Schlumberger

# EverCRETE

## $CO_2$-resistant cement for long-term zonal isolation

### BENEFIT

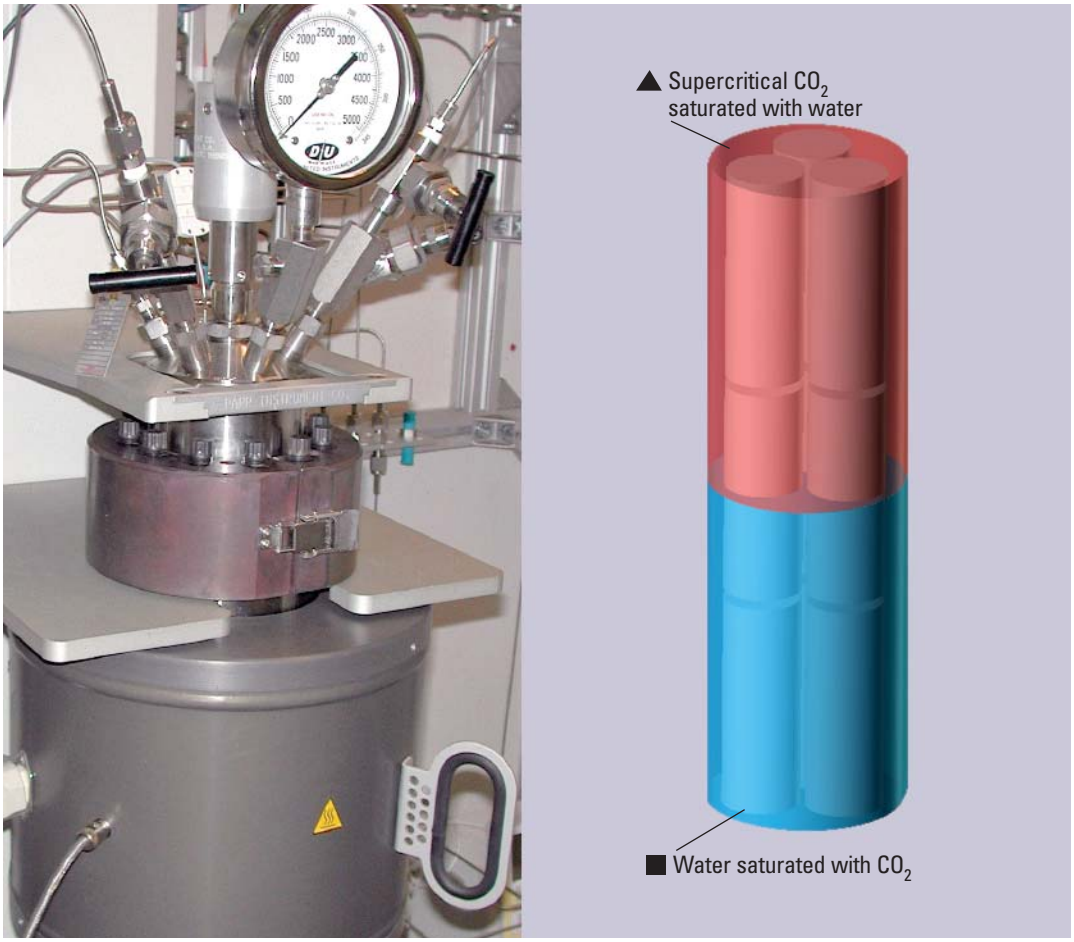
- Longer-lasting zonal isolation in $CO_2$ underground storage environment, because the EverCRETE* system is resistant to degradation when exposed to a $CO_2$ environment

### APPLICATIONS

- Carbon capture and storage injection wells
- Enhanced oil recovery $CO_2$ injection wells

### FEATURES

- Temperature range application of 104 degF to 230 degF [40 degC to 110 degC]
- Wide density range of 12.5 lbm/USgal to 16 lbm/USgal [1,497 kg/m$^3$ to 1,917 kg/m$^3$]
- Standard equipment only required for mixing and pumping
- Compatibility with portland cement




*$CO_2$ durability test reactor: Cement cores are tested simultaneously in supercritical $CO_2$ that is saturated with water and water-saturated $CO_2$ under downhole temperature and pressure conditions.*

### $CO_2$ ISOLATION CHALLENGES

Portland cement systems are used conventionally for zonal isolation in oil or gas production wells. However, portland cement is thermodynamically unstable in $CO_2$-rich environments and can degrade rapidly upon exposure to $CO_2$ in the presence of water.

As $CO_2$-laden water diffuses into the cement matrix, the dissociated acid ($H_2CO_3$) reacts with the free calcium hydroxide and the calcium–silicate–hydrate gel. The reaction products are soluble and migrate out of the cement matrix. Eventually, the compressive strength of the set cement decreases and the permeability and porosity increase, leading to loss of zonal isolation.

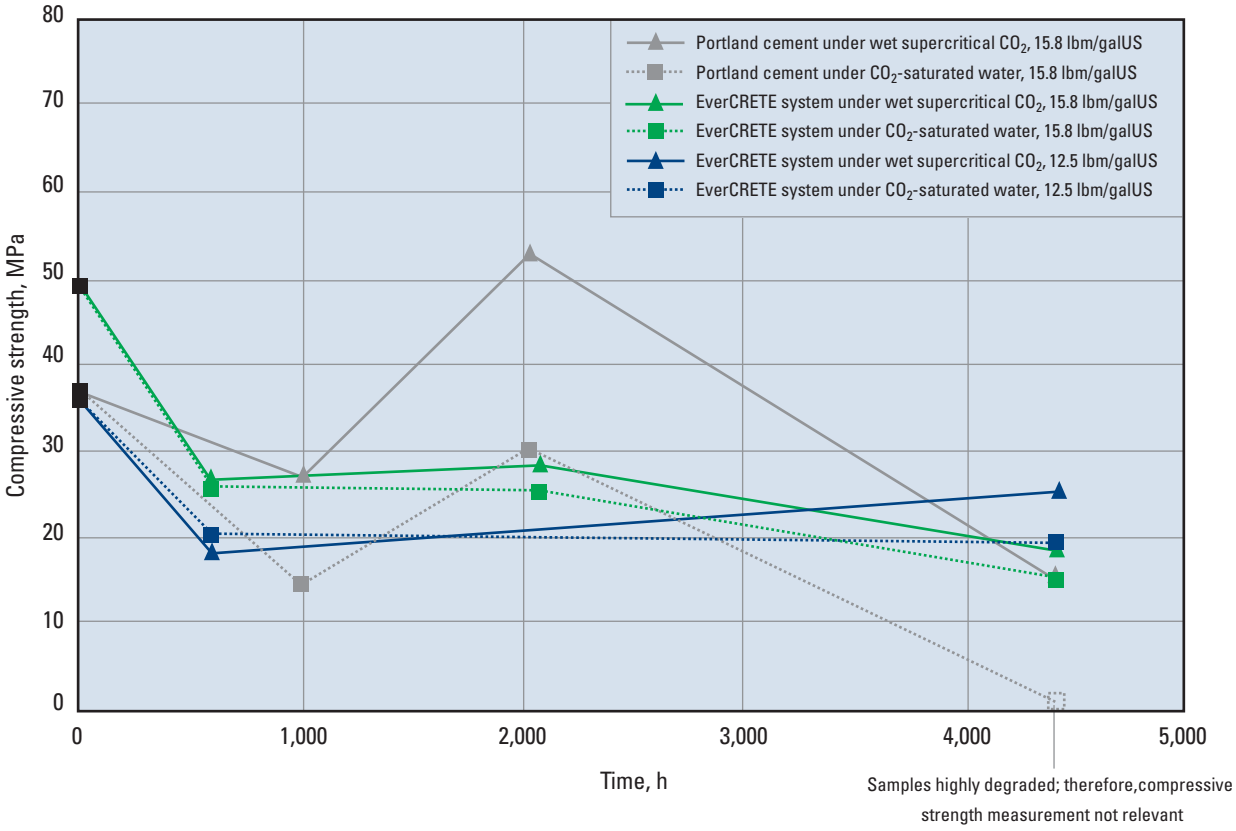
### $CO_2$-RESISTANT ISOLATION SOLUTION

Schlumberger has developed

- a $CO_2$-resistant cement system to ensure lasting zonal isolation
- a testing methodology using a computer-controlled titanium reactor to assess the long-term durability of cement cores under well $CO_2$ conditions.

In laboratory tests, the EverCRETE system has proven to be highly resistant to $CO_2$ attack from wet supercritical $CO_2$ and water saturated with $CO_2$ conditions.

EverCRETE blend can be prepared locally using the standard bulk plant. The density can be tailored to well requirements, providing operational flexibility.




*Compressive strength evolution of portland cement and EverCRETE system samples with time in wet supercritical carbon dioxide fluid and in $CO_2$ saturated in water at 90 degC under 28 MPa of pressure. After 6 months in $CO_2$-saturated water, the compressive strength of portland cement is not measurable since most of the samples are highly deteriorated.*

Unlike other offerings, this system is compatible with portland cement. EverCRETE $CO_2$-resistant cement can be used in combination with conventional portland cement slurries, depending on the requirements for $CO_2$ resistance. The EverCRETE system can be used as a tail slurry across the $CO_2$ injection zone or used as lead slurry to protect the casing string from $CO_2$ attack in front of any reservoir with $CO_2$ contact. It can be prepared and pumped using standard equipment.

## CARBON STORAGE

Carbon capture and storage is becoming a critically important part of global warming mitigation efforts, and this trend is expected to continue, with more and more wells being drilled for this purpose. Well integrity has been identified as the biggest risk contributing to leakage of $CO_2$ from underground storage sites.

Schlumberger offers a total solution with services for the entire process, from selection of the right reservoir to isolating $CO_2$ sequestration zones to monitoring $CO_2$ plume in the reservoir after injection. The advanced EverCRETE technology allows efficient underground storage and keeps greenhouse gases out of the atmosphere for a long time.

## $CO_2$-ENHANCED OIL RECOVERY

$CO_2$ injection wells can be used to increase reservoir pressure to recover oil in existing wells. This oil recovery methodology contributes to $CO_2$ underground storage, reducing emissions to the atmosphere.

During the $CO_2$ injection process, cement can be affected and can compromise the integrity of the project. The EverCRETE system reduces the risk of $CO_2$ degradation and leakage and can be used to cement new $CO_2$ injection wells or plug and abandon existing injection/production wells at the end of the project.

**www.slb.com/evercrete**

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