



SurAChem® VG 02 K

SURFACE PRETREATMENT KIT

for the increase of adhesion on various material surfaces



- Pretreatment device for the deposition of amorphous silicate layers (in nm thickness)
- Significant increase of the adhesion on metallic, glass, plastic and ceramic material surfaces
- Set with refill cartridge (200 ml), refill adapter and three test inks, each 10 ml, for the measurement of surface energies (25 - 66 mN/m)
- Compact transport case



Product Information

1. Introduction

The **SurAChem® VG 02 K** is a surface pretreatment kit for the increase of the adhesion on material surfaces via deposition of amorphous silicate layers. The surface pretreatment kit SurAChem® VG 02 K offers a complete solution for the pretreatment of surfaces:

- SurAChem® VG 02 surface pretreatment device / manual fire torch
- SurASil® 200 (200 ml) refill cartridge
- Refill adapter A 5612
- 3 SurAChem® Test inks (25 - 66 mN/m)
- Compact transport case

2. SurAChem® VG 02 Surface Pretreatment Device

The SurAChem® VG 02 surface pretreatment device is the main unit of the SurAChem® VG 02 K surface pretreatment kit.

The SurAChem® VG 02 surface pretreatment device, utilizing flame pyrolysis of an organosilicon compound, generates and deposits a thin, high-density and bonded silicate layer with a high surface energy on:

- Metals
- Glass
- Ceramics
- Plastics

In combination with the SurAChem® GE 141 adhesion promoter (for epoxy resins), GM 138 (for acrylates) and GA 139 (for polyurethanes) this layer represents the basis for long-term water- and solvent-stable adhesions, coatings and printings. The SurAChem® VG 02 surface pretreatment device is suitable for the pretreatment of small to medium-sized surface areas.

2.1 Safety Instructions

Please read carefully this instruction and get familiar with the content of the SurAChem® VG 02 K surface pretreatment kit before using.



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2.1.1 Operation Instructions

- Keep the surface pretreatment device away from children
- Protect your eyes with safety glasses when working with the pretreatment device
- Refill the pretreatment device only with the special gas **SurASil® 200** or **SurASil® 600**
- Keep the pretreatment device away from open fire and flames
- Do not smoke
- Take care, that the burner nozzle is not pointed towards people, flammable objects, clothes, etc. when igniting the burner. The ignition occurs via a piezoelectric ignition by pushing the button on the backside of the device
- Provide adequate air ventilation during operation and hold an extinguishing-water or fire-extinguisher prepared
- Parts of the device near the burner nozzle can be heated up over time. Avoid touching these parts
- The sharp blue flame can possibly be larger than it is visible to the naked eye, especially in a light environment. The blue flame can become invisible at bright daylight
- Keep dust and other impurities away from the burner nozzle
- Always use the SurAChem® VG 02 surface pretreatment device carefully and make no changes or alterations on the device. Turn off the device immediately by malfunction or by gas loss
- Do not store the device at temperatures over 40 °C or in the sun. The tank content is under pressure
- After operation make sure that the flame is extinguished and no gas is flowing

2.1.2 Instructions on the protection of health and workplace

No harmful gases and vapor will be evaporated when the SurAChem® VG 02 surface pretreatment device is correctly handled. The fire-protection information mentioned by the producer of the device shall be taken into account. A fume hood is recommended for long-term operations.

2.1.3 Additional instructions on pretreatment of PTFE surfaces

Special caution is required by the surface pretreatment of PTFE or other fluoropolymers. Fluoropolymers decompose over a temperature of 350 °C. Some of the formed decomposition products are highly toxic after inhalation. As a consequence, it shall be taken into account, that the surface pretreatment will be performed under consideration of paragraph 2 under continuous fanning actions by avoiding component temperatures of over 200 °C. If necessary, e.g., at very small or thin-walled components, take some breaks.



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Generally, higher temperatures than 150 °C are not necessary to reach the desired effect. A fume hood can be used if available, however it is not necessary when operating according to the instructions.

2.2 Operation

The respective component will be temporarily treated, under slight fanning (if applicable) and with the outer (oxidative) part of the flame. Caution! The pretreatment is never performed with the inner, blue (reductive) cone of the flame. If necessary, reduce the lighting at the workplace for a better distinction of the flame parts.

It is recommended for small, thin-walled or heat-sensitive components to repeat the pretreatment in short intervals. Local overheating shall be avoided. In general, the temperature of the component surfaces should not exceed 150 to 200 °C. The surface temperatures of temperature-sensitive polymers, e.g., PVC, should not be higher than 120 °C. Larger metal components should be heated to 50 °C before the treatment to avoid water condensation on the surface.

Optional: finally, the flamed areas will be appropriately prepared for further processing, by coating them with the SurAChem® GE 141 adhesion promoter for adhesives /coatings/printings of epoxy resins, the SurAChem® GA 139 for polyurethanes, as also the SurAChem® GM 138 for acrylates/methacrylates.

The pretreated components should be stored at room temperature and protected from contaminations. The storage time of the components between pretreatment and utilization of the adhesion promoter should not exceed one week.

The storage time can be increased to 4 – 6 weeks, thanks to the utilization of the adhesion promoter. Nevertheless, a short-term subsequent processing (adhesion, coating, printing) is recommended.

2.2.1 Technical Data

SurAChem® VG 02 - Technical Data	
Size:	H x D: 137 x 36 mm
Weight:	244 g
Filling capacity:	ca. 12 g
Burning life:	1 – 2 hours, depending on the flame size
Flame temperature:	1300 °C



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2.3 Handling

1. Clip the pedestal on [Figure 1 (1)]
2. Switch the safety-switch at the ignition button to "ON" [Figure 1 (2)]
3. Hold the device tightly in your hand. The torch will light by pushing the ignition button [Figure 1 (2)]. At the same time push the "continuous" switch, positioned on the left of the device, to the left [Figure 1 (3)]. A continuous flame will be generated
4. The flame will be adjusted with the rotary control "- Gas +" [Figure 1 (4)] and the air control [Figure 1 (5)]. The flame can be adjusted from soft to sharp, as required. The flame-length should not exceed 100 mm
5. The burner will be shut down after utilization by pushing the "continuous" switch to the right on "OFF" position [Figure 1 (3)] until the flame is completely extinguished



Figure 1: SurAChem® VG 02 surface pretreatment device



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3. SurASil® 200 Refill Cartridge (200 ml)

The SurASil® 200 refill cartridge, as also the corresponding refill adapter are included in the SurAChem® VG 02 K kit and are used for the refilling of the surface pretreatment device SurAChem® VG 02.

SurASil® is a doped propane/butane mixture and forms explosive mixtures with air, similar to pure propane/butane mixtures. Consequently, open ignition-sources must be removed. Smoking is excluded when using the pretreatment device SurAChem® VG 02.

During operation, no toxic or harmful reaction-products will be formed. Nevertheless, for long-term operations an air ventilation or fume hood should be available.

3.1 Health and Safety Instructions

The SurASil® 200 refill cartridge is a reactive gas mixture used for the pretreatment of metallic, glass, plastic and ceramic material surfaces. **Warning!**

- Extremely flammable aerosol. Contains gas under pressure. May explode if heated.
- Keep away from heat/sparks/open flames/hot surfaces. No smoking.
- Use personal protective equipment as required.
- IF INHALED: If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing.
- Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
- Protect from sunlight. Store in a well-ventilated place and in room temperature
- Shake well before using
- Take into consideration the transportation regulations GGVS Class 2, No. 2F during transportation of the SurASil® cartridges



3.2 Refill

The SurAChem® VG 02 surface pretreatment device can perform a continuous operation of 1 to 2 hours with a single filling of ca. 12 g. The refilling can take place only with the SurASil® refill cartridge (containing the special precursor) and the corresponding refilling adapter, both included in the SurAChem® VG 02 K surface pretreatment kit.



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For refilling, remove the pedestal [Figure 1 (1)] and turn or hold the device upside down. Put the adapter A 5612 on the refilling valve on the bottom of the device [Figure 1 (6)]. Push the nozzle of the refilling cartridge with the special gas in the counterpart of the adapter and push on the valve of the fire torch with firm pressure.

3.3 Technical Data

SurASi [®] 200 Refill Cartridge - Technical Data	
Size:	H x D: 17 x 5 cm
Weight:	200 ml / 110 g
Pressure:	ca. 5 bar – max 10 bar bei 50 °C

3.4 Disposal

Waste disposal according to your local and environmental disposal regulations and requirements.

4. SurAChem[®] Test Inks

The SurAChem[®] VG 02 K kit includes three test inks for the qualitative measurement of the energy on materials surfaces:

- SurAChem[®] TT5625 test ink with a surface energy of 25 mN/m
- SurAChem[®] TT5644 test ink with a surface energy of 44 mN/m
- SurAChem[®] TT5666 test ink with a surface energy of 66 mN/m

4.1. General

The wettability degree of a material surface plays a vital role on the adhesion intensity of coatings, adhesives, inks, laquers and other layers. High surface energies enable high wettability and thus a safe adhesion on the material surface. SurAChem[®] test inks are a useful tool for controlling the results of the surfaces, being cleaned or pretreatment, via visual and qualitative measurements of their surface energy.



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4.2. Test Inks - Characterization

The integrated test inks provide the measurement of a surface energy spectrum between 25 mN/m and 66 mN/m, concretely:

Name	Surface energy	Color code	Application
TT 5625	25 mN/m	white	For very hydrophobic surfaces, e.g. that of plastics, especially of polyolefins like PE, PP, PTFE
TT 5644	44 mN/m	red	For fine determination of the surface energy of glass, ceramic and metal as well as pretreated plastic surfaces TT 44 is defined as the "universal ink" and is appropriate for initial orientating tests
TT 5666	66 mN/m	green	Used especially for surfaces with very high surface energy. Main application area is on hydrophilic surfaces of, e.g. pretreated chromated or phosphated metals

Table 1: Test inks characterization

4.3 Dropper Test-Inks

In comparison to brush or pen test-inks, dropper test-inks prevent from contamination of the liquid ink, by eliminating contact with the surface to be measured.

The special test inks use a slim dropper (\varnothing 2 mm) with which even the smallest surfaces can be measured. High accuracy as well as lower ink consumption are also significant advantages.

The special bottles have a tamper-evident closure and child resistant tamper-evident (ISO 8317).

- I. Tamper-evident closure: by removing the bottle cap for the first time, the tamper-proof ring will detach itself from the cover.
- II. Child resistant tamper-evident: the bottle cap can be removed by pressing it downwards and turning it at the same time.



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On the bottle cap there is a tactile warning triangle sign for blinds. The plastic bottles are made of polyethylene terephthalate (PET). They are produced in clean room by spray process. Bottles and closures are manufactured strictly according to pharmaceutical conditions. All materials used are approved according to the European Medicines Regulation.

4.4 Technical Data

Test Inks - Technical Data	
Size:	H x D: 69 x 20 mm
Volume:	10 ml

4.5 Application

Apply a droplet of the SurAChem® TT5644 test ink to the non-pretreated surface and observe its spreading behavior. In the case of propagation (see example Figure 2 - right), the surface energy of the material is in the range of the surface energy of the test ink.

In the case of a droplet formation on the material surface (see example Figure 2 - left), the measurement should be repeated with a test ink of lower surface energy (test ink SurAChem® TT5625). In this case the surface energy of the non-pretreated material surface can be determined.

In order to increase the surface energy of the material, use the pretreatment device SurAChem® VG 02 and the SurASil® method. A drop of the SurAChem® TT5644 test ink is now applied to the pretreated surface and its spreading behavior is observed. In the case of spreading, the surface energy of the material is in the range of the surface energy of the test ink, and this range can be determined even more precisely with test inks of nearer surface energy values (test ink SurAChem® TT5666).

In the case of drop formation, the surface pretreatment should be repeated with higher coating thickness and better homogeneity. In general, a material surface is referred to as "active" or "wetable" when it reaches a surface energy of approx. 44 mN / m.



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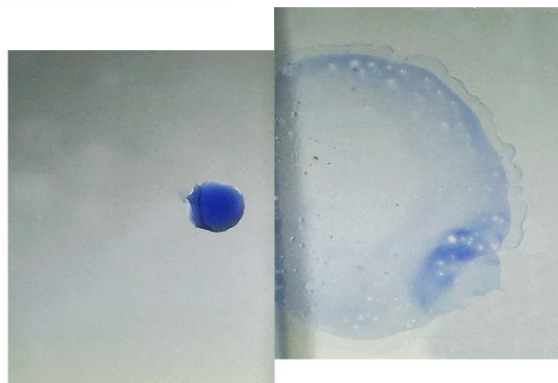


Figure 2: Formation (left) and spreading (right) of a test ink droplet. Example on untreated (left) and treated (right) aluminum surface

4.6 Storage

SurAChem® test inks are stable at room temperature for at least 12 months after delivery.

4.7 Health and Safety Instructions

SurAChem® - test inks contain small amounts of methanol. The occupational health & safety requirements, relevant for this solvent, must be taken into consideration. After the evaporation of the solution, any kind of contact is harmless.

Attention!

- Highly flammable liquid and vapour.
- Toxic if inhaled.
- Toxic in contact with skin.
- Toxic if swallowed.
- Causes damage to organs.
- Keep away from heat/sparks/open flames/hot surfaces. No smoking.
- Wear protective gloves/protective clothing/eye protection /face protection.
- IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin.
- IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
- Store in a well-ventilated place. Keep cool.



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4.8 Disposal

Waste disposal according to your local and environmental disposal regulations and requirements.

We will be pleased to provide you with our services and await your request.

The information and technical consultation given by SurA Chemicals GmbH, verbally or written, is based on the company's best knowledge and shall only be considered as non-binding advice, also in respect of the protected rights of third parties. The company's technical consultation does not release the customer from own examination concerning the suitability and usability of the company's product. The manufacturer's liability extends solely to the value of the products supplied by SurA Chemicals GmbH and applied by the customer.

SurA Chemicals GmbH guarantees its products to be of perfect quality as stated in its general terms and conditions of sale and delivery.



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