

SURA CHEMICALS

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SurACer[®] 4460 **DOMING RESIN**

Product- and Application Information

2020

The isocyanate- and solvent-free, low-viscosity, UV-cured, two-components doming resin based on an SH/En system. Ideal for flexible domes!

SurA Chemicals GmbH
Passion for Chemistry

Doming resin

SurACer® 4460

The isocyanate- & solvent-free,
low-viscosity, UV-cured, two-components
doming resin based on SH/En!



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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Doming resin

SurACer® 4460



This instruction guide will ensure the proper use of the SurACer® 4460 and prevent even-

tual mistakes, which can lead to quality insufficiencies or adverse effects.

1. What is doming

3D-Doming is the production process of a decorative, three-dimensional and highly transparent surface coating deposited on printed or unprinted foil or solid shapes. It is possible to use this technology to raise the effectiveness and the functionality of prints, scripts and corporate gifts. Doming is, thus, outstandingly suitable for assisting in meet-

ing advertising targets and boosting sales. 3D UV doming resins can be applied on articles with manual or automatic dispensing techniques. While doming, the resin flows up to the edge of the article and is then ready to be cured with UVA-light within minutes.

Isocyanate- and solvent-free

Reduction of skin irritations and ecological load.

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Compliant in accordance to RoHS & REACH regulations

SurACer® 4460 doming resin is compliant in accordance with the EU directive 2011/65/EC. All starting substances have been pre-registered according to the REACH regulations (EC) No. 1907/2006. SurA Chemicals is certified with DIN EN ISO 9001:2015.



Doming Resin SurACer® 4460

DOMING

Ideal for flexibel doming coatings



isocyanate free • UV-light cured • very long pot life • low viscosity • UV- & climate stable • high adhesion



2. SurADoming

SurADoming is the innovative technology for the production of doming articles with the SurACer® doming resins. The SurACer® 4450 doming material, the innovative SurACer® 4460 doming resin, the new SurACer® 4460c colorful doming resin and the SurACer 4497-1 scratch-resistant coating have been developed and produced by SurA Chemicals GmbH and are distributed worldwide.

3. Doming resin SurACer® 4460

SurACer® 4460 is a two-component, isocyanate- and solvent-free, low viscosity doming resin based on an SH/En system. The SurACer® 4460 doming resin impressively enhances the decorative effect of printed motives on polyester, PVC and metallic foils as well as on aluminum or plastics. SurACer® 4460 doming resin is compliant in accordance with the EU directive 2011/65/EC. All starting substances have been preregistered according to the REACH regulations (EC) No. 1907/2006. SurA Chemicals is certified with DIN EN ISO 9001:2015.

SurACer® 4460 is a further development of the already successful SurACer® 4450 doming resin. The innovative material provides better properties, such as greater adherence, leading to stronger bonds between the resin and the foil used. The doming resin enhances also the product's decorative effect due to its higher transparency, coming from the even lower inherent color of the resin. Furthermore, the decenter odor of the resin leads to a pleasant material processing.



Ideal for flexible domes

Increase of flexibility on stickers, badges etc. thanks to lower layer thickness

Easier and quicker application of the SurACer® 4460 doming resin thanks to lower material viscosity

Thanks to the significant reduction of the viscosity of SurACer® 4460 compared to its predecessor, the processing and application of the material on stickers, labels or badges is faster and easier. The reduced viscosity leads to a lower layer thickness, which gives the end-product an increased, unique flexibility. For this reason, the SurACer® 4460 doming resin is excellent for the production of more flexible domes. The lower doming layers result in a reduction of material consumption and thus in an additional financial advantage.

SurACer® 4460 contains no isocyanate- and solvent-containing components. Thus, the exposure to hazardous substances, such as skin and eyes irritations, complex and costly disposals as also other ecological burdens can be completely avoided. This is a huge advantage compared to other resins, such as polyurethane and epoxy resin systems.

SurACer® 4460 doming resin consists of two components, component 1 and component 2. After the two components have been successfully mixed, SurACer® 4460 doming resin has a pot-life of at least five days, if stored in the refrigerator. This pot-life is significantly longer than that of conventional doming resins and guarantees easy handling as also leads to significant material savings. The short curing time (within 8 - 12 minutes) of SurACer® 4460 by means of UVA-light guarantees the shortening of manufacturing processes up to product shipment. By curing SurACer® 4460 doming resin with the SurALux light-curing boxes, one can achieve transparent, flexible decorative domes for screen,

digital, sublimation and transfer prints with great brilliance.

SurACer® 4460 doming resin is UV and climate stable and therefore shows neither yellowing nor loss of flexibility in outdoor use. The doming resin is also characterized by its high bond strength with many substrate materials thanks to its very good adhesive strength. Due to its high transparency, the doming resin SurACer® 4460 achieves an effective three-dimensional look.

The application of SurACer® 4460 can be done in a continuous or discontinuous process with the help of suitable dispensing and curing technology.

Doming Technology



SurA Chemicals has several years of experience and extensive know-how in the field of doming technology and provides you with complete solutions for the production of doming articles for decorative and advertising purposes. Our manual and automatic as well as upgradeable workstations allow for a professional and individual production of doming articles. The company's portfolio also extends to light-curing boxes, dispensing devices, compressors, pressure tanks, surface pretreatment systems and devices, as also doming accessories and consumables. We offer you the material and the technology that best suits your needs. Take advantage of the excellent product properties and give your doming labels, 3D stickers and other promotional items a higher quality, a visual value and that extra feel of luxury!

**Very long
Pot-life**
of at least 5 days

UV-Licht cured

very fast curing within minutes

Material curing within 8 -12 minutes under UVA-light. For best curing results use the light curing boxes SurALux

Material advantages at a glance

Isocyanate- and solvent-free

Reduction of skin irritations & ecological load

UV-Licht curing

Very fast curing process within minutes

Very long pot-life

Easy handling
Material saving

Stable towards UV and climate

Absolutely suitable for outdoors

High Adhesion

Longer lifespan

High transparency

Great 3D-optic

Decent resin odor

Pleasant processability

Lower viscosity

Quicker application and processability
Easier dispensing
Greater product flexibility
Material saving

4. Application

The following instructions are a guideline for the correct processing and use of SurACer® 4460. When working with SurACer® 4460 doming resin, the following criteria must be considered:

- Storage
- Mixing ratio
- Mixing process
- Pot-life
- Curing

4.1 Storage

Each component of SurACer® 4460 (component 1 and component 2) can be safely stored for at least 6 months at a maximum temperature of 20° C with light excluded. Before mixing component 1 (blue plastic bottle) with component 2 (braun plastic bottle), the temperature of both should be between 20 °C and 40 °C. After the components 1 and 2 have been homogeneously mixed, the mixture must be stored at room temperature (20 °C) in the dark.

Warning! The viscosity of the components may alter during storage and transport of SurACer® 4460 at low temperatures (below 20 °C). Component 1 may crystallize out without affecting the quality. For this reason, both components require gentle heating up to maximum 40 °C before use (i.e. on a heating plate, radiator or in a bain-marie) to homogenize them. Only then should they be mixed together.

High Transparency

great 3D-optic

4.2 Mixing ratio

In order to obtain the optimum SurACer® 4460 properties, both components must be weighed in the right proportions, component 1: 1.0 g / component 2: 2.0 g and then thoroughly mixed.

The more accurate the weighing and the more homogeneous the mixing, the better the quality of the doming surface and the properties of the material. Accurate weighing of the components (with a tolerance of +/- 0.1 g) is the safest way to ensure the right mixing ratio. The weighing should preferably take place in special weighing and mixing containers.

The accurate mixing ratio of the two components is crucial for the achievement of the product specifications. Eventual tolerances will negatively affect the material surface and quality, ranging from stickiness to incomplete hardening.



Higher Adhesion

high material lifespan

The doming material SurACer® 4460 is available in different container sizes for easier handling. These are 1 kg containers, consisting of component 1 (blue bottle) and component 2 (brown bottle), as well as 5 kg containers and 15 kg containers, each consisting

of a white canister (component 1) and a blue canister (component 2). For all available container types, the weighing and mixing of the components should be carried out in a separate weighing and mixing container.

Information on hazards, labeling, protective measures and transport are given in the product specific safety data sheet.



Two-component doming resin



SurACer® 4460 is available in 1 kg containers, 5 kg containers and 15 kg containers

4.3 Mixing process

The successful mixing of component 1 and 2 is completed when a clear and homogeneous mass is formed. Eventual air bubbles imported during the mixing process will escape once the mixture has rest for some time; how long depends on the quantity of the components mixed and might last up to 24 hours, with minimum rest time of 2 hours. During the rest time, the mixture should be kept in the dark and in room temperature (20 °C). The time necessary for all the visible air bubbles to escape can be

shortened by brief heating of the mixture, to no more than 40 °C.

Warning! SurACer® 4460 must never be heated or degassed on a direct flame. Suitable stirring implements, such as plastic rods, glass rods, anchor-shaped stirrers or propeller-type stirrers, as also a suitable mixing container should be used for the mixing process.

For weighing and mixing containers with a capacity of 500 or 1,000 ml, a propeller-type stirrer shall be used. For weighing and mixing containers with a capacity of above 1,000 ml and especially 5,000 ml, an anchor-shaped stirrer is appropriate. Both stirrer-types can be operated with a suitable battery driven screwdriver. The SurACer® 5380 special cleaner can be used for the cleaning of stirrers, mixing cups and surfaces.

4.4 Pot-life

Pot life is defined under the DIN 55945 standard as the maximum period for which a coating material, initially supplied as a separate component, is usable once the component has been combined. In the case of SurACer® 4460, once component 1 and com-

ponent 2 have been mixed in the prescribed proportions, their pot-life will be 5 days under refrigerated storage. This means that,

Warning! In the case of inadequate stirring and / or air inclusion in the mixture in form of air bubbles, the endproduct will show a loss of quality. This is recognizable as pockmarks, circles, rods or swirls, still visible after the curing process.



after the stirring of the two components, the mixture will remain workable for 5 days (as long as the correct storage conditions are applied).

Even after the end of its pot life, SurACer® 4460 can be used for the production of domes in case it is still modifiable and curable. In that case, experimental runs must be first carried out. The successful use of SurACer® 4460 after the expiration of its pot-life is not guaranteed.



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In several
container sizes
available

4.5 Curing

The curing of SurACer® 4460 doming resin is performed in the specially-developed SurALux light curing boxes of the series 1000, 2000 and 3000. The curing process takes place between 8 and 12 minutes under UVA-light. This time-period depends on the surface area and height of the dome and must be determined experimentally before proceeding to mass production. The curing parameters are listed in the product information sheets supplied with the SurALux light curing boxes.

Warning! For the achievement of the material properties specified by the manufacturer, it is absolutely necessary to use the SurALux technology, developed exclusively for this purpose.

A fingernail test will reveal whether the curing process is completed (no depression possible) or not. If there is still liquid present in the interior of the dome, SurACer® 4460 is not fully cured and needs to be further exposed. This exposure time should be extended in gradual stages, each of which will afterwards be once more inspected. Eventual overexposure after the hardening process is completed is not critical.

Factors that affect the necessary exposure time are:

- the thickness of the layer used
- the size of the curing area
- the type of foil used
- the temperature of SurACer® 4460

Test the curing of SurACer® 4460 on a label with diameter 2.5 - 3 cm and layer thickness 1.4 – 1.5 mm. The following guideline presents some of the common exposure times:

Type	Layer thickness	Surface	Approximate time
Label	1,0 – 2,0 mm	1 - 10 cm ²	6 - 8 min
Label	1,5 – 2,0 mm	10 - 100 cm ²	1 + 1 + 6 min curing with pauses
Script	1,5 – 2,5 mm	bis 60 mm length	7 min
Script	1,5 – 2,5 mm	> 60 mm length	1 + 1 + 5 min curing with pauses
Area	1,0 – 2,0 mm	d ≤ 60 mm	7 min
Area	1,5 – 2,5 mm	d > 60 < 150 mm	1 + 1 + 1 + 6 min curing with pauses

The above application examples shall be always verified with individual tests. Note: for large areas, the curing time should be divided (curing with pauses) to avoid damage caused by shrinkage on the surface (i.e. 7 minutes = 1 + 1 + 1 + 4 minutes).

For eventual questions or doubts concerning your product, we encourage you to get in touch with SurA Chemicals GmbH. The 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.

Comparison

to common
doming resins

5. Doming resins comparison

SurACer® 4460	Polyurethane	Epoxy resins
Health and safety during process		
<ul style="list-style-type: none">▸ Non-toxic constituents, such as isocyanates and solvents▸ No dangerous goods, can be safely stored and transported	<ul style="list-style-type: none">▸ Toxic constituents, main constituents are isocyanates of acute toxicity▸ May cause skin and eyes irritation▸ Hazardous material, special precautions by storage and transport	<ul style="list-style-type: none">▸ Toxic and corrosive constituents, main constituents are epoxies with properties hazardous to health▸ May cause skin and eyes irritation
Disposal		
<ul style="list-style-type: none">▸ Reduced ecological pollution▸ Standard commercial waste disposal	<ul style="list-style-type: none">▸ Heavy environmental pollution▸ Hazardous waste disposal at additional costs	<ul style="list-style-type: none">▸ Environmental pollution▸ Hazardous waste disposal at additional costs
Curing process		
<ul style="list-style-type: none">▸ UVA-curable within minutes▸ Curing process not affected by humidity	<ul style="list-style-type: none">▸ Air-drying, slowly up to several hours▸ At room temperature in a ventilated area, place of work is absolutely necessary▸ Curing process affected by humidity	<ul style="list-style-type: none">▸ Air-drying, slowly up to several hours▸ At room temperature in a ventilated area, place of work is absolutely necessary▸ Curing process affected by humidity

SurACer® 4460**Polyurethane****Epoxy resins****Handling**

- | | | |
|--|--|--|
| ▸ Very long pot-life (days or weeks) | ▸ Very short pot-life (minutes) | ▸ Very short pot-life (minutes) |
| ▸ Material is available as two components | ▸ Material is available as two components | ▸ Material is available as two components |
| ▸ Low technology requirements for mixing and application processes | ▸ Costly in technology, investment and expenditure | ▸ Costly in technology, investment and expenditure |

Flexibility

- | | | |
|--------------------|--------------------|--------------------------------|
| ▸ High flexibility | ▸ High flexibility | ▸ Hard elastic, no flexibility |
|--------------------|--------------------|--------------------------------|

Outdoors use

- | | | |
|---|---|--|
| ▸ Suitable for outdoor use | ▸ Suitable for outdoor use | ▸ Not suitable for outdoor use |
| ▸ Doming resin is resistant to weather and UV-light | ▸ Doming resin is resistant to weather and UV-light | ▸ Doming resin is not resistant to weather and UV-light, prone to discolouring |

Profitability

- | | | |
|--|---|---|
| ▸ Low investment costs for both manual and industrial scale doming | ▸ Low costs for manual doming | ▸ Low costs for manual doming |
| | ▸ High investment costs for industrial manufacture | ▸ High investment costs for industrial manufacture |
| | ▸ Additional costs for storage of hazardous materials and cleanup | ▸ Additional costs for storage of hazardous materials and cleanup |



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