High-Lift Injection Valve
Debris tolerant, retrievable injection valve capable of high injection rates

Overview
The High-Lift Injection Valve is a compact, spring-loaded design for use in wells where reliability, high injection rates and extremely low pressure drops are a necessity.

Deployed below a wireline lock or bridge plug, the valve can be used to inject water, gas or re-inject cuttings back into the reservoir.

The valve is held closed by a spring-loaded “poppet and seat” mechanism. As injection commences, the valve poppet is easily pushed off-seat allowing smooth bypass of the injected material.

When injection is stopped, the poppet is automatically returned to its seated position by the spring, allowing pressure to build up from below and preventing fluids from flowing back up the well.

The operating mechanism is not flow rate or depth sensitive making the valve extremely versatile. This enables the same valve to be installed anywhere in the wellbore without the need for adjustment, simplifying operational planning and logistics.

Features and Benefits
- High-Lift Mechanism
  Allows the poppet to move easily to the fully open position with minimal injection flow rate.

- Large Flow Area
  Helps ensure a smooth flow path, providing a negligible pressure drop through the valve, while reducing the effects of erosion due to turbulence and maximizing the achievable injection rate.

- Debris Tolerant
  Unique cutaway outer housing with bypass ports minimizes the potential for debris buildup.

- Flexible Design
  Valve is not flow rate or depth sensitive, resulting in reduced inventory requirements and ease of operational planning.

- Durability
  Key components are protected from erosion with specialized coatings.

Debris and Flow
Debris ingress is one of the main failure modes for standard injection valves, especially in older completions due to the condition of the tubing. To mitigate the effects of debris, the High-Lift Injection Valve features a unique cutaway outer housing below the poppet. This design gives the valve a high bypass flow area, minimizing the potential for debris buildup.

Maximizing the flow area also ensures a smooth flow path while providing a negligible pressure drop through the valve and reducing the effects of erosion due to turbulence.

Jetting ports built into the main body wash debris away from the poppet as the valve operates, helping provide a good seal when the valve is closed.
The key components that are exposed to injection flow are protected with specialized coatings. This helps protect the valve sealing surfaces from the effects of erosional flow, particularly when large amounts of debris are anticipated. In addition, the poppet geometry deflects injected material away from the seal face, providing additional protection from erosion during injection. No dynamic seals are used in the operation of the valve.

In the vast majority of applications, the minimum restriction will be the anchoring device (lock or packer) used with the valve.

Applications
The valve can be used in a variety of different applications:
- Water injection
- Gas injection
- Cuttings re-injection (CRI)
- CO₂ re-injection
- Water Alternate Gas (WAG) injection
- Stimulation treatments
- Steam injection

Specifications
The High-Lift Injection Valve is available in a range of sizes and specifications. Due to the high number of design variables, the information given below is for guidance only. Your Halliburton representative will be able to provide further details.

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>Max OD</th>
<th>Overall Length</th>
<th>Flow Area</th>
<th>Max Pressure</th>
<th>Cracking Pressure</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>in.</td>
<td>in. (mm)</td>
<td>in. (mm)</td>
<td>in² (cm²)</td>
<td>psi (bar)</td>
<td>psi (bar)</td>
<td>lbs (kg)</td>
</tr>
<tr>
<td>2 7/8</td>
<td>1.750 (44.45)</td>
<td>13.82 (351.03)</td>
<td>0.96 (6.19)</td>
<td>5,000 (344.7)</td>
<td>10 (0.69)</td>
<td>4.41 (2)</td>
</tr>
<tr>
<td>3 ½</td>
<td>2.650 (67.31)</td>
<td>18.53 (470.66)</td>
<td>2.79 (18.00)</td>
<td>5,000 (344.7)</td>
<td>6 (0.41)</td>
<td>9.92 (4.5)*</td>
</tr>
<tr>
<td>4</td>
<td>3.100 (78.74)</td>
<td>22.53 (572.26)</td>
<td>3.91 (25.23)</td>
<td>5,000 ** (344.7)</td>
<td>5 (0.34)</td>
<td>16.76 (7.6)</td>
</tr>
<tr>
<td>4 ½</td>
<td>3.655 (92.84)</td>
<td>25.75 (654.05)</td>
<td>5.39 (34.77)</td>
<td>5,000 (344.7)</td>
<td>6 (0.41)</td>
<td>28.66 (13)</td>
</tr>
<tr>
<td>5 ½</td>
<td>4.265 (108.33)</td>
<td>27.21 (691.13)</td>
<td>7.62 (49.16)</td>
<td>5,000 ** (344.7)</td>
<td>5 (0.34)</td>
<td>44.10 (20)</td>
</tr>
<tr>
<td>7</td>
<td>5.710 (145.03)</td>
<td>30.94 (785.88)</td>
<td>13.85 (89.35)</td>
<td>5,000 ** (344.7)</td>
<td>5 (0.34)</td>
<td>92.60 (42)</td>
</tr>
</tbody>
</table>

* Estimated ** Valves with Inconel metallurgy are rated at 7,500 psi

Primary Materials

<table>
<thead>
<tr>
<th>Metallurgy</th>
<th>17-4PH (27-33 Rc) or Inconel 718 (34-40 Rc)</th>
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<tr>
<td>Elastomers</td>
<td>Viton, ED Resistant Viton (VE) or Chemraz</td>
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For more information about the High-Lift Injection Valve, contact your local Halliburton representative or email completions@halliburton.com.

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