WellLock® Resin System

WellLock® resin system can function as a gas-impermeable secondary barrier to the primary cement sheath. It is also ideal for squeeze applications and microannuli repairs or for permanent plug and abandonment. It can be solid laden or used as a pure clean fluid.

To serve as a secondary barrier, WellLock resin system can be placed in the space between the surface casing and intermediate casing and/or intermediate and production casing to provide the mechanical function of an annular packer; yet without the rig-time requirements of running it in with casing and activating with a plug or dart.

WellLock resin can also be used on squeeze jobs where fine-particle cement blends would otherwise be required or when solid-free material is needed. In squeeze cementing operations this resin system can be applied where conditions make particle-laden fluids undesirable and unable to penetrate areas previously inaccessible to conventional cement slurry, such as “tight” casing leaks, gravel packs, small fractures, channels, or microannuli.

Secondary Barrier

While designing the cement sheath with resilient properties capable of withstanding downhole forces and resisting mechanical fatigue, Halliburton also provides secondary barriers. The height of this secondary barrier is not limited to tool heights; instead a wellbore-specific volume (for desired height) can be mixed and pumped. With low viscosities, it flows to fill the void space regardless of the geometry, providing a highly ductile and gas-impermeable secondary barrier.

Tight Casing Leaks

Conventionally, “tight” casing leaks (the type that bleed off pressure yet will not accept a continuous injection rate) are treated with acid to increase the leak area so that cement slurry can enter. However, WellLock resin system is able to penetrate the small leak much more readily and therefore can successfully make the repair without prior breakdown, saving the time and cost of an acid treatment.

Gravel Packs

Wells completed and produced containing gravel packs can develop high-permeability streaks resulting in steam or water breakthrough and the attendant problems associated with either condition. Standard cement slurries, because of their greater particle size, are unable to produce more than a skin effect following squeeze procedures. WellLock resin system, however, is able to penetrate the permeability of the gravel pack to effectively shut off undesired water, gas, or steam production.

Permanent Plug and Abandonment

In addition to squeeze cementing, the WellLock resin system can be used as a permanent plugging material.

Properties

The mechanical properties of this product can be tailored to meet a variety of wellbore challenges. The product can be controlled over a wide range of temperatures up to 200°F. Compressive strengths can range from ≤1,000 psi to ≥18,000 psi. Likewise, tensile strength can range from several 100 psi to ≥2,000 psi. The WellLock resin is chemically inert and resistant to acid, base, and hydrocarbons. WellLock resin can withstand impurities in the wellbore and achieve a set state with high bond strength. Thus, it can form a competent hydraulic seal in an environment where aqueous- or hydrocarbon-based fluids have not been efficiently displaced.

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### WellLock® Resin System

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<thead>
<tr>
<th>SAP Number</th>
<th>721271</th>
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<tbody>
<tr>
<td>Function</td>
<td>Cement additive— Resin Plugging Material</td>
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<tr>
<td>Form</td>
<td>Liquid</td>
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<tr>
<td>Color</td>
<td>Clear - Brown</td>
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Benefits

The WellLock resin system can provide the following benefits:

- Excellent mechanical properties
  - High ductility
  - Compressive strengths up to 18,000 psi
  - Withstand 100 times more than the typical pressure differential required within the wellbore
  - Withstand impurities in the wellbore and achieve a set state with high bond strength
- Flexible in placement technique and can handle extreme wellbore conditions and geometries
- Can have very low rheological values without detrimental effects
- Compatible with brines and hydrocarbon fluids
- Secondary annular barrier to help seal off formation gasses, formation fluids and/or well fluids consistent with regulatory programs
- Eliminates the rig-time requirements of running an annular casing packer in with the casing and then activating with a plug or dart, while achieving the same mechanical function as an annular casing packer
- When pumped ahead of cement, resin film enhances cement bond to casing up to six fold (6X), as demonstrated in laboratory tests

For more information on WellLock® Resin System, contact your local Halliburton representative or email cementing@halliburton.com.

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