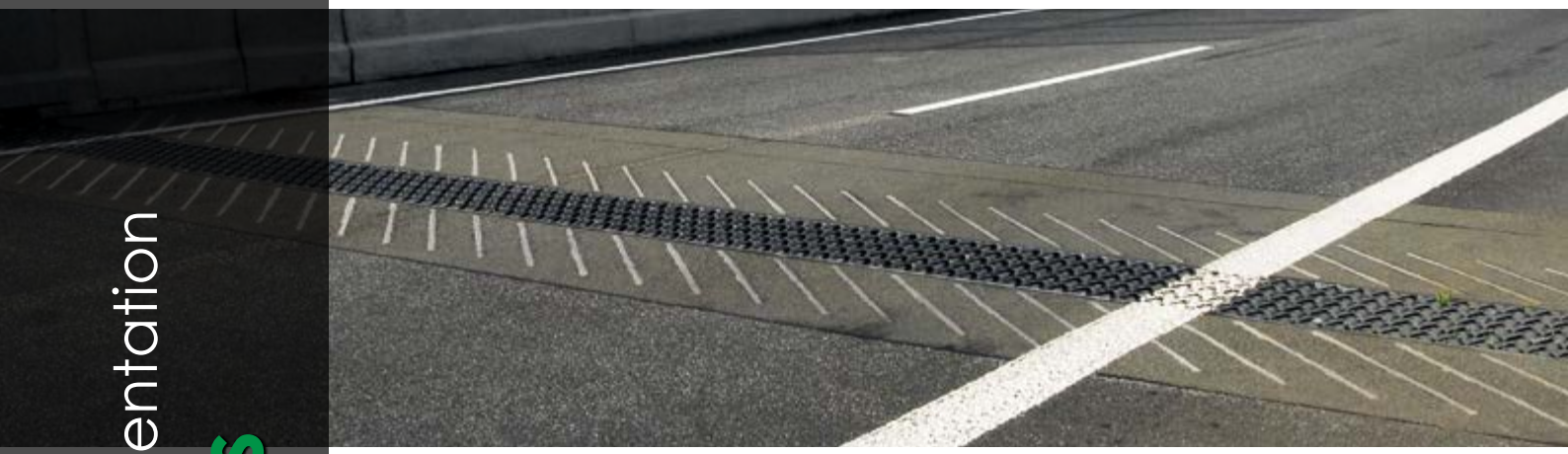
Reactive resin mortar for very strong, quick repairs in concrete and engineering works, also for mortar toppings for bridge bearings

Silikal®

Expect more from your floor.



Silikal Technical Documentation

Mortar systems

Silikal®
Expect more from your floor.

Silikal's production and administrative headquarters in Mainhausen/Germany, near Frankfurt am Main

… as we have been for more than 60 years

We've been doing the basics for you for decades: with a background in screed construction, we decided more than 60 years ago to concentrate on the development and manufacture of floor coatings based on synthetic resins. Our history since then has seen countless research and development projects. Silikal is now active across the world and is represented in Germany and Europe as well as Asia and Australia.

… whatever your problems

Whether it's a new construction, repairs or renovation: our methacrylate resins are tried and tested heavy-duty floor coatings for industry, commerce and crafts, on transport surfaces, in public institutions and in medical facilities. Silikal's repair mortar systems are also used as reliable problem-solvers: to ensure the rapid improvement of holes, cracks or ruptures in concrete, prefabricated concrete or screeding, underline bridge bearings, establish machine foundations or fix heavy-duty sections and components in position.

… with the right systems

We have the right answer for your flooring problem. Super-fast curing with no disruption to operations, the exact degree of slip resistance required, processing even at very low temperatures, a large selection of colour design options and much, much more – all thanks to Silikal's product range.

… and with professional staff

Need advice? Delighted – put us to the test! Every project has its own demands and requirements. Our staff come from the industry. They are familiar with the problems on site and boast worldwide experience as applications engineers. That's why you should talk to us. We'll be happy to help when it comes to realising even the most difficult flooring projects or the possible uses of rapid-curing mortar systems.

And if you'd really like to get into the details, Silikal's training centre in Mainhausen can provide you with a comprehensive range of practically-oriented information.

One thing you can be sure of: we're always here for you!

Silikal® made in Germany since 1951

TÜV PROFI CERT
Certified Quality and Ecology Management Systems
Reg. No. 73 100 / 104 663

AgBB GEPRÜFT
Certified according to AgBB evaluation scheme

HACCP INTERNATIONAL PROGRAMMES FOOD SAFETY CERTIFICATION
Our products are certified by HACCP international

European Institute of Halal Certification www.eurohalal.eu Halal EHZ
Our products comply with the Halal european guidelines

Silikal product information
Version R 17 – 3.00.A
August 2016

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Mortar Systems Technical Documentation
Contents

Important Note

The following extremely important and partially complementary data sheets or chapters are included in the technical documentation:

- **Data sheet SILIKAL® Hardening Powder**
- **Data sheet SILIKAL® Additive ZA, low-temperature accelerator for priming**
- **Special priming data sheet SILIKAL® R 51 resin (low viscosity) and SILIKAL® RU 727 resin (adherent priming)**
- **General processing information**
- **The substrate**
- **Information on safety and protection**

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Silikal reactive resins enable surfaces that combine high strength with decorative qualities to be applied in almost all industrial and traffic sectors, as well as permitting the preparation of mortar systems for the quick repair of concrete. Silikal is a well known company specialising in the methacrylate reactive resin sector. Its suitability has been demonstrated on millions of square metres over the last 60 years.

Silikal R 17 Mortar Systems ...

are different from other mortars and sealing mortars in their rapid setting time, which means the repaired surface can be used approximately one hour after completing the work. This is due to the unique qualities of the binder used: Silikal methacrylate-based reactive resins, which set quickly with little relation to temperature. No other reactive resin mortar (e.g. epoxy resin-based mortars) comes even close to matching the two major qualities of Silikal reactive resin mortars.

Reactive Resins (PMMA) from Silikal …

… have other significant advantages over other commercial resins, such as epoxy or polyurethane:

- **Fast setting time** of reactive resins, restoring the floor to full strength in a short space of time.
- Setting even at **low temperatures** (in certain conditions, as low as -10 °C or -25 °C), which means they can be applied without difficulty even in winter or in cold chambers.
- **Excellent adherence** to the base and easy to restore.
- **The hardened mortar** is physiologically harmless

Silikal R 17 Reactive Resin for Work on Concrete and Quick Repairs

Everyone knows that concrete is repaired with mineral mortars. Normally cement is used as the binder for the sand and other additives, while the mixture is set with water. If required, additives are added to improve specific qualities in the concrete.

Although cement mortars may be applied to moist bases,

- they need temperatures above 0° C to set
- they require long setting times
- and they have limited flexibility and little resistance to wear and aggressive environments.

Surprisingly, most people do not know that concrete can also be repaired using mortars whose mineral additives use synthetic resins and not cement as a binder. They probably think that reactive resins do not have the same properties as concrete, especially in terms of compressive strength. However, the opposite is true in fact, as the strength and general properties of mortars with reactive resin binders are, in certain cases, higher than concrete itself. Naturally, the cost is not the same, so reactive resins are not applied to large surface areas but are mainly used for repair work. Even so, considering the working time saved and the quick recovery of the properties of the floor, the overall cost of repair work is usually lower in such cases.

As previously mentioned, the binder in Silikal mortar is the reactive resin “methylmethacrylate” and certain other major reagents, and use sand with a special grain size as aggregate. This mortar, with such extraordinary properties, was invented by Silikal over 45 years ago and is still a unique and unbeatable product when it comes to repairing concrete surfaces or parts, especially under difficult conditions. Currently, no other comparable mortars have such a short setting time - even at low temperature - or such excellent properties in comparison with mineral mortars.

The Silikal R 17 mortar system consists of the filler, presented in 15-kg bags, and the corresponding hardening liquid in 2-litre cans. Once both components have been mixed, a pourable mass is produced for coating the area under repair. Naturally, (as with all other repair materials), the base needs to be properly prepared to obtain high-quality repairs. Optimum adherence requires priming with a product such as SILIKAL® RU 380 resin. A single packing unit of SILIKAL® R 17 mortar can be used to repair a surface of approx. 1 m^2 with a layer approx. 1 cm thick.

Silikal R17 polymer concrete resin mortar is also available in a special grade, such as “-25” for extremely low temperatures (down to –25 °C), ideal for repairs in cold storage or freezers.

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The standard colour of Silikal R 17 reactive mortar is “concrete grey”, but other colours are available of minimum order size. Silikal R 17 reactive resin mortar can be used even for layers of thickness > 25 mm by incorporating medium- or large-grain aggregate (gravel). Surfaces made using Silikal R 17 reactive resin mortar enable flooring to be laid at a later stage to provide different decorative effects. Silikal R 17 reactive resin mortar has been tested and certified for a number of different applications.

Summary of main characteristics:

- **Fast setting (approx. 1 hour)**
- **Usable at low temperatures as low as -10 °C (special grade -25 °C)**
- Easy to handle
- Harder than concrete itself
- Impermeable to liquids
- More resistant to chemical agents
- Totally weather-resistant
- Excellent wear-resistance
- Hot-water resistant
- No shrinkage
- Resistant to de-icing salt and frost
- High electrical insulating properties

Main applications of Silikal R 17 reactive resin mortar:

- Repairing floors without long-term interruptions to service
- Furring of train tracks and rails
- Building of traffic islands
- Kerb stone repair
- Surface covering for extreme load conditions
- Repairing bridge pillars
- Bridge bearings for rail and road pillars
- Repairing pedestrian walkways
- Repairing stairs and platform edges
- Ramps and levelling work in bridges and buildings
- Fixing metal components and beams
- Foundations for machinery and steel structures
- Repairing joints and edges
- Filling in potholes
- Precast polymer concrete parts

In general, the indications given in the current version of the general technical documentation as well as this “Mortar Systems” technical documentation should be observed.

Updating service

The latest versions of this technical documentation and the general technical documentation are available from the Silikal web site at **“www.silikal.de”.**

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SILIKAL® R 17 mortar areas of application
Road construction and traffic areas

A2 Motorway, Hamm-Uentrop/Germany:
Construction of transverse drainage channels

Car park “Altlöhrtor”, Koblenz/Germany:
Renovation of ramps

A11 Motorway/Germany:
Bridge cap and walk way renovation

A45 Motorway near Solms/Germany:
Repair and inplantation of joint profiles

A4 Motorway near Düren/Weisweiler/Germany:
Concrete slab edge repair

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SILIKAL® R 17 mortar areas of application
Road construction and traffic areas

K 106 by-road, Neuwied-Niederbieber/Germany:
Kerb of a traffic island stuck to the asphalt with SILIKAL® R 17 mortar

Repairing the kerbs with
SILIKAL® R 17 mortar

Metro station stairs in Venloer street,
Cologne/Germany: Repairing the steps

Car park airport, Stuttgart/Germany:
Kerb stone stuck to concrete with
SILIKAL® R 17-thix mortar

South bus station of the “Franz-Josef Strauss” airport,
Munich/Germany:
Repairing drainage channels

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SILIKAL® R 17 mortar areas of application
Road construction and traffic areas

A38 Motorway near Breitenworbis/Germany: Joint rips profile installation

B42 Interstate Road/Germany:
Underlayment of steel construction

Wied-Bridge, Waldbreitbach/Germany:
Surface coating of an aluminium pedestrian bridge

River Rhine Bridge near Wesel/Germany:
Underlayment of hand rail columns

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New railway bridge construction in Hannover-Ohedamm/Germany:
Bridge bearings

A6 Motorway Bridge, Massholdertal/Germany:
New bridge bearings

Metropolitan viaduct, Berlin/Germany, Sterndamm:
repairing bridge bearings

New railway bridge construction in Grafenwöhr/Germany:
Bridge bearings

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August 2016

SILIKAL® R 17 mortar areas of application
Industrial facilities

CORUS aluminium rolling mill,
Koblenz/Germany:

Repairing traffic areas

Top:
MHP Mannesmann
Präzisionsrohr GmbH, Hamm/Germany:

Repairing pot holes

Left:
Fahrzeugwerke Faymonville AG, Billingen/Belgium:

Repairing expansion joints

Forwarder warehouse, Kassel/
Germany:

Renovation of a loading ramp

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SILIKAL® R 17 mortar areas of application
Industrial facilities

Metro AG, Essen/Germany:
Renovation of expansion joints
in a warehouse

May Werke GmbH & Co. KG,
Erftstadt-Köttingen/Germany:
Renovation of expansion joints

Crack grouting /
renovation of
floor areas

Figure on top:
Deutsche See GmbH & Co. KG,
Bremerhaven/Germany:
Repair of floor areas in cold store
house with SILIKAL® R 17 mortar
with no disruption to operation
(-25 °C)

Left:
Rheingas AG, Brühl/Germany:
Repairing sliding gate

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SILIKAL® R 17 mortar areas of application
Airports

Mannheim Airport/Germany:

Repairing hangar floors

Leipzig/Halle Airport/Germany:

Repairing concrete, runways and taxiways

Top, left:
Leipzig/Halle Airport/Germany:

Repairing concrete, runways and taxiways

Mannheim Airport/Germany:

Laying foundations of sliding door rails

Nordrhein-Westfalen Airport/Germany:

Replacing and installing embedded runway lights without air-traffic interruption

Nordrhein-Westfalen Airport/ Germany:

Sealing cable ducts with asphalt-coloured SILIKAL® R 17 mortar

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SILIKAL® R 17 mortar areas of application
Rail construction

Railway track Düsseldorf-Wuppertal/Germany:
Installation of steel columns

Railway track Koblenz-Bonn/Germany:
Underlayment of steel columns for noise protection

Deutsche Bahn AG,
Braunschweig railyard/Germany:
Renovation of track storage

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SILIKAL® R 17

Reactive resin mortar for concrete repairs and screed

Properties

- High compressive strength (75 N/mm²)
- High tensile strength in bending (17 N/mm²)
- Low shrinkage
- Wear-resistant
- Good self levelling properties
- Processing time / hardening time at +20 °C: 15 min / 1 h

Area of application

- Reactive resin mortar indoors and outdoors

Guide for application and calculation

SILIKAL® R 17	Amount in kg	Quantity in ltr.	Quantity in ltr. fixed volume	Minimum layer thickness in mm
a) SILIKAL® R 17 Powder SILIKAL® R 17 Hardener	15.00 1.85 16.85	11.50 2.00	8.50	6
b) SILIKAL® R 17 Powder SILIKAL® R 17 Hardener SILIKAL® Filler QS 2 – 8 mm	15.00 1.85 8.00 24.85	11.50 2.00 5.00	11.60	25
c) SILIKAL® R 17 Powder SILIKAL® R 17 Hardener SILIKAL® Filler QS 2 – 8 mm SILIKAL® Filler QS 8 – 16 mm	15.00 1.85 3.00 12.00 31.85	11.50 2.00 1.90 7.50	14.25	50

Advice on application

- First add hardener liquid, then slowly stir in the powder component, then (as required) add SILIKAL® Filler QS and stir for roughly 2 minutes until an homogeneous mortar is created, then use immediately.
- The minimum layer thickness is 6 mm – not extendable to zero.
- Do not use any fillers other than those named in the table “Guide for application and calculation”.
- Note: If priming must be performed at temperatures between -11 °C and -25 °C, the special product SILIKAL® R 51 (-25 °C) can be used (data sheet on request).

Characteristics as delivered

Property	Approx. value
Viscosity, +20 °C	1 mPa · s
Density, +20 °C	0.93 g/cm³
Application temperature	-10 °C to +35 °C

CE marking

CE

05

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DOP: www.silikal.com

R17-001

EN 13813:2002

SR–C70–F15–B2,0–IR4–AR0,5–B_{fl}-s1

Synthetic resin screed
for application in buildings

Flexural strength	> 17 N/mm²
Compressive strength	> 75 N/mm²
Bond strength	B 2.0
Impact resistance	IR 0.4
Reaction to fire	B_{fl}-s1

Other applicable documents

SILIKAL® Filler QS	Data sheet FQS
General notes	Technical documentation MMA
Safety data sheets	All used Silikal products

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SILIKAL® RU 380

Reactive primer for absorbent and non-absorbent substrates

Properties

- Medium viscosity
- Medium penetration capacity and good adhesion

Area of application

- Universal primer resin for both cementitious substrates and non-absorbent substrates

Hardener dosages

Temperature	SILIKAL® BPO % by weight *	Pot life approx. min.	Hardening time approx. min.
-10 °C	4.5	35	80
0 °C	3.0	32	60
+10 °C	2.0	18	55
+20 °C	1.5	12	45
+30 °C	1.0	10	40

* The amount of SILIKAL® BPO is always calculated with reference to the amount of resin.

Advice on application

- SILIKAL® BPO must be stirred in until it is fully dissolved (approx. 1 minute) and the mixture must be used immediately.
- The mixture must be applied such that it forms a film. If the mixture penetrates in the substrate, it must be reworked wet in wet.
- Puddling must be avoided during application.

- Curing and adhesion tests must generally be performed.
- Always use primers as clear resin – they should never be filled or pigmented.

Guideline recipe, primer

No.	Component	Guideline recipe (% by weight)	Comment	Batch for 10 litre bucket
1	SILIKAL® RU 380	100 %		10 kg
	Total:	**100 %**	**Average consumption: 400 g/m²**	**10 kg**
2	SILIKAL® BPO	1 – 4.5 % with ref. to no. 1		See “Hardener dosages” table for quantities

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SILIKAL® RU 380

Reactive primer for absorbent and non-absorbent substrates

Characteristics as delivered

Property	Approx. value
Viscosity, +20 °C	200 mPa · s
Density, +20 °C	0.99 g/cm³
Application temperature	-10 °C to +30 °C

CE marking

CE
09
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www.silikal.com
RU380-001
EN 13813:2002
Synthetic resin screed
for application in buildings

Reaction to fire	E_{fl}
Release of corrosive substances	SR
Wear resistance	≤ AR1
Bond strength	≥ 1.5
Impact resistance	≥ IR 4

CE
09
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System-Küche-Alternativ-001
EN 1504-2:2004 1119
ZA.1d(1.3), ZA.1f(5.1) and ZA.1g(6.1)
Synthetic resin screed
for application in buildings
Detailed declaration of performance:
www.silikal.com

Other applicable documents

SILIKAL® BPO	Data sheet BPO
SILIKAL® Filler QM	Data sheet FQM
SILIKAL® Pigment	Data sheet PIG
SILIKAL® Additive M	Data sheet Additive M
General notes	Technical documentation MMA
Safety data sheets	All used Silikal products

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Expect more from your floor.

SILIKAL® R 90 Adhesive

2-component MMA-adhesive for the building industry and road construction

Expect more from your floor.

SILIKAL® R 90 Adhesive is a solvent free, fast curing 2-component adhesive compound based on a medium flexible Methacrylic resin for layer thicknesses of 1,5 – 3 mm, preferable 2 mm. The quick curing time of less than 1 hour and the excellent chemical resistance enables a fast working procedure.

Application

The application is being recommended directly onto the asphalt or concrete surface without primer. It can be used for fixing metal or PVC profiles to walls or floors, as well as tiles, concrete blocks like curb stones, road marking cat eyes, polymer concrete parts or prefabricated braille tiles. Surface must be dense, dry, dust and oil free. Since the application is very simple, ordinary comb trowels can be used.

Calculate the area per m² and thickness of 2 mm in average. A thickness can vary depending on the evenness of the surface and item. A 2 mm thickness in average means a consumption of appr. 4 kg/m². Mix the calculated amount of the SILIKAL® R 90 Adhesive with the right amount of BPO Hardening Powder (see table). Stir for 1 minute and avoid lumps in the mixture. Masking tape can be used to collect the surplus adhesive beside the fixed item to protection.

Potlife is appr. 10 – 15 minutes. Curing time about 1 hour.

Guideline recipe and batch quantities

Item	Component	Guideline recipe (% by weight)	Comments	Batch for 10 litre bucket	
1	SILIKAL® R 90 Adhesive	100 %		10 kg	10 litres
	Total:	**100 %**	**Average consumption: 2 kg/m² per 1 mm thickness**	**10 kg**	**10 litres**
2	SILIKAL® Hardening Powder	0.5 – 2 % related to item 1	See “Hardener dosages” table for quantities	50 – 200 g	

Characteristics of R 90 as delivered

Property	Measuring method	Approx. value
Viscosity	Visual	Pasty, thixotrope
Specific Gravity	EN ISO 2811-2	1.75 g/cm³
Flash point	DIN 51 755	+10 °C
Pot life at +20 °C (100 g, 1 % pbw. hardening powder)	approx. 10 – 15 min.	
Application temperature	+5 °C to +40 °C	
Recommended Thickness	Wet film comb	2 mm (1.5 – 3 mm)

Hardener dosages depending on surface and item temperature

Temperature	Hardening powder % pbw. *	Pot life approx. min.	Hardening time approx. min.
+5 °C	2.0	15 – 20	50
+10 °C	1.5	12 – 17	40
+15 °C	1.0	12 – 17	35
+20 °C	1.0	10 – 15	30
+25 °C	1.0	8 – 13	30
+30 °C	1.0	8 – 13	25
+35 °C	0.5	5 – 10	25
+40 °C	0.5	5 – 10	20

* The quantity of hardening powder is always related to the quantity of resin.

For further information, please refer to the separate product information sheet **“SILIKAL® Hardening Powder”**.

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Delivery form and shades

• 5 kg bucket

Not pigmented (If required the adhesive can be pigmented by adding 1 – 3 % SILIKAL® Pigment Powder).

Storable

Can be stored for 6 months. Store in a cool (< 25 °C), dry, frost-free place.
Do not expose to direct sunlight!

Labelling

Flammable, irritant.

Equipment cleaning

Use Ethylacetate, Acetone or MEK immediately after use.

Other relevant documentation:	Technical Documentation Data sheet
SILIKAL® Hardening powder	SILIKAL® Hardening powder
General processing information	AVH
The substrate	DUG
Information on safety and protection	SUS
Storage and transport	LUT

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Expect more from your floor.

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Reactive resins and polymer concrete for industrial floors and civil engineering projects

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