

Insights Paper

SILICONE RESIN EMULSION PAINTS: TESTED ON A “REAL LIVE OBJECT”

For us at WACKER, it's always exciting to see how our products actually perform in real life. Consider, for example, silicone resin emulsion paint (SREP®), which was first patented in 1963. In 2003, our colleague Dr. Heinz Geich decided to paint the exterior walls of his house with it. What do they look like 20 years later? We put them through their paces!

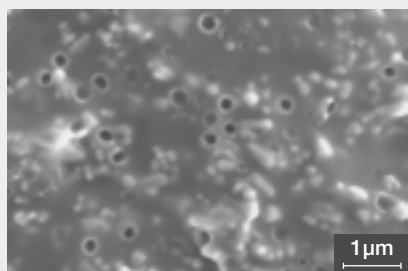




SILICONE RESIN EMULSION PAINTS FOR EFFECTIVE FACADE PROTECTION

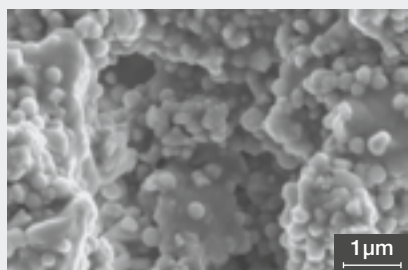
Two Different Approaches to Reducing Moisture on Facades

Approach 1: Latex Paints



Binder-rich paint (latex): Seals pores through film formation to create an intact coating.

Approach 2: Silicone Resin Emulsion Paint



Low-binder paint (silicone resin emulsion): the silicone resin binder provides a hydrophobic effect to the porous structured paint (breathable paint).

Anyone who has ever built a house knows that, as the builder, at some point you automatically become an expert in the best materials and techniques to use. It was no different for our colleague Heinz Geich when he built his house in the idyllic town of Marktl am Inn in 2003.

For Heinz Geich, however, there was an additional factor: as he was a technical service manager at WACKER in Burghausen, he was already “predisposed.” He was therefore fully aware of the importance of effective facade protection. “We wanted a solution that would permanently protect our exterior walls and look good for years to come,” he recalls today. “When you’ve just moved in, you don’t want to think about renovating again straight away.”

Silicone Resin Emulsion Paint Wins the Race

Heinz Geich’s house was built in brick in 2003 and then plastered and painted. The bricks and plaster were not given any special treatment with an impregnating agent. “For protection against water and moisture, we opted instead for an outer coat of silicone resin emulsion paint,” says Geich. “It was recommended to

us as the most modern form of facade protection at that time. And as a WACKER employee, I naturally had every confidence that our products would deliver on the promises that we make every day,” he adds with a grin.

“Silicone resin emulsion paint was recommended to us as the most modern form of facade protection. And as a WACKER employee, I naturally had every confidence that our products would deliver on the promises we make.”

Dr. Heinz Geich

Exterior Paints in Comparison

| | Latex paint | Silicate paint (not hydrophobized) | Silicone resin emulsion paint (SREP®) |
|----------------------------|-------------|------------------------------------|---------------------------------------|
| Surface/structure | Closed film | Porous surface | Porous surface |
| Moisture protection | Very good | Poor | Very good |
| Breathability | Poor | Very good | Very good |

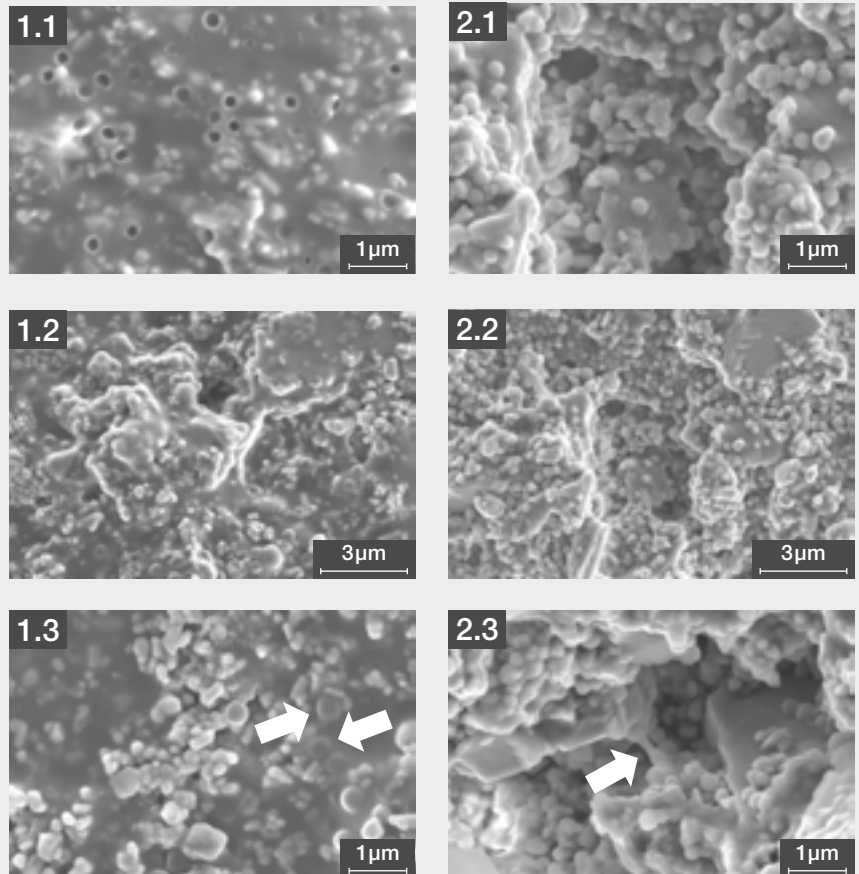
SREP®: THE BEST OF TWO WORLDS

Silicone resin emulsion paints (SREP®), patented by WACKER in 1963, combine the outstanding properties of mineral and synthetic-resin-bound paints: very high water-vapor permeability, extremely low water absorption and extreme durability. All these properties stem from the silicone resin binder that we at WACKER market today under the brand name SILRES®.

Silicone Resins: It's All about the Network

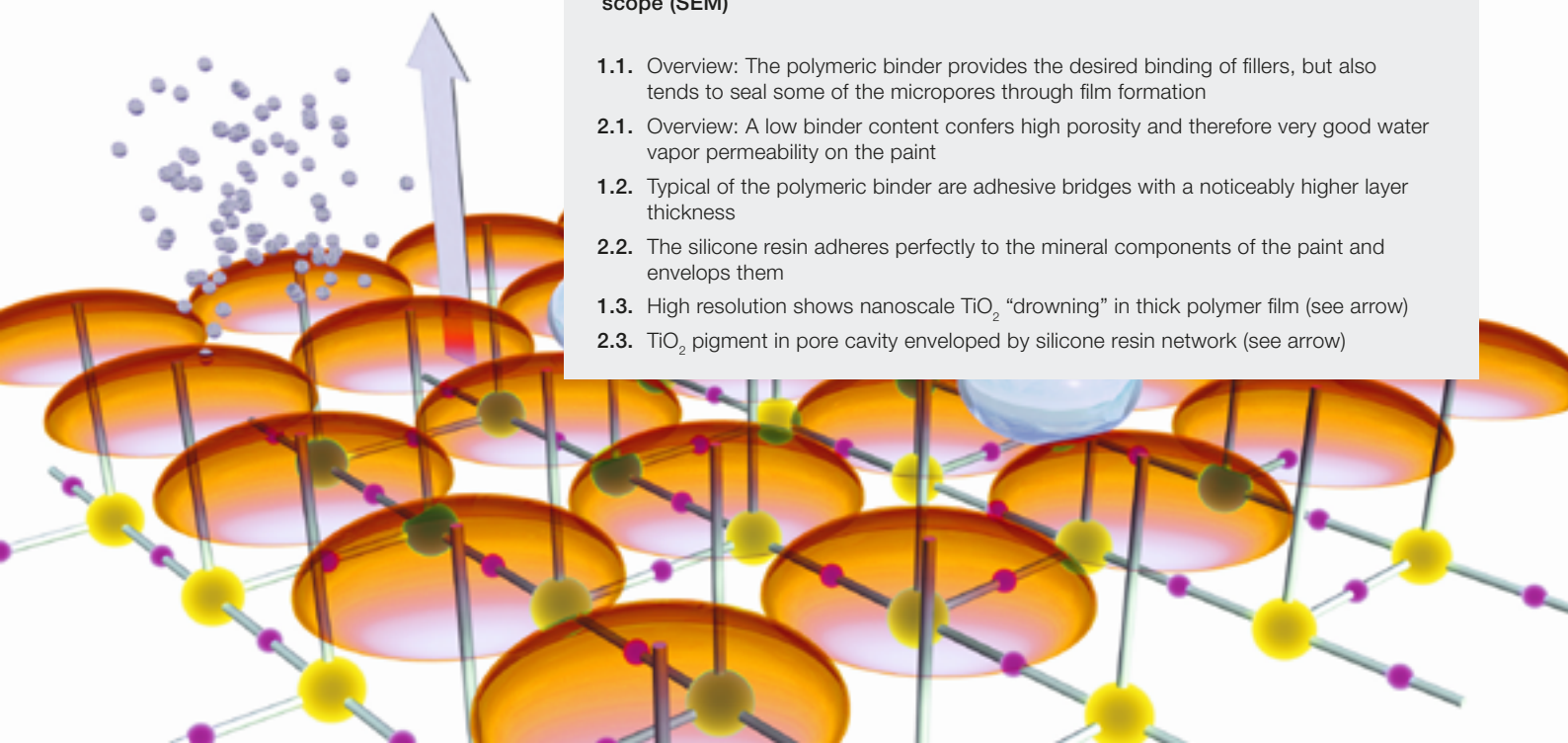
Silicone resins protect mineral surfaces against water, without impairing their water-vapor permeability – and they do this reliably and permanently. The silicone resin forms a UV-stable and water-repellent network within the paint. This protects permanently against water ingress, but allows water vapor to pass in and out, enabling the paint to breathe. So, on the outside, the brickwork is protected against moisture and, on the inside, natural water vapor is able to escape unhindered.

The Strength of the Silicone Resin Structure



Comparison of the characteristic features of a conventional latex paint (1.1–1.3) and a silicone resin emulsion paint (2.1–2.3) under the scanning electron microscope (SEM)

- 1.1. Overview: The polymeric binder provides the desired binding of fillers, but also tends to seal some of the micropores through film formation
- 2.1. Overview: A low binder content confers high porosity and therefore very good water vapor permeability on the paint
- 1.2. Typical of the polymeric binder are adhesive bridges with a noticeably higher layer thickness
- 2.2. The silicone resin adheres perfectly to the mineral components of the paint and envelops them
- 1.3. High resolution shows nanoscale TiO_2 “drowning” in thick polymer film (see arrow)
- 2.3. TiO_2 pigment in pore cavity enveloped by silicone resin network (see arrow)



THE PAINT JOB HAS LASTED. BUT IS IT STILL DELIVERING ON ITS LASTING PROMISES FROM 2003?

A great deal has happened since Heinz Geich painted the outside of his house with silicone resin emulsion paint 20 years ago. 20 summers and winters have come and gone. And the paint job? It has lasted. At least at first glance. But is it delivering on the lasting promises made back then? Heinz Geich invites us to carry out a few tests on his outside walls and to put the 20-year-old paint job through its paces.

Test 1

Abrasion Test – No Sign of Chalking

One measure of the durability of silicone resin emulsion paints is their mechanical strength. Chalking is the formation of a fine white powder on the paint surface. It is caused by weathering and leaching of the binder to expose the pigments and fillers – and indicates deterioration. There is no sign of it on Heinz Geich's exterior walls: Even when they are repeatedly wiped, no fillers or pigments stick to the sponge. The "durability" promise has therefore been kept.



In the abrasion test, no fillers or pigments stick to the sponge – this is a sign of high mechanical strength and durability.

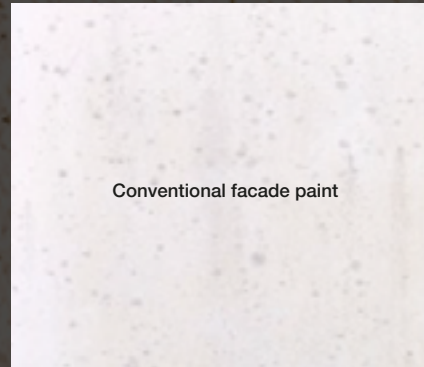
Test 2

Water-Beading Test – The Drops Keep Rolling Off

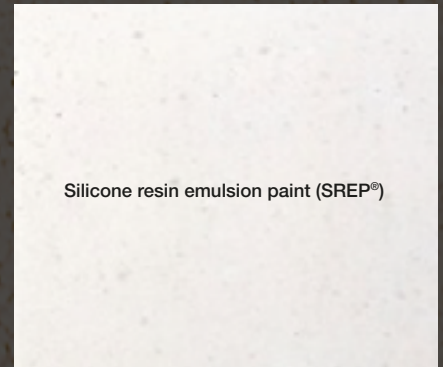
To test the beading effect of the exterior paint, we spray the walls with water. It is soon obvious that the paint is doing a lasting job of keeping Heinz Geich's walls dry. Instead of soaking into the walls, the water droplets simply roll off – entraining any dirt particles along with them. "It's like a self-cleaning effect," says a delighted Geich. "Every time it rains, my outside walls automatically get washed down. No need to reach for the pressure washer!"



The water-beading test shows: Droplets simply roll off the walls – the coating is still watertight, even after 20 years.



Conventional facade paint



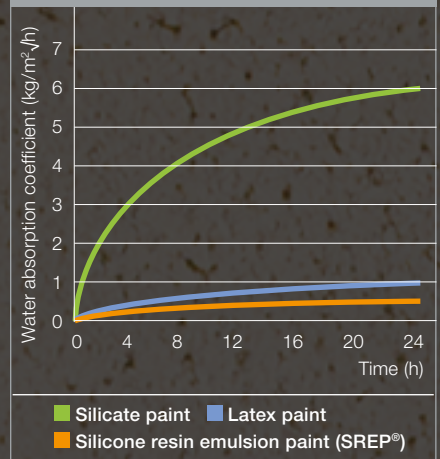
Silicone resin emulsion paint (SREP®)

Silicone resin emulsion paints have less dirt absorption: After 2 years of outdoor weathering in Burghausen, the walls painted with SREP® show less dirt absorption than the conventionally painted walls.

*“Every time it rains,
my outside walls
automatically get
washed down.
No need to reach
for the pressure
washer.”*

Dr. Heinz Geich

Comparison of the Water Absorption
by Different Facade Paints According to
DIN-EN 1062-3



Test 3

The Karsten Tube Test – Not Even Cracks are a Real Problem



The Karsten tube test simulates a downpour in strong winds. The water does not even penetrate via cracks in the walls.

But what about water absorption at cracks in the walls? Wait a minute, cracks? Lo and behold: there are hair-line cracks here and there in the plaster. But Heinz Geich is unfazed: "Nowadays, it's standard practice to incorporate a nonwoven into the plaster to prevent cracking. That wasn't done back then, so it would be quite normal for hairline cracks to appear over time." We want to know whether this has an impact on capillary water absorption by the wall. So, we carry out the Karsten tube test. This is designed to simulate a downpour in strong winds. What happens?

The water re-emerges from the crack below the tube. In other words, it does not penetrate into the depths of the masonry. The crack acts almost like a drainage channel. The silicone resin emulsion paint can therefore still be relied on to keep water out, even from cracks. Paint flaking around cracks in exterior walls is a common occurrence, but not in this case. "The cracks in the paint are essentially deactivated by the silicone resin. So this is purely an aesthetic problem," says Geich.



Test 4

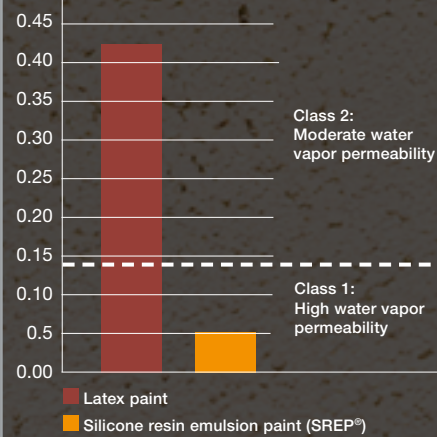
The North-Facing Wall – No Sign of Moss

Shaded, north-facing walls are particularly likely to become disfigured by algae, lichen and moss – and even mold. These are all unmistakable signs of permanently damp walls. For, no matter how good the paint is, no exterior paint provides 100% protection against condensation. The paint system therefore needs to be highly permeable to water vapor. This is the only way to allow the wall to dry out completely.

Heinz Geich leads us around his house and shows us the north-facing wall. Disfiguration? Mold? Nothing. On the contrary, the wall looks almost the same as it did 20 years ago. That's a sign it is dry through and through. "The paint job still looks great. Of course, I had hoped for that, but to be honest it has exceeded my expectations," says Geich.

Nor is there any moss or disfiguration on the shaded, north-facing wall – a sign of thoroughly dry walls.

Water Vapor Permeability



The Economics are Good, too

In 2003, the silicone resin paint was between 20 and 25 % more expensive than the standard alternative. However, that extra expense would barely have shown up in the construction costs. Proving the truth of the adage 'Use cheap paint, and you'll end up painting twice – because you'll be painting again after a few years', this small additional investment has already paid for itself several times over.

Renovate the Outside Walls? No Need!

The use of silicone resin emulsion paints cuts out every second round of renovation on the average. This saves not only on the money for buying the paint, but also on the costs that make up the lion's share of any outside paint job: tradesmen's wages, preparatory work and scaffolding costs. The carbon footprint involved in renovating outside walls should not be neglected either. Over the long term, therefore, silicone resin emulsion paints are definitely economical and sustainable.

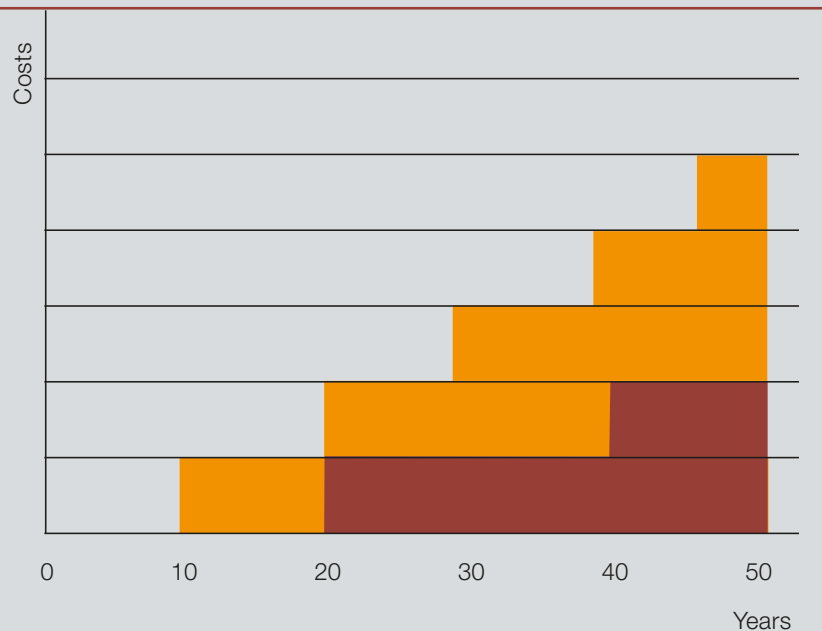
Heinz Geich's own observations corroborate this. "In our neighborhood, many exterior walls dating from the same period have been painted, some of them several times, but our original paint job is still delivering for us, even after 20 years!"

"The painter back then put it in a nutshell: Use cheap paint, and you'll end up painting twice – because you'll be painting again after a few years."

Dr. Heinz Geich



Silicone Resin Emulsion Paints (SREP®) are Particularly Economical



- ■ 2 renovations with silicone resin emulsion paints
- ■ ■ ■ ■ 5 renovations with other paint systems

Conventional paint systems need to be renovated every 10 years on the average. Silicone resin emulsion paints, on the other hand, last around 15 and often even 20 and up to 30 years.

WOULD YOU LIKE TO FIND OUT MORE ABOUT OUR SILRES® BS PRODUCT PORTFOLIO?

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silicone resin emulsion paints
can be found at our product
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