

## BAKEWARE COATINGS AND LINERS

# SILICONES FOR BAKEWARE COATINGS AND LINERS

Thanks to their high quality, silicones are ideal for reliable and durable coatings that impart perfect long-term release properties to baking trays and liners.

## Baking Tray Coatings

Baking trays are coated with silicones to improve production efficiency. They offer excellent release properties, are easy to clean and withstand a wide temperature range, from freezing to baking.

## Advantages of Silicone Coatings

- Easy application
- Improved efficiency of the baking process in professional or industrial environments:
  - Improved quality of the baked goods and reduced rejects thanks to homogeneous temperature distribution in the trays and optimal release effect, allowing fast removal of baked goods without overstressing the coating
  - Simple and fast in-process cleaning of the coated equipment
  - Unbaked and partially baked goods, which are often delivered frozen to commercial bake shops, can be easily removed from silicone-coated trays and molds after baking

## Advantages of Silicone Coatings

### Advantages over Conventional Methods (Oils or Fats):

1. Noticeable reduction in the use of additional release agents
2. Even and long-lasting release effect
3. Prevents loss of quality due to burnt fat or crumbs
4. Reduced environmental impact (less washing, i.e. a lower consumption of water and detergents, hence less effluents)

### Advantages over Fluoropolymer Coatings:

1. Coatings based on silicone resins retain their excellent release effect even after contact with doughs having a high sugar content
2. Strongly reduced environmental impact as, unlike fluorinated polymers, silicones are uncritical
3. Easier recycling (no critical waste, no toxic fumes)

## Choosing between Silicone Elastomer and Silicone Resin

### SILICONE ELASTOMER



#### Suitability for Baking Goods

- Particularly suitable for buns, white bread, and croissants
- Suitable for sour doughs such as rye bread and recipes containing acidic ingredients
- Not suitable for lye pastries as the diluted soda lye erodes the silicone coating and the metal structure beneath

#### Special Properties:

##### Longevity

- Up to 2,000 baking cycles\* for normal doughs
- Up to 1,000 to 1,500 baking cycles\* for sour or acid-containing doughs

### SILICONE RESIN



#### Suitability for Baking Goods

- Particularly suitable for cake and cookie doughs, and for all doughs containing a lot of sugar, fats or eggs
- Preferred alternative to silicone elastomer coatings for lye pastries

#### Special Properties:

##### Release Properties

Should be modified with a silicone fluid in order to achieve optimal release results (recommended product: SILFAR® 350, quantity: ca. 3 – 5% by weight, to be applied before use)

\* Deviations possible, depending on the individual baking goods' composition and the baking conditions applied.

**BAKING TRAY COATINGS**

**Coating for Experts:  
Processing of Silicone Rubber and Silicone Resin Coatings**

**1 Preparation**

- Before new baking trays or molds are coated, they should be pretreated as recommended by the tray and mold manufacturer
- New or recycled / refurbished equipment must be clean (free of dust, grease, oils or other contaminants) and dry
- Very smooth surfaces should be roughened, cleaned and degreased

**2 Priming**

We recommend priming with WACKER® PRIMER G790 TOLUENE FREE if the metal surface is to be coated with a silicone rubber:

- The primer should be applied as thinly as possible (preferably with a coat thickness of < 2 µm). An excessively thick primer layer may reduce adhesion.
- Immediately before use, we advise diluting the primer with a non-polar aliphatic solvent (cyclohexane, white spirit, or the like) in a 1:1 or 1: 2 ratio.
- Primer application step by step:
  1. The (diluted) primer is applied by spraying, dipping or brushing to achieve a bubble-free, thin coating film
  2. The wet, primer-coated parts must be air dried for at least 15 minutes (maximum 2 hours).
  3. After air drying the primer-treated equipment is baked for 15 to 30 minutes at 150 to 200 °C
  4. The primed trays and molds must cool down until they reach a temperature below 50 °C.

Note: for silicone resin coatings, no primer is necessary!

**3A Application of Silicone Rubber**

1. The silicone rubber, although flowable and self-leveling, must be diluted in order to reduce its viscosity and to make it sprayable
2. The coating suspension can be applied by any coating method, such as spraying, dipping, and brushing  
Note:
  - Airless spraying equipment is particularly recommended
  - Multilayered application is possible, e.g. for baking pans with a complex design
3. Curing already starts during application, when the coating suspension comes into contact with atmospheric moisture.
4. We recommend physically drying the coated trays for at least 60 minutes at room temperature and then baking them at 250 °C for 1 hour

Note: for more processing details please refer to the product TDS.



**3B Application of Silicone Resin Coatings**

Similar to coating with silicone rubber, except dilution is not necessary as the resins are already solvent-based and ready to use.

**Recommendations on the Coating Thickness**

The key criterion for a long-lasting performance is the coating thickness. For silicone elastomer-based coatings, we recommend a thickness of 150 to 250 µm. This corresponds to a consumption of 250 to 350 g of silicone rubber (100%) per m<sup>2</sup> of area to be coated (incl. losses due to spraying). For coatings based on silicone resins, the total thickness should not significantly exceed 15 to 20 µm, depending on the flexibility of the resin.



**Removal of Old Silicone Coatings**

Silicone coatings can be effectively removed in three ways:

- Pyrolysis at high temperature (> 600 °C) and subsequent cleaning by sand blasting
- Blasting with solid carbon dioxide
- Chemical etching in an alkali or acid bath, followed by thorough rinsing and mechanical removal of residual coating material

**NON-STICK BAKING LINERS**

Source: Courtesy of Sasa Demarle

## Non-Stick Silicone Baking Mats for the Professional or Hobby Pastry Chef

There are many types of substrates for baking trays. More recently specialists have developed specific non-stick baking mats for amateurs and professionals focusing on bakery and confectionery.

These baking mats – also called baking liners – are made of a fiber-glass canvas, coated exclusively with silicone:

- The entire surface is covered with a transparent silicone rubber
- And the pastry design can be screen printed on, which makes it easier to correctly dose cookie and macaroon doughs

### Advantages of Baking Mats

**They can be rolled up and thus save space in the kitchen.**

This is why silicone resin release agents cannot be used here, but, since the baking cycles of such pastries are short, silicone rubbers can be used as reliable release agents over many baking cycles.

**They combine the stability of a baking tray with the release function of a baking paper.**

It is thus possible to benefit from the release properties while avoiding the main disadvantage of baking paper that it can slip while the dough is being applied.

**BAKING TRAY COATINGS**

**Technical Data**

	<b>ELASTOSIL® E60 N RED</b>	<b>ELASTOSIL® E60 N GREY</b>	<b>ELASTOSIL® E60 N BLACK</b>	<b>SILRES® HK 46</b>	<b>WACKER® PRIMER G790 TOLUENE FREE</b>
	RTV-1 silicone	RTV-1 silicone	RTV-1 silicone	Methyl silicone resin	Primer
<b>Unvulcanized Product</b>					
Color	Red	Gray	Black	Colorless to yellowish	Colorless to yellowish
Viscosity, dynamic [mPa s]	80,000	75,000	75,000	50	1
Density [g/cm³]	1.12	1.06	1.05	1.01	0.76
Solids content [wt.-%]	100	100	100	50	17
Solvent	n.a.	n.a.	n.a.	Xylene / n-butanol	Isopar™
<b>Vulcanized Product</b>					
Hardness [Shore]	A 35	A 32	A 30	D 50	n.a.
Color	Red	Gray	Black	Colorless	n.a.
Density [g/cm³]	1.13	1.07	1.06	1.01	n.a.
Corresponds to statutory regulations pertaining to food according to	BfR Recommendation "XV. Silicones"* FDA 21 CFR § 175.300* FDA 21 CFR §177.2600*	BfR Recommendation "XV. Silicones"* FDA 21 CFR § 175.300* FDA 21 CFR §177.2600*	BfR Recommendation "XV. Silicones"* FDA 21 CFR § 175.300* FDA 21 CFR §177.2600*	BfR Recommendation "XV. Silicones"* FDA 21 CFR § 175.300*	n.a. n.a.

\* Responsibility for compliance with the FDA and European regulations resides with the manufacturer of the finished products. Please see the current Product Compliance Sheet of the respective product and/or the separate Food Contact Statement for detailed information about food contact including information about any limitation in the amounts, food types, and/or conditions of use that may apply for this product.

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




**Performance Attributes**

	<b>ELASTOSIL® E60 N RED</b>	<b>ELASTOSIL® E60 N GREY</b>	<b>ELASTOSIL® E60 N BLACK</b>	<b>SILRES® HK 46</b>
White loaves & rolls	●●●●	●●●●	●●●●	●
Light rye bread	●●	●●	●●	●
Dark rye bread	●●	●●	●●	●●●
Baguettes	●●●●	●●●●	●●●●	●
Croissants	●●	●●	●●	●●
Milk buns	●●	●●	●●	●●●
Hamburger buns	●●	●●	●●	●●●●
Hot dog buns	●●	●●	●●	●●●●
Cookies & cakes	○	○	○	●●●●
Madeleines & muffins	○	○	○	●●●●
Lye pastries	○	○	○	●●

●●●● excellent suitability ●●● good suitability ●● limited suitability ● suitable ○ not suitable  
These figures are intended as a guide and should not be used in preparing specifications.

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