 ft³ (166 L)
- » Allows for reverse circulating when required
- » Robust filter sleeve
- » Flexible FIS (diverter)
 - Shifting sleeve design
 - Redundant wipers
- » Self-modulating bypass
 - Helps eliminate swabbing potential
 - Provides regulated bypass
- » API and premium connections available

Riser Vali Tech® Filter

| Riser ID in. | Maximum Trip Speed ft/min | Maximum Rotating Speed RPM |
|----------------|---------------------------|----------------------------|
| 18.75 to 19.75 | 200 | 120 |



HAL120693

Riser
Vali Tech® Filter

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Completion Tools

Vor Tech® Riser Junk Bucket

The CleanWell® Vor Tech® riser junk bucket is designed to assist in capturing larger debris or solids that cannot be circulated out of the riser or casing because of volume challenges or unfavorable hydraulics. The riser junk bucket is designed to create a vortex effect that promotes solids dropping out of circulation and into the large upper collection throat.

The Vor Tech riser junk bucket is typically run in conjunction with CleanWell riser systems or other downhole tools, such as the Drill Tech® casing scraper or Bristle Tech® brush. It can be integrated into a single-trip system in combination with other wellbore cleaning tools during the displacement process or specialty intervention runs.

Features and Benefits

- » Robust
- » Integral mandrel
 - Smooth inner bore
 - No internal connections or upsets
- » Large ID to minimize pressure drop
- » Abundant radial total flow area
- » Large volume capacities
- » Non-rotational bucket
- » Large upper throat/opening for easy debris entry
- » Numerous drain ports
- » API and premium connections available

Vor Tech® Riser Junk Bucket

| Riser ID in. | Maximum Trip Speed ft/min | Maximum Rotating Speed RPM |
|--------------|---------------------------|----------------------------|
| 15.25 to 20 | 200 | 120 |



Vor Tech®
Riser Junk Bucket

Specialty Tools

Inflow Tech® High-Performance Test Packer

The CleanWell® Inflow Tech® High-Performance (HP) test packer is designed to perform isolated negative or positive inflow tests on downhole liner tops. The tool has top and bottom connections and can be run in conjunction with other wellbore cleaning tools promoting single-trip displacement runs.

The Inflow Tech HP test packer is equipped to promote quick trip speeds with generous bypass area under the packer element. Rather than loading the liner top during the inflow test, the slip system helps eliminate the potential for liner-top damage caused by excessive compressional forces and helps manage critical space out issues. These proven components can be used during drilling operations, or more traditionally, during the displacement process.

Features and Benefits

- » Robust
- » Simple slackoff and pickup setting
 - Rotational speeds allow up to 80 RPM when tool is not in use
- » Compression-set slip design
- » No liner-top loading
- » Generous bypass area under packer element
 - Top seal isolation
- » Increased trip speeds
- » Capable of drilling and milling operations

Inflow Tech® High-Performance (HP) Test Packers

| Casing Size in. | Casing Weight lb/ft | Differential Pressure Rating psi | Temperature Rating °F | Maximum Trip Speed ft/min | Maximum Rotating Speed in Tension RPM |
|-----------------|---------------------|----------------------------------|-----------------------|---------------------------|---------------------------------------|
| 13 5/8 | 88.2 | 5,000 | 250 | 150 | 80 |
| 13 3/8 | 48 to 72 | 5,000 | 250 | 150 | 80 |
| 10 3/4 | 55.5 to 65.7 | 6,000 | 300 | 150 | 80 |
| 9 5/8 | 36 to 43.5 | 6,000 | 325 | 150 | 80 |
| 9 5/8 | 47 to 58.4 SD | 8,000 | 350 | 150 | 80 |
| 7 | 23 to 35 | 8,000 | 350 | 150 | 80 |



Inflow Tech® HP Test Packer

Inflow Tech® Test Packer With Setting Control Module

The Setting Control Module enhances the Inflow Tech® packer by repeatedly providing resistance that must be overcome with compression each time the packer is set. This allows the tool to be run in conditions that are challenging for a standard Inflow Tech packer. Such conditions include highly deviated wells with minimal effective weight/tension below the tool, high-flow-rate situations where a risk of the tool setting hydraulically exists, or a combination of the two. The valve in the setting control module resets after each cycle, so the tool is not reliant on string weight/tension provided by drillpipe below the tool. The setting control module is a true add-on feature. The Inflow Tech packer can be converted to be run with or without the setting control module when built in the shop with minimal part changes, as the operator's requirements vary by well.

Features and Benefits

- » Robust
- » Compression activated
- » Unlimited cycles
- » Repeatable and resettable metering system
 - Available in 20, 40, and 60 klb
- » High-torque internal connections — does not introduce any weak points to the Inflow Tech packer assembly
- » Does not reduce differential pressure or temperature rating to the base Inflow Tech packer
- » Allows the Inflow Tech packer to be run in challenging well geometries, while helping eliminate concerns of accidental packer setting

InflowTech® Packer With Setting Control Module

| Casing Size in. | Casing Weight lb/ft | Differential Pressure psi | Temperature Rating °F | Available Set Weight klb |
|-----------------|---------------------|---------------------------|-----------------------|--------------------------|
| 9 5/8 | 36 to 58.4 SD | 8,000 | 350 | 20, 40, 60 |
| 9 5/8 | 36 to 43.5 | 6,000 | 325 | 20, 40, 60 |
| 10 3/4 | 55.5 to 65.7 | 6,000 | 300 | 20, 40, 60 |



Inflow Tech® Test Packer With Setting Control Module

StimTech® Long-Stroke Slick Joint

The CleanWell® StimTech® long-stroke slick joint is designed to mitigate concerns of stripping a tool joint through the annular preventer during frac, gravel pack, tubing-conveyed perforating, or other sequences requiring the back side to remain closed. This slick joint helps with critical space out demands and allows easement for keeping weight down during pumping operations or stripping to cycle downhole valves. This tool protects the annular preventer from damage when stripping by minimizing the mid-tool joint upset.

Features and Benefits

- » Minimized mid-connection upset
- » Range 3 joint length (41 to 43 ft)
- » Large ID to minimize pressure drop
- » Simplified space out
- » No external components (seals, etc.)
- » Reduced mechanical risk
- » Pressure limitation of annular preventer only
- » Multiple joints can be run together to create appropriate length to match operation objectives

StimTech® Long-Stroke Slick Joints

| Tube OD in. | Tool Joint OD in. | Connection |
|-------------|-------------------|-----------------|
| 5.00 | 5.156 | CT-M43, TSH 533 |
| 5.875 | 6.25 | XT-M46 |
| 6.625 | 6.875 | CT-M57, XT-57 |



HAL41913
StimTech®
Long-Stroke Slick Joint

Tru-Drift® Mill Sleeve

The CleanWell® Tru-Drift® mill sleeve is designed to provide a 360° downhole drift simulation. Water-coursed stabilizers are locked to the integral mandrel, allowing the mill sleeve to be rotated and to mechanically assist in addressing casing tight spots or restrictions. The mill sleeve can be dressed with tapered tungsten mills for aggressive casing ID restoration or standard stabilizers for routine drift validation.

The Tru-Drift mill sleeve can be run in conjunction with other casing cleaning systems. The mill sleeve can save valuable rig time and helps ensure zero non-productive time is incurred when deploying critical OD equipment downhole. Additionally, the sleeve often eliminates the need to make a wireline/gauge ring run subsequent to displacement operations.

Features and Benefits

- » Robust
- » Integral mandrel
 - Smooth inner bore
 - No internal connections or upsets
- » Large ID to minimize pressure drop
- » 360° drift simulation
- » Locking sleeves rotate with pipe, enabling tight spots to be addressed
- » Simulates close tolerance completion equipment
- » API and premium connections available
- » Adaptable stabilizers
 - Standard stabilizers
 - Tapered mill sleeves
- » Technical specifications validated through finite element analysis modeling

Tru-Drift® Mill Sleeves

| Casing Size in. | Maximum Trip Speed ft/min | Maximum Rotating Speed in Tension RPM | Maximum Rotating Speed in Compression RPM | Maximum Compression While Rotating klb |
|-----------------|---------------------------|---------------------------------------|---|--|
| 9 5/8 to 10 3/4 | 200 | 120 | 90 | 50 |
| 7 to 8 5/8 | 200 | 120 | 90 | 35 |
| 5 to 5 1/2 | 200 | 120 | 90 | 15 |



HAL41870

Tru-Drift®
Mill Sleeve

