

# SEMICOSIL<sup>®</sup> 811

## Room Temperature Curing Silicone Rubber (RTV-2)

SEMICOSIL<sup>®</sup> 811 is a non-slump silicone that is designed for oven free processing and fast adhesion built-up at room temperature or minimum energy input.

It is used in 10:1 combination with a catalyst (ELASTOSIL<sup>®</sup> CAT Pt-F or ELASTOSIL<sup>®</sup> CAT Pt for regular or ELASTOSIL<sup>®</sup> CAT UV for UV-activated cure.



## Properties

- Primerless adhesion to many substrates
- Fast adhesion built-up at room temperature or with low energy input (< 10 min 60-80°C; IR 70°C < 2 min)
- To be applied as 2-part system in 10:1 mixing ratio with catalyst ELASTOSIL<sup>®</sup> Cat Pt or -Pt-F or ELASTOSIL<sup>®</sup> Cat UV for UV-activated cure
- Modular catalyst system offers different pot-life and curing speed level options at same material properties
- Thixotropic
- High flexibility and high temperature resistant low-stress-adhesive for broad operation temperature range -40°C to +180°C
- UV tracer for automated in-line inspection

## Technical data

### Properties Uncured

Property	Condition	Value	Method
Pot Life 10:1 mix (EL CAT Pt) <sup>(1)</sup>	25.0 °C	< 10 min	-
Pot Life 10:1 mix (EL CAT Pt-F) <sup>(2)</sup>	25.0 °C	< 5 min	-
Viscosity, dynamic D=0.5 s <sup>-1</sup>	25.0 °C	350000 mPa·s	ISO 3219
Viscosity, dynamic D=25 s <sup>-1</sup>	25.0 °C	45000 mPa·s	ISO 3219
Viscosity, dynamic Mix (10:1) D=0.5 s <sup>-1(3)</sup>	25.0 °C	260000 mPa·s	ISO 3219
Viscosity, dynamic Mix (10:1) D=25 s <sup>-1(4)</sup>	25.0 °C	35000 mPa·s	ISO 3219
Density at 23°C	23.0 °C	1.10 g/cm <sup>3</sup>	DIN EN ISO 1183-1 A
Color	-	translucent	-
Gel time 10:1 mix (EL CAT Pt)	25.0 °C	60 min	-
Gel time 10:1 mix (EL CAT Pt-F)	25.0 °C	25 min	-
Gel time 10:1 mix (EL CAT UV), not irradiated	25.0 °C	> 48 h	-

<sup>1</sup>Viscosity < 5 000 000 mPas

<sup>2</sup>Viscosity < 5 000 000 mPas

<sup>3</sup>(EL Cat Pt-F, Pt or-UV)

<sup>4</sup>(EL Cat Pt-F, Pt or-UV)

These figures are only intended as a guide and should not be used in preparing specifications.

## Properties Cured

Property	Condition	Value	Method
Dielectric strength <sup>(1)</sup>	-	23 kV/mm	IEC 243
Modulus at 100 % elongation	25.0 °C	1 N/mm <sup>2</sup>	ISO 37
Elongation at break <sup>(2)</sup>	-	300 %	ISO 37
Tensile strength <sup>(3)</sup>	-	3 N/mm <sup>2</sup>	ISO 37
Hardness Shore A	-	30	-
Density at 23°C	-	-	ISO 2781
Color	-	translucent	-
Tear strength	-	8 N/mm	ISO 37

<sup>1</sup>measured@25°C on pressed sheet 165°C / 15 min

<sup>2</sup>measured@25°C on pressed sheet 165°C / 15 min

<sup>3</sup>measured@25°C on pressed sheet 165°C/15 min

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All the information provided is in accordance with the present state of our knowledge. Nonetheless, we disclaim any warranty or liability whatsoever and reserve the right, at any time, to effect technical alterations. The information provided, as well as the product's fitness for an intended application, should be checked by the buyer in preliminary trials. Contractual terms and conditions always take precedence. This disclaimer of warranty and liability also applies particularly in foreign countries with respect to third parties' rights.

## Application details

Adhesive sealant for oven free bonding and FIPG sealing in electronic, automotive and other industrial applications.

Sealing adhesive for moderate temperature cure (25 - 80°C).

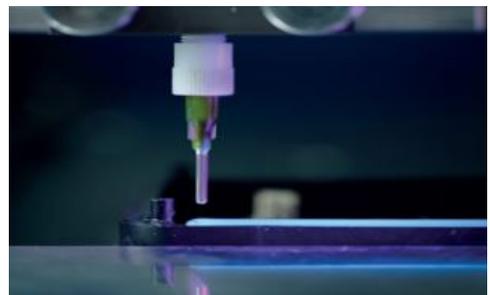
Fast adhesion on aluminum and thermoplastics by moderate energy input (e.g. 80°C/ 2 min) within 5 min allows inline tightness or part control

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## Processing

### Substrate Surface Recommendations

#### Surface preparation

All surfaces must be clean and free of contaminants that will inhibit the cure of SEMICOSIL<sup>®</sup> 811 / ELASTOSIL<sup>®</sup> Cat UV or SEMICOSIL<sup>®</sup> 811 / ELASTOSIL<sup>®</sup> Cat Pt (F). Examples of inhibiting contaminants are sulfur containing materials, plasticizers, urethanes, amine containing materials and organometallic compounds – especially organotin compounds. If a substrate's ability to inhibit cure is unknown, a small scale test should be run to determine compatibility.

#### Substrate cleaning, drying

Prior to the silicone application it is recommended to ensure that all contaminations on the substrate like dust, salts, processing aids, greases are efficiently removed and that substrates are dried. As a cleaning solvent acetone, isopropanol or low boiling hydrocarbons that evaporate without any residue may be used (depending on compatibility with the substrate).

Contaminations, residues of processing agents or migrating additives not chemically linking to the substrate surface and the silicone may have adverse effects on bonding quality.

#### Substrate pretreatment

Depending on precursor processing or substrate cleaning processes surfaces can still comprise changing concentrations of contaminations that might worsen or prevent suitable adhesion. Reproducible conditions can be accomplished by performing substrate pretreatment processes like in-line plasma cleaning, Pyrosil<sup>®</sup>, flame, laser, priming or comparable processes.

*AlMgCu 2pl (non-treated) / PBT Ultradur 4300 BG GF 30)*

Conditions	Time	Lap Shear Force [N/mm <sup>2</sup> ]
UV + 25°C	60 min	0,2-0,4
UV + 25°C	24 h	1,0
UV + 80°C/2min	10 min	1,0
UV + 80°C/2min	60 min	1,3
85°C / 85% r. h.	1000 h	2,4
H <sub>2</sub> O / 25°C	1000 h	2,1
150°C	1000 h	2,3
T-Change		
-40°C/ 150°C	1000 cycles	2,1
T-Shock		
-40°C / 150°C	1000 cycles	1,9

*AlMgCu 2pl (non-treated)/ PA Ultraamid 4300 BG GF 30)*

Conditions	Time	Lap Shear Force [N/mm <sup>2</sup> ]
UV + 80°C/2min	10 min	0,2-0,4
UV + 80°C/2min	60 min	0,6
H <sub>2</sub> O* / 25°C	1000 h	1,2 * only after Plasma

### SEM 811 Cleaning

For cleaning purposes uncured SEMICOSIL<sup>®</sup> 811 / ELASTOSIL<sup>®</sup> Cat can be dissolved using apolar solvents like white spirit or test benzenes. Cure material can be softened using above mentioned agents, removal of then softened material is possible using manual mechanical processes.

### Material Supply

SEMICOSIL<sup>®</sup> 811 can be processed from hobcock using follower-plates. ELASTOSIL<sup>®</sup> CAT Pt or Pt-F is supplied in hobcocks.

ELASTOSIL<sup>®</sup> CAT UV is supplied in cans with safety mechanism in order to avoid exposure to daylight during handling. Once the packaging is opened or material is fed any exposure to UV-light or daylight will start to have impact on the material mix pot-life.

## Dispensing Process and Mixing

### Mixing & Dispensing Application

ELASTOSIL® CAT Pt or Pt-F contain the Pt-catalyst, ELASTOSIL® CAT UV contains the UV active catalyst, while SEMICOSIL® 811 contains the crosslinker. Even traces of the catalysts may cause gelling of the component containing the crosslinker. Therefore tools (spatula, stirrers, etc.) used for handling of the catalyst containing component must not come into contact with this component.

The two components should be thoroughly mixed at a 10 : 1 ratio by weight or volume as a target process value. Acceptable mixing tolerances range from 9,7:1 to 10,3:1 (w/w). Necessary dosing accuracy is provided by state-of-the-art equipments (piston dispenser, endless piston or gear pumps) for shot weights in the gram scale.

Machine capability tests should be conducted to safeguard processes especially if significantly lower shot weights are considered.

For homogenous mixing we recommend the use of a 2-part dispensing machine equipped with preferentially a dynamic mixing system or a static mixer. Sufficient mixing performance can be achieved by using a static mixing tube with maximum <6 mm diameter and at least >32 helical turnings. Manual mixing/dispensing is not recommended.

### Degassing

SEMICOSIL® 811 is filled into hobbock packaging avoiding inclusions of macroscopic air bubbles. Like all silicones significant volumes of air are dissolved in the material at ambient pressure during storage.

To eliminate any air introduced during dispensing or trapped under components or devices a vacuum deairing process in the material supply feeding system is recommended. In case of permanent material preparation in vacuo, it is recommended to not exceed room temperature or go below 50 mbar.

In all steps of the mixing process, transfer and bonding of the substrates (manually or by robots) a potential contamination of the substrate surface should be avoided. Substrates pretreated should be used in the intended time period.

Because of the pronounced shear thinning effect and the strongly reduced viscosity under shear SEMICOSIL® 811 / ELASTOSIL® Cat. can be dispensed with high dispensing performance and enables superior wetting of substrated in the bonding process.



## UV Cure and UV Sources

### UV Cure

#### Discharge Lamps

SEMICOSIL® 811 / ELASTOSIL® Cat UV is activated by direct UV irradiation using UV B and UV A light. UV-irradiation should use emissions in the wavelength range between 250 and 350 nm. Typically, D-bulbs (Fe-doped Hg-light sources) using ozone-free quartz should be used and are commercially available. H-bulbs with emissions below 250 nm are not recommended.

UV-intensity levels here referred to are corresponding to the integral intensity of a Fe-doped ozone free discharge lamp as measured with a UV-intensity sensor array that is sensitive in the UV A region (Hönle AG area sensor UVA (330 nm - 400 nm)).

Curing time of SEMICOSIL® 811 / ELASTOSIL® Cat UV is highly dependent both on the intensity and dose of the UV-light and the spectral intensity distribution. Curing is also dependent on the layer thickness, the optical properties of the substrate and temperature. Increase of the temperature will fasten curing reaction.

Approx. 50 mW/cm<sup>2</sup> can be regarded as the minimum intensity that is required to activate thin layers of 1-2 mm thickness. With increasing UV intensity the light propagates into deeper layer sections. For 120 mW/cm<sup>2</sup> light intensity the following dependency of the curing time on layer thickness can be given for an open layer of stable thickness which is not bonded to another substrate. Maximum layer thickness at this intensity is approx. 8 mm

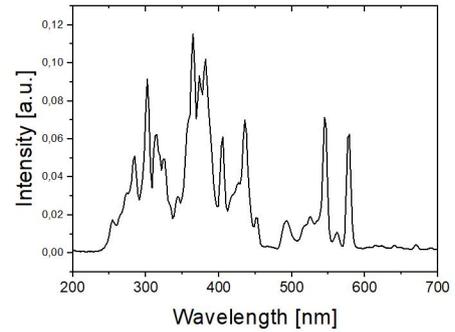
#### UV-LED

SEMICOSIL® 811 / ELASTOSIL® Cat UV alternatively can be cured using high power 365 nm UV-LEDs. Currently, the use of UV-LEDs can be recommended in case distance of light source to silicone can be set to a minimum distance (< 0,5 cm), in case of matching of size of silicone area to be irradiated and LED array. Moreover, wet film thickness should be less than 3 mm as depth of UV light penetration is reduced compared to discharge lamp at comparable overall UV intensity.

#### General

SEMICOSIL® 811 / ELASTOSIL® Cat. cures at room-temperature or after UV irradiation (with ELASTOSIL CAT UV) and generates unprimed adhesion. Depending on the specific substrate and the intended time period for adhesion built-up a minimum of energy input via short heat tests or IR irradiation may be utilized to further accelerate cure and adhesion built-up.

We recommend to run preliminary tests to optimize conditions for the particular application.



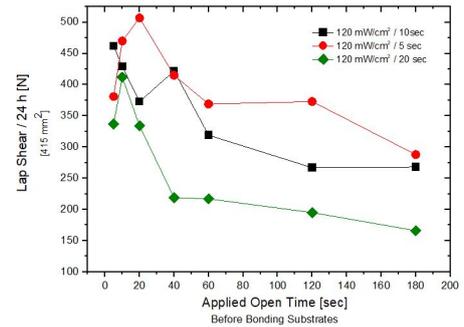
## Open Time

For the processing of SEMICOSIL<sup>®</sup> 811 / ELASTOSIL<sup>®</sup> Cat Pt (Pt-F) potlife (purging of static mixing tube with a frequency of < 2 min) has to be considered.

Morover for processing of SEMICOSIL<sup>®</sup> 811 / ELASTOSIL<sup>®</sup> Cat Pt (Pt-F) and SEMICOSIL<sup>®</sup> 811 / ELASTOSIL<sup>®</sup> Cat UV open times hav to be considered.

The open time defines the maximum recommended time between start of the reaction (e.g. mixing in case of combination with ELASTOSIL<sup>®</sup> CAT Pt) or between UV irradiation and the subsequent bonding step in order to allow optimum adhesion performance.

Open times are influenced by temperature of the silicone prior to bonding as well as temperature, UV intensity and dose (in the case of ELASTOSIL<sup>®</sup> Cat UV catalyst). Above figure shows an open time of approx. 60 sec, which allows automated processing, for a 5 to 10 sec UV irradiation at 120 mW/cm<sup>2</sup> whithout major effect on adhesion performance on the model substrate.



## SEM 811 UV Cure Speed

General Consideration / Discharge Lamps

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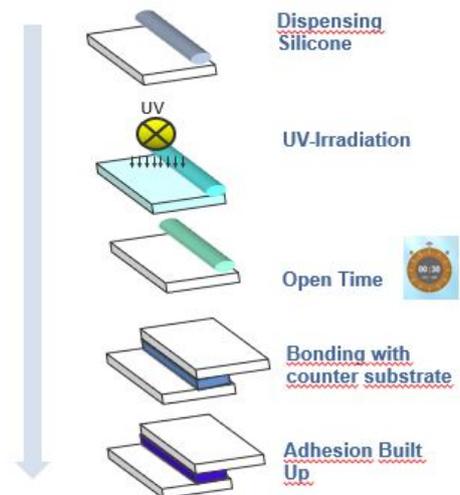
UV-activation (120 mW/cm <sup>2</sup> )	Curing time* at 25°C (3 mm)
7 s	35 min
10 s	25 min

## SEM 811 Processing Option

SEMICOSIL<sup>®</sup> 811 / ELASTOSIL<sup>®</sup> Cat UV is provided as an UV active silicone. UV irradiation activates the catalyst starting an addition polymerization (hydrosilylation) of directly irradiated areas. Even after stop of the UV irradiation the reaction is not interrupted, but proceeds in degree dependent on time and temperature.

This allows the use of non UV transparent substrates.

Curing speed and open times are adjustable by UV intensity and dose. The UV active sealing adhesive SEMICOSIL<sup>®</sup> 811 / ELASTOSIL<sup>®</sup> Cat UV allows therefore the application (e.g. dispensing) of the silicone to one substrate surface, followed by UV irradiation and then in a separate process step the subsequent bonding to the counter substrate with the given open time.



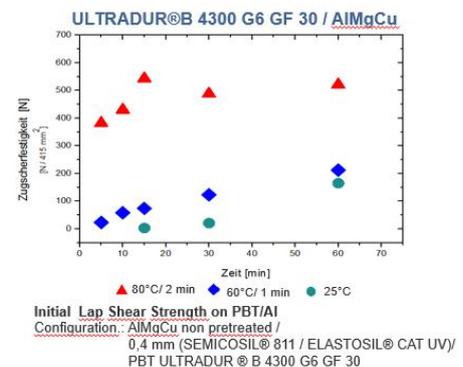
## Adhesion Built-up

SEMICOSIL<sup>®</sup> 811 / ELASTOSIL<sup>®</sup> Cat (Pt; Pt-F and UV) shows good primerless adhesion to many substrates. We recommend to run preliminary tests to optimize conditions for the particular application. Safeguarding reproducible and suitable surface qualities is recommended. State of the art methods include in-line surface pretreatments like plasma processes or laser pretreatment. SEMICOSIL<sup>®</sup> 811 / ELASTOSIL<sup>®</sup> Cat (Pt; Pt-F and UV) offers adhesion built up at moderate temperatures. First cohesive adhesion at 25°C may be accomplished on suitable substrates may be observed after approximately 60 min.

Time to first adhesion (allowing tightness tests of bonded parts) can be significantly shortened by moderate energy input. A short exposure to 80°C (2 min) can reduced time to first adhesion to less than 5 min. Moderate energy input not only will boost speed of adhesion built-up, but also will support to increase concentration of established chemical links to the anchor groups of the substrate contribution to enhanced adhesion performance.

In the interest to safeguard robust processes and fitness of the product for an application dedicated tests after different exposure scenarios of application are recommended to customers for specific substrate surface qualities.

Moreover, in order to enable optimum results it is recommended to consider potlife (combination with ELASTOSIL<sup>®</sup> Cat (Pt; Pt-F) and open times (SEMICOSIL<sup>®</sup> 811 / ELASTOSIL<sup>®</sup> Cat (Pt; Pt-F and UV)). Typically, at 25°C dispensing speed and bonding process design should be designed that bonding is performed within 2 min after mixing of the material. Purging frequency has to be aligned, respectively. In combination with ELASTOSIL<sup>®</sup> UV potlife does not need to be considered (during 1-3 days). However, after UV-irradiation the bonding process of the involved substrates has to be affected within open time. Open times are depending on and can be tuned by UV intensity and dose. For a 120 mW/cm<sup>2</sup> / 10 sec irradiation with an ozone free discharge lamp open time is approx. 60 sec, which allows integration in automated processing.



## Packaging and storage

### Packaging

SEMICOSIL® 811 can be processed from hobbock using follower-plates. ELASTOSIL® CAT Pt or Pt-F is supplied in hobbocks.

ELASTOSIL® CAT UV is supplied in cans with safety mechanism in order to avoid exposure to daylight during handling. Once the packaging is opened or material is fed any exposure to UV-light or daylight will start to have impact on the material mix pot-life.

### Storage

SEMICOSIL® 811 / ELASTOSIL® Cat. should be stored between 5 °C and 25 °C in the tightly closed original container. The 'Best use before end' date of each batch appears on the product label.

Storage beyond the date specified on the label does not necessarily mean that the product is no longer usable. In this case however, the properties required for the intended use must be checked for quality assurance reasons.

## Safety notes

According to the latest findings SEMICOSIL® 811 / ELASTOSIL® Cat., being an addition-curing silicone rubber contains neither toxic nor aggressive substances which might require special handling precautions. General industrial hygiene regulations should be observed.

Detailed safety information is contained in each Material Safety Data Sheet which can be obtained from our sales offices.

## QR Code SEMICOSIL® 811



### For technical, quality or product safety questions, please contact:

**Wacker Chemie AG**, Hanns-Seidel-Platz 4, 81737 Munich, Germany  
info@wacker.com, www.wacker.com

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