Introduction

Running liners is not without risk. Wellbores take on many characteristics that are often challenging to liner deployment. Wells with high pressure differentials and extreme temperature ranges can threaten tool integrity. This can lead to non-productive time, which increases costs. These extreme environments require liner system solutions that can effectively manage the liner to total depth while mitigating risks and withstanding severe conditions.

Liner systems help reduce capital expenditures by eliminating the need to extend a single, long casing string to the top of the wellbore.

A liner hanger allows the liner (casing below the liner hanger) to be suspended in the previous casing string to reduce material costs and provide completion solution options. A seal is required at the top of the liner hanger to prevent transfer of fluid or pressures from either direction. This seal can be in the form of an integral expandable liner hanger or by means of a liner packer.

The Halliburton portfolio of tools offers both expandable and conventional liner hangers to cover all types of well environments from mature and unconventional assets to shallow and ultra-deep water.
Expandable Liner Hanger Systems

VersaFlex® Expandable Liner Hanger Systems

VersaFlex® expandable liner hanger (ELH) systems combine Halliburton industry-leading expandable solid liner hanger technology with our complete range of cementing products and services to offer a total system approach to liner installations.

The system features a VersaFlex integral liner hanger/packer, which is made up of an integral tieback receptacle above an expandable solid hanger body and a lower sleeve designed to carry the tensile and torque loads during deployment. Elastomeric elements are bonded onto the hanger body. As the hanger body is expanded, the elastomeric elements are compressed in the annular space. This virtually eliminates the liner hanger/casing annulus and provides liner-top pressure integrity while delivering impressive tensile and compressive load capacity on setting. With no moving parts, slips, or cages, the simple VersaFlex liner system design helps eliminate the risk of presetting the liner hanger/packer.

Understanding different applications require different solutions, Halliburton has engineered and designed several ELH systems suited for various applications. While these applications cover a wide range of conditions, Halliburton maintains simplicity throughout each system, helping to promote liner deployment and liner-top seal on setting — all while incorporating fewer installation procedures with minimal operational steps.

VersaFlex ELH systems:
- VersaFlex Standard system
- VersaFlex High-Torque system
- VersaFlex Big Bore system
- VersaFlex Breech Lock system
- VersaFlex XSL system
- VersaFlex GT system
- VersaStim® system

Applications
- Drilling liners
- Production liners
- Tight tolerance liners
- Extended reach liners
- Openhole completions
- Horizontal completions
- Drill-in liners

Features
- Liner hanger and liner-top isolation packers are packaged as a single unit
- Packer element design allows for high circulation rates
- Clean-form design improves run-in-hole speeds and circulation rates
- Improved fluid flow with the absence of external components, including slips, hydraulic cylinders, cages, etc.
- Less induced stress and more even stress distribution in supporting casing for a given liner length
- No physical damage to the supporting casing; no slip “wickers” to cut into the supporting casing

Benefits
- Eliminates potential leak paths
- Holds in tension and compression during the life of the well
- Sets in deviated wellbores
- Reduces operating steps
## VersaFlex® Expandable Liner Hanger System

<table>
<thead>
<tr>
<th>Liner Size</th>
<th>Casing Size</th>
<th>Casing Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>in.</td>
<td>in.</td>
<td>lb/ft</td>
</tr>
<tr>
<td>3 1/2</td>
<td>5 1/2</td>
<td>15.5; 17; 20; 23; 26</td>
</tr>
<tr>
<td>5</td>
<td>6 5/8</td>
<td>24</td>
</tr>
<tr>
<td>5; 5 1/2</td>
<td>7</td>
<td>20 to 35</td>
</tr>
<tr>
<td>5 1/2</td>
<td>7 5/8</td>
<td>26.4 to 39</td>
</tr>
<tr>
<td>7; 7 5/8</td>
<td>9 5/8</td>
<td>36 to 58.4</td>
</tr>
<tr>
<td>7 5/8</td>
<td>9 3/8</td>
<td>39</td>
</tr>
<tr>
<td>7 5/8</td>
<td>9 7/8</td>
<td>62.8</td>
</tr>
<tr>
<td>7 3/4</td>
<td>10 3/4</td>
<td>55.5 to 71.1</td>
</tr>
<tr>
<td>9 5/8</td>
<td>11 3/4</td>
<td>54 to 65</td>
</tr>
<tr>
<td>9 5/8</td>
<td>11 7/8</td>
<td>71.8</td>
</tr>
<tr>
<td>11 3/4; 11 7/8</td>
<td>13 3/8</td>
<td>61 to 72</td>
</tr>
<tr>
<td>11 7/8</td>
<td>13 5/8</td>
<td>88.2</td>
</tr>
<tr>
<td>11 7/8</td>
<td>13 3/4</td>
<td>98.58</td>
</tr>
<tr>
<td>11 7/8</td>
<td>14</td>
<td>112.8; 114; 115.53</td>
</tr>
<tr>
<td>13 3/8; 13 5/8; 14</td>
<td>16</td>
<td>84 to 96; 102.9 to 118</td>
</tr>
<tr>
<td>14</td>
<td>18 5/8</td>
<td>136</td>
</tr>
<tr>
<td>16</td>
<td>18</td>
<td>93.54</td>
</tr>
<tr>
<td>16</td>
<td>18 5/8</td>
<td>136</td>
</tr>
<tr>
<td>16</td>
<td>20</td>
<td>129.33; 133; 147; 169</td>
</tr>
<tr>
<td>18</td>
<td>22</td>
<td>224</td>
</tr>
</tbody>
</table>

For additional sizes and weight ranges, please contact your Halliburton representative.
VersaFlex® XSL Expandable Liner Hanger System

VersaFlex® XSL expandable liner hanger (ELH) systems combine the latest design features from across our portfolio of liner hangers that are ideal for onshore and offshore applications. The VersaFlex XSL hanger system is designed to improve the deliverability of a low-to-moderate load-bearing ELH without sacrificing its gas-tight sealing capability or reliability. The system can bring significant value to your well construction project without compromising quality and continues the legacy of our industry-leading ELH technology with a total system approach to liner installations.

The unique body profile of the VersaFlex XSL liner hanger system uses engineered extrusion limiter spikes, which provide a fully compliant metal-to-metal (MTM) seal with full bi-directional anchoring capability. Its ability to provide a 360° MTM seal is backed by redundant resilient elastomeric seals to account for any imperfections in the parent casing. The system offers no external moving parts and its unique integral design eliminates any body connections below the hanger body to minimize leak paths.

Its clean-form design offers a smooth radial flow path allowing for unrestricted bypass area, which assists in reducing equivalent circulating densities (ECDs) during all phases of the operation.

The VersaFlex XSL liner hanger system includes a standard length upper tieback receptacle. The lower setting sleeve can be adapted or easily threaded to a wide range of thread connections and compatible weight ranges.

Applications
» Conventional liner installations
» Onshore and offshore
» Oil and gas
» Vertical to horizontal

Features
» Simple clean-form design
» Integral upper tieback receptacle
» Shortened one-piece expandable hanger body design with engineered extrusion limiter spikes
» 360° hydraulically energized MTM sealing package
» Bi-directional anchoring and sealing capability
» Wash and ream during deployment; rotate and reciprocate during cementing operations
» Runs with VersaFlex standard ball-drop system with quick lock collet
» Compatible with a wide range of industry-standard cementing accessories
Benefits
» Ready-to-run system — install tool and test before shipping
» Set-and-forget sealing — design simplicity helps eliminate risks
» Tieback capable
» Unmatched, redundant gas-tight seal reliability
» High circulating rates

» Engineered extrusion spikes (non-damaging to parent casing ID)
» Based on field-proven VersaFlex® system technology
» Running tools provide hydraulic hanger body expansion — no string weight to set required
» Cement not required for pressure integrity
» Reliable, engineered solution

VersaFlex® XSL Expandable Liner Hanger System

<table>
<thead>
<tr>
<th>Liner Size</th>
<th>Casing Weight</th>
<th>Maximum Elastomer OD</th>
<th>Tieback Receptacle Sealbore ID</th>
<th>Tieback Receptacle Sealbore Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 x 7</td>
<td>29 to 32</td>
<td>5.88</td>
<td>5.25</td>
<td>127.35</td>
</tr>
<tr>
<td>5 1/2 x 7 5/8</td>
<td>29.7 to 33.7</td>
<td>6.56</td>
<td>5.75</td>
<td>126.17</td>
</tr>
<tr>
<td>7/7 5/8 x 9 5/8</td>
<td>47 to 53</td>
<td>8.325</td>
<td>7.75</td>
<td>123.8</td>
</tr>
<tr>
<td>5 x 7</td>
<td>29 to 32</td>
<td>5.88</td>
<td>5.25</td>
<td>127.35</td>
</tr>
<tr>
<td>5 1/2 x 7 5/8</td>
<td>29.7 to 33.7</td>
<td>6.56</td>
<td>5.75</td>
<td>126.17</td>
</tr>
<tr>
<td>7/7 5/8 x 9 5/8</td>
<td>47 to 53</td>
<td>8.325</td>
<td>7.75</td>
<td>123.8</td>
</tr>
</tbody>
</table>

VersaFlex® Tieback Seal Assembly

<table>
<thead>
<tr>
<th>Top Connection</th>
<th>Locator Type</th>
<th>Maximum OD</th>
<th>Minimum ID</th>
<th>Mating Sealbore ID</th>
<th>Muleshoe Guide Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>in.</td>
<td></td>
<td>in.</td>
<td>in.</td>
<td>in.</td>
<td></td>
</tr>
<tr>
<td>4 1/2 API-LC Box</td>
<td>No-Go</td>
<td>5.85</td>
<td>4</td>
<td>5.25</td>
<td>Standard</td>
</tr>
<tr>
<td>5 API-LC Box</td>
<td>No-Go</td>
<td>5.85</td>
<td>4.26</td>
<td>5.25</td>
<td>Standard</td>
</tr>
<tr>
<td>Blanked for 7 5/8-33.7</td>
<td>No-Go</td>
<td>8.36</td>
<td>6.68</td>
<td>7.76</td>
<td>Standard</td>
</tr>
</tbody>
</table>
**VersaFlex® GT Expandable Liner Hanger System**

The VersaFlex® GT expandable liner hanger (ELH) system combines the latest design features from our portfolio of liner hangers that are ideal for geothermal applications with the ability to handle temperature ranges up to 650°F (343°C). The VersaFlex GT system is designed to improve the deliverability of a low-to-moderate load-bearing ELH without sacrificing sealing capability or reliability. The system can provide significant value to your well construction project without compromising quality and continues the legacy of our industry-leading ELH technology with a total system approach to liner installations.

The unique body profile of the VersaFlex GT ELH system uses engineered extrusion limiter spikes, which provide a fully compliant metal-to-metal (MTM) seal with full bi-directional anchoring capability. The system offers no external moving parts, and its unique integral design eliminates any body connections below the hanger body to minimize leak paths. Its clean-form design offers a smooth radial flow path allowing for unrestricted bypass area, which assists in reducing equivalent circulating densities (ECDs) during all phases of the operation.

The VersaFlex GT system includes a standard upper tieback receptacle and a threaded box end, which can be easily adapted by an interchangeable adapter. The system is compatible with a wide range of thread connections and casing weights.

**Applications**
- Geothermal, oil and gas
- Conventional liner installations
- Onshore and offshore
- Vertical to horizontal

**Features**
- Simple clean-form design
- Integral upper tieback receptacle
- Single-piece expandable hanger body design with engineered extrusion limiter spikes
- 360° hydraulically energized MTM sealing package
- Bi-directional anchoring and sealing capability
- Wash and ream during deployment — rotate and reciprocate during cementing operations
- Runs with the VersaFlex standard ball-drop system with quick lock collet
- Compatible with a wide range of industry-standard cementing accessories
Benefits
» Ready-to-run system — install tool and test before shipping
» Set-and-forget sealing — design simplicity helps eliminate risks
» Tieback capable
» Unmatched, redundant gas-tight seal reliability
» Engineered extrusion spikes (non-damaging to parent casing ID)

» High circulating rates
» Based on field-proven VersaFlex® system technology
» Running tools provide hydraulic hanger body expansion — no string weight to set required
» Cement not required for pressure integrity
» Reliable, engineered solution

VersaFlex® GT Expandable Liner Hanger System

<table>
<thead>
<tr>
<th>Hanger Seal Type</th>
<th>Liner OD</th>
<th>Casing Size OD</th>
<th>Casing Weight</th>
<th>Tieback Receptacle ID</th>
<th>Tieback Receptacle Sealbore Length</th>
<th>Expansion Body Material</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>in.</td>
<td>in.</td>
<td>lb/ft</td>
<td>in.</td>
<td>in.</td>
<td></td>
</tr>
<tr>
<td>Metal-to-metal</td>
<td>5</td>
<td>7</td>
<td>29 to 32</td>
<td>5.25</td>
<td>127.35</td>
<td>Low alloy steel, 80 ksi MY</td>
</tr>
<tr>
<td>Metal-to-metal</td>
<td>5 1/2</td>
<td>7 5/8</td>
<td>29.7 to 33.7</td>
<td>5.75</td>
<td>126.17</td>
<td>Low alloy steel, 80 ksi MY</td>
</tr>
<tr>
<td>Metal-to-metal</td>
<td>7, 7 5/8</td>
<td>9 5/8</td>
<td>40, 43.5, 47</td>
<td>7.75</td>
<td>123.8</td>
<td>Low alloy steel, 80 ksi MY</td>
</tr>
<tr>
<td>Metal-to-metal</td>
<td>9 5/8</td>
<td>11 3/4</td>
<td>65</td>
<td>9.66</td>
<td>43.15</td>
<td>Low alloy steel, 80 ksi MY</td>
</tr>
<tr>
<td>Metal-to-metal</td>
<td>11 3/4</td>
<td>13 3/8,13 5/8, 14</td>
<td>68 to 115.53</td>
<td>11.47</td>
<td>43.25</td>
<td>Low alloy steel, 80 ksi MY</td>
</tr>
</tbody>
</table>

For sizes not listed, contact your Halliburton representative.
**XtremeGrip™ Expandable Liner Hanger System**

Halliburton XtremeGrip™ and XtremeGrip high-pressure/high-temperature (HP/HT) expandable liner hanger (ELH) systems take the standard VersaFlex® liner hanger to the next level. This high-performance, advanced technology provides a compliant metal-to-metal (MTM) seal with a fully bonded resilient elastomeric seal to account for imperfections in the parent casing. Its ability to provide an ISO 14310 V0-tested, gas-tight seal on setting is surpassed only by its ability to provide enhanced hang-weight capabilities at elevated temperatures up to 575°F (302°C) and pressures up to 15,000 psi.

Ideal for use from land to deep water and HP/HT applications, and wherever long liners are deployed, the XtremeGrip and XtremeGrip HP/HT systems are designed to mitigate risks and maintain hang-weight capabilities at elevated temperatures and pressures. The system offers increased robustness associated with liners and liner deployment. The hanger and running tool are assembled together and form an intrinsic packoff, which minimizes downhole tool components and potential leak paths while cementing. The standard running tool setup offers washdown capabilities, rotation capabilities without bearings, and simultaneously allows for reciprocation of the liner. Once the cement is placed and the tool actuates the expansion process, the hanger is set to offer bi-directional load capabilities and provide a gas-tight, liner-top seal, which eliminates remedial liner-top squeeze jobs after setting.

The unique body profile of the XtremeGrip and XtremeGrip HP/HT systems utilizes engineered extrusion limiter rings to provide MTM sealing and full bi-directional anchoring capability in all casing grades at elevated temperatures. Its clean-form design offers a smooth radial flow path allowing for an unrestricted bypass area, which assists in reducing equivalent circulating densities (ECDs) during all operation phases.

XtremeGrip ELH systems:
- XtremeGrip Standard system
- XtremeGrip Low ECD system
- XtremeGrip Big Bore system
- XtremeGrip HP/HT system

**Applications**
- Land
- Offshore
- Deep water
- HP/HT
Features
» Simple, clean-form design
» MTM seal with resilient elastomeric seal¹
» Eliminates internal body connections
» 360° hydraulically energized compliant seal
» Engineered extrusion limiter rings
» Gas-tight, ISO 14310 V0 qualified²
» Performs in elevated temperature and pressure environments — tested up to 575°F (302°C) and pressures up to 15,000 psi
» Heavy liners and vertical or long lateral installations

¹Resilient seals might not be present on all hangers, application dependent.
²Contact a Halliburton representative for full list of V0-qualified hangers.

Benefits
» Maintains hang-weight capability at elevated temperatures
» Sets in standard and heavy-weight parent casings
» Applicable across multiple applications
» Reduces ECDs and improves flow rates
» Single-piece integral tieback receptacle/packer/hanger minimizes leak paths
» Fewer connections, less parts, less problems
» Energized sealing mechanism does not require drillpipe weight to set packer/hanger
» Reliable, engineered solution

<table>
<thead>
<tr>
<th>Liner Size</th>
<th>Casing Size</th>
<th>Casing Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>in.</td>
<td>in.</td>
<td>lb/ft</td>
</tr>
<tr>
<td>4 1/2; 5 1/2</td>
<td>7</td>
<td>32; 35; 38</td>
</tr>
<tr>
<td>4 1/2</td>
<td>7 5/8</td>
<td>35.8</td>
</tr>
<tr>
<td>5 1/2</td>
<td>7 5/8; 8 1/8</td>
<td>33.7; 54</td>
</tr>
<tr>
<td>5 3/4</td>
<td>7 5/8; 7 3/4</td>
<td>35.8; 42.8; 46.1</td>
</tr>
<tr>
<td>7 3/4</td>
<td>9 3/8; 9 5/8; 9 7/8; 9 3/4; 10; 10 1/8</td>
<td>39; 47; 53.5; 62.8; 65.1; 65.3; 68.8; 69.9; 79.3; 81</td>
</tr>
<tr>
<td>9 5/8; 10 1/8</td>
<td>11 3/4; 11 7/8</td>
<td>65; 71.8</td>
</tr>
<tr>
<td>11 3/4; 11 7/8</td>
<td>13 3/8; 13 5/8; 13 3/4; 13 7/8; 14; 14.15</td>
<td>54.5; 61; 68; 72; 88.2; 94.8; 98.58; 100; 105.89; 112.6; 113; 114; 115; 115.53; 116; 126.82</td>
</tr>
<tr>
<td>13 5/8; 14</td>
<td>16; 16.04; 16.15</td>
<td>84; 102.9; 109; 109.61; 119.23; 126.91; 127.5</td>
</tr>
<tr>
<td>16</td>
<td>18</td>
<td>93.5; 94; 105</td>
</tr>
</tbody>
</table>

Additional sizes or weight ranges are under development and testing.

<table>
<thead>
<tr>
<th>Liner Size</th>
<th>Casing Size</th>
<th>Casing Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>in.</td>
<td>in.</td>
<td>lb/ft</td>
</tr>
<tr>
<td>5 1/2</td>
<td>7</td>
<td>32; 35; 38</td>
</tr>
<tr>
<td>5 3/4</td>
<td>7 5/8; 7 3/4</td>
<td>35.8; 42.8; 46.1</td>
</tr>
<tr>
<td>7 5/8; 7 3/4</td>
<td>9 3/8; 9 5/8; 9 7/8; 9 3/4; 10; 10 1/8</td>
<td>39; 47; 53.5; 62.8; 65.1; 65.3; 68.8; 69.9; 79.3; 81</td>
</tr>
<tr>
<td>10 3/4; 11 3/4; 11 7/8</td>
<td>13.625; 13.875; 14; 14.15</td>
<td>88.2; 105.89; 115; 115.53; 116; 126</td>
</tr>
<tr>
<td>13 5/8; 14</td>
<td>16; 16.04; 16.15</td>
<td>84; 102.9; 109; 109.61; 119.23; 126.91; 127.5</td>
</tr>
</tbody>
</table>

Selected sizes in the XtremeGrip™ system portfolio are available in the HP/HT configuration to meet industry-recognized temperature ratings of up to 575°F (302°C) and pressure ratings up to 15,000 psi.

Additional sizes or weight ranges are under development and testing.
**Expandable Liner Hanger Setting Tools**

Halliburton offers various setting tool designs based on the hanger configuration and application. Primary systems are:

» Standard ball/flapper set
» Quick lock
» High torque
» Low equivalent circulating density (ECD)
» Big Bore
» Breech lock adjustable pressure setting tool

The expandable liner hanger expansion (setting) is accomplished using a hydraulically actuated liner running/setting tool assembly. This unique system provides the necessary expansion mechanics, cementing packoff system, a collet assembly to carry the liner weight and transfer that weight to the drillstring while providing torque, and an expansion indicator assembly. The running/setting tool assembly features a primary and secondary releasing system for maximum reliability.

**Features**

Each tool design is unique; however, each cementing liner hanger running tool contains four primary components, which simplifies processes and enhances reliability.

» Piston provides the transition from pressure to force during the expansion process. Various forms of pistons and force multipliers are used to create force.
» Crossover valve incorporates multiple porting, which allows pressure paths for hydraulic expansion and fluid returns paths during the reverse out process.
» Expansion cone assembly uses the force from the piston to drive the cone into the hanger body, expanding it into the parent casing.
» Collet assembly transfers the load of the liner string being conveyed into the wellbore to the drillpipe and transmits torque to the liner through contact with the collet retainer to torque adapter.

**Benefits**

» Allows for washing and reaming during deployment without special configurations of each tool
» Higher circulating rates and pressures than conventional systems
» Allows rotation and reciprocation during cementing operations
» Debris-tolerant porting
» Simplified setting processes and procedures
» Redundant setting features on all flapper-set tools
» Tertiary setting systems on high torque tool system
» Standard contingency release features
## Expandable Liner Hanger Setting Tools Portfolio

<table>
<thead>
<tr>
<th>Tool Types</th>
<th>Sizes</th>
<th>Applications</th>
<th>Distinguishing Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ball Set¹⁻²⁻³</td>
<td>5 × 7 in. 5 1/2 × 7 5/8 in. 7 5/8 × 9 5/8 in.</td>
<td>Drilling Liners Production Liners</td>
<td>J-slot upgrade kit available for deviated wellbores Primary expansion by ball set (rupture disk) Weight-down contingency release</td>
</tr>
<tr>
<td>Flapper Set²</td>
<td>9 5/8 × 11 3/4 in. 9 5/8 × 11 7/8 in.</td>
<td>Drilling Liners Tight Tolerance Liners Drill-In Liners</td>
<td>J-slot upgrade kit available for deviated wellbores Primary expansion by flapper valve (secondary ball set) Weight-down contingency release</td>
</tr>
<tr>
<td>Quick Lock⁴</td>
<td>5 × 7 in. 5 1/2 × 7 5/8 in. 11 7/8 × 13 5/8 in.; 13 3/4 in.; 14 in. 13 5/8 × 16 in.</td>
<td>Drilling Liners Production Liners Tight Tolerance Liners Drill-In Liners</td>
<td>J-slot upgrade kit available for deviated wellbores Primary expansion by flapper set (secondary ball set) Weight-down contingency release Mates to single-piece hanger body</td>
</tr>
<tr>
<td>High Torque</td>
<td>3 1/2 × 5 1/2 in. 5 1/2 × 7 5/8 in. 7 5/8 × 9 5/8 in.; 9 7/8 in. 7 3/4 × 10 3/4 in.</td>
<td>Drilling Liners Production Liners Drill-In Liners</td>
<td>Primary expansion by flapper set Two contingency setting methods Mechanical contingency release</td>
</tr>
<tr>
<td>Low ECD</td>
<td>5 1/2 × 7 3/4 in. 7 5/8 × 9 5/8 in.</td>
<td>Drilling Liners Production Liners Drill-In Liners</td>
<td>Primary expansion by ball set Weight-down contingency release</td>
</tr>
<tr>
<td>Big Bore</td>
<td>14 × 16 in. 16 × 18 in. 14 × 18 5/8 in. 16 × 18 5/8 in. 16 × 20 in. 17 × 20 in. 17 7/8 × 22 in. 18 × 22 in.</td>
<td>Drilling Liners Tight Tolerance Liners</td>
<td>Primary expansion by ball set Weight-down contingency release</td>
</tr>
<tr>
<td>Breech Lock Adjustable Pressure Setting Tool</td>
<td>5 × 7 in. 7 5/8 × 9 5/8 in.</td>
<td>Cemented Liners Non-Cemented Liners VersaStim® Frac Liners</td>
<td>Primary setting by ball set Weight-down or mechanical contingency release</td>
</tr>
</tbody>
</table>

Separate options as noted:
¹ Flapper valve conversion kit or complete tool option
² J-slot lockout conversion kit or complete tool option
³ Available as a complete assembly with adjustable pressure setting module
⁴ Force multiplier kit required for 14-in. hanger

Note: Sizes listed are general. Contact your Halliburton representative for additional sizes.
Expandable Liner Hanger Accessories

Tieback Seal Units

The expandable tieback seal unit is designed to be installed into the upper tieback receptacle (TBR) of the liner hanger assembly. Tieback seal units allow for the upper casing string to be tied back to surface, while leaving the largest possible ID in the hanger assembly.

» Tieback seal units are designed to be fully landed, allowing a no-go locator to locate at the top of the TBR.

» When required to cement surface casing in place, the tieback seal unit can be used alone or in conjunction with Halliburton SuperFill™ TB equipment. (See additional data located within the Halliburton Casing Equipment product service line.)

» Metallurgy and seal units can be selected to suit well conditions.

» Seal units are available in three types of elastomer configurations: premium, molded, and bonded.
Expandable Liner Hanger Plug Systems

The VersaFlex® plug system consists of three main components: the VersaFlex plug assembly, wiper dart, and landing collar. Each component must be ordered separately to meet size and material requirements.

VersaFlex Plug Assembly

The plug design uses the proven HWE® high wiping efficiency cementing plug to provide superior wiping performance and fluid separation with a single wiper plug. The plug design has several unique features that provide improved functionality and reliability, including:

» Integral swivel mechanism allows plug rotation during makeup to the liner along with an equalizing feature to help prevent damage from pressure applied to the plug

» Adjustable shear pins allow adjustable pressure release features to help ensure plug launch during displacement operations

» Spacer tube fully encapsulates the drillpipe wiper dart to assist in centralization of dart for secure latch

» Designed for the most common casing sizes

» Designed to be used in conjunction with a VersaFlex landing collar

» Two distinct types:
  - Standard HWE plug assembly for use in casing sizes of 4 1/2 to 5 1/2 in.
  - Heavy mud HWE plug assembly for use in casing sizes of 7 to 11 3/4 in.
VersaFlex® MCXV Wiper Dart

The VersaFlex® MCXV wiper dart is a unique releasing plug designed specifically for use with the VersaFlex plug assembly. (SSR® subsurface release wiper plugs are not compatible with this system.)

» The wiper dart is available to cover a variety of standard drillpipe sizes.
» Wiper darts for tandem string scenarios also available.

VersaFlex Landing Collar

The VersaFlex plug assembly is designed to be used in conjunction with a landing collar. The VersaFlex plug assemblies and landing collars have been designed for the most common casing sizes.

» Uniquely designed to mate with the VersaFlex plug assembly.
» The specially designed landing collar helps ensure a positive seal is created when plug bump is achieved and is primarily available in P110 or P110/Q125 grades.
**MatchSet™ Conventional Liner Hanger Systems**

MatchSet™ conventional liner hanger systems help solve well challenges in which modular design capability and minimizing risks are key priorities. This suite of conventional liner hanger technologies can result in quantifiable reductions in well construction costs, yet still allow for value in overall performance.

The MatchSet liner hanger system portfolio includes slip-type liner hangers, such as mechanical or hydraulic-set, coupled with a full range of integrated liner-top packers, tieback receptacles, and other complementary components required for a variety of applications.

Regardless of system selection, the goal is always to get the liner to bottom as effectively and efficiently as possible. Our MatchSet liner hanger systems allow for all aspects of a standard liner hanger installation.

**Features**
- Compact design
- Pocket-slip arrangement
- Uniform slip loading
- Heavy load-hanging capability

**Benefits**
- Modular design adjustable to application configuration
- Weight-set sealing element
- Dynamic service tool before cementing
**MatchSet™ Pocket-Slip Liner Hanger**

The MatchSet™ pocket-slip liner hanger has a unique compact design for highly deviated or horizontal wells. The hanger is equipped with premium o-rings and glass-filled Teflon® backup rings to seal in the hydraulic cylinder. A high-strength alloy cylinder provides maximum burst and collapse rating.

The hanger is set by applying pressure through the drillpipe. A setting ball is circulated or dropped to the ball seat in the landing collar or running tool. Applied pressure acts on an internal piston, moving the slips up the cones to the set position. The hydraulic-set liner hanger incorporates a tapered roller-bearing assembly, if required, which allows the liner to be rotated in the set position while cementing the liner.

**Applications**
- Drilling liner
- Production liner
- Openhole horizontal wells
- Unconventional completions

**Features and Benefits**
- Unique protected slip design provides more slip contact area and uniform loading
- Available in rotation or non-rotation models in which the tapered roller bearings allow the liner to be rotated in the set position
- Hydraulic cylinder remains stationary with respect to body, seals static during rotation
- Slip and cone designed for minimum casing stress levels
- Capable of hanging long and heavy liners
- Hardened slips bite and hold in all standard casing grades
- Large annular flow area in set position helps ensure minimum pressure drop
- Liner hanger body and cylinder have burst and collapse ratings equal to or greater than the API specifications for relevant grade of casing (unless otherwise stated)

Teflon® is a registered trademark of The Chemours Company.

**MatchSet™ Pocket-Slip Liner Hanger**

<table>
<thead>
<tr>
<th>Liner Size in.</th>
<th>Casing Size in.</th>
<th>Casing Weight lb/ft</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 1/2</td>
<td>7</td>
<td>23 to 38</td>
<td>L80, P110, and Q125</td>
</tr>
<tr>
<td>5</td>
<td>7</td>
<td>23 to 38</td>
<td></td>
</tr>
<tr>
<td>5 1/2</td>
<td>7 5/8</td>
<td>29.7 to 45.3</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>9 5/8</td>
<td>40 to 58.4</td>
<td></td>
</tr>
<tr>
<td>7 5/8</td>
<td>9 5/8</td>
<td>40 to 53.5</td>
<td></td>
</tr>
<tr>
<td>9 5/8</td>
<td>13 3/8</td>
<td>54.5 to 72</td>
<td></td>
</tr>
</tbody>
</table>

For additional sizes and material grades, please contact your Halliburton representative.

---

Completion Solutions

**MatchSet™ Pocket-Slip Liner Hanger**
**MatchSet™ Liner Hanger with Integral Liner-Top Packer**

The MatchSet™ liner hanger with integral liner-top packer has a unique compact design for highly deviated or horizontal wells. The hanger is equipped with premium o-rings and glass-filled Teflon® backup rings to seal in the hydraulic cylinder. A high-strength alloy cylinder provides maximum burst and collapse rating.

The hanger is set by applying pressure through the drillpipe. A setting ball is circulated or dropped to the ball seat in the landing collar or running tool. Applied pressure acts on an internal piston, moving the slips up the cones to the set position. The hydraulic-set liner hanger incorporates a tapered roller-bearing assembly, if required, which allows the liner to be rotated in the set position while cementing the liner.

The liner-top packer is a high-performance packer that is suited for most applications and sets by applying set-down weight. The packer provides an effective annular seal between the top of the liner and the parent casing, preventing formation breakdown, loss of cement slurry, and gas migration above the liner top during the life of the well. The liner-top packer features holddown slips, making it suitable for use in deviated or horizontal wells. Connection to accept an upper tieback receptacle is standard.

**Applications**

- Drilling liner
- Production liner
- Openhole horizontal wells
- Unconventional completions

Teflon® is a registered trademark of The Chemours Company.
Liner Hanger Features and Benefits
» Unique protected slip design provides more slip contact area and uniform loading
» Available in rotation or non-rotation models in which tapered roller bearings allow the liner to be rotated in the set position
» Hydraulic cylinder remains stationary with respect to body, seals static during rotation
» Slip and cone designed for minimum casing stress levels
» Capable of hanging long and heavy liners
» Hardened slips bite and hold in all standard casing grades
» Large annular flow area in set position helps ensure minimum pressure drop
» Body and cylinder have burst and collapse ratings equal to or greater than the API specifications for the relevant grade of casing (unless otherwise stated)

Liner-Top Packer Features and Benefits
» High-performance, compression-set liner-top packer
» Provides effective annular seal at liner top
» Prevents formation breakdown, loss of cement slurry, and gas migration
» Integral body lock ring holds positive set in seal elements
» Holddown slips prevent light liners from moving

MatchSet™ Liner Hanger with Integral Liner-Top Packer

<table>
<thead>
<tr>
<th>Liner Size</th>
<th>Casing Size</th>
<th>Casing Weight</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>in.</td>
<td>in.</td>
<td>lb/ft</td>
<td></td>
</tr>
<tr>
<td>4 1/2</td>
<td>7</td>
<td>23 to 38</td>
<td>L80, P110, and Q125</td>
</tr>
<tr>
<td>5</td>
<td>7</td>
<td>23 to 38</td>
<td></td>
</tr>
<tr>
<td>5 1/2</td>
<td>7 5/8</td>
<td>29.7 to 45.3</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>9 5/8</td>
<td>40 to 58.4</td>
<td></td>
</tr>
<tr>
<td>7 5/8</td>
<td>9 5/8</td>
<td>40 to 53.5</td>
<td></td>
</tr>
<tr>
<td>9 5/8</td>
<td>13 3/8</td>
<td>54.5 to 72</td>
<td></td>
</tr>
</tbody>
</table>

For additional sizes and material grades, please contact your Halliburton representative.
MatchSet™ Liner-Top Packer

The MatchSet™ liner-top packer is a high-performance packer that is suited for most applications and sets by applying set-down weight. The packer provides an effective annular seal between the top of the liner and the parent casing, preventing formation breakdown, loss of cement slurry, and gas migration above the liner top during the life of the well.

The liner-top packer features holddown slips, making it suitable for use in deviated or horizontal wells. Connection to accept an upper tieback receptacle is standard.

Applications
» Drilling liner
» Production liner
» Openhole horizontal wells
» Unconventional completions

Features and Benefits
» High-performance, compression-set liner-top packer
» Provides effective annular seal at liner top
» Prevents formation breakdown, loss of cement slurry, and gas migration
» Integral body lock ring holds positive set in seal elements
» Holddown slips prevent light liners from moving
» Configuration with or without slips

MatchSet™ Liner-Top Packer

<table>
<thead>
<tr>
<th>Liner Size</th>
<th>Casing Size</th>
<th>Casing Weight</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>in.</td>
<td>in.</td>
<td>lb/ft</td>
<td></td>
</tr>
<tr>
<td>4 1/2</td>
<td>7</td>
<td>23 to 38</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>7</td>
<td>23 to 38</td>
<td></td>
</tr>
<tr>
<td>5 1/2</td>
<td>7 5/8</td>
<td>29.7 to 45.3</td>
<td>L80, P110, and Q125</td>
</tr>
<tr>
<td>7</td>
<td>9 5/8</td>
<td>40 to 56.4</td>
<td></td>
</tr>
<tr>
<td>7 5/8</td>
<td>9 5/8</td>
<td>40 to 53.5</td>
<td></td>
</tr>
<tr>
<td>9 5/8</td>
<td>13 3/8</td>
<td>54.5 to 72</td>
<td></td>
</tr>
</tbody>
</table>

For additional sizes and material grade, please contact your Halliburton representative.
**MatchSet™ Integral Tieback Packer and Tieback Seal Assembly**

The MatchSet™ tieback packer is a liner-top packer used to prevent microannular gas leaks at the liner top. The packer is frequently run on drillpipe using a mechanical setting tool, tieback receptacle, and liner setting sleeve with tieback extension. The seal stem is inserted until seated and pressure is tested down the drillpipe. Additional set-down weight shears the release pins and sets the packer seal.

The tieback stem on the MatchSet tieback packer has three sets of chevron-type premium seals for severe pressure and temperature applications. It features a ratchet lock in the setting shoulder to prevent premature setting while running in. Holddown slips and an internal body lock ring maintain seal compression and prevent floating of short liners. Tieback receptacles are available with this packer in different lengths, and the assembly can be configured with a mechanical- or hydraulic-release running tool with rotational capability, if required.

**Features and Benefits**

» Used to prevent microannular gas leaks at the liner top

» Integral body lock ring holds positive set in seal elements

» Ratchet lock feature prevents premature setting while running in hole

» Chevron-type premium seals provide high-temperature/high-pressure tieback capabilities

» Setting tool is released with right-hand rotation

### MatchSet™ Integral Tieback Packer and Tieback Seal Assembly

<table>
<thead>
<tr>
<th>Liner Size</th>
<th>Casing Size</th>
<th>Casing Weight</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>in.</td>
<td>in.</td>
<td>lb/ft</td>
<td></td>
</tr>
<tr>
<td>4 1/2</td>
<td>7</td>
<td>23 to 38</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>7</td>
<td>23 to 38</td>
<td></td>
</tr>
<tr>
<td>5 1/2</td>
<td>7 5/8</td>
<td>29.7 to 45.3</td>
<td>L80, P110, and Q125</td>
</tr>
<tr>
<td>7</td>
<td>9 5/8</td>
<td>40 to 58.4</td>
<td></td>
</tr>
<tr>
<td>7 5/8</td>
<td>9 5/8</td>
<td>40 to 53.5</td>
<td></td>
</tr>
<tr>
<td>9 5/8</td>
<td>13 3/8</td>
<td>54.5 to 72</td>
<td></td>
</tr>
</tbody>
</table>

For additional sizes and material grades, please contact your Halliburton representative.
**MatchSet™ Hydraulic Latch Landing Collar with Ball Catcher**

The MatchSet™ hydraulically activated landing collar is used when running hydraulic-set liner hangers or other hydraulic-activated components in a liner string. A setting ball lands in the ball seat allowing pressure to be applied to the hanger to set the slips. This releases the hydraulic running tool from the liner at a higher pressure before shearing the pre-installed shear pins and removing the seat from the flow path. A retained ball-seat design prevents the sheared-out cage and ball assembly from interfering with float equipment installed below the landing collar. Large milled slots provide an unrestricted flow area while cementing. Internal components are constructed of wrought aluminum and are compatible for drillout.

**Features and Benefits**
- Robust latch assembly for liner wiper
- Standard hydrogenated nitrile rubber (HNBR) seals
- Available with anti-wear coating

<table>
<thead>
<tr>
<th>Liner Size</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>in.</td>
<td></td>
</tr>
<tr>
<td>4 1/2</td>
<td>L80, P110, and Q125</td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>5 1/2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
<tr>
<td>7 5/8</td>
<td></td>
</tr>
<tr>
<td>9 5/8</td>
<td></td>
</tr>
</tbody>
</table>

For additional sizes and material grade, please contact your Halliburton representative.
Float Equipment for Expandable and Conventional Liner Hangers

Super Seal II® Float Equipment

Super Seal II® floating equipment is installed in and becomes an integral part of the casing string. This equipment helps float and cement the casing in the well. The equipment’s basic backpressure and temperature ratings (5,000 psi and 400°F) allow it to be used in most wells. The plastic valve materials and surrounding shear and shockload-resistant concrete exceed the strength requirements for landing cementing plugs. The valve assembly and the cement holding the valve assembly in place can be drilled out easily with roller-cone rock bits or polycrystalline diamond compact bits after cementing operations. All casing-size Super Seal II float shoes and collars are supplied with an autofill feature. Customers can request Super Seal II float equipment for any casing grade or premium thread.

Super Seal II Float Collar

The Super Seal II float collar includes the Super Seal II backpressure valve, which prevents cement pumped into the casing/wellbore annulus from re-entering the casing ID after cementing operations. The float collar is normally installed one or two joints above the float or guide shoe.

Float Shoe

The high-port up-jet (HPUJ) float shoe jets the formation face to remove detrimental mudcake and cuttings, increasing the chances of a successful cement-to-formation bond. The high circulation rates and cement flow rates that are possible with the Super Seal II float valve allow turbulent flow at the shoe without damaging the float valve.

- Approximately 40% of the fluid pumped through the equipment is discharged at a high velocity through the bottom of the float shoe.
- All Super Seal II HPUJ float shoe casing sizes use the same autofill strap used for the Super Seal II float valve.