

**1. Definition and Characteristics**

Products under the trade name SILOKSAN E-1, E-2 and E-3 are oil-in-water aqueous emulsions of medium viscosity polydimethylsiloxane oils.

Silicone oil contained in emulsions is characterized by thermal stability, excellent anti-adhesion and sliding properties, transparency, and physiological inertness.

Silicone emulsions SILOKSAN E-1, E-2 and E-3 have the following features:

	<b>E-1</b>	<b>E-2</b>	<b>E-3</b>
Appearance	milky-white liquid		
Concentration	35±2	35±2	50±2/60±2/70±2
pH value	6-7	6-7	6-7
Ionic character	non-ionic		
Density at 20°C kg/m <sup>3</sup>	990	990	990
Viscosity of the emulsified silicone oil at 20°C, mm <sup>2</sup> /s	300	1000	200

Owing to a special manufacturing process of emulsification and the choice of emulsifiers, obtained emulsions are characterized by a narrow distribution and small droplet size of the oil phase (about 99% of droplets are 0.01 - 0.02 nm in diameter). As a result, the emulsions are very stable during storage and are resistant to metal ions.

**2. Areas of Application**

Silicone emulsions SILOKSAN E-1, E-2 and E-3 are widely used in various industries as:

- release and sliding agent in the manufacture of rubber and plastic hoses
- release agent for the separation of the parts of the transportation equipment in the manufacture and processing of india-rubber
- anti-adherent agent for the mould release after the vulcanization of tires and other rubber products (plates, sections)
- anti-adherent agent preventing the adhesion of the raw material particles and extrudates in the rubber industry
- release agent in the production of cables
- agent for the final treatment and softening of textiles and sewing threads
- sliding agent in the production of socks
- release agent in the production of expanded polystyrene
- release and sliding agent in the processing of plastics and elastomers
- anti-adherent agent for the mould release in the production of moulds from a mixture of sand and resins in the foundry industry.

**3. The Advantages of Silicone Emulsions**

Silicone emulsions SILOKSAN E-1, E-2 and E-3 offer several advantages in above named applications:

- plastic and rubber castings are removed from the mould easily and without damage to the surface,
- moulds, process equipment and the workplace stay clean,
- ability of silicone oils to spread mean that surfaces of castings, even complex shape ones, are coated with a thin anti-adhesive film,
- one application allows for multiple working cycles,
- silicone oil remaining in the mould is physiologically inert
- the quality of casting surface improves
- the emulsions are harmless and non-combustible in application

**4. Instructions for use**

Silicone emulsions SILOKSAN E-1, E-2 and E-3 are used primarily in the form of solutions containing 0.5 - 3% of silicone oil. It is best if a suitable concentration is determined by the user, since it depends on the application method and form of the workpiece. The solutions prepared by diluting the emulsion with soft water (hardness below 40°), are stable for 8 hours. In order to avoid differences in the concentration of the solutions, gentle stirring is needed. Here are the ways to use silicone emulsions SILOKSAN E-1, E-2 and E-3 in the two most important cases of application, in the rubber industry and the foundry industry:

**4.1. Application methods for SILOKSAN E-1 and E-3**

Silicone emulsions SILOKSAN E-1 and E-3 are most often used in the rubber industry as release and sliding agents in the manufacture of automobile tires and other rubber products. Given the incompatibility of silicon with organic substances, it is necessary that the moulds are pre-treated. This applies to both new moulds and moulds stained during use. Cleaning is done in one of the following ways:

- burning at temperatures 370-400° C, or by blowlamp and welding torch,
- sanding with very fine abrasive sand
- immersion in a bath of 10% caustic soda solution at 90° C (steel moulds)
- immersion in a bath of sulphuric acid (light alloys moulds).

On the cleaned, thoroughly rinsed and dried moulds, pure silicone oil SILOKSAN DM-300 is first applied, and then a solution of silicone oil in aromatic, aliphatic or chlorinated hydrocarbons (for example, 0.5 - 3.5% solution in trichlorethylene), or an original Silicone emulsion SILOKSAN E-1/E-2. Application is done by brushing or spraying.

Sometimes it is necessary to further stabilize the primary silicone layer on the surface of the device (the so-called varnishing) by burning at temperatures above 150° C for several hours. This procedure is applied only when starting working with clean or new moulds; diluted silicone emulsion is used in the course of further work. Silicon film has to be very thin (0.02 - 0.05 nm) and uniform, and therefore it is recommended to use a very diluted solutions and emulsions usually from 0.5% to 3.5%.

For coating of moulds with working temperature up to 120° C solutions of silicone oils are used, and for coating of moulds that are heated above 120° C, a silicone emulsion is used.

**4.2. Application methods for SILOKSAN E-2**

Because of its excellent thermal stability and inertness to phenolic resins and other organic substances, silicone emulsion SILOKSAN E-2 has been widely used as a lubricant for moulds ("Croning» and «Hot box» procedures). Prior to application of emulsion, mould has to be cleaned using one of the following methods:

- burning with blowlamp or welding torch, followed by cleaning with a wire brush or fine sandpaper
- immersion in a bath of toluene or trichloroethylene for 24 hours, followed by exposure to trichloroethylene vapour for 6 hours (unit for industrial degreasing)
- immersion in a bath of 10% caustic soda solution at 90° C for several hours, followed by thorough washing with hot and cold water.

In order to avoid further penetration of the phenolic resin into the pores of the moulds, it is necessary to apply original silicone emulsion SILOKSAN E-2 or pure silicone oil SILOKSAN DM-1000 to the cleaned and dried mould first. Application is done by hand, and the silicon film must be thin and uniform. The following mould coating is carried out with diluted silicone emulsion (typically 0.7%). Diluted emulsion is applied by spraying, and one application is usually sufficient to produce 4-5 forms, if the specified concentration of silicone emulsion is used.

Although silicone emulsions SILOKSAN E-1, E-2 and E-3 contain a corrosion inhibitor (sodium nitrite), prolonged contact with metal surfaces can lead to corrosion. Addition of small amounts of water-soluble corrosion inhibitors (for example, 0.005% sodium nitrite) in diluted emulsion can yield significant improvements.

**5. Packaging and storage**

Silicone emulsions SILOKSAN E-1, E-2 and E-3 are supplied in PE-canisters with a net weight of 5, 10, 20, 25 and 50 kg or PE-drums with a net weight of 220 kg.

Shelf life of silicone emulsions is 6 months in sealed original packing under normal storage conditions. The preservation of silicone emulsions is negatively influenced by multiple freeze-thaw cycles, heating and microbial agents.