

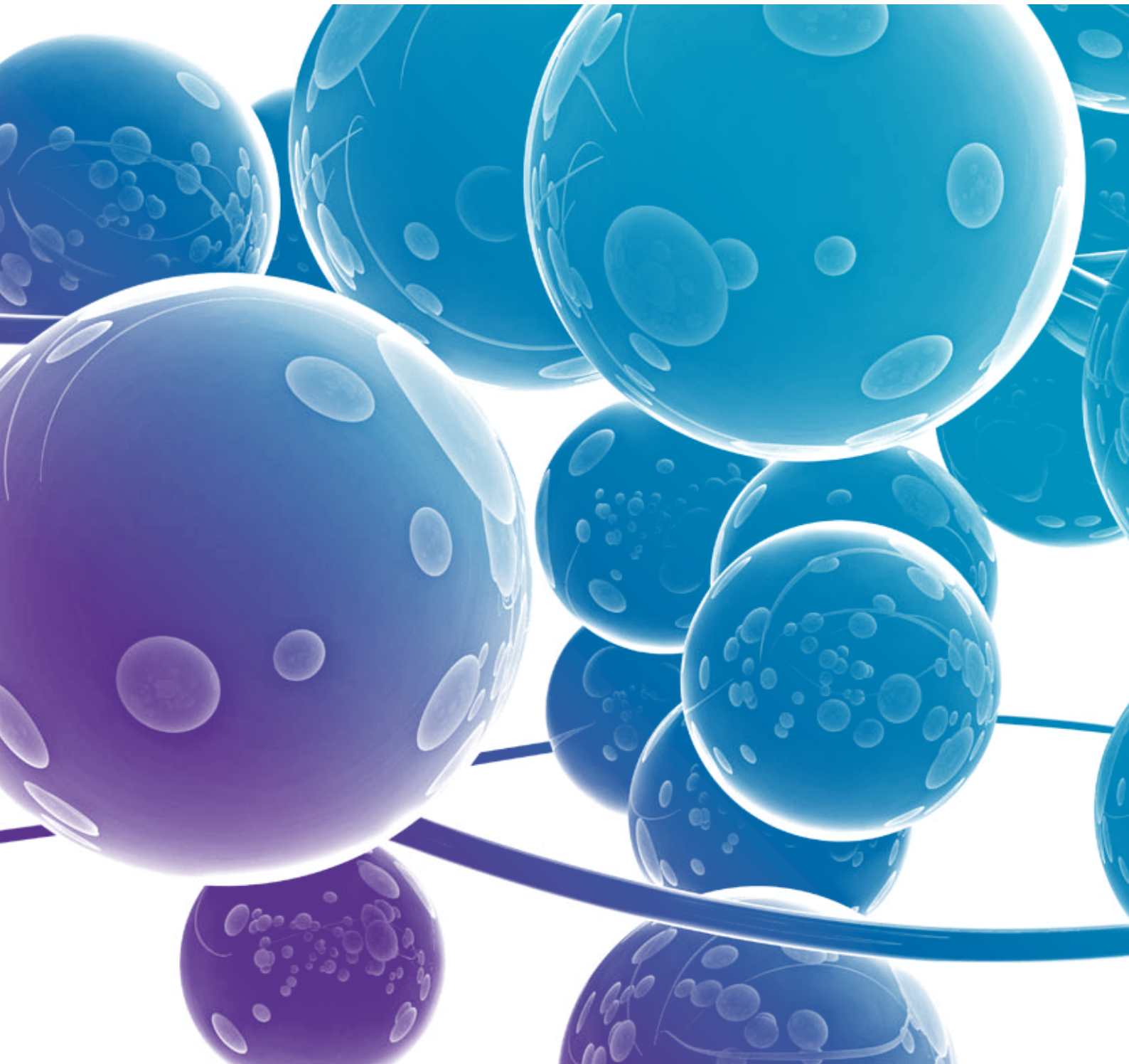
Cembinder W colloidal silica dispersions

For the oil field industry



AkzoNobel

Tomorrow's Answers Today



Cembinder W technology

– for demanding well cementing

Cembinder W technology for safe and predictable well cementing

Cembinder W is suitable for all drilling operations both on- and offshore, in deep and ultra deep waters and at low or high temperatures.

Cembinder W provides substantial enhancement of early compressive strength, thereby shortening the setting time of the cement slurry. Since wait of cement (WOC) time is reduced, drilling ahead can resume earlier. Cembinder W is available in several different grades. W50, W36 and W75 are our most reactive grades and are suitable for deep waters applications.

Stable slurries and zero free water

When Cembinder W is mixed with cement, the slurry becomes extremely stable and free water is eliminated. Due to their low specific gravity and low dosages, Cembinder W50 and W36 works extremely well in lightweight water slurries.

Storage stability and easy handling generating cost efficiency

Cembinder W will not settle during storage and is perfect for use in a liquid additive system, giving virtually no waste during operations. The extremely high specific surface area, 200–900 square meters per gram, makes Cembinder W more effective per weight unit than other silica based additives. The effectiveness per volume and weight unit saves bulk, transportation, handling and storage costs.

Cembinder W technology for demanding geothermal well cementing

At high temperatures (150 C to 400 C) involved regression chemistry processes rapidly create a fractured and porous cement body structure. Loss in compressive strength is the main measurable consequences. The acidic groundwater caused by large amounts of dissolved carbon dioxide is the main reason for carbonation degradation of the cement grout, which opens the way for corrosion of the steel casing. Carbonation of the free lime (calcium hydroxide) phases in Portland cement and with certain cement blends forming a low alkali porous zonal structure between the formation and steel casing.

The disintegration of the cement structure is accelerated by the micro cracking caused by temperature-related regression and the carbonation process. Cembinder W colloidal silica technology helps the formulator to create more durable cement grouts.

- converts the lime to more temperature stable phases
- converts the lime to acid and carbonation resistant calcium-silica-hydrates.

Cembinder W technology for water cut-off cement grouts

Cembinder W product grades with very large surface area generate an extremely cohesive cement grout. The silica particles react with free lime, leading to stabilization control and a set acceleration. A cohesive cement grout can control the wash-out problem connected to underwater application. Recommended grades are: CembinderW50 and CembinderW75.

Operational benefits

Major benefits of Cembinder W:

- Zero free water
- Early strength enhancement at low temperatures
- Low specific gravity excellent in light-weight slurries
- Improved gas migration control
- Uniform downhole results
- Improved bonding
- Stable low viscosity slurries
- Use in a liquid additive system
- Low required dosage reduces inventory at rig site

Product characteristics:

- High product consistency
- Can be stored on the rig, over long periods of time, ready for use whenever needed
- Environmentally safe. Non-toxic, non-hazardous



Cembinder W technology

– for gel barriers

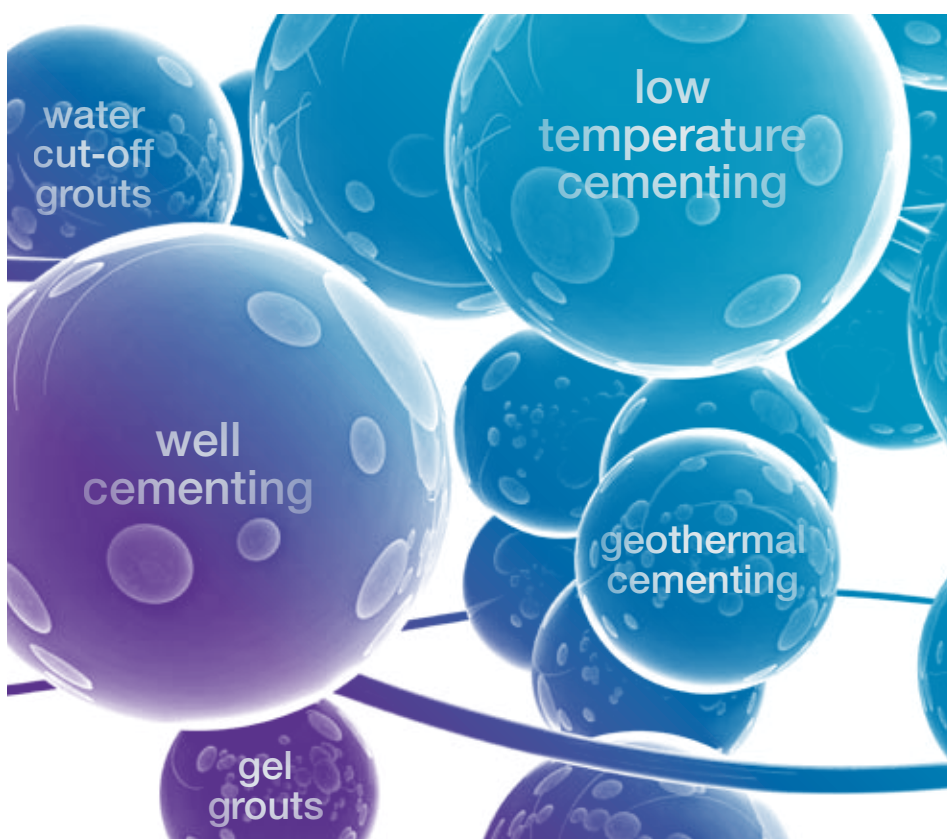
Water barriers of silica gel

Cembinder W colloidal silica technology can permeate very narrow fractures. The active compound is an inorganic, high purity, water-based colloidal silica. Together with Cembinder W, a gel activator must be added; preferably, an inorganic water soluble salt. The gel-time is determined by the mixing ratio of the colloidal silica and the gel activator. By changing the mixing ratio, the gel-time can be adjusted from a few minutes up to several hours.

Before using, the user should determine the suitability of the product for its intended use. The user assumes the risk and liability in connection therewith. Since Cembinder W is incompressible, high pressure during injection is possible but not needed. It can also be adjusted by having longer open time, before gelling takes place. The gel-time is strongly dependent on temperature, silica concentration and mixing ratio.

Key benefit summary

- Permeation of very narrow cracks (0.015 mm) or porous formations and sand structures
- A waterbased Newtonian liquid, with very low viscosity
- Stable in underground environments
- Accurately adjustable set time
- Hydraulic conductivity lower than 10^{-8} cm/s can be reached
- User and environmentally friendly



Cembinder W Product Line to the Oil Field Industry

Grades	Surface area m ² /g	Average size nm (nanometer)	Concentration % silica by weight
Cembinder W75	750	3	15
Cembinder W50	500	5	15
Cembinder W36	360	7	30
Cembinder W30	300	9	30
Cembinder W8	80	35	50

Further Information

For more detailed product information, please refer to the separate product guide. For samples, technical service and further information, please contact your nearest office, visit our website at www.colloidsilica.com, or send an e-mail to colloidsilica@akzonobel.com

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