

SURA CHEMICALS

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SurAChem[®] VG 02 K **PRETREATMENT KIT**

Product and application
information

SurA Chemicals GmbH
Passion for chemistry

SurAChem® VG 02 K Pretreatment kit

For the **increase of adhesion** on
various material surfaces

Our company

Welcome to SurA Chemicals GmbH. The company has a long experience and an extensive know-how in the fields of protective and decorative coatings, adhesives, special chemicals such as hydrophobic agents and adhesion promoters, systems and equipment for surface pretreatment, as well as contract manufacturing for the development and production of customer-specific products.

The company is TÜV certified according to DIN EN ISO 9001: 2015. Our products comply with the RoHS directive and are registered according to the REACH regulation. The devices manufactured in our house are CE-marked.



Table of content

1	Surface silicatization	Page 03
2	Pretreatment Kit SurAChem® VG 02 K	Page 06
2.1	Pretreatment Device SurAChem® VG 02	Page 07
2.2	SurAChem® - Test Inks	Page 11
2.3	Refill Cartridge SurASil®	Page 16
2.4	Safety and transportation	Page 17

Compliant in accordance to RoHS & REACH regulations



The pretreatment kit SurAChem® VG 02 K complies with Regulation (EC) No. 1907/2006 (REACH) and EU Directive 2011/65/EU (RoHS). SurA Chemicals GmbH is certified with DIN EN ISO 9001:2015.



This product and application information is intended to ensure the correct use of the Pretreatment kit SurAChem® VG 02 K and to prevent eventual mistakes that can lead to quality insufficiencies or adverse effects.

1. Surface Silicatization

The pretreatment of surfaces by means of flame pyrolysis for the increase of adhesion on coatings, adhesives and printing media has been an established process in numerous industrial fields. A further significant improvement of the adhesive strength can be achieved by depositing a reactive silicate layer produced by flame pyrolysis. The combustion of a silane additive in a fuel gas atmosphere creates high-density and bonded silicate layers with high surface energy on a wide variety of material surfaces, such as metals, glass, ceramics and plastics.



Surface Silicatization

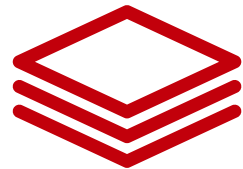
Wirth the SurASil®-Process



By the SurASil® process, a gaseous, silicon-containing precursor is fed into the fuel gas mixture of a burner. The combustion energy of the flame creates highly reactive compounds that are deposited on the surface of the material. As a result, very dense and firmly bonded silicate layers (layer thickness approx. 20 - 100 nm) with high surface energy are formed on various material surfaces, such as metals, glass, ceramics, plastics and composite materials.



The environmentally friendly



& cost effective
alternative

to common harmful chromate coatings
and primer applications

Combustion Chemical Vapour Deposition (CCVD) is a very effective and cost-saving in-line procedure to enhance the wettability of surfaces by depositing highly reactive amorphous silicate layers (layer thickness approx. 20 - 100 nm). The surface silication is an environmentally friendly alternative to common harmful chromate coatings and primer applications! The effect of the SurASil® pretreatment of surfaces is shown in figure 1. The surface energy of the pretreated surface (figure 1 - right) is much higher than that of the untreated surface (figure 1 - left). Here are used the testing inks SurAChem® for qualitative testing of the surface energy. In combination with adhesion promoters

with appropriate functionalities, this layer represents the basis for long-term, water- and solvent-stable adhesives, coatings and prints. Further applications of this technology are temporary corrosion protection as well as generation of diffusion barrier layers.

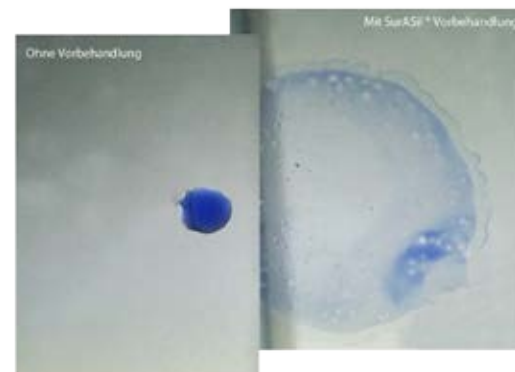


Figure 1: The effect of surface silication and the surface energy on aluminum material

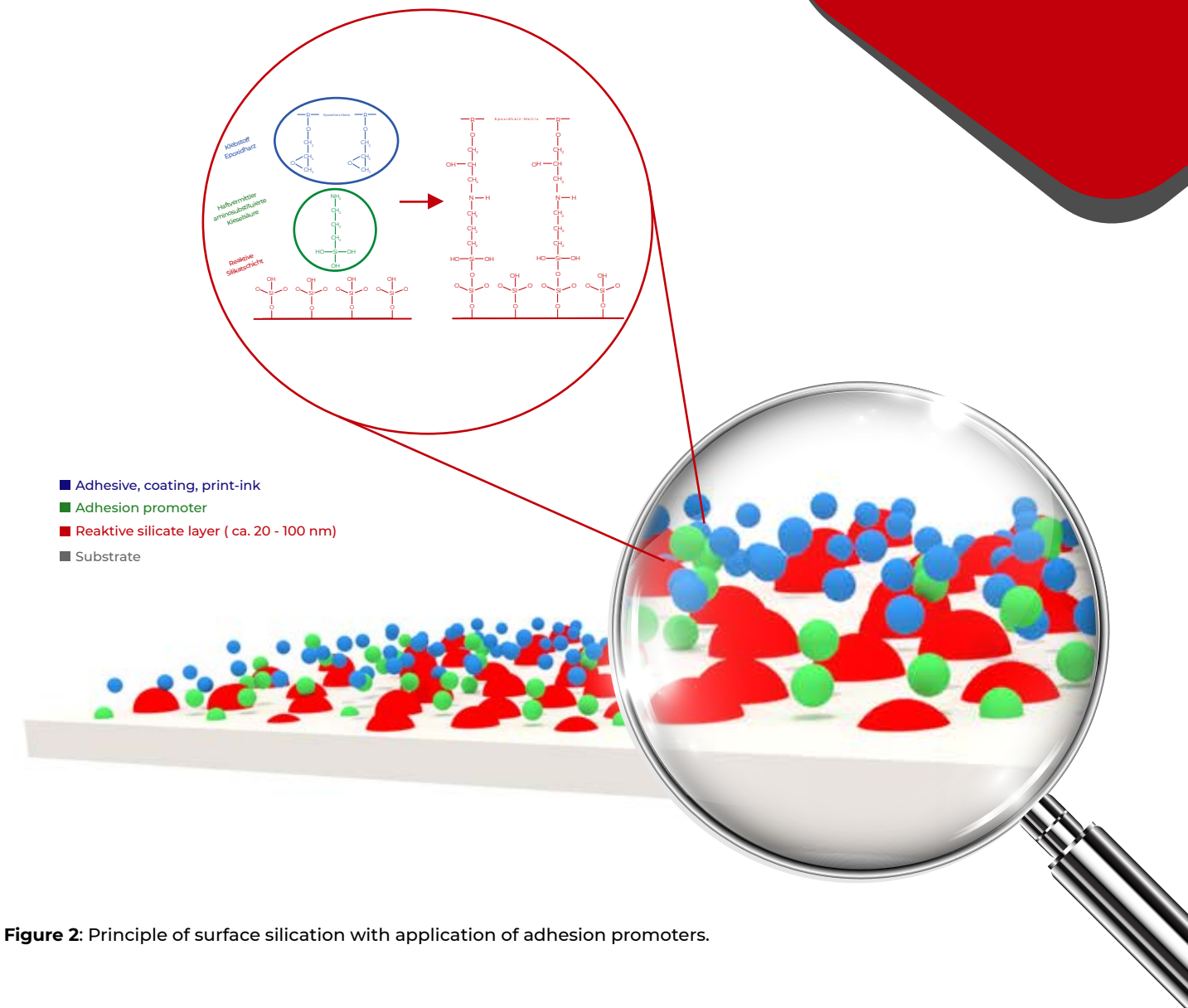


Figure 2: Principle of surface silication with application of adhesion promoters.

2. Pretreatment Kit SurAChem® VG 02 K

The SurAChem® VG 02 K Pretreatment Kit is a pretreatment set designed to increase the adhesion of material surfaces by depositing amorphous silicate layers.

The SurAChem® VG 02 K Pretreatment Kit provides a complete solution for surface treatment including:

- 1× SurAChem® VG 02 pretreatment device
- 1× SurASil 200 refill cartridge (200 ml)
- 1× A 5612 refill adapter
- 3× test inks (25 – 66 mN/m)
- 1× transport case

2.1 Pretreatment Device SurAChem® VG 02

The SurAChem® VG 02 Pretreatment Device is the core unit of the SurAChem® VG 02 K pretreatment kit. SurAChem® VG 02 is a surface silicatization device that operates on the principle of flame pyrolysis. Through the flame pyrolysis of a silicon-organic compound, the device generates a thin yet very dense and strongly adhering silicate layer with high surface energy on metals, glass, ceramics, and plastics.

2.1.1 Application

For immediate use, the respective substrate should be briefly pretreated using the outer (oxidizing) part of the flame (see Figure 3). It is important to ensure that the pretreatment is never performed with the inner, blue (reducing) part of the flame. If needed, workplace lighting should be reduced to better distinguish the flame zones. For very small, thin-walled, or heat-sensitive parts, it is recommended to repeat the pretreatment at short intervals. Local overheating must be avoided. In general, achieving the desired effect does not require surface temperatures above 150 °C. For heat-sensitive polymers (e.g., PVC), surface temperatures should not exceed 60 – 80 °C. Larger parts to be flamed should be preheated to approx. 50 °C before treatment to prevent condensation of water on the surface.

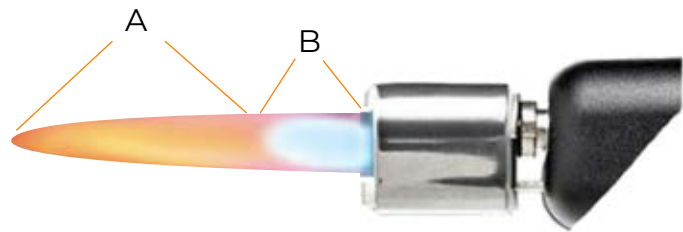


Figure 3: Flame A – oxidizing zone (application area for flame silicatization).
Flame B – reducing zone

2.1.2 Handling

1. Attach the base, see Figure 4 (1).
 2. Set the safety switch on the ignition button to “ON,” see Figure 4 (2).
 3. Hold the device in your hand. By pressing the ignition button, the burner is ignited, see Figure 4 (2). While holding down the ignition button, push the switch marked “continuous” on the left side to the left, see Figure 4 (3). This will produce a continuous flame.
 4. The flame is adjusted using the rotary control “– Gas +,” see Figure 4 (4), and the air regulator, see Figure 4 (5).
- Depending on requirements, the flame can be adjusted from soft to hard. For correct adjustment, initial professional instruction is necessary. The flame length should not exceed 100 mm.
5. After use, shut off the burner by moving the “continuous” switch to the right, towards “OFF,” see Figure 4 (3), so that the flame extinguishes completely.



Figure 4: Pretreatment device SurAChem® VG 02

2.1.3 Safety Instructions

Please read these instructions carefully and familiarize yourself with the contents of the SurAChem® VG 02 pretreatment device before using it.

Caution! Always keep the SurAChem® VG 02 pretreatment device out of the reach of children. Wear protective goggles while working. Only refill the burner with SurASil® 200 or 600 special gas. Keep the device away from open flames and ignition sources. No smoking!

When igniting, take special care that the burner nozzle is not pointed towards people, flammable objects, clothing, etc. Ignition is carried out by a piezo igniter using the push

button at the rear end of the device.

When working with the device, ensure adequate ventilation and always keep extinguishing water or a fire extinguisher nearby.

After extended use, the device components in the immediate vicinity of the nozzle become hot. Avoid contact with these heated parts.

Be aware that the flame may be significantly longer than visible to the naked eye, especially in bright environments. In bright daylight, the flame may become almost invisible.

2.1.3.1 Additional information regarding surface pretreatment of fluorine-containing polymers

Take care when treating the surface of PTFE and other fluoropolymers. Fluoropolymers start to decompose at temperatures above

350 °C. Some of these decomposition products are very toxic by inhalation.

Increase of adhesion

on glass-, metals-, plastics
and ceramics

Therefore, it is essential to ensure that the surface pretreatment is carried out according to the instructions at point 2.1, with perma-

nent fanning and avoiding of substrate temperatures higher than 200 °C.

2.1.4 Storage

The storage of flamed parts prior to the application of the specially developed SurAChem® adhesion promoters should not exceed 1–2 weeks at room temperature and must be protected from contamination. After applying the corresponding adhesion

promoter, longer-term storage of up to 3–4 weeks is possible. Nevertheless, the shortest possible further processing - such as bonding, coating, or printing - is recommended.

SurAChem[®] test-inks

based on ethanol

2.2 SurAChem[®] - test-inks

The SurAChem[®] VG 02 K pretreatment kit includes three ethanol-based test inks, each 10 ml. These cover a broad range of surface energies from 25 mN/m to 66 mN/m, see Table 1. The SurAChem[®] test inks are used to verify surface pretreatment or surface clean-

ing by means of a visual and qualitative measurement of surface energy. Each SurAChem[®] test ink is individually colored to allow quick and unmistakable identification of the respective surface energy.

Article	Surface energy	Identification color	Application
TT 5725	25 mN / m	white	for very hydrophobic surfaces, e.g. plastics, especially PE, PP, or PTFE

Article	Surface energy	Identification color	Application
TT 5744	44 mN / m	red	This test ink is primarily used for the precise determination of surface energy on glass, ceramics, metals, and especially on pretreated plastics. The TT 5744, acting as a 'universal ink', should always be used for initial orientation tests.
TT 5766	66 mN / m	green	Primarily suitable for surfaces with very high surface energies; the main area of application is hydrophilic surfaces of pretreated metals, e.g. chromated or phosphated metals.

Table 1: Characterization of the Test inks SurAChem[®]



Colored Test-inks

for the unmistakable
identification of surface
energies!

2.2.1 Test-ink Bottles

Unlike brush or pen test inks, the dropper test inks prevent contamination of the liquid ink (e.g. by impurities or foreign particles) since there is no direct contact with the material surface being tested.

The special test ink bottles are equipped with a slim dropper (approx. Ø 2 mm or Ø 3 mm), allowing even very small surfaces to be tested. Advantages include high accuracy and reduced ink consumption.

The bottles feature a cap with both quality seal and child safety protection (ISO 8317). In

addition, the caps are marked with a warning triangle for the visually impaired.

1. Quality seal: When the cap is opened for the first time, the tamper-evident safety ring detaches from the cap.

2. Child safety lock: To open, press the cap downward while turning.

2.2.2 Application

Apply one drop of the selected test-ink (e.g. 38 mN / m) on the non-pretreated surface and watch its spreading behavior. After spreading (e.g. figure 1 - right), the surface energy of the material surface is in the range of the surface energy of the test-ink. In case of drop formation on the material surface (e.g. figure 1 - left), repeat the test with a test-ink of lower surface energy. This is how to determine the surface energy of a non-pretreated material surface.

In order to increase the surface energy of a material surface, the material can be pretreated, among others, with the SurASil® process. A drop of the selected test-ink is to be applied on the pretreated surface and its spreading behavior is to be observed. When spreading, the surface energy of the material surface is in the range of the surface energy of the test-ink. This range can be determined even more precisely using test-inks of

surface energy values closer to each other. In case of drop formation on the material surface, the test must be repeated with a test-ink of a lower surface energy. Repeat the surface pretreatment or choose another pretreatment method, if no measurement range is determinable. A material surface is generally termed as "active" or "wetable" when a surface energy of more than approx. 44 mN / m is reached.

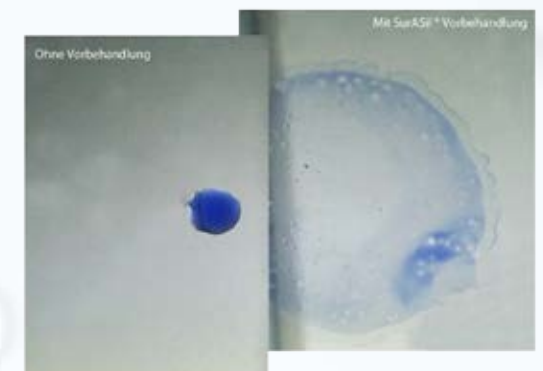


Figure 5: Formation (left) and spreading (right) of an ink drop on an untreated (left) and a treated (right) aluminum surface



Energy spectrum

between 25 - 66 mN / m

For the qualitative assessment of a wide range of surface energies!

2.2.3 Storage

The SurAChem® test inks remain stable for at least 12 months after delivery when stored at room temperature.

2.2.4 Technical Data

Test-inks SurAChem®

Filling capacity	10 ml
Dimentions	height 69 mm, ø 20 mm

2.3 Refill Cartridges SurASil®

The SurASil® refill cartridges are propane–butane gas mixtures doped with a specially developed silicon-containing precursor. The SurASil® refill cartridges are specially designed for manual application with small handheld flame pretreatment devices on a wide variety of material surfaces.

The SurAChem® VG 02 K pretreatment kit includes 1 SurASil® 200 refill cartridge, suitable for metal, plastic, and ceramic surfaces. Other SurASil® refill cartridges can also be used with the SurAChem® VG 02 K pretreatment kit and are available separately (see Table 2).

Article	Filling quantity	Application	Additional properties
SurASil® 200	200 ml	Ideal for metal, glass and ceramics	also suitable for plastics
SurASil® 200 K	200 ml	Ideal for plastics	also suitable for metal, glass and ceramics
SurASil® 200 L	200 ml	Ideal for low-adhesion plastics	also suitable for metal, glass and ceramics
SurASil® 200 XL	200 ml	Ideal for extremely low-adhesion plastics	also suitable for metal, glass and ceramics

Table 2: Charakterization of the refill cartridges SurASil® with filling quantity 200 ml

2.3.1 Storage

The SurASil® refill cartridges have a shelf life stored in cool.
of at least 12 months after delivery when

2.3.2 Technical Data

Refil cartridges SurASil 200® - technical data

Dimensions	H x D: 17 x 5 cm
Net weight	200 ml / 110 g
Pressure	ca. 5 bar – max 10 bar by 50 °C

2.4 Safety and Transport Instructions

Information on hazards, labeling, protective measures, transport, and disposal of the SurASil® VG 02 K pretreatment kit and its contents can be found in the product-specific safety data sheets.

Our verbal and written application-technical consultation is the best to our knowledge and belief and is a non-binding notice, also with regard to any third party property rights. However, this advice does not release the user of our products from carrying out their own testing for the intended purpose. Any liability only relates to the value of the products supplied by us and used by the user. Of course, we guarantee the perfect quality of our products in accordance with our sales and delivery conditions.

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