



Lithium Silicates for better performance!

Lithium silicates are aqueous solutions resulting from combinations of lithium oxide (Li_2O) and colloidal silica (SiO_2) in varying proportions. These interesting liquids combine valuable characteristics of soluble silicates and colloidal silica. For example, they offer alkalinity levels that are higher than colloidal silica, but much lower than sodium- and potassium silicates. In addition, they possess very good film forming and binding properties.

Therefore, they are preferred to sodium- and potassium silicates in applications such as concrete surface treatment, specialty paints and coatings, refractory, ceramic and glazes.

Silmaco introduced his first lithium silicate grades in 2004. Based on customer demand and own research and development we expanded our product portfolio, which counts nowadays grades with molar ratio's $\text{SiO}_2/\text{Li}_2\text{O}$ ranging from 2,95 towards 5,80.

Product Range

Silmaco has developed lithium silicate solutions with molar ratio's $\text{SiO}_2/\text{Li}_2\text{O}$ ranging from 2,95 towards 5,80.

Table 1: An overview of Silmaco's Lithium Silicate grades

Grade	Molar Ratio	Weight Ratio	Concentration (%)	Density (g/cm ³)	Viscosity @ 20°C (cP)	pH (1%)
SILL295	2,95	5,90	21,65	1,20	~ 15	~10,6
SILL350	3,50	7,00	23,45	1,20	~ 16	~10,5
SILL420	4,20	8,40	23,50	1,20	~ 23	~10,4
SILL440	4,40	8,80	25,15	1,20	~ 30	~10,4
SILL480	4,80	9,60	22,10	1,18	~ 17	~10,3
SILL580	5,80	11,60	19,55	1,15	~ 7	~10,2

Properties and advantages

- Lithium silicates are **high ratio, low viscosity** solutions.
- Compared to potassium- and sodium silicates, lithium silicates are **less soluble** once they are dried.
- They exhibit **less desalting effects** compared to potassium- and sodium silicates.
- The **binding and refractory properties** of potassium- and sodium silicates can be **improved by mixing them with lithium silicates**.

Applications

• Inorganic binders

Lithium silicate is an aqueous, odorless, non-flammable and non-toxic solution that is used in inorganic binder systems, which are applied for the production of

- Ceramic Materials
- Refractory Materials
- Welding Rods

Recommended grades:

SILL350, SILL440, SILL480, SILL580

• Coatings and paints

Lithium silicates possess very good film forming and binding properties and are used in zinc-rich paints and top coat formulations for **protecting metal surfaces from corrosion**. For this application we especially developed the **SILL48L**, a lithium silicate with a **very low chloride and sulphate content**:

Parameter	Unit	Typical Value
Molar Ratio		4.80
Weight Ratio		9.60
Concentration	%	22
Density	g/cm ³	1,18
Viscosity @ 20°C	cP	~17
Chloride	%	< 0.006
Sulphate	%	< 0.027

• Concrete floor hardeners

Lithium silicates are used in **concrete floor hardeners**. When sprayed on a concrete surface, the silicate penetrates the calcium hydroxide-saturated bleed water channels and voids where it reacts with the free lime (calcium hydroxide) to form insoluble calcium silicate hydrate gels. These gels **increase the treated concrete's surface density, strength and durability**. The result is a concrete floor which is more abrasion resistant, less dusting and easier to maintain. In addition to increased protection, floors treated with liquid floor hardeners gain an attractive, glossy sheen over time.

Lithium silicate based formulations offers **clear advantages compared to formulations based on standard sodium- and potassium silicates** due to its lower alkalinity and viscosity. This results in liquid hardeners that are **safer, faster and easier to apply**.

Such a lithium silicate based formulation can be applied **on fresh or existing concrete**. To get the best result, when applied on a fresh floor, it is recommended to wait for 28 days to ensure that sufficient calcium hydroxide is available to properly react with the lithium silicate solution and to guarantee a good penetration.

Recommended grades:

SILL420, SILL440, SILL480

Packaging and Storage

- Lithium silicate solutions are available in **200L drums (plastic or steel)**, **1000 L IBC** or in **bulk**. For storage no aluminium, light alloy, galvanized steel and glass receptacles or pipes should be used. On contact with aluminium or light alloys hydrogen gas may be released. Steel, stainless steel and alkali stable plastics (e.g. HDPE) are generally appropriate.
- Although lithium silicates can often be thawed to a homogeneous solution after freezing, we recommend to avoid freezing or excessive warm temperature to prevent precipitation. Therefore the product is best stored at temperatures above 4°C/39°F and below 40°C/104°F.

Safety

Lithium silicates are alkaline products and classified as irritating. They should be handled with care in order to prevent injuries. Whenever lithium silicate as a substance on its own or in a preparation is handled outside closed systems, **suitable personal protective equipment** (gloves, goggles) is the preferred and only measure of control. We strongly advise to carefully read our corresponding Material Safety Datasheet before using the product.

The information contained herein is based on our testing and experience and is offered for the user's consideration, investigation and verification. Since operating and use conditions vary and since we do not control such conditions, we must DISCLAIM ANY WARRANTY, EXPRESSED OR IMPLIED, with regard to results to be obtained from the use of this product.