STEELSEAL®
Lost Circulation Material

CHALLENGE
During the drilling process, wellbore instability and lost circulation are major causes of drilling non-productive time, which inherently is a large cost for the operator. When combined with the additional cost associated with the lost fluids, lost circulation prevention becomes an important issue. As the industry continues to explore in more difficult drilling conditions, it is important to provide lost circulation technology that is able to manage circumstances such as depleted formations, higher temperatures and pressures, and fractured/vugular carbonates.

OVERVIEW
STEELSEAL® lost circulation materials are highly resilient, angular, dual composition, carbon-based particulate additives designed to compress with an increase in downhole pressures. Resiliency is one of the more unique characteristics of STEELSEAL particulate, a compressive property allowing it to “mold” itself into the fracture, promoting retention of screen-out. Given downhole pressure fluctuations, the material “rebounds,” thus continuing to isolate the fracture tip. This property makes STEELSEAL additive one of the most effective lost circulation materials that is currently available for both preventing lost circulation, as well as treating lost circulation after it occurs.

FEATURES
» High resiliency, dual composition carbon based material
» Resiliency up to 120%
» Effective in aqueous- and non-aqueous based fluids
» High concentrations (100 lb/bbl.) have been added without plugging drilling equipment or adversely affecting rheological properties
» Non-magnetic and does not affect downhole logging tools
» Increased lubricity in water-based fluids
» Can be used as pretreatment to prevent seepage
» Suitable for all well types, including HP/HT wells
» Retains a granular property up to closure pressures of 10,000 psi.

BENEFITS
» Unique material helps increase productivity for multiple drilling conditions, including HP/HT scenarios
» Cost-efficient
» Increases drilling performance
» Reduces non-productive time
» Deform to multiple fracture sizes

The resilient graphitic carbon component of STEELSEAL® highly resilient lost circulation material demonstrates a powerful spring-back effect that contributes to the performance of STEELSEAL lost circulation material products under changing differential pressures.
The addition of lost circulation materials may impact drilling fluid properties and even increase the equivalent circulating density (ECD) of the fluid; which is counter-productive when treating a loss zone. STEELSEAL lost circulation material treatments have no adverse effect on the rheological properties, even if used in relatively high concentrations.

STEELSEAL resilient graphitic carbon material is manufactured using an electro thermal purification batch process which removes all impurities and gives the material the distinctive resiliency characteristic, resulting in a unique product that is non-magnetic and does not interfere with logging tools.

STEELSEAL 50, 100, 400 and 1000 materials have specifically designed particle size distributions. These pre-determined particle size distributions help STEELSEAL lost circulation material perform as a bridging agent over a wide range of pore and fracture sizes and helps stop losses where more conventional materials might fail.

Resiliency Measurement: After release of pressure, high resiliency materials will still produce a granular specimen. Lower resilient materials will make a slug of permanently compacted matter.

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<tr>
<th>MATERIAL SPECIFICATIONS</th>
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<tbody>
<tr>
<td><strong>PROPERTIES</strong></td>
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<tr>
<td>Resiliency (%)</td>
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<tr>
<td>Specific Gravity (g/cc)</td>
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<tr>
<td>Ash (%)</td>
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<tr>
<td>Moisture (%)</td>
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<td>Nominal Size (D50 - µm)</td>
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