

WACKER

CREATING TOMORROW'S SOLUTIONS

SILRES®

ELASTOSIL®

ELASTOMERS, PLASTICS & COMPOSITES | COATINGS

BAKING TRAY COATINGS

Smart solutions for greater efficiency



EVERYTHING RUNS SMOOTHLY WITH SILICONES

Because of the high-quality, reliable and efficient products we supply for perfect coatings on baking trays.

Thanks to their heat resistance and release effect, silicones from WACKER are ideal for coating metal surfaces on baking molds and trays. They make baking simpler, better, and more cost-effective.

Whereas the ingredients are critical for the bakery products, the release agent is critical for the bakeware. The traditional way of ensuring that the baked goods release from the mold was to grease it first. However, this requires time, effort, and materials, thus reducing the efficiency of the production process. This is where WACKER silicones show their many advantages.

Better baking with silicones

High-quality, innovative product solutions based on silicone elastomers or silicone resins make additional release agents superfluous during baking. The best choices for this are the specially tailored product series SILRES® and ELASTOSIL®. Our product solutions have excellent release properties and high thermal stability. They are thus optimally suited for coating metal baking molds and trays for bread, pastries, and cakes.

These coatings are ideal not only for large industrial baking lines, but also for small bakeries. Their durability and robustness guarantee the best baking results over a long period. Impressive properties wherever efficient baking is all-important.

WACKER has a wide range of products for baking tray coatings – so wide that we can only present a few of them in this brochure. WACKER experts are always ready to assist you in finding the right solution for your particular requirements. Please contact us – in person, by telephone, or at info.silicones@wacker.com

Contents

Introduction	3
Advantages	4
Applications	5
Products	6
Practical applications	8
Overview	10
WACKER at a glance	11

PROPERLY COATED – GREATER EFFICIENCY

Innovative silicone coatings offer a number of advantages over conventional methods that use vegetable oils or fats. These include not only faster processes, but also improvements in the quality of the baked goods.

Compared to other coating materials, silicone elastomer-based coatings have not only excellent release properties, but also effective anti-slip characteristics. This provides competitive advantages, particularly during transport in fully automated baking lines because our silicones keep the goods in the correct place.

Overall, Numerous Positive Properties

Another advantage is that unbaked and partially baked goods, which are often delivered frozen to commercial bake-off stations and are slightly defrosted before baking, can be removed more easily from silicone-coated trays and molds after baking. In contrast to fluorinated coating materials, coatings based on silicone resin retain their excellent release effect even after contact with very sugary bakery products.

Our baking mold coatings not only speed up work processes, they also provide a sustainable reduction in processing costs. The customized products of the SILRES® and ELASTOSIL® series also help to optimize the quality of the baked goods and to achieve the highest quality requirements.

Clear Advantages for Silicones

- Noticeable reduction in the use of additional release agents such as fats and oils
- Long-lasting decrease in rejected goods due to optimum release effect (fast removal of baked goods without damage)
- Simple and fast in-process cleaning of the bakeware
- Uniform heat transfer during baking, thus resulting in an evenly baked crust
- Prevents loss of quality due to burnt residues or carbonized fat

IMPRESSIVE PERFORMANCE

Durability of the coating: this is essentially dependent on the dough and the baking conditions, such as the temperature, temperature cycles, processing time, and design. All these individual factors and, of course, the optimum silicone product affect the performance of the coatings.

Bakeware coated with ELASTOSIL® silicone rubber are particularly suitable for **buns, white bread, and croissants**. They can be used for up to 2,000 baking cycles without problems. Sour doughs, such as rye bread, and also recipes containing particularly acidic ingredients attack the coatings more quickly. Nevertheless, 1,000 to 1,500 baking cycles are still possible in most cases.

Molds coated with SILRES® silicone resin formulations are particularly suitable for **cake and cookie doughs and for all doughs containing lots of sugar, fats or eggs**. We recommend that molds with resin coatings should be lightly greased to achieve optimum release results. Particularly suitable for this are silicone oils such as SILFAR® 350, which are added to the silicone resin solutions in quantities of 3–5 percent by weight before use.

Silicone elastomer coatings have only limited suitability for **lye pastries** because these coatings are rapidly attacked by the highly alkaline additives. In such cases, the suitability should be checked on a case-by-case basis or silicone resin-based coatings can be used instead.



THESE PRODUCTS GET THE MOST OUT OF YOUR BAKEWARE

Silicone Elastomer Formulations

ELASTOSIL® E60 and ELASTOSIL® E60 N GRAY are flowable RTV-1 silicone rubbers specially formulated for the requirements of the bakeware industry. They vulcanize in the presence of atmospheric moisture, releasing acetic acid (approx. 5–6 percent by weight) to produce a rubbery material with a very high thermal stability and excellent release properties. These vulcanizates are ideal as non-stick coatings for bread rolls, croissants, wheat and rye breads.

Our products ELASTOSIL® E60 and ELASTOSIL® E60 N GRAY comply with the guidelines of the German Federal Institute for Risk Assessment (BfR), Recommendation XV Silicones. The prerequisites in this case are: before the coated object is used, all solvents must have been completely removed and the amount of volatile and extractable constituents must have been reduced to less than 0.5 percent by weight via the specified heat treatment.

ELASTOSIL® E60 N GRAY is also suitable for the manufacture of coatings in accordance with FDA 21 CFR §175.300 “Resinous and Polymeric Coatings” – provided that the coated object has been heat-treated as specified to reduce the amount of volatile and extractable constituents to less than 18 mg/square inch.

Silicone Resin Formulations

SILRES® HK 46 and SILRES® REN 171 are solvent-containing products based on silicone resins. After physical drying (evaporation of the solvent), the coatings are baked at a high temperature. They have excellent release properties in the cured state. The resin-based coatings are especially suitable for doughs containing sugar, fat, or eggs, such as cakes, cookies, and sweet bakery goods (individual products). These products are also very suitable for croissants, madeleines, and muffins.

Provided that the solvent has been completely removed and the product has been cured, SILRES® HK 46 complies with the requirements of the German Federal Institute for Assessment (BfR), Recommendation XV for silicones, and is also suitable to manufacture coatings according to FDA 21 CFR §175.300 “Resinous and Polymeric Coatings”. SILRES® REN 171 does not comply with BfR Recommendation XV for silicones and can only be used according to FDA §175.300 “Resinous and Polymeric Coatings”.

For both product solutions, the aforementioned stipulations and limit values apply with respect to volatile and extractable constituents and also the European Community limit value of 10 mg/dm² or 60 mg/kg for global migration.

Responsibility for compliance with the respective limit values and assessment of the suitability of materials and articles intended to come into contact with foodstuffs for the respective application lies exclusively with the manufacturer or the distributor of the respective article.

Primer

WACKER® PRIMER G790 is a low-viscosity, solvent-based formulation to pretreat metal bakeware (baking trays and molds, wire mesh and wire cloth). The product contains reactive silanes and silicone resins that form a thin film of silicone resin on evaporation of the solvent in the presence of atmospheric moisture. The primer ensures optimum bonding between the silicone coating and the metallic substrate. Pretreatment of metal molds and trays with WACKER® PRIMER G790 is always recommended for our products ELASTOSIL® E 60 and ELASTOSIL® E 60 N GRAY. This improves adhesion to the bakeware and optimizes the service life of the silicone coating.



COATING FOR EXPERTS

Preparation and Primer

Before new baking trays and molds are used for the first time, they should be pretreated as recommended by the manufacturer. Trays and molds that have been recycled, refurbished or which have already been pretreated by the manufacturer should be cleaned to remove dust, dirt, and grease. The surface of the metal can also be slightly roughened by sand-blasting.

Application of a primer to the thus-prepared metal substrate is not necessary for the silicone resin-based products SILRES® HK 46 or SILRES® REN 171.

In contrast, if the object is to be coated with the silicone elastomers ELASTOSIL® E60 or ELASTOSIL® E60 N GRAY, we recommend pretreating the metal surface with WACKER® PRIMER G790. The primer should be applied as thinly as possible (preferably with a coat thickness of < 2 µm).

Excessively thick primer coats may reduce adhesion. It is thus expedient to dilute the primer directly before use with a non-polar aliphatic solvent (cyclohexane, petroleum ether, ISOPAR™ E, white spirit, etc.) in a 1:1 or 1:2 ratio.

Please Note:

WACKER® PRIMER G790 is sensitive to atmospheric moisture. Opened containers should always be stored in a cool, dry place with regular checks for cloudiness or a white sediment. If there is a white sediment, dispose of the primer and do not use it.

The (diluted) primer is best applied as a thin, bubble-free layer using an airless spraying system and then left at room temperature for at least 15 minutes (maximum 2 hours) until it is physically dry. Subsequently, bake the prime coat for 20 minutes at 200 °C and then leave the coated trays and molds to cool below 50 °C.

Alternatively, the freshly applied primer solution can also be left at room temperature for at least 90 minutes (maximum 12 hours) at a relative humidity of 40%. The baking step is not necessary in this case.

Preparation of the Spray Suspension

WACKER supplies the products ELASTOSIL® E60 and ELASTOSIL® E60 N GRAY as solvent-free formulations. They must therefore be diluted before use with a non-polar, aliphatic solvent (cyclohexane, petroleum ether, ISOPAR™ E, white spirit, etc.) to the spray viscosity. This solvent should contain as little water as possible. Typical mixing ratios are 1–2 parts of solvent to 1 part of the silicone formulation.

Responsibility for compliance with the respective limit values and assessment of the suitability of the solvent for diluting the material lies exclusively with the manufacturer or the distributor of the respective article that is intended to come into contact with foodstuffs.

Important

The fillers in the thus-prepared coating suspension tend to settle and the mixture must therefore be continuously stirred during use. The mixture is sensitive to moisture in the air (may form a skin) and should thus always be stored in moisture-tight containers.

In contrast, silicone resins SILRES® HK 46 or SILRES® REN 171 are ready for use. They do not need to be diluted any further.

Coating and curing

The solvent-containing mixtures can be applied with all the popular coating methods (brush, dipping, spraying). Suspensions of ELASTOSIL® E60 or ELASTOSIL® E60 N GRAY are particularly suitable for airless spraying systems. This avoids premature skin formation and the associated unsatisfactory coating results.

Coatings based on ELASTOSIL® E60 or ELASTOSIL® E60 N GRAY start vulcanizing directly during spraying due to contact with moisture in the air. We recommend that the freshly coated bakeware is left to dry at room temperature for 60 minutes and then baked for 1 hour at 250 °C (or 4 hours at 200 °C). The risk of blistering can be reduced by starting the baking process after the solvent and the acetic acid have evaporated.

The silicone resin-based products SILRES® HK 46 and SILRES® REN 171 require similar curing conditions. The sprayed coating should also be physically dried for 60 minutes at room temperature to evaporate the solvent and then baked for 1 hour at 250 °C.

The key criterion for a long-lasting bakeware coating is an optimum 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 ELASTOSIL® E60 or ELASTOSIL® E60 N GRAY (100 %) per m² of area being 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 coating. A multilayer coating is possible in all cases and is particularly recommended for bakeware with a complicated geometry.

Removal of old silicone coatings

These can be removed effectively in three ways:

- a. Pyrolysis at temperatures > 600 °C and subsequent cleaning by sand blasting
- b. Blasting with CO₂
- c. Chemical etching in an alkali or acid bath followed by thorough rinsing and mechanical removal of residual coating material.

OUR MATERIALS FOR THE BEST BAKING RESULTS

Properties	ELASTOSIL® E60	ELASTOSIL® E60 N GRAY	SILRES® HK 46	SILRES® REN 171	WACKER® Primer G790
	RTV-1 Silicone	RTV-1 Silicone	Methyl silicone resin	Phenyl silicone resin	Primer

Unvulcanized product

Color	Red	Gray (red on request)	Colorless to yellowish	Colorless to yellowish	Colorless to yellowish
Viscosity, dynamic [mPa s]	70,000	90,000	50	9	1
Density [g/cm³]	1.12	1.05	1.01	0.87	0.76
Solids content [wt.-%]	100	100	50	23	17
Solvent	n.a.	n.a.	Xylene/n-butanol	Acetone/i-butyl-i-butyrate	ISOPAR™ E/toluene

Vulcanized product

Hardness [Shore]	A 35	A 35	D 50	D 50	n. a.
Color	Red	Gray	Colorless	Colorless	n. a.
Density [g/cm³]	1.13	1.07	1.01	1.01	n. a.
Corresponds to statutory regulations pertaining to food according to	BfR, Recommendation XV: Silicones* -	BfR, Recommendation XV: Silicones* FDA, 21 CFR § 175.300**	BfR, Recommendation XV: Silicones* FDA, 21 CFR § 175.300**	- FDA, 21 CFR § 175.300**	n. a. n. a.

* Provided that any residual solvent has been completely removed from the coated object before use and the amount of volatile and extractable constituents has been reduced to less than 0.5 weight-% by the specified heat treatment.

** Provided that the coated object has been subjected to the specified heat treatment so that the amount of volatile and extractable constituents have been reduced to less than 18 mg/inch².

	ELASTOSIL® E60	ELASTOSIL® E60 N GRAY	SILRES® HK 46	SILRES® REN 171
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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

EXPERTISE AND SERVICE NETWORK ON FIVE CONTINENTS



WACKER is one of the world's leading and most research-intensive chemical companies, with total sales of €5.3 billion. Products range from silicones, binders and polymer additives for diverse industrial sectors to bioengineered pharmaceutical actives and hyperpure silicon for semiconductor and solar applications. As a technology leader focusing on sustainability, WACKER promotes products and ideas that offer a high value-added potential to ensure that current and future generations enjoy a better quality of life based on energy efficiency and protection of the climate and environment.

Spanning the globe with 5 business divisions, we offer our customers highly-specialized products and comprehensive service via 25 production sites, 22 technical competence centers, 12 WACKER ACADEMY training centers and 50 sales offices in Europe, North and South America, and Asia – including a presence in China. With a workforce of some 17,000, we see ourselves as a reliable innovation partner that develops trailblazing solutions for, and in collaboration with, our customers. We also help them boost their own success. Our technical centers employ local specialists who assist customers world-

wide in the development of products tailored to regional demands, supporting them during every stage of their complex production processes, if required. WACKER e-solutions are online services provided via our customer portal and as integrated process solutions. Our customers and business partners thus benefit from comprehensive information and reliable service to enable projects and orders to be handled fast, reliably and highly efficiently. Visit us anywhere, anytime around the world at: www.wacker.com

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