

The essential ingredient for strength

Levasil OF – colloidal silica dispersions for
optimized cementing in oilfield drilling

AkzoNobel 



Levasil Colloidal Silica

Natural solutions for extreme conditions

It is vital that well cementing is both safe and predictable in oil drilling operations on land and offshore. Our Levasil OF products are optimized for low and high temperatures, as well as deep and ultra-deep waters.

Levasil Colloidal Silica is a natural, water-based cohesive binder that helps create more durable cement. A perfect component when cementing to secure steel casings in oilfield boreholes – both on land and offshore. Our Levasil OF products are registered on the OSPAR PLONOR list.



Our future depends on our capacity to innovate. On our ability to do radically more while using less – and at the same time maximize our use of renewable energy and materials. We are determined to turn this obvious challenge into a clear opportunity and bring more value to our customers and to society.

By 2020, our goal is that 20% of our revenue will come from products that are more sustainable than our competitors' products. We call it eco-premium solutions.

Levasil Colloidal Silica

Levasil® is a registered trademark of AkzoNobel.

In cement-based applications, Levasil Colloidal Silica works exceptionally well as a stabilizer, a durability enhancer, an accelerator and a strength developer. Resulting in extremely stable, bleed-free cement slurries without free water.

Shorter setting time

Levasil OF provides a substantial enhancement of early compressive strength, shortening the setting time of the cement slurry so drilling can resume faster – saving time and money. Additionally, the low specific gravity of colloidal silica produces lightweight slurries that can be injected more controllably.

Zero free water

Levasil OF particles interact with the free lime (calcium hydroxide) – created during cement hydration – to create calcium silicate hydrate (CSH) binders. These binders produce a cohesive gel structure that enhances cement-paste density, reinforces the structure between cement grains, and eliminates free water.

Fluid loss control

Thanks to their small size, the Levasil OF particles make their way into and fill up voids between the larger cement particles, reducing the risk of fluid loss. Combining colloidal silica and latex gives a synergetic effect that improves fluid loss control even further.

More durable cement grouts

Our Levasil Colloidal Silica technology helps the formulator create more durable cement grouts. The lime is converted to more temperature stable phases and to more carbonation/acid-resistant calcium silicate hydrates (CSH).

Recommended products

Levasil OF products are stable during storage and are perfect for use in a liquid additive system, resulting in virtually no waste during operations. The extremely high specific surface area makes our Levasil OF products very cost-effective per weight unit. This effectiveness per volume and weight unit gives lower transportation, handling and storage costs.

Additional benefits are:

- Designed particle technology
- Discrete particles
- Specifically manufactured, wide range of products available
- Non-toxic, inorganic, water-based and registered on the OSPAR PLONOR list
- Long shelf life

Specific parameter	Unit measure	Levasil OF50	Levasil OF75	Levasil OF36	Levasil OF8
Density	g/cm3	1.1	1.1	1.2	1.4
SiO ₂	wt%	15	15	30	50
pH	-	10.0	10.5	10.1	9.5
Viscosity	mPas	<10	<15	<10	<10



Conditions	Product selection	Design guideline	Temperature	Benefits	
Shallow gas Low temperature Fragile formation	Levasil OF50 or Levasil OF36	Class G cement Fresh water Dispersant Retarder Fluid loss additive Levasil OF50 or Levasil OF36 <i>Specific gravity: 1.56 kg/l (13 ppg)</i> <i>Temperature: 10–60°C (50–140°F)</i>	kg 100 85 0.5–1 0–2 1–3 7–10	10°C 50°F	Lightweight grouts Acceleration, early strength Gas migration control Zero free water
Wash out/fluid loss	Levasil OF75	Class G cement Fresh water Fluid loss additive Dispersant Levasil OF75	kg 100 44 1–3 0–3 3–6	75°C 170°F	Cohesive and high yield viscosity
Acidic environment High temperature	Levasil OF8	Class G cement Fresh water Dispersant Retarder Silica flour Levasil OF8	kg 100 41 1–2 2 15–35 10–5	120°C 250°F	Improved strength retrogression control Enhanced acid resistance Addition of silica flour is indispensable at temperature above 120 °C (250°F)

How it works

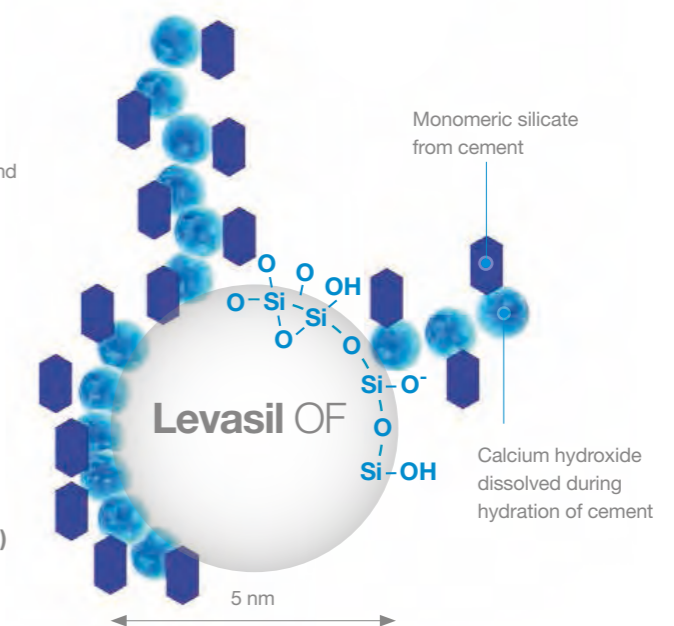
Hydration of cement

During hydration of cement, both silica and calcium hydroxide are dissolved and become available for further reaction.



CSH gel creation

The Levasil OF silica particles attract the dissolved silica and calcium hydroxide. Additional CSH binder is created.



Densification of cement

The new CSH binder enhances the cement paste density, reinforcing the structure between cement grains.

Björnström, J., Martinelli, A., Matic, A., Börjesson, L. and Panas, I. "Accelerating effects of colloidal nano-silica for beneficial calcium-silicate-hydrate formation in cement", Chem. Phys. Lett., Vol 392, No. 1–3, pp. 242–8.

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