

Cementing Solutions  
Cement Systems and Additives

# ThermaLock™ cement

For corrosive CO<sub>2</sub> and ultrahigh-temperature environments

## FEATURES

- Non-Portland cement system
- Nonreactive with CO<sub>2</sub>
- Low permeability
- Enhanced to increase elasticity
- ultrahigh-temperature stability

## BENEFITS

- Resistant to CO<sub>2</sub> corrosion
- Resilience to cyclic loading
- Ideal for ultrahigh-temperature applications (1,500°F)

## Overview

Cement operations in CO<sub>2</sub> environments, such as carbon capture, utilization, and storage (CCUS) present unique challenges. In the presence of water, CO<sub>2</sub> 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 CO<sub>2</sub> and acid. Developed for high-temperature geothermal wells and CO<sub>2</sub> environments, it offers superior thermal and chemical stability under ultrahigh-temperature and corrosive environments with a lower permeability than Portland-based designs. Mechanical properties modifiers are added to enhance the elasticity of the system and help make the cement barrier more resilient to the cyclic loading imposed by CO<sub>2</sub> 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.

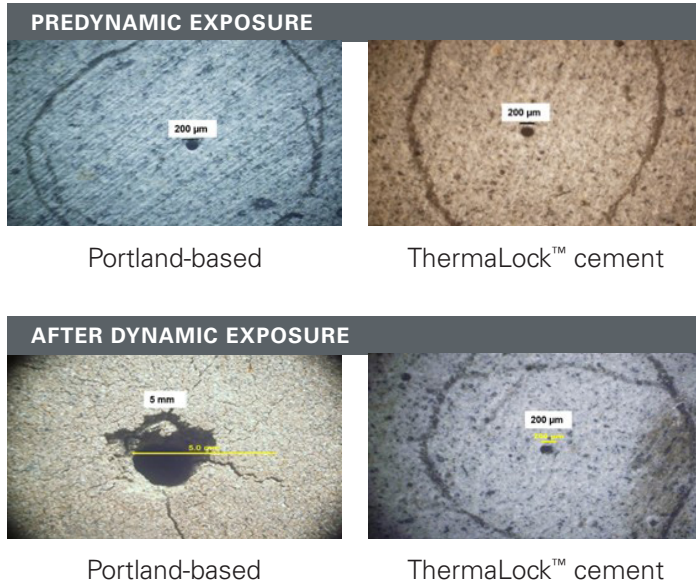
## CCUS solutions portfolio

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 CO<sub>2</sub>-resistant barrier with long-term integrity. The ThermaLock™ cement system is part of the Halliburton non-Portland solutions portfolio.

## Dynamic CO<sub>2</sub> Exposure



After dynamic, supercritical CO<sub>2</sub> exposure at 180°F for 12 weeks, ThermaLock™ cement system exhibits no change compared to Portland cement where the CO<sub>2</sub> 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](http://www.halliburton.com)

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