

ABRAJ

AbraLIFE (Self-Healing Slurry)

Reactive Cement System for Autonomous Hydraulic Seal Repair

Reacts to Hydrocarbons . Seals Cracks & Microannuli . Restores Zonal Isolation

DESCRIPTION

AbraLIFE is ABRAJ's self-healing cement blend system built with reactive materials that respond directly to hydrocarbons. When gas or oil migrates into a crack or microannulus, the embedded particles swell and expand to reseal the flow path - restoring hydraulic isolation without a well intervention.

FEATURES

- High solid volume fraction (SVF $\approx$ 51%) with excellent compaction
- Reactive particles that swell on contact with hydrocarbon gas or liquid
- Good rheology and fluid-loss control, with stable, non-settling slurry
- Engineered across a density range -AbraLIFE up to 15.8 ppg
- Remains reactive and continues to reseal for as long as cement is in the annulus

HOW IT WORKS

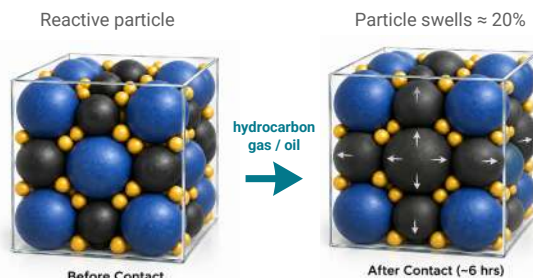
1. **Reactive particles** are distributed uniformly through the set cement matrix.
2. **On hydrocarbon** contact, the particles swell and expand into the open flow path.
3. **The expanding matrix** reseals the crack or microannulus, restoring long-term isolation.

APPLICATION

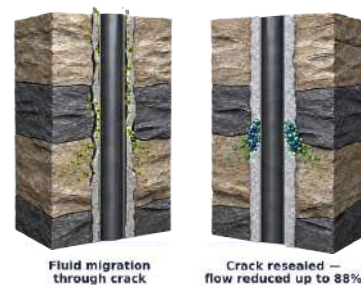
- Lead and tail slurries in primary casing or liner cementing
- Oil, condensate and gas wells
- Plug and abandonment operations
- Zones prone to sustained casing pressure (SCP)

The Self - Healing Mechanism

A. Swelling in Hydrocarbon Gas



B. Self-Healing of a Cracked Matrix



Laboratory testing shows AbraLIFE's reactive particles swell on contact with hydrocarbon, expanding to close the fracture path. In cracked set-cement samples exposed to a methane/ethane stream, the healing reaction closed the fracture and cut fluid flow through the crack, demonstrating a self-sealing response that continues to protect the cement sheath long after placement.

WHY AbraLIFE

- Continuous protection - unlike conventional slurries that only perform during placement, AbraLIFE stays reactive for the life of the Well.
- Reduces remedial costs - autonomously reseals cracks and microannuli without costly well intervention.
- Proven in testing — stable, non-settling slurry with high SVF, verified swelling response and crack-closure performance.