

Cementing Solutions
Cement Systems and Additives

ThermaLock™ cement

For corrosive CO₂ and ultrahigh-temperature environments

FEATURES

- Non-Portland cement system
- Nonreactive with CO₂
- Low permeability
- Enhanced to increase elasticity
- ultrahigh-temperature stability

BENEFITS

- Resistant to CO₂ corrosion
- Resilience to cyclic loading
- Ideal for ultrahigh-temperature applications (1,500°F)

Overview

Cement operations in CO₂ environments, such as carbon capture, utilization, and storage (CCUS) present unique challenges. In the presence of water, CO₂ forms carbonic acid, which reacts with the hydration elements of Portland cement barriers in a process referred to as carbonation. This reaction can compromise the barrier's mechanical integrity. Additionally, the cyclic pressure and temperature in CCUS environments further increase the risk of mechanical failure through debonding or cracking.

Low-permeability, corrosion-resistant cement system tailored with enhanced elasticity

ThermaLock™ cement, a specially formulated calcium aluminate phosphate cement, resists both CO₂ and acid. Developed for high-temperature geothermal wells and CO₂ environments, it offers superior thermal and chemical stability under ultrahigh-temperature and corrosive environments with a lower permeability than Portland-based designs. Mechanical property modifiers enhance the elasticity of the system and help make the cement barrier more resilient to the cyclic loading imposed by CO₂ injection and storage operations.

High temperature stability

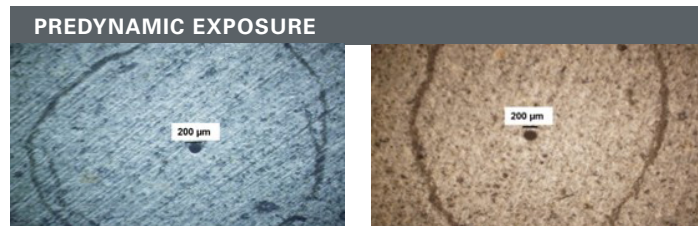
The high temperature stability of ThermaLock cement makes it ideal for ultrahigh-temperature applications, such as geothermal, steam injection, steam-assisted gravity drainage (SAGD), and in-situ combustion. Portland cement goes through compressive strength retrogression above 230°F; even with added micro silica content, it is useable only up to 650°F with the addition of high silica content, which is an operational challenge to mix. Beyond the temperature range of 650°F, ThermaLock cement is recommended.

CCUS solutions portfolio

The Halliburton CCUS solutions portfolio includes non-Portland, modified Portland, and reduced Portland products. These solutions use tailored chemistries, pure resin, cement and resin composites, and additives to enhance

mechanical properties. They also reduce the set cement permeability and deliver an improved CO₂-resistant barrier with long-term integrity. The ThermaLock™ cement system is part of the Halliburton non-Portland solutions portfolio.

Dynamic CO₂ Exposure



Portland-based

ThermaLock™ cement



Portland-based

ThermaLock™ cement

After dynamic, supercritical CO₂ exposure at 180°F for 12 weeks, ThermaLock™ cement system exhibits no change compared to Portland cement where the CO₂ flow path expands from 200 Micron to 5 mm.

For more information, contact your local Halliburton representative or visit us on the web at www.halliburton.com

Sales of Halliburton products and services will be in accord solely with the terms and conditions contained in the contract between Halliburton and the customer that is applicable to the sale.

H014796 9/24 © 2024 Halliburton. All Rights Reserved.

halliburton.com

HALLIBURTON