

## RiLOCK™ Resin Sealant

Long-term zonal isolation issues with oilfield cement annuli are common during the lifetime of a well. Wellbore stresses affect the long-term durability of the cement seal and often lead to well control issues. Remediation of zonal isolation failures can be costly and challenging to execute. RiLOCK allows you to gain control of your well. It was designed to address these issues and reduce remediation costs to the operator.

RiLOCK is an epoxy resin optimized for oilfield applications. It can be effectively designed for a temperature range of ranges of 40 to 350°F and densities ranging from 7 to 19 ppg.

### Applications:

- Create barriers for plug and abandonment operations
- Seal gas leaks and leaking production packers
- Plug control lines, valves and wellheads
- Perform remedial squeeze jobs
- Shut off water flows and consolidate gravel packs
- Consolidate weak and permeable formations

### Features and Benefits:

- A solids-free formulation means that the resin can be squeezed deeper into a microannulus to create a stronger seal.
- Low rheology means that the sealant can be easily mixed and pumped.
- Used with conventional oilfield equipment such as pumps, batch mixers and dump bailers.
- Cohesive properties ensure that the sealant will remain stable at downhole conditions.
- Free falls through water and re-forms in the zone of interest.
- Can be drilled out with standard oilfield drill bits or can withstand perforation.
- Outperforms conventional Portland cement for compressive strength, tensile strength and shear bonding.
- Non-shrinking, non-corrosive, and impermeable for long-term durability.

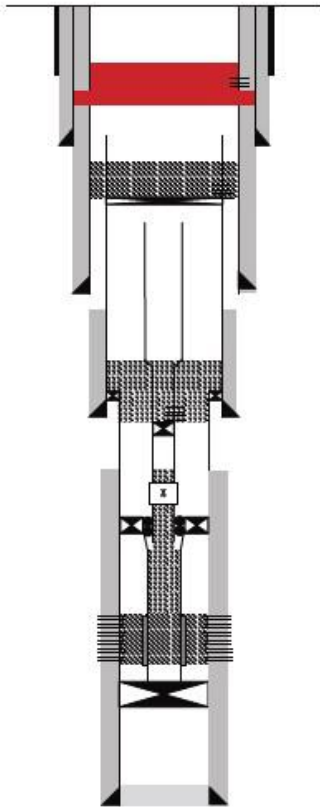
### RiLOCK vs Cement mechanical properties and bonding

Testing at 175°F	Standard Slurry	ControlSEAL
UCS	6,167 psi	12,772 psi
YM	2.7E+06 psi	4.7E+05 psi
PR	0.30	0.46
Tensile	455 psi	4,364 psi
Water Wet Shear Bond	212 psi	3,922 psi
Oil Wet Shear Bond	132 psi	3,594 psi
Water Wet Hydraulic Bond	<50 psi	+1,000 psi
Oil Wet Hydraulic Bond	<50 psi	+1,000 psi



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Case Studies



*Simplified Schematic Showing  
a RiLOCK plug and squeeze*

## Case History #1

A client with a well located in the Gulf of Mexico was having problems with a leaking production packer. They were experiencing communication between the tubing/casing annulus and had made several unsuccessful attempts to resolve this issue. The leaking packer was preventing the well from being put on production. RiLOCK was pumped into the annulus to the top of the production packer, essentially locking the tubing in place and sealing the annulus so gas lift production could resume. After 24 hours, a successful positive pressure test was performed, indicating that the resin sealant had successfully set against the top of the packer and sealed the annulus.

## Case History #2

During P&A operations on an offshore well, an operator had made repeated attempts to seal the 10-3/4" X 16" casing annulus, however injection with conventional cement was not possible due to the annulus being cemented to surface. After multiple attempts, the operator selected remediation using RiLOCK due to its solids free formulation allowing deep penetration into the microannulus. A window was milled through the 10-3/4" casing in the area of the leak, and 5 bbls of 9.0 ppg resin was pumped. The set time was 48 hours at a bottom hole temperature of 70°F. After the resin was placed, the well was shut in for 48 hours with pressure. After 48 hours, no bubbling was observed in the annulus, indicating a successful job.

## Case History #3

In the final stages of P&A operations, a client encountered bubbling through the top cement plug. In order to fulfill regulatory requirements, this GOM well would need to have these bubbles completely shut off. The operator selected RiLOCK to create a gas tight plug. The wellhead was reinstalled and 10 gal of RiLOCK was pumped into the 10-3/4" casing. The temperature at the mud line was 55°F. After the resin was placed, squeeze pressure was applied for 8 hours and then shut in for 40 hours. After 48 hours, a successful positive pressure test was performed, indicating that the resin had created an effective plug. In addition, no more bubbling was observed in the annulus.

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