SURA CHEMICALS

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SurAChem®

PRIMER

The liquid silane-based adhesion promoting systems

For the enhanced adhesion of coatings, adhesives and printings on various material surfaces, such as glass, metals, plastics and ceramics as well as composite materials.

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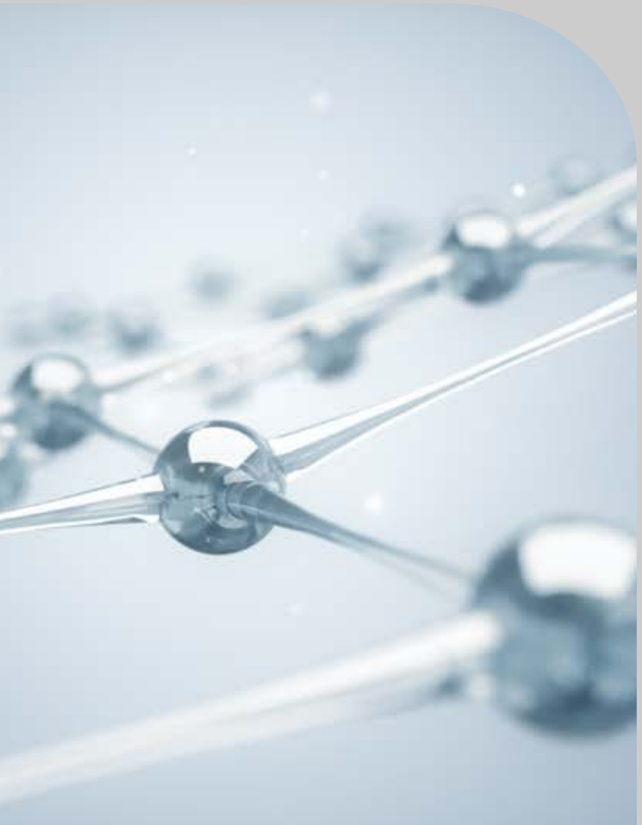
Product and application information

SurA Chemicals GmbH
Passion for Chemistry

The liquid silane-based adhesion enhancing systems.

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 focus of our technologies and innovative products is on the sectors of chemical industry, automotive, micro/-electronics, electrical engineering, healthcare, optics, glass & metal industry, plastics processing, printing and graphics industry, as also solar technology.
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. Furthermore, we are partners in international and national research projects and cooperate with large companies and institutes from various countries. .



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Compliant in accordance to

RoHS & REACH regulations

SurAChem® primers are compliant according to the regulation (EG) No. 1907/2006 (REACH) and the EU directive 2011/65/EC (RoHS). SurA Chemicals is certified with DIN EN ISO 9001:2015.

This instruction guide will ensure the proper use of SurAChem® primers and prevent eventual mistakes, which can lead to quality insufficiencies or adverse effects. When using SurAChem® primers, proper handling during processing, application, curing, storage and, if necessary, surface pretreatment is required.

1. Introduction

SurAChem® adhesion promoters are liquid, organic-anorganic, adhesion enhancing systems based on silane. They are suitable for the enhanced adhesion of epoxy-, polyurethane-, meth- /acrylate-, polyester-, silicone as well as SH-En- or polysulphide-based adhesives, coatings and printings. The molecules of SurAChem® adhesion promoters are structured in such a way that they form a bridge via functional groups between the substrate and the coating (adhesive, lacquer or printing) used. SurAChem® adhesion promoters are suitable for metals, glass and ceramic subsrrates as well as - after proper activation - plastics (see overview in table 1).

SurAChem® adhesion promoters - overview

Item	Application	Suitable substrates
SurAChem® GM 138	for meth-/acrylate-based adhesives, coatings and printings	metals, glass, ceramics, plastics
SurAChem® GA 139	for epoxy- and polyurethane-based adhesives, coatings and printings	metal, glass, ceramics, plastics
SurAChem® GE 141	for epoxy-, polyurethane- and polyester-based adhesives, coatings and printings	metals, glass, ceramics, plastics
SurAChem® GE 141 WAD	for thermal-curing coatings based on polyurethane	metals (aluminum)
SurAChem® GH 144	universal adhesion promoter, particularly suitable for silicone-based adhesives, coatings and printings	metals, glass, ceramics, plastics
SurAChem® GS 145	for adhesives, coatings and printings based on SH-En- and polysulfide- or rather vulcanized polymers	metals, glass, ceramics, plastics
SurAChem® 5250	for dip coating of aluminum surfaces	metals (aluminum)

Tabelle 1: SurAChem® adhesion promoters

2. SurAChem® GM 138 adhesion promoter

SurAChem® GM 138 adhesion promoter is a liquid, organic-anorganic, adhesion enhancing system based on silane. It is suitable for acrylate-based adhesives, coatings and printings. SurAChem® GM 138 adhesion promoter is suitable for metals, glass and ceramics as well as, after proper activation, for plastic surfaces.

2.1 Surface pretreatment

For best adhesion results the surfaces to be coated should be free from contamination and organic residues. Before printing, coating or gluing, cleaning can be done using suitable cleaning agents such as ethanol or isopropanol.

2.2 Processing

Depending on the shape of the component, the application of SurAChem® GM 138 adhesion promoter should be carried out as thin as possible by spraying, dip coating, roll coating or in case of smaller components using a brush, cotton pad or similar to achieve a dense layer. In case of proper storage and the exclusion of humidity the applied layer stays active up to > 1 week. Preferably immediately after evaporation of the solvent and, if necessary, short-term heating up to 70 °C, the adhesive, coating or printing can be applied in liquid form or as hot-melt or powder. **Attention!** Rest-amounts, which have been previously taken from the associate storage container, storage vessel etc., cannot be once more within them collected. If so, the storage stability will be significantly reduced.

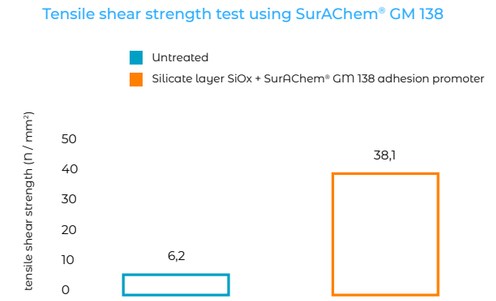
2.3 Packaging and Storage

The packaging and delivery of the SurAChem® GM 138 adhesion promoter can be provided in bottles, starting from 250 ml. SurAChem® GM 138 adhesion promoter is durable for at least 6 months after delivery, if un- opened and stored at approx. +5 °C.

2.4 Performance tests

Tensile shear strength test based on DIN 53283 standard.

The adhesion of an acrylate-/methacrylate-based adhesive was investigated by testing the tensile shear strength based on DIN 53283. The jointing materials used were glass on sandblasted stainless steel. The measurement was performed with untreated as well as pretreated jointing material surfaces. The results (graph 1) show a very low tensile shear strength of only 6.2 N/mm² for untreated glass/stainless steel material. The surface pretreatment using the SurASil® process and SurAChem® GM 138 adhesion promoter significantly influenced the adhesion of the acrylate-/methacrylate-based adhesive. An increase of tensile shear strength of more than 500% was achieved.



Graph 1: tensile shear strength (N/mm²) with SurAChem® GM 138 adhesion promoter on Glas / stainless steel sandblasted

2.5 Technical data

Technical data of SurAChem® GM 138 adhesion promoter

Color	colorless
Physical state	liquid
Application	suitable for acrylate-based adhesives and coatings

Table 2: Technical data of SurAChem® GM 138 adhesion promoter

3. SurAChem® GA 139 adhesion promoter

SurAChem® GA 139 adhesion promoter is a liquid, organic-anorganic, adhesion enhancing system based on silane. It is suitable for epoxy- and polyurethane-based adhesives, coatings and printings. SurAChem® GA 139 adhesion promoter is suitable for metals, glass and ceramics as well as, after proper activation, for plastic surfaces.

3.1 Surface pretreatment

For best adhesion results the surfaces to be coated should be free from contamination and organic residues. Before printing, coating or bonding, cleaning can be done using suitable cleaning agents such as ethanol or isopropanol.

3.2 Processing

Depending on the shape of the component, the application of SurAChem® GA 139 adhesion promoter should be carried out as thin as possible by spraying, dip coating, roll coating or in case of smaller components using a brush, cotton pad or similar to achieve a dense layer. In case of proper storage and the exclusion of humidity the applied layer stays active up to > 1 week. Preferably immediately after evaporation of the solvent and, if necessary, short-term heating up to 70 °C, the adhesive, coating or printing can be applied in liquid form or as hot-melt or powder. **Attention!** Rest-amounts, which have been previously taken from the associate storage container, storage vessel etc., cannot be once more within them collected. If so, the storage stability will be significantly reduced.

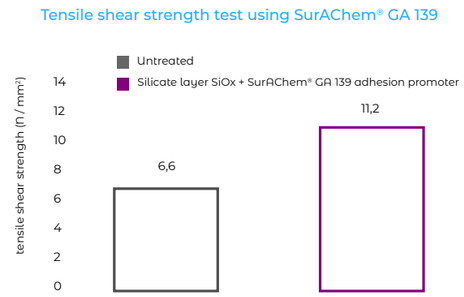
3.3 Packaging and Storage

The packaging and delivery of the SurAChem® GA 139 adhesion promoter can be provided in bottles, starting from 250 ml. SurAChem® GA 139 adhesion promoter is durable for at least 6 months after delivery, if un- opened and stored at approx. +5 °C.

3.4 Performance tests

Tensile shear strength test based on DIN 53283 standard.

The adhesion of an epoxy-based adhesive was investigated by testing the tensile shear strength based on DIN 53283. The jointing materials used were PMMA and sandblasted stainless steel. The measurement was performed with untreated as well as pretreated jointing material surfaces. The results (graph 2) show a low tensile shear strength of only 6.6 N/mm² for untreated PMMA/stainless steel material. The surface pretreatment using the SurASil® process and SurAChem® GA 139 adhesion promoter significantly influenced the adhesion of the epoxy-based adhesive. An increase of tensile shear strength of more than 65% was achieved.



Graph 2: tensile shear strength (N/mm²) with SurAChem® GA 139 adhesion promoter on PMMA / stainless steel sandblasted

3.5 Technical data

Technical data of SurAChem® GA 139 adhesion promoter

Color	colorless
Physical state	liquid
Application	suitable for epoxy- and polyurethane-based adhesives and coatings

Table 3: Technical data of SurAChem® GA 139 adhesion promoter

4. SurAChem® GE 141 adhesion promoter

SurAChem® GE 141 adhesion promoter is a liquid, organic-anorganic, adhesion enhancing system based on silane. It is suitable for epoxy-, polyurethane- and polyester-based adhesives, coatings and printings. SurAChem® GE 141 adhesion promoter is suitable for metals, glass and ceramics as well as, after proper activation, for plastic surfaces.

4.1 Surface pretreatment

For best adhesion results the surfaces to be coated should be free from contamination and organic residues. Before printing, coating or bonding, cleaning can be done using suitable cleaning agents such as ethanol or isopropanol.

4.2 Processing

Depending on the shape of the component, the application of SurAChem® GE 141 adhesion promoter should be carried out as thin as possible by spraying, dip coating, roll coating or in case of smaller components using a brush, cotton pad or similar to achieve a dense layer. In case of proper storage and the exclusion of humidity the applied layer stays active up to > 1 week. Preferably immediately after evaporation of the solvent and, if necessary, short-term heating up to 70 °C, the adhesive, coating or printing can be applied in liquid form or as hot-melt or powder. **Attention!** Rest-amounts, which have been previously taken from the associate storage container, storage vessel etc., cannot be once more within them collected. If so, the storage stability will be significantly reduced.

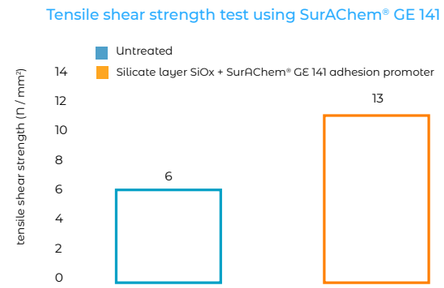
4.3 Packaging and Storage

The packaging and delivery of the SurAChem® GE 141 adhesion promoter can be provided in bottles, starting from 250 ml. SurAChem® GE 141 adhesion promoter is durable for at least 6 months after delivery, if un- opened and stored at approx. +5 °C.

4.4 Performance tests

Tensile shear strength test based on DIN 53283 standard.

The adhesion of an epoxy-based adhesive was investigated by testing the tensile shear strength based on DIN 53283. The jointing materials used were polyphenylene sulphide (PPS) on sandblasted stainless steel. The measurement was performed with untreated as well as pretreated jointing material surfaces. The results (graph 3) show a low tensile shear strength of only 6 N/mm² for untreated PPS/stainless steel material. The surface pretreatment using the SurASil® process and SurAChem® GE 141 adhesion promoter significantly influenced the adhesion of the epoxy-based adhesive. An increase of tensile shear strength of more than 115% was achieved.



Graph 3: tensile shear strength (N/mm²) with SurAChem® GE 141 adhesion promoter on PPS / stainless steel sandblasted

4.5 Technical data

Technical data of SurAChem® GE 141 adhesion promoter

Color	colorless
Physical state	liquid
Application	suitable for epoxy-, polyurethane- and polyester-based adhesives and coatings

Table 4: Technical data of SurAChem® GE 141 adhesion promoter

5. SurAChem® GE 141 WAD adhesion promoter

SurAChem® GE 141 WAD adhesion promoter is a silane-based chromium-free liquid adhesion enhancing system, especially developed to coat aluminum surfaces with thermally curing polyurethane-based coating systems. An environmentally friendly mixture of water and isopropanol is used as solvent.

5.1 Surface pretreatment

For best adhesion results the surfaces to be coated should be free from contamination and organic residues. Before coating, cleaning can be done using suitable cleaning agents (e.g. ethanol or isopropanol) or rather in accordance to the state of the art.
The further processing according to chapter 5.2 *Processing* should preferably proceed in-line. Pauses should not exceed 1 hour.

5.2 Processing

The application of SurAChem® GE 141 WAD adhesion promoter should be carried out as thin as possible by spraying or roll coating. The evaporation of the solvent is followed by drying the adhesive layer for 5 minutes at 80 °C. Then, the adhesive layer is ready for coating with corresponding coatings. Components coated with SurAChem® GE 141 WAD adhesion promoter should not be stored for more than 2 weeks.
Attention! Rest-amounts, which have been previously taken from the associate storage container, storage vessel etc., cannot be once more within them collected. If so, the storage stability will be significantly reduced.

5.3 Packaging and Storage

The packaging and delivery of SurAChem® GE 141 WAD adhesion promoter can be provided in canisters, starting from 10 l. SurAChem® GE 141 WAD adhesion promoter is durable for at least 6 months after delivery, if unopened and stored at room temperature.

5.4 Technical data

Technical data of SurAChem® GE 141 WAD adhesion promoter

Color	colorless
Physical state	liquid
Application	especially for coating of aluminum surfaces with thermally curing polyurethane-based coating systems

Table 5: Technical data of SurAChem® GE 141 WAD adhesion promoter

6. SurAChem® GH 144 adhesion promoter

SurAChem® GH 144 adhesion promoter is a liquid, organic-anorganic, adhesion enhancing system based on silane. SurAChem® GH 144 adhesion promoter is suitable for universal applications, particularly for silicones. The SurAChem® GH 144 adhesion promoter is suitable for metals, glass and ceramics as well as, after proper activation, for plastic surfaces.

6.1 Surface pretreatment

For best adhesion results the surfaces to be coated should be free from contamination and organic residues. Before printing, coating or bonding, cleaning can be done using suitable cleaning agents such as ethanol or isopropanol.

6.2 Processing

Depending on the shape of the component, the application of SurAChem® GH 144 adhesion promoter should be carried out as thin as possible by spraying, dip coating, roll coating or in case of smaller components using a brush, cotton pad or similar to achieve a dense layer. In case of proper storage and the exclusion of humidity the applied layer stays active up to > 1 week. Preferably immediately after evaporation of the solvent and, if necessary, short-term heating up to 70 °C, the adhesive, coating or printing can be applied in liquid form or as hot-melt or powder. **Attention!** Rest-amounts, which have been previously taken from the associate storage container, storage vessel etc., cannot be once more within them collected. If so, the storage stability will be significantly reduced.

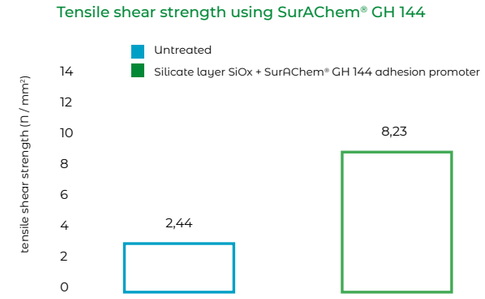
6.3 Packaging and Storage

The packaging and delivery of the SurAChem® GH 144 adhesion promoter can be provided in bottles, starting from 250 ml. SurAChem® GH 144 adhesion promoter is durable for at least 6 months after delivery, if unopened and stored at approx. +5 °C.

6.4 Performance tests

Tensile shear strength test based on DIN 53283 standard.

The adhesion of a top coat based on an addition cross-linking silicone was investigated by testing the tensile shear strength based on DIN 53283. The jointing material used was glass. The measurement was performed with untreated as well as pretreated jointing material surfaces. The results (graph 4) show a tensile shear strength of 2.44 N/mm² for untreated glass material. The surface pretreatment using SurAChem® GH 144 adhesion promoter significantly influenced the adhesion of the top coat. An increase of the tensile shear strength of more than 240% was achieved.



Grafik 4: tensile shear strength (N/mm²) using SurAChem® GH 144 adhesion promotor on Glass material

6.5 Technical data

Technical data of SurAChem® GH 144 adhesion promoter

Color	colorless
Physical state	liquid
Application	universal adhesion promoter, particularly suitable for silicones

Table 6: Technical data of SurAChem® GH 144 adhesion promoter

7. SurAChem® GS 145 adhesion promoter

SurAChem® GS 145 adhesion promoter is a liquid, organic-anorganic, adhesion enhancing system based on silane. It is suitable for adhesives, coatings and printings based on SH-En- and polysulfide- or rather vulcanized polymers. SurAChem® GS 145 adhesion promoter is suitable for metals, glass and ceramics as well as, after proper activation, for plastic surfaces.

7.1 Surface pretreatment

For best adhesion results the surfaces to be coated should be free from contamination and organic residues. Before printing, coating or bonding, cleaning can be done using suitable cleaning agents such as ethanol or isopropanol.

7.2 Processing

Depending on the shape of the component, the application of SurAChem® GS 145 adhesion promoter should be carried out as thin as possible by spraying, dip coating, roll coating or in case of smaller components using a brush, cotton pad or similar to achieve a dense layer. In case of proper storage and the exclusion of humidity the applied layer stays active up to > 1 week. Preferably immediately after evaporation of the solvent and, if necessary, short-term heating up to 70 °C, the adhesive, coating or printing can be applied in liquid form or as hot-melt or powder. **Attention!** Rest-amounts, which have been previously taken from the associate storage container, storage vessel etc., cannot be once more within them collected. If so, the storage stability will be significantly reduced.

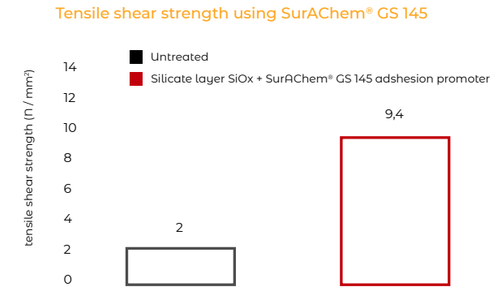
7.3 Packaging and Storage

The packaging and delivery of the SurAChem® GS 145 adhesion promoter can be provided in bottles, starting from 250 ml. SurAChem® GS 145 adhesion promoter is durable for at least 6 months after delivery, if unopened and stored at approx. +5 °C.

7.4 Performance tests

Tensile shear strength test based on DIN 53283 standard.

The adhesion of PMMA and a thioether compound was investigated by testing the tensile shear strength based on DIN 53283. The measurement was performed with untreated as well as pretreated jointing material surfaces. The results (graph 5) show a very low tensile shear strength of only 2 N/mm² for untreated surfaces. The surface pretreatment using the SurASil® process and SurAChem® GS 145 adhesion promoter significantly influenced the adhesion. An increase of tensile shear strength of more than 350% was achieved.



Graph 5: tensile shear strength (N/mm²) using SurAChem® GS 145 adhesion promoter on PMMA Material

7.5 Technical data

Technical data of SurAChem® GS 145 adhesion promoter

Color	colorless
Physical state	liquid
Application	suitable for adhesives, coatings and printings based on SH-En- and polysulfide- or rather vulcanized polymers

Table 7: Technical data of SurAChem® GS 145 adhesion promoter

8. SurAChem® 5250 adhesion promoter

SurAChem® 5250 adhesion promoter is a polymer-based, chromium-free, no-rinse adhesion promoter concentrate, especially developed for the coating of aluminum surfaces by dip coating. Water is used as solvent.

8.1 Surface pretreatment

The cleaning and degreasing of the surface to be coated is done in accordance to the state of the art using magnus spray or similar cleaners, followed by pickling and rinsing with deionized water. The further processing according to chapter 8.2 *Processing* should preferably proceed in-line. Pauses should not exceed 1 hour. Recommended procedure: 1) Dipping in or spraying of a 3% solution of magnus spray at 60 °C / 30 sec; 2) pickling with a 14% solution of nitric acid for 30 sec; 3) rinsing with deionized water.

8.2 Processing

SurAChem® 5250 adhesion promoter is prepared as a 1% ready-to-use solution in water. SurAChem® 5250 adhesion promoter can be applied by dip coating. In this process, the substrates to be coated should be dipped into the ready-to-use solution for approx. 60 seconds at 30 °C. Coating can start immediately after the adhesive layer has dried.

8.3 Packaging and Storage

The packaging and delivery of SurAChem® 5250 adhesion promoter can be provided in bottles, starting from 1 l. SurAChem® 5250 adhesion promoter is durable for at least 6 months after delivery, if unopened and stored at room temperature.

8.4 Performance tests

Application and curing of a polyurethane coating (layer thickness 20 µm)

The results (table 8) show an excellent adhesion of the polyurethane coating onto an aluminum surface, pretreated by dip coating. Cross cutting as well as tempering of a 1T-bend sample show no coating defects.

Cross cutting test:	Gt = 0
Cross cutting / cupping:	Gt = 0 at cupping 6
ending test / tempering	1T 90°C 3h ok

Table 8: Performance tests with SurAChem® 5250 adhesion promoters

9. Surface Silication (CCVD)

polymers have low surface energies due to their molecular structure. Often the lack of reactive groups on the material surface can prevent adhesion. Such materials require an additional surface pretreatment in order to increase the wettability and enable high adhesive strength between substrate and coating. This can be done using the SurASil® process.

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!

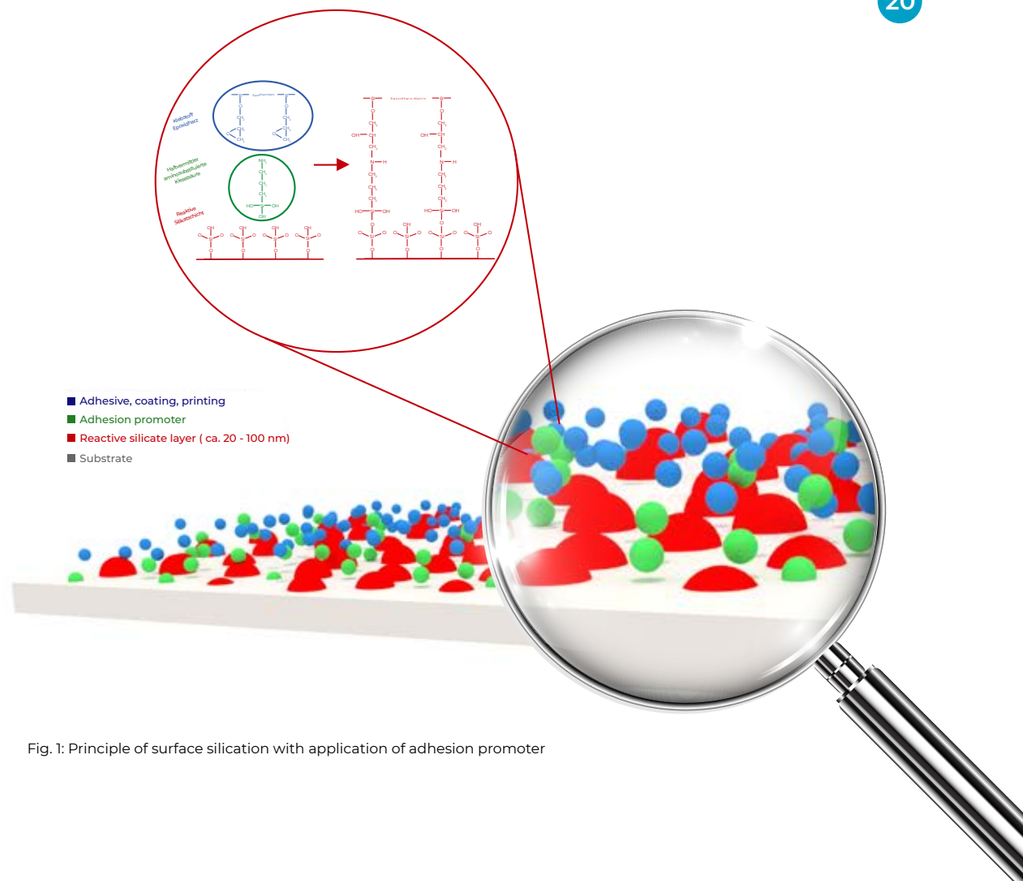


Fig. 1: Principle of surface silication with application of adhesion promoter

In combination with adhesion promotors 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.

The effect of the SurASil® pretreatment on surfaces is shown in figure 2. The surface energy of the pretreated surface (figure 1 - right) is much higher than that of the untreated surface (figure 2 - left). Here are used the testing inks SurAChem® for qualitative testing of the surface energy.

Fig. 2: Effect of surface silication on aluminum material

10. Safety information

Information regarding hazards, labeling, safeguards, transport and disposal are given in the product-specific safety data sheets.

Our verbal and written application-technical consultation is the best to our knowlegde 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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