

# Levasil CC

## in sol-silicate paints

Colloidal silica – uses and benefits



## Levasil CC301 for stable highly concentrated 1-pack formulations with excellent properties

The results presented here are a summary of the study "Use of surface modified colloidal silica in 1-pack sol-silicate paints" conducted by Céline de Lame, Jean-Marie Claeys and Xavier Godeaux at CoRI, Belgium, in co-operation with AkzoNobel.

### Improved paint properties

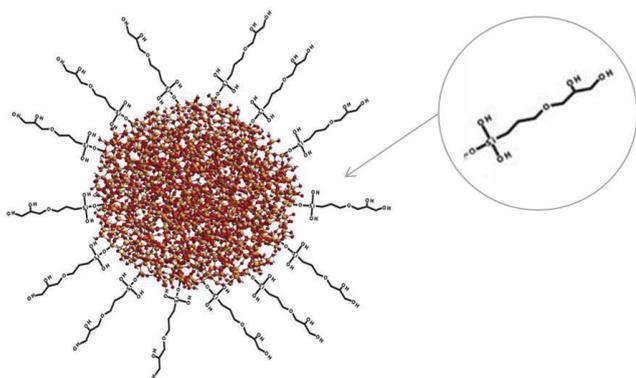
One-pack sol-silicate paints based on silane modified colloidal silica, Levasil CC301, are characterized by long term stability and enable concentrated formulations up to solid contents of 50 wt %. Further more the study shows that they have excellent properties regarding adherence, scrub and dirt-pick up resistance, high vapour permeability and good water resistance.

### Product properties

Levasil CC301 is a unique water-based epoxy silane modified colloidal silica dispersion.

Specific parameter	Unit measure	Levasil CC301
SiO <sub>2</sub>	wt%	30
pH		8
Density	g/cm <sup>3</sup>	1.2
Viscosity	mPas	5
Average particle size	nm	7

### Levasil CC301, model structure

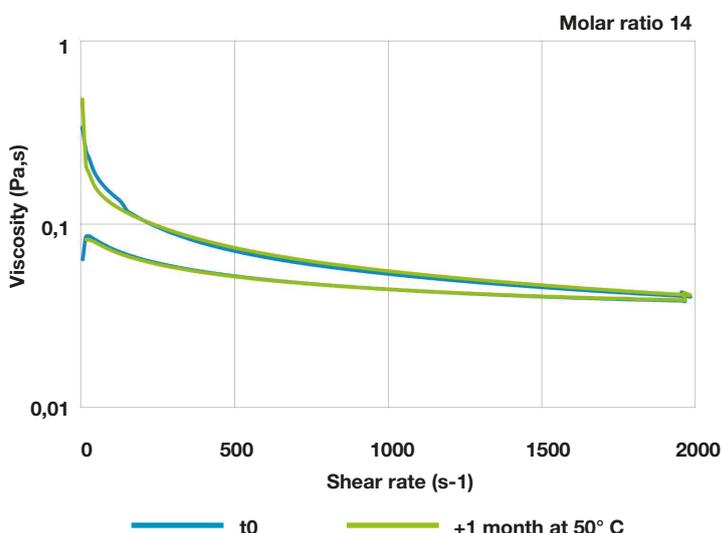


### Studied paints

The study includes the use of colloidal silica and specifically silane modified colloidal silica in pure silicate paints in order to prepare sol-silicate paints. Mechanical and protective properties have been investigated and the influence of the surface modification of the colloidal silica particles as well as the molar ratio ( $n\text{SiO}_2/n\text{K}_2\text{O}$ ) has been evaluated. The study shows that the silane modified colloidal silica has superior effect so the following data focuses on formulations using Levasil CC301.

### Paint stability

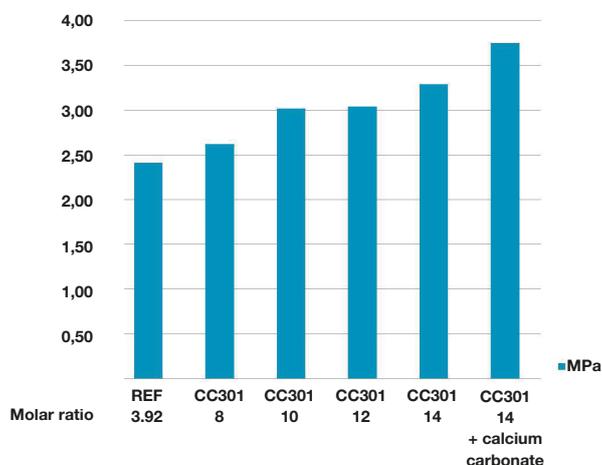
Rheometer data indicating the absence of gel formation and aggregation in the wet paint formulation shows that for the paints with Levasil CC301 included, there are no changes in the paint consistency indicating good in-can stability. The viscosity profile after one month storage at 50°C is identical to the initial profile, as shown in the "up and down" curves in the figure below. One month storage at 50°C is equivalent to one year shelf life at room temperature.



### Adherence to substrate

The adherence is significantly higher for the formulations with Levasil CC301 included as seen in the graph below. The cohesive nature of the rupture indicates good paint adhesion and this varied from 65-100%.

The adherence test of the studied paints has been done on concrete substrates using five test spots according to ISO 4624 standard paints and varnishes pull off test for adhesion.



### Scrub resistance

Formulations including Levasil CC301 with molar ratio 10-14 show a significantly better result than the reference formulation with regards to scrub resistance. Scrub resistance has been determined according to ISO 11998 standard, expressed as loss of thickness after 200 go/returns. Persoz hardness has been measured according to ISO 1522 standard paints and varnishes, pendulum damping test.

	Molar ratio (nSiO <sub>2</sub> /nK <sub>2</sub> O)	Persoz hardness (sec.)		Scrub resistance loss of thickness (µm)	pH
		1 day	30 days		
REF (silicate)	3.92	74	73	8.96	11.17
Levasil CC301	8	84	80	9.55	11.07
Levasil CC301	10	80	86	<b>5.93</b>	11.02
Levasil CC301	12	81	90	<b>5.97</b>	10.97
Levasil CC301	14	81	92	<b>5.83</b>	10.92
Levasil CC301 + calcium carbonate	14	101	97	7.74	11.06

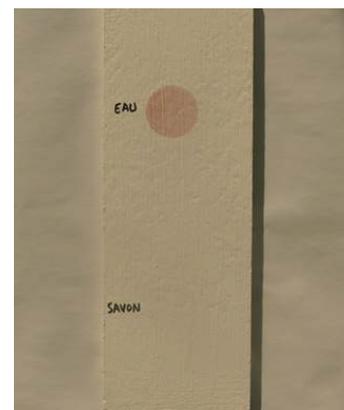
### Dirt pick-up resistance

Modern 1-pack sol-silicate paint formulations have a good dirt pick-up resistance, significantly better than the old 2-pack systems tested. After washing with soap all tested formulations showed similar good results.



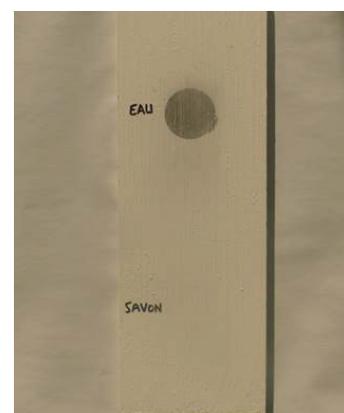
Panel contaminated with iron oxide dirt

Image to the right shows panel rinsed with water (top) and rinsed with soap (bottom)



Panel contaminated with carbon black dirt

Image to the right shows panel rinsed with water (top) and rinsed with soap (bottom)



[www.akzonobel.com/colloidalsilica](http://www.akzonobel.com/colloidalsilica)

AkzoNobel creates everyday essentials to make people's lives more liveable and inspiring. As a leading global paints and coatings company and a major producer of specialty chemicals, we supply essential ingredients, essential protection and essential color to industries and consumers worldwide. Backed by a pioneering heritage, our innovative products and sustainable technologies are designed to meet the growing demands of our fast-changing planet, while making life easier. Headquartered in Amsterdam, the Netherlands, we have approximately 46,000 people in around 80 countries, while our portfolio includes well-known brands such as Dulux, Sikkens, International, Interpon and Eka. Consistently ranked as a leader in sustainability, we are dedicated to energizing cities and communities while creating a protected, colorful world where life is improved by what we do.

### Further Information

For more detailed product information, please refer to our product guide. For samples, technical service and further information, please contact your nearest office, visit our website at [www.akzonobel.com/colloidalsilica](http://www.akzonobel.com/colloidalsilica) or send an e-mail to [colloidal.silica@akzonobel.com](mailto:colloidal.silica@akzonobel.com)

Levasil® is a registered trademark of AkzoNobel in several countries worldwide.

Information herein is given in good faith and is accurate to the best of our knowledge. Information and suggestions are made without warranty or guarantee of results. Before using, user should determine the suitability of the product for its intended use and user assumes the risk and liability in connection therewith. The application, use and processing of our products and the products manufactured by you on the basis of our technical advice are beyond our control and, therefore, entirely your own responsibility. We do not suggest violation of any existing patents or give permission to practice any patented invention without a license.