



Technologies and Concepts for Joint Sealing



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Technologies and Concepts for Joint Sealing

Joint sealants make up only a small portion of the monetary value of a construction project and are often considered as an unimportant detail. Yet, joint sealants play the major role in keeping a building air and water tight and thus prevent damages with unforeseeable consequential costs.

In order for a sealant to fulfil its function over the whole lifetime of a building or construction the selection of the right solution and the correct design taking into account all potential influences are key.

In addition, joint sealants contribute significantly to energy-efficient, sustainable building design and will thus become even more important in the near future.

In this brochure Sika's solutions and concepts for joint sealing are described in detail.

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Joint Sealing Solutions

Introduction

Joints and openings between construction elements can be found in different parts of a construction, e. g. between precast concrete elements in facades, around windows and doors, at the connection between floors and walls, in storage tanks etc.

Joint sealants have to meet various requirements depending on the function and location of the respective joint.

The purpose of joint sealing generally is to:

- Prevent passage of media (air, water, chemicals, smoke etc.)
- Provide thermal and sound insulation
- Enhance the visual appearance of the whole construction

Why Elastic Sealing?

Building and civil engineering structures consist of individual elements which exhibit relative movements to each other. There are two kinds of such movements:

Thermal movements

Changes in temperature result in an expansion or contraction of the building elements, i.e. joints become larger (extension) or smaller (compression) continuously. Thermal movements are considerably in case of big elements or when different materials are used (e. g. brick wall and vinyl window frame).



Expansion of building elements



Contraction of building elements

Structural movements

These movements are caused by settlements of the structure, vibrations or other loads (wind etc.) and consequently deform the joint dimensions and hence may stress the sealing material significantly.

Structural movements often result in shear stress acting on the sealant.



Shear loads

Advantages of elastic joint sealants

In comparison to rigid materials (e.g. cement or mortar) high-performance elastic joint sealants by Sika are able to accommodate thermal and structural movements without breaking or losing the adhesion to the building elements. These sealants thus retain their original functionality throughout their whole life cycle and provide long-term tightness.



Joint Sealing Solutions by Sika

Sika provides a full range of elastic joint sealants and accessories for buildings and civil engineering structures with the following main advantages:

- Movement capability exactly matching the requirements for a specific joint to ensure long-term functionality
- Perfect adhesion to common construction materials to make sure that the joint remains tight at all times
- Ease of use to minimize installation errors and ensure on-time project completion
- Optimised visual appearance that meets the demands of architects and owners
- High mechanical strength, chemical resistance and weatherability to ensure excellent performance even under most adverse conditions and loads
- Unsurpassed and proven durability that guarantees longevity

With more than 60 years experience in sealants and sealant applications, references on all continents and in all climes Sika's product portfolio is designed to fit all requirements reaching from high movement capability to superior UV and chemical resistance.

In fact, Sika invented one-component elastic polyurethane sealants and the nowadays very popular and waste-reducing foil packaging for sealants.

The range of products comprises not only general purpose construction sealants but also virtually "tailor-made" solutions for specific applications such as joints in water and sewage treatment plants where maximum resistance to aggressive chemicals and micro-organisms is mandatory.

Specific **Sikaflex**[®], **Sikasil**[®], **Sikacryl**[®] and other brand sealants are designed for a great variety of applications including – but not limited to –

- Joints in pre-cast concrete facades
- Joints in glass and metal facades
- Joints in natural stone facades
- Joints in exterior insulation and finishing systems (EIFS) for wall claddings
- Floor joints
- Roof joints
- Interior finishing joints
- Wet-room joints (bathrooms, kitchens etc.)
- Joints in swimming pools
- Joints in containment bunds (petrol stations etc.)
- Joints in water and sewage treatment plants
- Joints in clean rooms (solar industry, semiconductor industry, pharmaceutical industry, etc.)

As market leader in construction chemicals Sika offers comprehensive and compatible solutions for all types of building and civil engineering structures (from "roof to basement") including high-performance sealants. This full range approach ensures reliable and long-lasting technical solutions for a long life expectancy of the building or structure.

Sika develops, produces and supplies many types of quality joint sealing materials globally and is recognised as the worldwide market and technology leader in elastic polyurethane (PU) sealants.

Sika provides sealing solutions based on the following technologies:

- **Sikaflex**[®] polyurethane (PU) for facade, floor and speciality joints
- **Sikaflex AT** PU-Hybrid (Sika advanced technology which combines PU and silane-terminated polymers, namely MS) for facade joints and speciality joints
- **Sikasil**[®] silicone for facade, highway, glazing and sanitary joints
- **Sikacryl**[®] acrylics for indoor joints, outdoor low movement joints and crack filling

Additionally, Sika offers ancillary products such as primers and cleaning agents to complement the sealants range.

With Sika's local support in more than 70 countries cost effective, reliable and customised solutions for every joint sealing requirement and standard are available.

Technical Quality, Services and Support

Sika offers solutions rather than single products. Individualised service and support are a key element to guarantee long-lasting joint sealing solutions that keep their function even under the most difficult and adverse conditions.

Sika's service and support comprises:

- Product selection based on specific requirements
- Advice regarding joint design and dimensioning
- Specification templates, method statements, project-specific technical documentation
- Adhesion, compatibility and performance tests
- Recommendations for joint details also in connection with compatible **Sikafloor**[®], **Sikaplan**[®] and **Sarnafil**[®] flooring and roofing systems as well as **Sikagard**[®] protective coatings
- Applicator training and on-site support
- Tailor-made guarantee concepts
- Project-specific colour matching
- Optimized supply chain with production locations as well as sales and technical support organizations in more than 70 countries on all continents



Key Application Advantages of Sika Sealing Solutions

Application properties of sealants are very important mainly for two reasons. Firstly, they have a direct impact on costs and compliance with project time lines because the application rate, extra labour and other factors mainly depend on the sealant properties. Secondly, the easier and the more hassle-free the application of a sealant the lower is the risk for errors during the installation which might lead to failures on the long run.

Excellent working properties have therefore always been a core element in the design of sealants within Sika. The combination of – sometimes opposed – application properties is the fine art of sealant development and requires a good knowledge of the on-site requirements and experience to translate these requirements into a final product. All Sika sealants are optimised for superior workability.



1. Low extrusion force

To ensure a sufficient speed of application mandatory to meet project completion dead lines and not to exceed cost limits a sealant must be easy to extrude – even at low temperatures. Sika's sealant range has been formulated specifically to meet exactly this goal.



2. Short cut-off string

A sealant should not leave long strings of material when stopping or interrupting the application and the gun is lifted off as this would potentially contaminate the surrounding area. Sika's portfolio of non-sag sealants is optimized to have a short cut-off string to avoid unnecessary extra labour and to prevent damages and discolouration of susceptible surfaces.



3. Perfectly matching rheology

Rheology is a term that describes the flow of matter. Depending on the application, a sealant must either be completely sag resistant or flow able to a certain degree. A so-called non-sag sealant designed, for example, for sealing vertical joints in a facade should not run down after gunning it into the joint whereas a floor joint applied horizontally can be self-levelling. Sika has designed the rheology of each sealant to meet the requirements for a particular type of joint to ensure an easy application in any case.



4. Easy to tool

Non-sag sealants usually have to be smoothed to yield a uniform and visually pleasing appearance of the final joint. Tooling properties of sealants are therefore of great importance. Sika has formulated its sealants to provide an optimal skinning time allowing enough time for tooling even under high temperature / high humidity conditions. Our products also provide enough resistance when pressing them into the joint ("body") which is very important especially in the case of wide joints. They also do not adhere to frequently used smoothing tools.



Sealing Solutions for Joints in Concrete Facades and for Metal Cladding



General Description & Main Requirements: Movement Joints

Joint dimensions and shapes in concrete and metal facades are subject to relatively large changes due to the thermal expansion and contraction of the building units. The corresponding movements must be accommodated by the sealant in order to protect the inner parts of the building against environmental influences. The large movements are either due to the size of the single building units (e. g. pre-cast concrete elements) or the high thermal expansion coefficient of the panels (e. g. metal sheets) and temperature variations. Additionally, structural movements can play a role as well.

The main requirements for a sealant in this application are:

- Low modulus even at low temperatures
- Excellent weatherability
- High colour stability and UV resistance
- Good adhesion to porous and non-porous substrates
- High tear resistance
- Paintability
- Resistance to cleaning procedures
- Defect-free curing

Sealing Solutions

Sikaflex® AT Facade

1-component polyurethane hybrid sealant

- 25% movement capability
- Low-modulus sealant
- Excellent primerless adhesion to porous and non-porous substrates
- Odourless and solvent free

Approvals & standards

- ISO 11600 F 25 LM
- SNJF facade 25 E
- DIN 18540 F
- ASTM C 920, class 25



Typical application example

- Sealing of joints between steel pillars and precast concrete elements in warehouse/factory constructions

Sikaflex® PRO-2 HP

1-component polyurethane sealant

- 25% movement capability
- Low-modulus sealant
- Excellent adhesion to concrete and many other building materials
- Cures completely bubble-free

Approvals & standards

- ISO 11600 F 25 LM
- SNJF facade 25 E



Typical application example

- Sealing of joints between precast concrete elements

Note: Ancillary Products for Substrate Preparation
For best long-term performance it is recommended to pre-treat the adhesion surfaces with the recommended **Sika® Primer, Sika® Cleaner or Sika® Aktivator**.
For more details please refer to page 26.



General Description & Main Requirements: Connection Joints

Connection joints are a particular kind of joints between inbuilt function elements such as doors and windows and the main construction elements of a facade (e. g. concrete slabs). The main challenge for a sealant in such an application is the combination of different materials (e. g. vinyl window frame and concrete) with different surface properties and thermal expansion coefficients.

The major requirements for a sealant in this application are:

- Broad adhesion range to porous and non-porous substrates
- Compatibility to various substrates including plastics, paints and coatings
- High colour stability and UV resistance
- Excellent weatherability
- Paintability

Sealing Solutions

Sikaflex® AT Connection

1-component polyurethane hybrid

- 25% movement capability
- Medium-modulus sealant
- Excellent adhesion to PVC, metals, coated metals, wood, concrete, bricks and many other construction materials
- Odourless and solvent free

Approvals & standards

- ISO 11600 F 25 HM
- SNJF facade 25 E
- ASTM C 920, class 25
- EC 1 (very low emissions)



Typical application example

- Sealing of joints between vinyl or powder-coated aluminium window frames and bricks or concrete slabs

Sikaflex® Construction

1-component polyurethane sealant

- 25% movement capability
- Medium-modulus sealant
- Excellent adhesion to concrete and many other building materials
- Cures completely bubble-free

Approvals & standards

- ISO 11600 F 25 HM
- SNJF facade 25 E



Typical application example

- Universal construction sealant for sealing of brick work, roller blind boxes and many other tasks

Note: Ancillary Products for Substrate Preparation
For best long-term performance it is recommended to pre-treat the adhesion surfaces with the recommended **Sika® Primer, Sika® Cleaner or Sika® Aktivator**.
For more details please refer to page 26.

Sealing Solutions for Glazing and Glass Facades



General Description & Main Requirements

The quality and optical appearance of a curtain wall and other glass structures are critically dependent on appropriate weather sealing. The corresponding joints are located either between different single glass elements or insulating glass units on one hand or between glass and a frame.

The individual elements are ultimately subject to extreme movements due to temperature changes, wind load and vibrations, which do affect the joints.

The main requirements for a sealant in this application are:

- High elasticity and flexibility
- Excellent adhesion to glass and metal
- Superior UV stability
- Outstanding weatherability
- Compatibility with insulating glass sealants and – at least in some cases – with structural glazing adhesives

Sealing Solutions

Sikasil® WS-605 S

1-component neutral-curing silicone sealant

- ±50% movement capability
- Low-modulus sealant
- Excellent primerless adhesion to glass and metals
- Non-streaking sealant
- Compatible with **Sikasil® SG, Sikasil® IG** and **SikaGlaze®** adhesives and sealants

Approvals/standards

- ISO 11600 F & G 25 LM
- SNJF facade & vitrage 25 E
- DIN 18540 F
- DIN 18545 E
- ASTM C 920 class 50
- ASTM C 1248



Typical application example

- Weather sealing of glass facades, specifically structurally glazed facades

Note: Ancillary Products for Substrate Preparation

For best long-term performance it is recommended to pre-treat the adhesion surfaces with the recommended **Sika® Primer, Sika® Cleaner or Sika® Aktivator**. For more details please refer to page 26.

Sikasil® WS-305 CN

1-component neutral-curing silicone sealant

- ±50% movement capability
- Low-modulus sealant
- Excellent primerless adhesion to glass and metals
- Compatible with **Sikasil® SG, Sikasil® IG** and **SikaGlaze®** adhesives and sealants

Approvals/standards

- ASTM C 920 class 50



Typical application example

- Weather sealing of glass facades, window sealing

Sikasil® C

1-component neutral-curing silicone sealant

- 25% movement capability
- Low-modulus sealant
- Excellent primerless to many building materials
- Resistant to fungi

Approvals & standards

- ISO 11600 F & G 25 LM
- DIN 18545 E
- SNJF facade & vitrage 25 E



Typical application example

- Weather sealing of greenhouses and conservatories, general glazing applications

Sealing Solutions for Natural Stone Facades



General Description & Main Requirements

Natural stones such as granite, marble and sandstone are highly sensitive materials when used on facades. Where an inappropriate sealant is used, there may be staining of the joint edges or streaking, which greatly impairs the optical appearance of the facade.

The main requirements for a sealant in this application are:

- Proven non-staining properties
- Good adhesion to porous substrates
- Superior UV stability
- Outstanding weatherability

Sealing Solutions

Sikasil® WS-355

1-component neutral-curing silicone sealant

- $\pm 50\%$ movement capability
- Low-modulus sealant
- Excellent adhesion to natural stone, concrete, bricks, glass and metals
- Non-staining

Approvals & standards

- ASTM C 920 class 50
- ASTM C 1248 (non-staining on white marble)



Typical application example

- Weather sealing of natural stone facades

Note: Ancillary Products for Substrate Preparation

For best long-term performance it is recommended to pre-treat the adhesion surfaces with the recommended **Sika® Primer, Sika® Cleaner or Sika® Aktivator.**

For more details please refer to page 26.

Sealing Solutions for Floor Joints



General Description & Main Requirements

Sealants used for floor joints are required to have:

- High mechanical strength
- High abrasion resistance
- Good chemical resistance
- Excellent adhesion properties

Depending on the area of application special requirements are important in addition.

The **manufacturing industry and the foodstuff industry** have a plurality of such demands. Generally, they need sealants which:

- Can withstand traffic loads from fork lifts and cleaning machines
- Are cleanable with high pressure
- Survive the contact with aggressive cleaning agents and other chemicals
- Are compatible with foodstuff

In **car parks** floor sealants must be able to:

- Resist traffic loads from cars and cleaning machines passing over
- Retain their properties in direct contact with oil and fuel
- Withstand weathering if used outside

In **pedestrian areas** such as train stations or shopping malls the floor sealant must:

- Have a sufficiently high Shore A hardness
- Exhibit a very high mechanical resistance to allow a surface flush finish without risk of damages
- Be resistant against cleaning fluids and high pressure cleaning

Sealing Solutions

Sikaflex® PRO-3

1-component polyurethane sealant

- 25% movement capability
- High tear and tear propagation resistance
- High stability against a great variety of chemicals
- Superior working properties
- Non-sag product
- Cures completely bubble-free

Approvals & standards

- ISO 11600 25 HM
- ISEGA approval for foodstuff compatibility
- CSM clean room suitable material



Typical application example

- Sealing of floor connection joints in automotive and semiconductor factories
- Sealing of floor joints in car parks

Note: Ancillary Products for Substrate Preparation

For best long-term performance it is recommended to pre-treat the adhesion surfaces with the recommended **Sika® Primer, Sika® Cleaner or Sika® Aktivator**. For more details please refer to page 26.



Sikaflex® PRO-3 SL

1-component polyurethane sealant

- 25% movement capability
- High tear and tear propagation resistance
- High stability against a great variety of chemicals
- Self levelling – no tooling required
- Cures completely bubble-free

Approvals & standards

- ISO 11600 25 HM
- EN 15651, part 4 25 HM
- ISEGA approval for foodstuff compatibility



Typical application example

- Sealing of horizontal floor joints in foodstuff factories

Sikaflex® Floor

1-component polyurethane sealant

- 12.5% movement capability
- High Shore A hardness
- High mechanical resistance and flexibility
- Non-sag product
- Cures completely bubble-free

Approvals & standards

- ISO 11600 12.5 E
- EN 15651, part 4 12.5 E



Typical application example

- Sealing of joints in shopping malls and factories

Note: Ancillary Products for Substrate Preparation

For best long-term performance it is recommended to pre-treat the adhesion surfaces with the recommended **Sika® Primer, Sika® Cleaner or Sika® Aktivator**.

For more details please refer to page 26.

Sealing Solutions for Roof Joints



General Description & Main Requirements

On every flat roof joint sealants are needed to seal different connection joints e. g. between flashings and the structure or to skylights and between laminated metal sheets.

The main requirements for a sealant in this application are:

- Excellent adhesion to porous and non-porous substrates
- Optimum compatibility with the roofing membranes and good adhesion to roofing membranes
- High UV & weathering resistance

Sealing Solutions

Sikaflex® AT Connection

1-component polyurethane hybrid sealant

- Excellent adhesion to porous and non porous substrates, e. g. PVC, metals, coated metals, wood, concrete, bricks etc.
- Proven compatibility with **SikaPlan®/Sarnafil®** PVC Membranes
- 25% movement capability
- Excellent UV resistance, colour stability and weatherability
- Paintability
- Odourless and solvent-free

Approvals & standards

- ISO 11600 F 25 HM
- ASTM C 920 class 50
- SNJF facade 25 E
- EC1 very low emission



Typical application example

- Roofing connection joints on roofs water-proofed by PVC membrane

Sikasil® N Plus

1-component neutral curing silicone sealant

- Excellent adhesion to FPO (**Sarnafil® T**) and a wide range of other substrates such as metals, coated metals, concrete, bricks etc.
- Proven compatibility with **Sarnafil® T** (FPO) membranes
- 25% movement capability
- Long term resistance against fungal decay
- Low odour
- Non corrosive

Approvals & standards

– DIN 18545-E



Typical application example

- Connection joints on roofs waterproofed with FPO membrane

Note: Ancillary Products for Substrate Preparation
For best long-term performance it is recommended to pre-treat the adhesion surfaces with the recommended **Sika® Primer, Sika® Cleaner or Sika® Aktivator**.
For more details please refer to page 26.

Sealing Solutions for Specialty Joints in Sewage Treatment Plants



General Description & Main Requirements

Sealants used in sewage treatment plants have to survive extremely severe conditions and meet high requirements:

- Durability and good adhesion performance despite permanent water immersion
- High mechanical strength to withstand strong water currents
- Resistance to wastewater treatment chemicals and microbiological attack

Sealing Solutions

Sikaflex® PRO-3

1-component polyurethane sealant

- 25% movement capability
- High tear and tear propagation resistance
- High stability against a great variety of chemicals and bacteria
- Durable und constant water immersion
- Superior working properties
- Non-sag product
- Cures completely bubble-free

Approvals & standards

- ISO 11600 25 HM
- Tested in accordance with the specification and principles of DIBT (German approval body for construction products and types of construction) for wastewater exposure



Typical application example

- Sealing of joints in sewage treatment plants

Sikaflex® TS Plus

1-component polyurethane sealant

- Resistant to domestic sewage, liquid manure and numerous chemicals including acids
- High tear resistance and flexibility
- High modulus elastic sealant
- Non-sagging

Approvals & standards

- Tested in accordance with the specification and principles of DIBT (German approval body for construction products and types of construction) for wastewater exposure
- Resistant against liquid manure
- Resistant against silage
- ISEGA Certificate for foodstuff
- Conforms to BS 6920 (drinking water contact)



Typical application example

- Sealing of steel containers out of enamelled or stainless steel which are built in sections out of concrete

Note: Ancillary Products for Substrate Preparation
For best long-term performance it is recommended to pre-treat the adhesion surfaces with the recommended **Sika® Primer, Sika® Cleaner or Sika® Aktivator**.
For more details please refer to page 26.

Sealing Solutions for Specialty Joints in Containment Bunds and Petrol Stations



General Description & Main Requirements

In areas for the storage, filling and handling of water polluting liquids, such as petrol stations, storage areas, containment bunds, barrel stores etc., proper joint sealants help to protect the environment, especially the ground water against contamination.

The main requirements for a joint sealant in containment bunds and gas stations are:

- Fuel and oil resistance
- High resistance against various chemicals
- High mechanical resistance
- Conformance to legal regulations and approvals

Sealing Solutions

Sikaflex® Tank N

1-component polyurethane sealant

- Good tear resistance and flexibility
- 25% movement capability
- Excellent application properties
- High resistance against various chemicals
- Bubble free curing
- Non-sag product

Approvals & standards

– European Technical Approval joint-sealing system in areas for the storage, filling and handling of water polluting liquids (ETA-09/0272)



Typical application example

- Sealing of containment bunds in a storage area of a chemical plant
- Sealing of pavement in gas stations

Note: Ancillary Products for Substrate Preparation

For best long-term performance it is recommended to pre-treat the adhesion surfaces with the recommended **Sika® Primer, Sika® Cleaner or Sika® Aktivator**. For more details please refer to page 26.

Sealing Solutions for Specialty Joints in Airport Runways



General Description & Main Requirements

Airport runway sealants are applied between concrete slabs to seal out moisture and debris from joints on airport runways and taxiways.

The most important requirements for an airport sealant are:

- All-temperature adhesion & flexibility
- Resistance to heavy equipment traffic from airplanes, maintenance vehicles and trucks
- Resistance to aggressive chemicals

Sealing Solutions

Sikaflex®-68 TF

2-component polyurethane sealant

- Good tear resistance and flexibility
- Oil and fuel resistance
- Jet fuel resistance
- Self levelling

Approvals & standards

– US Federal Specification SS-S-200E



Typical application example

- Pavement sealing on airport-taxiways and aprons

Note: Ancillary Products for Substrate Preparation

For best long-term performance it is recommended to pre-treat the adhesion surfaces with the recommended **Sika® Primer, Sika® Cleaner or Sika® Aktivator.**

For more details please refer to page 26.

Sealing Solutions for Specialty Joints in Silos and Tanks



General Description & Main Requirements

A special application field of sealants is the gasket sealing in silos and tanks which are of various uses, e. g. digesters for biogas, water tanks and tanks for industrial or domestic wastewater. These silos and tanks are mostly built out of enamelled, stainless or galvanised steel plates which are bolted together and where the overlapping area in between is sealed with an elastic sealant. Also in case of concrete tanks and silos elastic gunnable sealants are used to seal the movement and connection joints tight against the liquid they contain. Depending on the filling goods and storage temperatures the sealant must meet extremely high demands.

The main requirements for joint sealants in such tank and silo applications are:

- High acid resistance especially against organic acids
- Resistance against liquid manure
- Resistance against silage liquid
- Wastewater resistance

Sealing Solutions

Sikaflex® TS Plus

1-component polyurethane sealant

- Resistant to domestic sewage, liquid manure and numerous chemicals including acids
- High tear resistance and flexibility
- High modulus elastic sealant
- Non-sagging

Approvals & standards

- Testing in accordance with the specification and principles of DIBT (German approval body for construction products and types of construction) for wastewater exposure
- Resistance against liquid manure
- Resistance against silage
- ISEGA certificate for foodstuff
- Conforms to BS 6920 (drinking water contact)



Typical application example

- Sealing of containers out of enamelled or stainless steel which are built in sections
- Sealing of concrete silos and tanks

Note: Ancillary Products for Substrate Preparation
For best long-term performance it is recommended to pre-treat the adhesion surfaces with the recommended **Sika® Primer, Sika® Cleaner or Sika® Aktivator**.
For more details please refer to page 26.

Sealing Solutions for Specialty Joints in Drinking Water Reservoirs



General Description & Main Requirements

For joints in contact with potable (drinking) water e. g. drinking water reservoirs, tanks, treatment and filtration plants, sealants must not have negative influence on the water quality.

The main requirements for a joint sealant in drinking water reservoirs are:

- Approvals according to the local regulations for use in drinking water facilities
- Resistance to disinfection agents like chlorine
- No toxic ingredients
- Not metabolisable
- Good adhesion to a great variety of substrates

Sealing Solutions

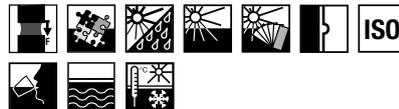
Sikasil® DW

1-component acetoxy curing silicone sealant

- Specialized for joints in contact with potable (drinking) water
- High tear resistance and flexibility
- Good chemical resistance, e. g. to diluted acids

Approvals & standards

- Meets all requirements of the German Federal drinking water approval DVGW W270 and Conforms to the KTW recommendations of the German Federal Board of Health



Typical application example

- Sealing of joints in contact with potable (drinking) water
- For drinking water reservoirs where approvals according to british regulations are required **Sikaflex® PRO-3** or **Sikaflex® TS Plus** may also be used

Note: Ancillary Products for Substrate Preparation

For best long-term performance it is recommended to pre-treat the adhesion surfaces with the recommended **Sika® Primer, Sika® Cleaner or Sika® Aktivator**.

For more details please refer to page 26.

Sealing Solutions for Specialty Joints in Fire Rated Areas



General Description & Main Requirements: Smoke & Fire Protection

Fire barriers in airports, schools, industrial warehouses and many other buildings need to be completely sealed with fire-rated sealants to prevent spreading of fire and smoke from one section to the other and to keep the temperature in the fire averted zone low.

The main requirements for a sealant used in such fire barriers are to:

- Meet the local standards
- Exhibit a high ignition resistance and low flame spreading characteristics
- Prevent smoke from passing through
- Maintain its sealing function for as long as possible when exposed to fire

Sealing Solutions

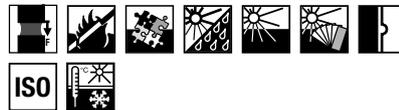
Sika® Firesil N

1-component neutral-curing silicone sealant

- Fire-rated sealant for interior and exterior use
- 25% movement capability
- Superior UV and weathering resistance
- Primerless adhesion to a wide range of typical construction substrates
- Low odour
- Non-corrosive

Approvals & standards

- BS 476-20
- DIN 4102 B1
- ISO 11600 25 LM
- ASTM C 920, class 25



Typical application example

- Sealing of connection joints in and around fire compartments, cable ducts etc.

Sika® FireStop

1-component polymerized silicate sealant

- Intumescent – outstanding resistance to fire
- Inorganic product – does neither ignite nor give off fumes when exposed to fire
- Temperature resistant up to +1000 °C
- Starts expanding at temperatures above +250 °C
- Excellent adhesion to commonly used construction materials
- Can be covered with **Sika® Firesil N**

Approvals & standards

- BS 476-4 (non-combustibility test)



Typical application example

- Sealing of non-moving joints in fire compartments such as fire doors, chimneys etc.

Note: Ancillary Products for Substrate Preparation
For best long-term performance it is recommended to pre-treat the adhesion surfaces with the recommended **Sika® Primer, Sika® Cleaner or Sika® Aktivator**.
For more details please refer to page 26.

Sealing Solutions for Interior Finishing



General Description & Main Requirements

Practically any apartment, office, industrial or other building has interior gaps or connection joints that need to be sealed. Due to the lower temperature variations or smaller differences in the thermal expansion coefficients these interior joints are not exposed to high movements of the adjacent building materials.

The main requirements for an interior finishing sealant are

- Paintability and compatibility with paints
- Good adhesion
- Good application properties

Sealing Solutions

Sikacryl® HM

1-component acrylic dispersion sealant

- Excellent adhesion to concrete, bricks, wood and other construction materials
- Easy to sand
- Paintability
- Fast drying
- Low odour



Typical application example

- Filling gaps and cracks that need to be grinded and painted over after a short period of time

Sikacryl® S

1-component acrylic dispersion sealant

- 10% movement capability
- Excellent adhesion to concrete, bricks, wood and other construction materials
- Over paintable
- Good application properties
- Durable sealant



Typical application example

- Sealing of connection joints with lower movements

Note: Ancillary Products for Substrate Preparation
For best long-term performance it is recommended to pre-treat the adhesion surfaces with the recommended **Sika® Primer, Sika® Cleaner or Sika® Aktivator**.
For more details please refer to page 26.

Sealing Solutions for Joints in Wet Rooms



General Description & Main Requirements

In wet rooms such as bathrooms and lavatories joints are exposed to cold and hot water as well as high humidity. Cleaning products, shower gels, soaps and other organic matter in combination with aforementioned high humidity provide ideal conditions for the growth of fungi and mildew on the sealant.

The main requirements for a wet room sealant are

- To prevent mould growth
- To withstand a particularly high humidity
- To have good long-term adhesion under these environmental conditions

Sealing Solutions

Sanisil®

1-component acetoxy-curing silicone sealant

- 25% movement capability
- Long-term fungus and mildew resistance
- Remains flexible in high humidity environments
- Adheres well without primer to typical substrates such as tiles and enamelled surfaces
- Solvent-free – low shrinkage
- High elasticity



Typical application example

- Sealing of joints between wall tile and floor tile or joint around bath tube

Sikasil® C

1-component neutral-curing silicone sealant

- 25% movement capability
- Long-term fungus and mildew resistance
- Adheres well without primer to typical substrates such as tiles, enamelled surfaces, metals and plastics
- Low odour



Typical application example

- Sealing of connection joint between shower cubicle and tiled wall

Note: Ancillary Products for Substrate Preparation

For best long-term performance it is recommended to pre-treat the adhesion surfaces with the recommended **Sika® Primer, Sika® Cleaner or Sika® Aktivator**. For more details please refer to page 26.

Solutions for Joint Renewal and Repair



General Description

Reasons for joint repair

A careful visual inspection is usually enough to determine if the joint sealing is improper or worn out and a replacement is needed.

Reasons for joint refurbishment may include but are not limited to the following:

- Failures in workmanship
- Use of unsuitable type of sealant
- Wrong joint design
- Underestimated load
- Sealant reached end of its life cycle
- Compatibility issues with adjacent materials (e. g. gaskets)
- Exposure to aggressive chemicals
- Insufficient surface preparation (loss of adhesion)

Sealing Solutions

Renovation in case of insufficient pre-treatment or a sealant at the end of its normal life cycle

An old sealant needs to be renovated at the end of a normal life cycle or because of maintenance or quality insufficiency reasons. Usually such joint renovation is done with gunnable sealants.

Renovation with gunnable sealant



Check first the reason why the old sealant failed and the compatibility of the old sealant with the sealant intended to be used as replacement. If in doubt contact your Sika representative. If the old sealant is based on polyurethane, silane-terminated polymers (hybrids, MS, etc.) or polysulfide it can be replaced with a suitable **Sikaflex**® sealant.

Typical tools needed for the renovation with gunnable sealants are shown on the photograph below:



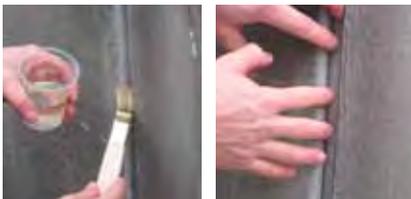
To start renovating the joint pick or cut out the old or damaged sealant using, for example, an oscillating knife or similar tools. For cutting a variety of professional tools is available (one example is depicted in the left-side photograph below). In areas with adhesion loss, mechanical cleaning of the bonding area is not only very important but mandatory.



When using a polyurethane sealant for joint renewal remains of old polyurethane, silane-terminated polymer based sealants or polysulfide can be left in the joint in a layer thickness of 0.2 – 0.5 mm. In order to ensure long-



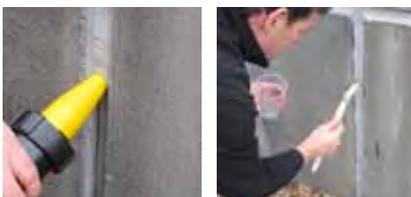
term durability and tightness of the newly sealed joint both the substrate surfaces as well as the old sealant remains should be pre-treated using the primer recommended by Sika. If the originally used joint sealant is a silicone it must be repaired with a suitable **Sikasil®** silicone sealant.



Apply the new sealant and ensure proper filling of the joint without gaps.

Tool the sealant before it starts forming a skin at the surface.

Is the reason for sealant replacement some kind of incompatibility with the substrate or any adjacent material, either the incompatible material has to be replaced or a sealant that is not affected negatively must be used, of course.



Renovation in case of wrong joint dimensioning

In this case it will not be useful to renew the sealant with similar dimensions as the original joint or a sealant with similar mechanical properties again, because the damage is likely to re-occur. If the joint dimensions cannot be changed or sealants with a movement capability high enough to accommodate all loads are unavailable, the only way to re-seal such joints is with rubber profiles (stripes) or tapes.

Renovation with joint tapes

Preformed elastic joint tapes are available in various dimensions to suit different joint sizes. One of the major advantages of such tapes is the fact that they can be used regardless of the reason the joint has to be refurbished or the kind of sealant previously used. The method is convenient and almost universally suitable.

Sikaflex® Stripe FB-90

The **Sikaflex® Stripe FB-90** joint tape system is ideally suited for repair work especially when the building's facade is supposed to be re-coated:

- Repairs failed joints without having to cut out existing sealant or bond to incompatible joint side-wall remains
- Easy and fast applicable
- High UV resistance

Surface Pre-Treatment Products for Sealants



General Description & Main Requirements

Many Sika sealants exhibit excellent adhesion to a great variety of substrates. In order to build up sufficient adhesion the substrate surface must be clean, dry and free from any grease, oil, dust, release agents and any other substances that potentially could have a negative influence on the adhesion. Sika's cleaners and activators are products that help to achieve such an ideal surface for perfect adhesion results. Primers enhance the adhesion on difficult to adhere substrates such as certain plastics and significantly improve the long-term adhesion especially under severe conditions.

Pre-Treatment Solutions

Sika® Aktivator-205

is a 1-component alcohol-based cleaner containing adhesion promoters. The product is used to activate non-porous substrates such as metals, plastics, glazed ceramics and various painted surfaces.

Sika® Primer-3 N

is a 1-component epoxy based primer that improves the long-term adhesion of sealants on porous, absorbent materials such as concrete, but also on metals.

Sika® Primer-215

is a 1-component polyurethane based primer that improves long-term sealant adhesion to plastics, varnishes lacquers and even porous materials. A typical application where **Sika® Primer-215** would be used for substrate pre-treatment is perimeter sealing between vinyl or powder-coated aluminium window frames and brickwork.



On-site Application of Sealants

Application Steps

To create visually appealing and durable joints, you have to consider several points. Below is a description for the procedure valid for porous substrates such as precast concrete. In the case of non-porous substrates the surface preparation is usually different (please refer to Sika's pre-treatment chart for further details) but the other steps are identical.

1. Prepare the substrate:

Grind the substrate with a wire brush or other equipment, and clean the dust and friable particles away.



2. Insert a fitting backer rod to the required depth. The width of the backing rods should be 20–30% larger than the joint width. If using a closed cell polyethylene backer rod pay attention when inserting the rod so that it is not damaged by a sharp tool like a screwdriver. It is generally better to use a blunt tool.



3. Apply primer to the bonding area. Use a masking tape if you need sharp and exact joint lines.



4. Fill the joint avoiding air entrapment. Remove any material excess.



5. Press the sealant against the joint flanks to ensure good adhesion and smooth the joint with smoothing liquid for a perfect sealant surface.



Remark:

when using masking tape, remove it before skin formation of the sealant.

Construction Sealant Standards

Sealants amount to approximately 1% of the construction cost of a typical large building project. However, when a building develops water leaks, these products can become 90% of the problem, with remediation and damage correction costing many times the installation cost.

Industry-wide sealant standards, standard specifications and guidelines play a significant role in helping reduce the occurrence of above mentioned leakage problems and are also useful as tools to educate the designer, user, and installer.

There are a great number of international, regional and local standards covering construction sealants. A selection of important standards is described in more detail below.

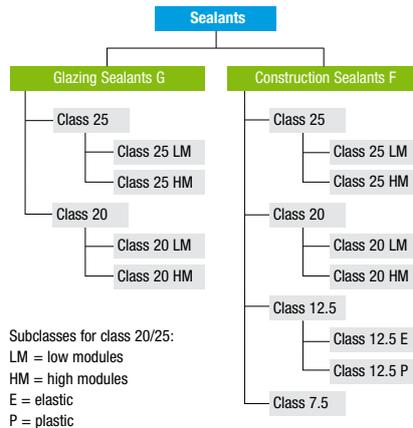
ISO 11600

This standard, issued by the International Organisation of Standardisation, specifies the types and classes of sealants used in building construction according to their applications and performance characteristics. It also describes the requirements and respective test methods for the different classes.

According to their applications sealants are divided into two different types:

- **Type G:** glazing sealants for use in glazing joints
- **Type F:** construction sealants for use in building joints other than glazing.

Another classification criterion according to ISO 11600 is the so called movement capability which is also an important value to be taken into account when calculation joint dimensions. Glazing sealants (Type G) are split up into two classes – class 20 (20% movement capability) and class 25 (25% movement capability). Construction sealants (Type F) are divided into to 4 different classes (classes 7.5, 12.5, 20 and 25). Additionally, depending on their secant tensile modulus – a value indicating the elasticity of a sealant – the sealants are divided into sub-groups such as “high modulus” and “low modulus” (= low stress at the sealant/substrate interface even at low temperatures). Depending on the actual application one kind of sealant or another can be preferred. The following scheme shows an overview of the sealant classification according to ISO 11600 based on actual tests of the specific product:



Subclasses for class 20/25:
 LM = low modulus
 HM = high modulus
 E = elastic
 P = plastic

As all ISO standards ISO 11600 can be used world-wide but is mainly used in specifications etc. in Europe and the Middle East.

EN 15651

EN 15651 is based on similar test methods as described in ISO 11600. This European standard specifies definitions and requirements for sealants for non-structural use in joints in buildings and pedestrian walkways and is the basis for CE marking of sealants within the European Union.

There are 5 parts of the standard covering different sealant uses and the CE marking:

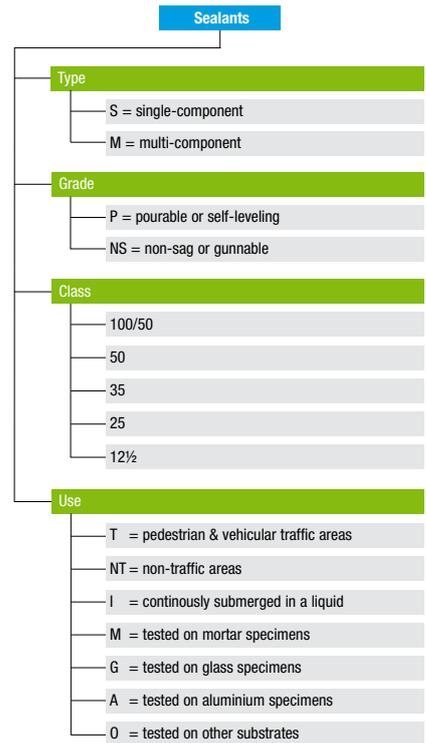
- Part 1: Sealants for facade elements;
- Part 2: Sealants for glazing;
- Part 3: Sealants for sanitary joints;
- Part 4: Sealants for pedestrian walkways;
- Part 5: Evaluation of conformity and marking.

ASTM C 920

ASTM C 920 is one of the most recognized national sealant standard specifications issued by ASTM International, formerly known as the American Society for Testing and Materials. This standard is not only referred to when writing specifications in the United States but also widely in Canada, Latin America, Asia, the Middle East and other countries or regions, respectively.

ASTM C 920 covers the properties of cured single- or multi-component cold-applied elastomeric joint sealants for sealing, caulking, or glazing operations on buildings, plazas, and decks for vehicular or pedestrian use, and types of construction other than highway and airfield pavements and bridges. A sealant qualifying under this specification is classified as to the type, grade, class, and use. The class

is defined after testing the sealants’ cohesion and adhesion under cyclic movement according to the so-called “Hockman Cycle” (ASTM C 719). A class 100/50 sealant, for example, is able to withstand an increase of at least 100% and a decrease of at least 50% of its original dimensions under the test conditions.



JIS A 5758 and Other Important Standards

Japanese JIS standard A 5758 for sealing and glazing in buildings is based upon the principles of ISO 11600 and provides a classification of sealants according to their movement capability and modulus. Contrary to ISO 11600 the JIS standard defines an additional class “30S” (S indicates shearing) for glazing sealants.

There is a great variety of other regional and local standards focused on construction sealants. German DIN standard 18540, for example, deals with sealing of exterior wall joints in buildings and is valid for joints in brickwork, concrete and natural stone. Key elements of DIN 18540 are the adhesion/cohesion behaviour of sealants and the conduction of external controls to ensure a consistent quality. The standard also describes in detail how to dimension joints correctly and provides guidelines for sealant application.



Joint Design Principles

General Design Considerations

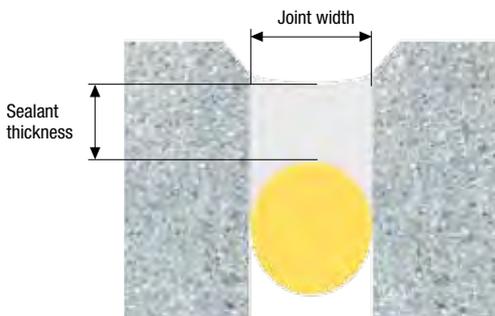
The design of a sealing system involves more than just the selection of a sealant with suitable physical and chemical characteristics. In order to obtain a long-term optimal performance the following considerations are essential as well:

- Proper joint design, including correct dimensioning and backup
- Type and nature of substrates
- Application process and ambient conditions at the time of the installation

Movement capability of the sealant and joint width must fit to the expected movement of the adjacent building elements. To illustrate this context a calculation example is given below.

In general

- The joint edges must run parallel to a depth of twice the joint width, but at least 30 mm. This gives the backing material sufficient grip.
- For most sealants, the joint width must be at least 4 times the expected joint movement, which results from 25% movement capability.
- The optimal ratio of joint width to depth (sealant thickness) is 2:1 for facade joints and 1:1 for floor joints (see also tables below).



Accordingly, the recommended joint dimensions for concrete elements and a sealant with 25% movement capability are as follows:

Facade Joints

Joint distance (m)	2	4	6	8	10
Minimum joint width (mm)	15	20	25	30	35
Sealant thickness (mm)	8	10	12	15	15

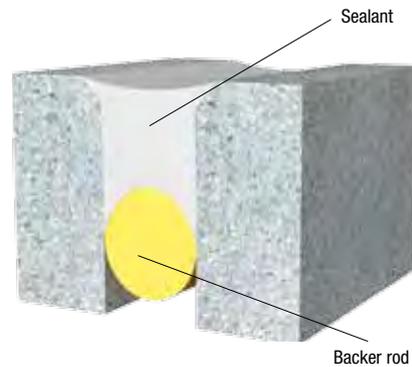
Interior Floor Joints

Joint distance (m)	2	3	4	5	6	8
Minimum joint width (mm)	12	12	12	12	12	12
Sealant thickness (mm)	12	12	12	12	12	12

Exterior Floor Joints

Joint distance (m)	2	3	4	5	6	8
Minimum joint width (mm)	12	12	15	18	20	30
Sealant thickness (mm)	12	12	12-15	15	17	25

Low stress at the sealant/substrate interface even at low temperatures joints that are too deep may either cause severe stresses or take very long to cure and should be avoided. The joint depth (sealant thickness) can be limited by using suitable backing rods made of closed-cell polyethylene or open-cell polyurethane foam. The latter are easier to compress and to install, but may take up water and moisture which eventually will have a negative influence on the long-term performance of the sealant. Therefore, especially for floor joints polyethylene (PE) foam backer rods are preferable. When installing such backing materials made out of closed-cell PE care must be taken not to damage the rod, because gas released from the foam may lead to bubble formation within the sealant.

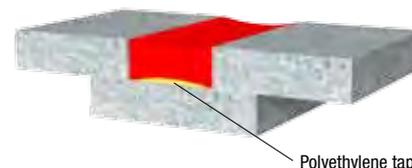


In many cases a compressible backup material – which must be constantly under compression even at maximum joint volume – is also used to prevent adhesion to 3 sides.

The sealant must be capable of extending and contracting along with the building elements to which it is joined. If adhesion to 3 flanks is not avoided, this free movement is not possible leading eventually to adhesive and/or cohesive failure as illustrated in the drawing below:



To prevent 3-sided adhesion a release agent or polyethylene tape can be used as shown here:



Floor Joint Design

Depending on the loads and location special design considerations for floor joints are necessary. Joints in areas with a lot of car and/or equipment traffic should be recessed to reduce wear and tear. On the other hand, joints in pedestrian areas should be flush with the surface to prevent injury of people.

High traffic joints



Pedestrian area joints



Project-Driven Performance Requirements

Joint sealants must fulfil stringent prerequisites specific for each application and project. In order to meet these requirements Sika has designed sealants which address several of below mentioned criteria and combined them in dedicated products ideally fit for their respective purpose.



Excellent Adhesion

Adhesion to commonly used construction substrates such as concrete is a prerequisite for a sealant to maintain its functionality over time. High-performance sealants have the advantage that they bond well also to difficult-to-adhere substrates such as certain powder-coated aluminium profiles and keep their grip even under the most contrarious conditions. For sealing glass units UV-resistant adhesion is mandatory.



Fire and Smoke Resistance

Sealants are often part of constructions used to prevent spreading of fire and smoke from one room to the other, from one floor to the other or even to another building. They must thus be able to withstand fire for at least a certain period of time without failing. The exact requirements are usually defined in local regulations and standards which the sealant has to meet.



Compatibility

Sealants must be designed specifically for compatibility with adjacent materials such as gaskets, backing rods, coatings and paints, other sealants and adhesives, roofing membranes, floor coverings etc. Only a confirmed system compatibility ensures a long term functionality of all building materials.



Weathering Resistance

Outdoor joints are the first barrier against environmental influences such as sunlight, rain, temperature variations etc. Superior Weatherability is thus one of the major requirements for a sealant.



Tear Resistance and Flexibility

Joint sealants especially in floor joints are exposed to various mechanical loads which may lead to damages. In order to ensure the tightness sealants with high tear and tear propagation resistance are clearly advantageous.



Traffic and Mechanical Wear

Especially for floor joints mechanical and abrasion resistance is mandatory to resist stress caused by traffic, pedestrians and cleaning equipment.



Chemical Resistance

Resistance to chemical attack is a general requirement for basically all sealants (acid rain, cleaning agents). For specific applications such as joints in containment bunds (water polluting liquids, solvents, fuels) or swimming pools (chlorine containing substances) the demands are even higher.



UV-Resistance

Especially facade and roof joints are exposed to direct sunlight. Due to UV radiation sealants age faster and may develop cracks on the surface. Sealants with good UV stability on the other hand will not change significantly when exposed to sunlight.



Colour Stability

Especially light-coloured sealants may discolour and become yellow when exposed to sunlight (UV radiation). In order to maintain its original visual appearance colour stability is an important property of a sealant and something that is expected by building owners and architects.



Bubble-free and Deep-section Curing

Sealants which form bubbles during cure or do not harden uniformly throughout the whole joint have a significantly reduced mechanical performance, i.e. lower elongation and tear resistance. Bubble-free curing largely independent from environmental conditions is therefore of great importance.



Non-staining Properties

Most elastic sealants contain plasticizers which can migrate into adjacent substrates leading to discolouration of the areas next to the joint. Especially natural stone such as marble is prone to this effect called staining. For projects where natural stone is used non-staining sealants with plasticizers having no or a very low tendency to migrate are mandatory.



ISO Accreditation

Besides specific regulations for particular applications high-quality sealants commonly have to meet international ISO and EN as well as local ASTM, DIN, JIS or other standards to be accepted by building authorities or specifiers. Important sealant standards are ISO 11600, EN 15464, ASTM C 920, DIN 18540 and 18545 as well as JIS A 5758.



Low Odour and Low VOC

Especially for indoor applications sealants should not release strong and unpleasant odours. VOC (volatile organic compound) emissions should also be as low as possible to minimise health risks.



Resistance to Water Diffusion

Diffusion resistant sealants are required in cases where the penetration of water through a joint must be prevented.

Especially in the case of window connection joints it's necessary to have inside and outside a certain level of water vapour diffusion resistance of the sealing system to avoid water condensation within insulation material



Potable Water Suitability

Sealants used in drinking water reservoirs or other potable water bearing areas are strictly regulated as to not contaminate the water. Local approvals by authorities are required and only certified sealants can be applied.



Resistance to Fungi

Sealants used in wet rooms such as kitchens and bathrooms must be able to resist fungi growth in order to maintain their visual appearance and not develop a health risk for people. Such products therefore must be equipped with fungicides.



Resistance to Microorganisms

Joint sealants in sewage plants but also regular construction joint sealants in tropical zones are attacked by bacteria and other kinds of microorganisms. Sealants must therefore be designed to withstand these attacks without being destroyed.



Food Contact Suitability

Sealants for joints in the food and beverage industry must neither exhibit any risk for human health nor adversely affect foodstuff or beverages.

Usually, foodstuff compatibility must be externally certified.



Multiple Colour Shades

Sealants often have an optical function and enhance the visual appearance of a construction and help to underline the intensions of the architect. This requires in many cases sealants in particular colours or a sealant manufacturer able to do colour matching.



Clean Room Suitability

Sealants used in production plants of the pharmaceutical, semiconductor, solar and other industries working under clean room conditions are required to have very low particle emissions in order not to adversely affect the processes and quality.



Paintability

Although elastic sealants are significantly more flexible than paints they are often painted over. Sealants must therefore in many cases be compatible with the used paints, i.e. cure fully even when painted over and do not adversely affect the drying or visual appearance of the paint.



Resistance to Water Pressure

Water flow and water pressure in drinking water reservoirs, sewage plants, swimming pools and similar structures can wear a joint sealant severely. To withstand these forces special products with high mechanical resistance and excellent adhesion even if constantly immersed in water are mandatory.



Large Service Temperature Range

Since sealants are used outside in all climates they must perform their basic functions under the most severe temperature conditions for extended periods of time. Only sealants with a large service temperature range are suitable to withstand temperature extremes.



Cleaning and Maintenance

Facades, floors and other areas where joint sealants are used are frequently cleaned. Sealants used in such zones exposed to intense cleaning regimes and aggressive cleaning agents must therefore be able to withstand chemical attacks as well as mechanical stress caused by the used equipment.

Sika Full Range Solutions for Construction

Concrete Production



Sika® ViscoCrete®
Sika® Retarder®
Sika® SikaAer®

Waterproofing



Sikaplan®, Sikalastic®
Sika® & Tricosal® Waterstops
Sika® Injection Systems

Flooring



Sikafloor®
SikaBond®

Corrosion and Fire Protection



SikaCor®
Sika® Unitherm®

Concrete Repair and Protection



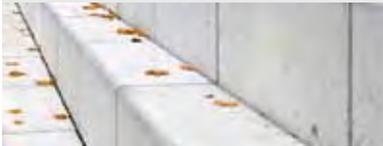
Sika® MonoTop®
Sikagard®
Sikadur®

Structural Strengthening



Sika® CarboDur®
SikaWrap®
Sikadur®

Joint Sealing



Sikaflex®
Sikasil®

Grouting



Sikadur®
SikaGrout®

Roofing



Sarnafil®
Sikaplan®
SikaRoof® MTC®

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