

Industry



**Sika System Solutions –
The Way to Success
Technology Guide**

Sika®

Sika Core Competencies

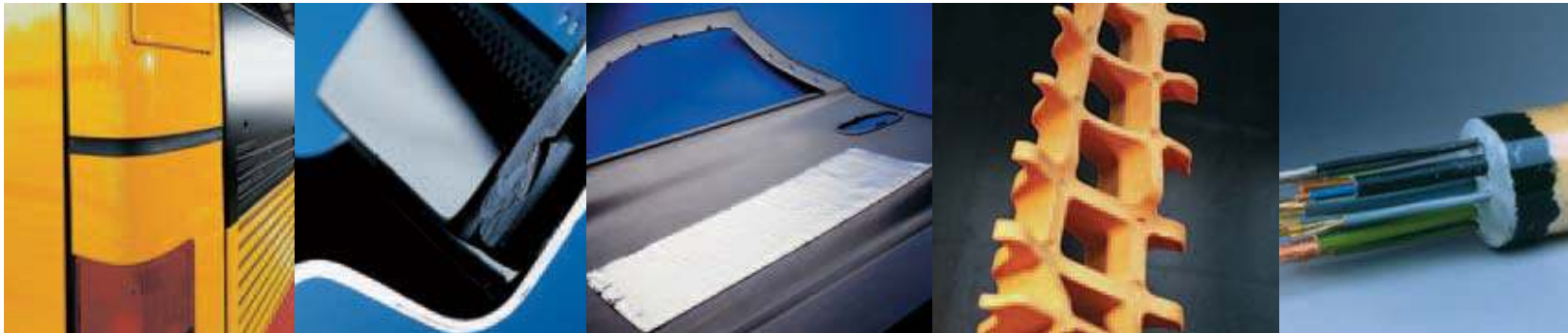
Sealing
 minimises the flow of dust, gases, liquids, heat and cold between cavities and interstices. This raises interior functionality and comfort.

Bonding
 connects different materials permanently and powerfully. This allows production cycles to be shortened while giving greater freedom to the designer and extending the service life of the end product.

Damping
 reduces oscillations of all wavelengths in fixed and moveable objects. This dampens the sounds and noises emitted by load-bearing structures and cavities.

Reinforcing
 boosts the strength of load-bearing structures exposed to both static and dynamic forces. It increases structural stability and thus makes an important contribution to safety.

Protecting
 increases the durability of load-bearing structures and preserves the substance of fixed and moveable objects, whether new, renovated or repaired.



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Sika System Solutions – The Way to Success

Sika's contact with the customer does not end with the sale of a product. In fact this is where the partnership really begins. Sika's primary aim is to provide total solutions that help the customer to generate added value on a long-term basis and stay one step ahead of the competition at all times. Underlying this mission statement is the belief that long-term success comes not just from high-quality products, but from the development of total integrated solutions.

The Sika System Solutions
All our activities are focused on the needs of the customer. To meet those needs we have put together the Sika package for integrated System Solutions, which consists of three elements:

The Technologies form the platform for advanced, high-performance products. Sika has developed a comprehensive range of process materials delivering complete system solutions for industry in its core competencies of technological expertise: sealing, bonding, damping, reinforcing and protecting.

The Services link together our different areas of activity and bridge the gap between research and development (R&D) and the market. They include worldwide R&D Technology Centres, System Engineering and Technical Services as well as our Acoustic Co-Engineering and Co-Design services, which provide technical support for the car industry with CAD/FEM facilities and a dedicated acoustic test centre.

The People, finally, our team of experienced and highly trained Sika professionals who are on the ground in more than 60 countries around the world to assist customers in developing and implementing solutions.

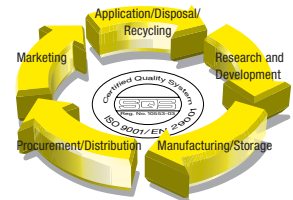


Trained and experienced technicians from Sika provide on-the-spot advice and support for our customers worldwide.

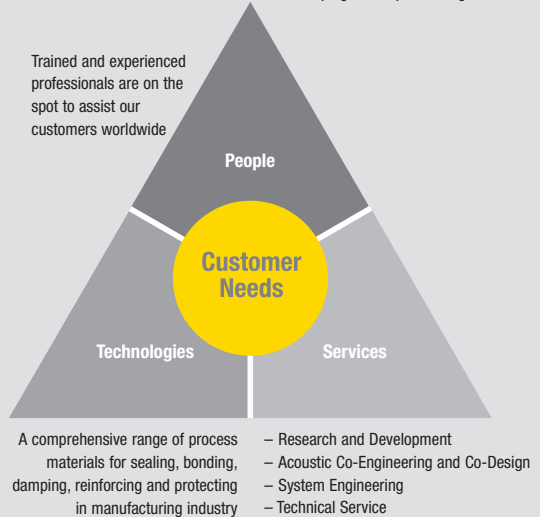
About the Company

Sika
Founded in 1910, Sika remains an independent company of Swiss origin. With local Sika companies now established in more than 60 countries, we have evolved into a truly global network. Sika is active in the field of specialist chemicals, which are marketed at clearly defined target groups by our strategic business units Construction and Industry. These two business units are segmented into a number of distinct Market Fields (p.6/7). The defining characteristics of the corporate culture are tradition with innovation, and the will to reach out constantly into new areas and to excel at all we do. That includes developing advanced technologies that are always opening up new horizons for our industrial customers. Even after nearly 100 years of trading Sika remains a force for innovation and an acknowledged technological pioneer.

Committed to Quality
A deep-seated culture of quality and service is an integral part of Sika's corporate ethos. "Quality first" is the standard by which every production process, every workplace and every member of staff is measured. The Sika management system conforms to international standards ISO 9001, ISO 14001 and QS 9000. For our customers this means top-quality products, first-class service and professional support for the implementation of system solutions.



Ecology as an Opportunity
Sika sees no contradiction between ecological and economic demands. People and the environment have been the focus of our activities since the day the company was founded. A concern for the environment and safety are an integral component of every management task and every staff action throughout the value chain. Our commitment to these goals is signalled by our participation in the worldwide "Responsible Care" program initiated by the chemical industry and by our compliance with ISO 14001. In order to satisfy the three basic requirements of sustainable development – which may be summed up as "profit, people, planet" – Sika has extended the scope of its corporate mission statement to embrace ethical concerns: "Our conduct vis-à-vis customers, suppliers, competitors, authorities and the public is governed by high ethical standards."



Sika Industry: Market Fields

Automotive OEM

In the Market Field Automotive OEM (Original Equipment Manufacturer) Sika has developed a comprehensive range of high-grade products and services for soundproofing, structural reinforcement, bonding and sealing. Sika's global network and a customer-focused system of key account management enable us not only to supply all the major car markets but also to support customers worldwide in transplants and CKD systems. Sika engineers in Co-Engineering and Co-Design use CAD/FEM technology to perfect acoustic and structural reinforcement solutions, working closely with the customer from the initial development phase to the start of series production. Their colleagues in System Engineering and Technical Service are likewise dedicated to supplying state-of-the-art solutions. This full-service package helps the customer to achieve his aim of producing high-quality automobiles at minimum cost.

Automotive Aftermarket

The Market Field Automotive Aftermarket covers all the products and services supplied to our customers and dealers in the AGR (After Glass Repair) and CBR (Crash Body Repair) sectors. Sika specialises in innovative, customer-oriented solutions based on products that meet or even exceed the car manufacturer's original specification. Sika's AGR and CBR adhesives and sealants are characterised by outstanding working characteristics and mechanical strengths, ensuring that repaired vehicles are as good and as safe as the day they were built. The extensive AGR product range includes normal-modulus to high-modulus adhesives offering guaranteed protection against contact corrosion to high-quality radio reception in vehicles with integral (window-mounted) aerials. With short fitting times and Safe Fast Drive-Away Times, they save installers time and money. Sika's AGR and CBR adhesives and sealants are marketed under the AutomotiveLine® brand name, and have been used with success by the automobile industry for a number of years now.

Transportation

In the Market Field Transportation Sika supplies high-quality solutions for bonding, sealing and damping to manufacturers of buses, trucks, rail vehicles and special-purpose vehicles (fire tenders, ambulances, agricultural utility vehicles, construction machinery, etc.). Typical applications include the bonding and sealing of roof assemblies, side panels, front and rear end mouldings, luggage and stowage compartments, partitions and windows. Our products are also used for bonding sandwich panels in truck trailer construction, levelling bus floors, attaching prefabricated cab modules to railcars and reducing noise and vibration in special-purpose vehicles. Elastic bonding technology offers significant advantages over other fastening methods (p.8). At the development stage it affords greater freedom to the designer; during production it reduces the number of processing operations, shortens production cycles and cuts costs in terms of materials, energy and capital investment; and throughout the service life of the vehicle it simplifies repairs and cuts cleaning and fuel bills.

Marine

In the Market Field Marine Sika supplies products used in the construction and repair of boats, yachts, cruise ships, freighters, ferries and sailing ships, as well as oil-drilling platforms and offshore equipment. The Sika Marine range offers the international shipbuilding industry first-class solutions for general bonding and sealing applications, direct glazing, sealing and fireproofing of cable ducts, deck caulking and flooring systems, both conventional and acoustic. Sika's high-quality „Total Teak Decking System“, which meets the need for prefabricated solutions as well as in-situ applications, is a leading-edge technology of its kind – and ahead of anything else on the market. Sika has also developed sophisticated acoustic deck coverings that are used in the construction of cruise ships and oil-drilling platforms to enhance the comfort of passengers and crew. All Sika Marine products carry the „wheelmark“ symbol, certifying compliance with MED (Marine Equipment Directive) standards and the appropriate EU directives.

Appliances & Equipment (A&E)

The Market Field Appliances & Equipment focuses on elastic bonding as a technologically advanced alternative to mechanical fastening systems. In addition Sika supplies effective solutions for the sealing, damping, structural reinforcement and protection of assemblies. This allows cost savings to be achieved at all stages of the value chain, coupled with benefits for both the industrial customer and the end user in terms of the production process, the end product and its use. The Market Field Appliances & Equipment covers a broad spectrum of customers and applications, from large-scale OEM manufacturers to small producers, whether of domestic appliances, consumer electronics, electrical equipment or indicator boards. As well as supplying the products for successful bonding, sealing, soundproofing and structural reinforcement solutions, Sika also offers its customers a complete engineering service, with professional help and advice on everything from application systems and process specification to the challenges of implementation in a mass-production environment.

Building Components

In the Market Field Building Components Sika supplies customers from many areas of manufacturing who are principally engaged in the industrial production of components for the construction industry. Here the range of applications extends from windows and doors to glazing and metal roofing, from building components and lift installations to furnishings and sanitary fittings. Sika offers products and technologies for elastic sealing, elastic and structural bonding, acoustic damping and structural reinforcement. Expert support is provided by our local sales teams as well as our Technical Service and System Engineering to ensure that customers get professional results every time.



1-Component Polyurethane Technology

What is it?

Sika's 1-component polyurethane product range consists of prepolymer-based flexible adhesives and sealants that cure on exposure to atmospheric moisture to form a durable elastomer. Some of our 1-component polyurethanes are certified for occasional contact with foodstuffs.

How is it used?

1-component polyurethanes are generally of stiff, paste-like consistency, with good non-sag properties. They are applied in bead form using a cartridge gun or pump-operated application equipment; applied thicknesses range from 3 mm to 20 mm plus. Tack-free or skinning time varies between 10 minutes and one hour plus, depending on the product.

Four systems are available to meet different needs:

- Moisture-curing systems, with application and curing temperatures within the range 5–35°C (ideally 15–25°C)
- Hot-applied moisture-curing systems with high initial strength
- Hot-cure systems (100–160°C) with high initial strength
- Booster systems, where a cure accelerator is added to the product via a static mixer, giving rapid strength development combined with a long open time

Where is it used?

Thanks to their elastic characteristics 1-component polyurethanes are particularly suitable for use where materials with very different coefficients of thermal expansion are being bonded together, and where large dynamic stresses have to be absorbed. Typical applications include:

- Direct glazing in shipbuilding and vehicle assembly
- General bonding and sealing applications in shipbuilding and vehicle assembly
- Structural bonding in window assembly
- Bonding, sealing and structural strengthening of household appliances

Technological Benefits

The success of Sika's 1-component PUR adhesives is based on their unique combination of permanent elasticity and flexibility combined with excellent mechanical properties and high strength. Elastic bonding offers significant advantages over mechanical fastening techniques:

- In development: more design freedom, based on ability to fasten together different materials without difficulty
- In production: reduces number of processing stages, shortens production cycles and cuts costs in terms of materials, energy and capital investment, thanks to ability of 1-component polyurethanes to bond and seal in a single operation, accommodate manufacturing tolerances, simplify preparation and leave surfaces undamaged (no mark-through)

In service:

- Extended service life thanks to damping of vibrations, uniform stress distribution and improved corrosion resistance
- Lower fuel costs thanks to reduced weight and improved aerodynamics resulting from greater design freedom
- Simpler repairs requiring less substrate preparation
- Lower cleaning costs thanks to smooth surfaces

Product Examples

- Sikaflex®-221 (adhesive sealant)
- Sikaflex®-250 PC (OEM windshield adhesive)
- Sikaflex®-252 (structural adhesive)
- Sikaflex®-254 Booster (universal adhesive with accelerated cure)
- Sikaflex®-265 (windshield adhesive/Transportation)
- Sikaflex®-290 DC (deck caulking)
- Sikaflex®-296 (windshield adhesive/Marine)
- SikaTack®-HighModul (windshield repair adhesive)
- SikaTack®-Ultrafast II (windshield repair adhesive)



Sika windshield adhesives give outstanding protection against contact corrosion and guarantee high-quality radio reception for factory-fitted glazing and glass repairs

Elastic-bonded joints and seals can accommodate the high dynamic stresses imposed on rail vehicles



Adhesive plus levelling, bedding and caulking compounds for the «Total Teak Decking System», general sealing and direct glazing applications in marine craft

2-Component Polyurethane Technology

What is it?

Sika's 2-component polyurethane adhesives range from flexible to structural strength. They consist of a filled resin component (polyol-based) and a hardener. Curing takes place by chemical reaction when the two components are mixed together.

The latest generation of 2-component PUR adhesives is based on a new technology developed and patented by Sika. The polyols are derived from recycled PET bottles. The resulting products exhibit outstanding adhesion and excellent mechanical properties.

How is it used?

Sika's 2-component polyurethanes vary in consistency from pourable to paste-like, and are applied with a cartridge gun or a 2-component pump-operated dispenser in film thicknesses ranging from a few tenths of a millimetre to several millimetres. Depending on the application the adhesives are available with a choice of open and curing times ranging from a few minutes to over an hour. The curing reaction can be greatly accelerated by heating the bonded components (max. 100°C). To eliminate the risk of processing errors, Sika's System Engineering department supports the customer with a full process design and engineering service tailored to specific projects.

Where is it used?

Depending on the product selected, Sika's 2-component PUR adhesives are suitable for elastic to structural bonding and sealing.

Typical applications include:

- Bonding sandwich panels for truck trailers, refrigerated trucks, caravans and ships
- Bonding wind turbines
- Bonding partition walls and wall insulation materials
- Bonding vehicle doors
- Levelling up floors in the construction of ships, buses and rail vehicles
- Bonding add-on components and attachments in vehicle construction
- Encapsulating, bonding and sealing of electronic components

Technological Benefits

- Outstanding adhesive properties
- High mechanical strengths
- Rapid rate of cure
- Good resistance to aging
- Fire-resistant product variants available

Product Examples

- SikaForce®-7750 W (sandwich panel)
- SikaForce®-7750 S (sandwich panel)
- SikaForce®-7752 L10 (assembly adhesive)

Sika's 2-component PUR adhesives are classified according to their mechanical properties as follows:

- Flexibel: SikaForce®-7550–7599
- Flexibilized: SikaForce®-7650–7699
- Structural: SikaForce®-7750–7799
- High-performance structural: SikaForce®-7850–7899



Adhesives for the production of sandwich panels and their assembly in the manufacture of truck trailers

High-performance structural bonding applications in the Market Field Building Components, including wind turbines



1-Component Polyurethane Hybrid Technology

What is it?

Sika's 1-component polyurethane hybrid adhesives and sealants – "hybrids" for short – are based on the company's tried and tested 1-component PUR technology. Consequently these products have similar mechanical properties to the 1-component polyurethanes (p.8).

The prepolymers are silane-terminated, giving good adhesion on a wide range of substrates with minimum surface preparation. Hybrids cure to form a durable elastomer by absorbing moisture from the air.

How is it used?

Like the 1-component polyurethanes, Sika's hybrids are generally of stiff, paste-like consistency, with good non-sag properties. They are applied in bead form in thicknesses of a few millimetres, using a cartridge gun or pump-operated application equipment. Application and curing temperatures lie within the range 5–35°C (ideally 15–25°C). Tack-free or skinning time varies between 10 minutes and one hour plus, depending on the product. The rate of cure depends on temperature and relative humidity, and typically amounts to a few millimetres a day.

Where is it used?

The areas of application for hybrids are much the same as for 1-component polyurethanes. Examples include:

- Bonding and sealing in caravan and vehicle production
- Direct glazing and auto glass repairs in the motor industry
- Sealing and bonding of panels and modular building systems
- Sealing of building components, such as wind turbines and shower enclosures
- Sealing of household appliances and industrial equipment

Technological Benefits

Hybrid technology delivers all the benefits of elastic bonding just like Sika's 1-component PUR technology. Specific product advantages include:

- Very high resistance to UV degradation and weathering
- Excellent adhesion to a wide range of substrates with minimum surface preparation
- Outstanding mechanical properties, comparable to those of 1-component polyurethanes
- Classification-exempt
- Free from VOCs and solvents

Product Examples

- Sikaflex®-521 UV (universal sealant)
- Sikaflex®-529 (sprayable sealant)
- Sikaflex®-552 (structural adhesive)
- Sikaflex®-555 (windshield adhesive)



Watertight seals for shower enclosures



Elastic joints and seals in vehicle construction, where resistance to UV degradation and weathering are a prime requirement



Weather-resistant seals and bonds for modular building systems

Reactive Acrylic Adhesive Technology

What is it?

The products of Sika's reactive acrylic adhesive technology are known as ADP (Acrylic Double Performance) adhesives. Recently developed by Sika, this easy-to-use polymer technology is based on the chemistry of acrylates. ADP adhesives are low in odour and supplied as rapid-hardening, flexibilized 2-component systems. Component A contains the reactive resin, component B acts as the initiator for the chemical reaction. Polymerisation takes place when the two components are mixed together.

How is it used?

ADP adhesives exhibit a paste-like, non-sag consistency. They are suitable for a bond line of 1–3 mm thickness and are applied by using a cartridge gun or pump-operated dispensing equipment incorporating a static mixer.

Application and curing are carried out at room temperature. Once bonded, the components should not be moved while the chemical reaction is taking place. Although curing occurs rapidly in a matter of minutes, the available working time is relatively long.

Where is it used?

ADP adhesives are rapid-hardening and flexibilised and can be used for structural and semi-structural joints. Suitable for application on a wide variety of substrates, they are ideal for the fast production processes used for example in the appliances and equipment industry. They are particularly effective for bonding stainless steel, coated metals and plastics. Typical applications include:

- Household appliances and machines
- Furnishings and fittings
- Neon signs
- Window profiles and trims

Technological Benefits

The development of ADP technology has led to a new generation of rapid-hardening, non-sag adhesives. These offer many of the benefits of elastic bonding found

with 1-component polyurethanes, but with higher levels of strength. Specific product advantages include:

- Shorter production cycles through very rapid strength development
- Excellent adhesion to a wide range of metals, stainless steel, galvanized steel and plastics, with minimum surface preparation
- Low in odour compared with conventional acrylic adhesives
- Simplifies production through ability to accommodate manufacturing tolerances up to 3 mm
- Simple, non-critical mixing of components, eliminating risk of processing errors
- A better end product thanks to the many benefits of elastic bonding (ability to dampen vibrations, high impact strength and good low-temperature characteristics)

Product Examples

- SikaFast®-5211 (3 minutes open time)
- SikaFast®-5221 (9 minutes open time)



Bonding of plastics replaces time-consuming mechanical fastenings, e.g. in the production of neon signs

Shorter production cycles, e.g. in the manufacture of furnishings and fittings, thanks to ADP technology's ideal combination of rapid strength development and long open time



New possibilities in the design and production of household appliances are opened up by Sika's reactive acrylic adhesives, which bond extremely well to many metals and plastics with minimum surface preparation



Epoxy Hybrid Technology

What is it?

Sika has further developed the chemistry of epoxy resins to produce epoxy hybrid adhesives, which are a marriage of PUR and epoxy technologies. The resulting products combine the stiff elastic properties of epoxy resins with the flexibility of polyurethanes. Epoxy hybrids cure by means of heat-activated hardeners at temperatures normally between 160 and 180°C, and in special instances at lower temperatures. In order to attain predefined early strengths and also to improve the resistance of the adhesive to washing out, Sika has developed a 2-component variant of the system. Pre-curing takes place at room temperature, full cure requires the application of heat.

How is it used?

Sika's epoxy hybrid adhesives exhibit a paste-like, non-sag consistency. The 1-component systems are applied manually or by robot. Products designed for structural applications are generally applied with heated pump-operated dispensers; applied thicknesses range between 1 and 4 mm. Products designed for anti-flutter or sealing applications are applied using unheated pump systems, in thicknesses ranging between 5 and 12 mm. Swirl application systems are also available. The 2-component systems can be mixed using static or dynamic mixers; application is by robot, in applied thicknesses of up to 8 mm. These products are used for sealing and semi-structural bonding applications. The open time can be adjusted to suit the varying production cycles of different manufacturers, up to a maximum of 15 minutes.

Where is it used?

Sika's epoxy hybrid technology is designed for use in industrial manufacturing environments where oven facilities are available (e.g. drying ovens for electro-dipped coatings). It permits:

- Bonding of oiled metals
- Various bonding and sealing applications at the bare bodysell stage of car and truck assembly, e.g. anti-flutter inserts, flanged seams, flush seams and spot weld bonding

Technological Benefits

- Excellent adhesion even on oiled sheet metal and plastics (2-component systems)
- High degree of flexibility and good adhesion thanks to combination of polyurethane and epoxy
- Faster, simpler production, thanks to bonding and sealing in one operation
- Protects against corrosion because of resistance to aging and weathering
- More design freedom – allows different steels to be bonded together
- Overpaintable
- Contains no solvents or PVC
- Resistant to washing out in most washing processes and electrophoretic dip baths

Product Examples

- SikaPower®-430 (1C, semi-structural)
- SikaPower®-460C (2C, semi-structural)
- SikaPower®-490 (1C, structural)
- SikaPower®-496 (1C, crash-resistant)



Attached components (bonnets, doors) are stiffened with bonded anti-flutter inserts at the bare bodysell stage of car and truck assembly

Building higher safety margins into vehicles with Sika's crash-resistant epoxy hybrids

Laminating Adhesive Technology

What is it?

Sika uses the term "laminating adhesive technology" to refer to a range of water-based and solvent-based panel adhesives developed for a variety of laminating applications.

Sika's laminating adhesives are formulated on a variety of chemical bases (acrylates, various rubbers, polyurethanes). 1-component and 2-component products are available, the addition of a second component serving to increase heat resistance and adhesive strength.

Laminating adhesives are based either on polymer solutions suspended in solvents or on polymer emulsions (water-based systems).

Solvent-free reactive hotmelts (p. 15) can also be used for laminating applications.

How is it used?

Sika's laminating adhesives are of liquid consistency and applied by spray, roller, spatula or spreader at a coverage of 50–200 g/m².

Through evaporation of the water (emulsions) or solvents they form a thermoplastic film that is activated by the application of heat (up to approx. 130°C). The substrates are brought together under

solvent-based laminating adhesives are increasingly being superseded by water-based emulsions on environmental grounds. In a concerted program of further product development, Sika has successfully developed, emulsions whose performance actually exceeds that of solvent-based products.

Where is it used?

- Interfacial bonding of composite systems, e.g. foils, fabrics or textiles on a moulded backing
- Bonding of decorative linings or facings in automobile cabins, such as door panel trims, instrument panels, centre consoles, roof linings, parcel shelves and A-, B-, and C-pillars
- Wall coverings in ships' cabins and stairways
- PSAs are particularly suitable for the bonding of felts, quilts, foams, heavy-gauge films and floor coverings in automobile and bus assembly, and also for:
- Imparting self-adhesive properties to foams and textiles

Technological Benefits

- Instant grab when substrates are brought together



Bonding of door panel trims

Bonding of textile wall coverings in ships' cabins

vacuum or by means of a press. Laminating adhesives are used to form bonds that may be subject to high restoring forces. Products suitable for manual laminating applications are also available. Some water-based adhesives remain permanently tacky, and these are known as PSA (Pressure-Sensitive Adhesives). The bond is formed under pressure and without application of heat, and these products are used to join substrates that are not subject to significant restoring forces. These adhesives cure at room temperature.

- Ability to accommodate high initial stresses
- Excellent resistance to aging
- Low fogging and emission levels

Product Examples

- Sika® Therm (laminating adhesives)
- Sika® Coll (contact and pressure-sensitive adhesives)



Bonding of floor coverings and luggage rack linings in bus interiors



Hotmelt Adhesive Technology

What is it?

The hotmelt adhesives developed by Sika are non-reactive, physically curing products based on various thermoplastic polymers (modified polyamide, polyester or polypropylene, according to product). So there is a Sika hotmelt available for virtually every type of substrate in common use. Hotmelts are 1-component, solvent-free products. As they become solid at room temperature, they need to be heated to melting point prior to application. They are characterised by high early strength, which results from the physical cure mechanism (the material hardens by passing from the liquid to the solid state). Adhesive joints made with hotmelts can be separated and then reassembled simply by reheating the material above its melting point.

How is it used?

Sika's hotmelt adhesives are heated to temperatures of 140–200°C for application. Within this temperature range they are of liquid consistency and are applied by roller or spray equipment at coverage rates typically between 30 and 100 g/m². The bond is made immediately after application, applying light pressure to the components to ensure full surface contact. PSA hotmelts constitute a special category of hotmelt adhesives. The surface of these pressure-sensitive adhesives remains permanently tacky, and the bond is formed by pressing the adhesive-coated component against the substrate. The big advantage for the end user is that he can take delivery of precoated components; all he has to do is peel off the backing paper or foil and press the component into place, with no further activation necessary.

Where is it used?

Hotmelts are typically used to bond plastics, textiles or fibrous materials that are not exposed to extremes of temperature. These include:

- Assembly joints in car cabins, e.g. air ducts, fresh-air filters, polypropylene components (no surface preparation needed)
 - Seals in refrigerators and chest freezers
- PSA hotmelts are particularly suitable for imparting self-adhesive properties to lining or cladding materials that are not subject to restoring forces, e.g.:
- Carpets
 - Felts, foams and heavy-gauge films
 - Insulation materials and sound-deadening quilts

Technological Benefits

- Faster production thanks to instant bonding
- Bonding of polypropylene components with no surface preparation
- Simple to use – eliminates risk of processing errors
- Low fogging and emission levels
- Good resistance to aging
- Solvent-free
- Unlimited open time (PSA)

Product Examples

- Sika® Melt-9170
- Sika® Melt-9270 (PSA)



Structural bonding of air ducts in automobile assembly



Sealing refrigerators and chest freezers to prevent escape of insulation foam

Bonding carpeting in vehicle cabins



Reactive Hotmelt Adhesive Technology

What is it?

Sika's reactive hotmelts (RHM) are solid at room temperature and are based on polyurethane prepolymers. This technology combines the properties of hotmelts with those of reactive polyurethanes. Sufficient early strength is attained when the material passes from the liquid to the solid state as it cools. By reaction with atmospheric moisture the adhesive is then transformed from a fusible thermoplastic to an infusible elastomer, making it more resistant to high temperatures than non-reactive hotmelts.

How is it used?

Sika's reactive hotmelt adhesives are heated to temperatures of 120–160°C for application. Within this temperature range they exhibit a liquid or free-flowing consistency. They are applied by spray or roller or in extruded bead form at coverage rates determined by the specific application.

Where is it used?

Reactive hotmelts adhere well to textiles, plastics and other porous substrates. Adhesion to metals is more limited.

Typical applications include:

- Heat-resistant interfacial bonding of textiles, e.g. door facings and parcel shelf linings in automobile assembly
- Decorative furniture facings
- Bonding of PUR foams as an alternative to flame laminating
- Fast structural bonding of interior trim components in automobile assembly, e.g. panel retaining clips for door panel trims

Technological Benefits

- Faster production due to high early strength
- Significantly improved creep and heat resistance due to post-curing by means of atmospheric moisture
- Smaller investment in plant compared with emulsion-type or solvent-based laminating adhesives, as drying lines are not needed
- High final strength
- Bonds well to a wide variety of substrates
- Very low fogging and emission levels

Product Examples

- Sika® Melt-9630 (pseudoplastic)
- Sika® Melt-9670 (crystalline)



Bonding of textile/foam and textile/quilt linings as an alternative to flame laminating



Bonding of linings to parcel shelves, which are exposed to extremes of heat

Fast assembly of door panel trims and retaining clips with the aid of reactive hotmelts



Butyl Rubber Technology

What is it?

Sika's butyl rubber products are used as sealants. The two types available are bulk products and preformed sealing strips or profiles.

The bulk products contain solvents, which evaporate to leave a plastic rubber material.

The preformed products are solvent-free, and like the PSAs (p. 13/14) they are characterised by a permanently tacky surface. Butyl rubbers are designed for use as sealants only; they do not set or harden by chemical reaction but remain permanently plastic.

How is it used?

The bulk butyl rubbers are of paste-like or thick consistency, and are applied in bead form at thicknesses of a few millimetres by cartridge gun or pump-operated application equipment.

The preformed profiles or strips are pressed into position by hand after first removing the backing foil. They are available in a range of sizes.

Since butyl rubbers do not harden, they can be used to seal components that are designed for later disassembly.

Where is it used?

- General seals designed for later disassembly
- Caravans, buses, trucks
- Household appliances and equipment
- Ventilation plant

Technological Benefits

- Sealed components can be disassembled as required
- Good adhesion to a wide variety of substrates with no special preparation
- Outstanding moisture resistance
- Effective corrosion protection
- Speedy and simple application, especially with preformed profiles
- Good acoustic properties (e.g. SikaDamp®, p. 18)

Product Examples

- SikaLastomer®-710 (bulk sealant)
- SikaLastomer®-831 (sealing profile)



Seals made with butyl rubber provide outstanding moisture resistance and effective corrosion protection on metal building components

Fast and simple sealing in caravan production with preformed butyl rubber profiles



General sealing applications in household appliances

Silicone Technology

What is it?

Sika's silicone products are classed as "reactive sealants". They are based on solvent-free polyorganosiloxanes, the curing mechanism being achieved through polycondensation.

Curing takes place by reaction with atmospheric moisture. Depending on the type of reaction, small quantities of volatile reaction products are released.

Sika's silicone products are generally supplied as 1-component systems.

How is it used?

Sika's silicone products exhibit a paste-like, non-sag consistency. They are applied in bead form using a cartridge gun or pump-operated dispensing equipment and are primarily used for sealing joints.

Where is it used?

Sika uses silicone technology to produce sealants with good resistance to temperature extremes and UV degradation.

Typical applications include:

- Elastic seals of all kinds where resistance to vibration and UV degradation is a requirement
- Sealing joints in refrigerators, chest freezers, greenhouse panels, etc.
- Sealing ventilation ducts
- Sealing glazing units and joints that are subject to fire regulations
- Used in conjunction with SikaFirestop® Marine and Sika® Assembly Foam OZ plus Marine to provide fire protection for cable ducts in ships

Technological Benefits

- Very high temperature resistance
- High degree of resistance to UV degradation and weathering
- Moisture resistance
- Good adhesion to glass, ceramics and metals
- Remains extremely elastic and flexible even at low temperatures
- Good working characteristics, thanks not least to ease of extrusion, which is independent of ambient temperature
- High degree of elasticity

Product Examples

- SikaSil®-1 (universal sealant)
- SikaFiresil® (flame-retardant sealant)
- SikaFiresil® Marine (flame-retardant sealant for the marine industry)



Flame-retardant seals for cable ducts in ships



Heat-resistant seals for cooker hobs



Acoustic and Structural Reinforcement Technologies

What are they?

Sika's acoustic and structural reinforcement technologies encompass an extensive range of product groups used for damping noise and vibration and strengthening structural assemblies, primarily in the car industry. They may also have applications in the Market Fields Transportation, Marine and Appliances & Equipment. The products are based on various technologies such as butyl rubber, epoxy resin and thermoplastics.

Most of the product groups, including SikaBaffle® and SikaReinforcer®, expand when heat is introduced via the chemical decomposition of expansion agents. The diversity of Sika's acoustic and reinforcement product range is such that each product group must be considered separately in terms of its chemical structure and reaction mechanism and how and where it is used.

SikaBaffle® is a line of products based either on thermoplastics or on rubber. The thermoplastics are injection mouldings designed for specific applications, developed with 3-D CAD design tools. They expand by up to ten times their original volume, insulating and sealing the vehicle cabin against noise, dust and moisture. The SikaBaffle® products based on extruded rubber are self-adhesive and ideal for sealing smaller cavities.

SikaDamp® products are twin-layer lightweight acoustic pads based on butyl rubber. They are used to damp vibrations in vehicle body panels and are available with different acoustic ratings to suit specific types of application. SikaDamp® pads are machine-punched to the required size and shape.

SikaReinforcer® products are heat-reactive epoxy-based reinforcement materials. The mouldings expand by 50–200% of their original volume, enabling design engineers to increase the structural stiffness of the bodyshell at selected points, and hence improve crash strength. By

using SikaReinforcer® they can reduce panel thicknesses or omit metal stiffening plates. Other applications include the reduction of structure-borne sound, the prevention of stress cracking and sealing of the fuel tank filler neck.

Sika® Structure products are based on modified PPS and are primarily used in conjunction with SikaReinforcer®. They can be injection-moulded and are used to improve crash strength and stiffen vehicle bodyshells at selected points.

SikaSeal® products are based on butyl rubber and are used to seal vehicle bodyshells. They are available as preformed profiles or in bulk for pumped application, with or without expansion capability.

Sika Cufadan® PU-Red is a multi-layer viscoelastic damping system, based on polyurethane. This system has been especially developed to enhance the acoustical dampening of noise and vibration in ship decks.

Technological Benefits

- Reduction of noise and vibration in vehicle and ship interiors and in household appliances
- Vehicle and ship cabins feel extremely quiet and comfortable
- Insulation of interiors against noise, water, moisture and dust
- Reduction in overall weight of bodyshell without sacrificing stiffness or crash strength
- Increased passive safety through localised strengthening of bodyshell assembly
- Co-Engineering and Co-Design service with CAD/FEM – available to car manufacturers from initial development phase (p. 21)

Product Examples

- SikaBaffle®-229 (self-adhesive)
- SikaBaffle®-250 (injection moulding)
- SikaDamp®-620/-630
- SikaReinforcer®-911/-913
- SikaSeal®-708/-710/-772/-831

SikaBaffle® cavity fillers for insulating and sealing vehicle cabins against noise, dust and moisture

SikaDamp® for damping vibrations in vehicle body panels



SikaDamp® and SikaBaffle® for damping vibrations in truck cabins



Sika Industry: Product Groups at a Glance

Product group	Technology	Page	Brief description
SikaBaffle®	Acoustic	18	Sound-damping cavity fillers based on thermoplastics or rubber
Sika® Coll	Laminating adhesive	13	2C contact adhesives, water based 1C pressure-sensitive adhesives, water based 1C/2C contact adhesives, solvent based
Sika Cufadan® PU-Red	Acoustic	18	Multi-layer viscoelastic damping system for ship decks
SikaDamp®	Acoustic	18	Lightweight acoustic pads based on butyl rubber
SikaFast®	Reactive acrylic adhesive	11	2C acrylic adhesives, curing by polymerisation
SikaFiresil®	Silicone	17	Flame-retardant silicone-based sealants
Sikaflex®-200 series	1C polyurethane	8	Moisture-curing polyurethane sealants and adhesives
Sikaflex®-300 series	1C polyurethane	8	Heat and moisture-curing polyurethane adhesives
Sikaflex®-500 series	1C polyurethane hybrid	10	Silane-terminated moisture-curing polyurethane sealants and adhesives
Sikaflex®-600 series	1C polyurethane	8	Hot-applied moisture-curing polyurethane adhesives
Sikaflex®-800 series	1C polyurethane	8	Flame-retardant moisture-curing polyurethane sealants and adhesives
SikaForce®	2C polyurethane	9	2C polyurethane adhesives
SikaLastomer®	Butyl rubber	16	Butyl rubber-based permanently plastic sealants
Sika® Melt	(Reactive) hotmelt adhesive	14/15	Reactive and non-reactive hotmelt adhesives
SikaPower®	Epoxy hybrid	12	Hot-cured polyurethane-epoxy hybrid adhesives
SikaReinforcer®	Acoustic/Structural reinforcement	18	Heat-reactive epoxy-based reinforcement materials
SikaSeal®	Acoustic	18	Butyl rubber-based sealants
SikaSil®	Silicone	17	Silicone sealants
Sika® Structure	Structural reinforcement	18	Stiffening materials based on modified PPS, used in conjunction with SikaReinforcer®
SikaTack®	1C polyurethane	8	Hot-applied moisture-curing polyurethane adhesives
Sika® Therm	Laminating adhesive	13	1C/2C laminating adhesives, water based 1C laminating adhesives, solvent based

A broad range of process materials for improved acoustics and structural reinforcement, primarily used in the car industry



Sika Services – System Solutions Geared to Customer Needs

The technologies described in these pages form the basis of all Sika's high-quality process materials. Sika recognises, however, that sophisticated technologies alone are no guarantee of success. The products have to be backed up by professional system solutions and high standards of service. For Sika, that means responding quickly and efficiently to the needs of our markets and customers, wherever they may be. A global service – tailored to individual needs.

Research and Development (R&D)

In terms of its commitment to R&D, Sika is in a league of its own. Tomorrow's competitive lead rests on the innovations we develop today. The state-of-the-art industrial process materials we supply to our customers help them to build a better product – and so stay ahead of their competitors.

A Global Presence for Rapid Know-how Transfer

The Group's central R&D facility in Switzerland is supported by regional Technology Centres in Germany, Spain, France, the USA and Japan, as well as local test labs in over 50 countries. This global network facilitates rapid transfer of know-how and keeps us in close touch with our markets, ensuring that new research findings are translated very quickly into better products for our customers everywhere.

Core Areas of Research

Research and development is carried out in four core industrial product areas:

- Elastic adhesives and sealants
- Structural adhesives
- Acoustic damping and sealing materials
- Floor coverings and coatings

Customer-Oriented Research Activities

R&D activities are geared to solving problems for our customers – and that includes application techniques and systems as well as products. The innovations developed by our R&D department lay the foundations for the pioneering technologies and products that maintain Sika's strength in its five core competencies of technological expertise: sealing, bonding, damping, reinforcing and protecting.

Regional Technology Centres in three continents facilitate rapid know-how transfer and keep us in close touch with our markets

Acoustic Co-Engineering and Co-Design

Quality standards have risen sharply in the motor industry – as have the demands made on component suppliers. So our teams of specialists in R&D (p. 20), System Engineering (p. 22) and Technical Service (p. 23) have now been supplemented by experts who use CAD/FEM computer modelling to develop process materials for acoustic and structural reinforcement applications. With facilities in Europe (Switzerland and Belgium), North America (USA) and Asia (Japan), our Co-Engineering and Co-Design services are ideally placed to meet the needs of car makers in three continents.

Working with the Customer

From the first stage of product development to the start of full-scale production, Sika's Co-Engineering and Co-Design professionals work side by side with our motor industry customers. A worldwide network of Key Account Managers and resident engineers provides constant feedback from our customers and ensures that we work together from the beginning to develop the complete solutions they need.

Acoustic Test Centre

Our dedicated test centre in the USA (Madison Heights) is used to evaluate the performance of Sika's acoustic and structural reinforcement solutions for the motor industry. The state-of-the-art 30 000 m² complex houses sound-reflecting and anechoic chambers, plus other facilities such as a bodyshell dynamometer, wind tunnel and paint-drying oven. This sophisticated test environment enables Sika to carry out tests and trials under simulated real-life conditions.

Cost Savings and Efficiency Gains

This comprehensive service package enables Sika to become involved at an early stage of the design process. This reduces the customer's development workload, cuts development costs and spreads the risks. Development times are also shortened, which increases the efficiency of the value-adding process.



Sika's Co-Engineering and Co-Design professionals work together with vehicle manufacturers to analyse problems in acoustic design and structural reinforcement and develop effective, economical solutions



Sika invests heavily in R&D, because tomorrow's competitive lead is built on the innovations we develop today



Facilities at the 30 000 m² test centre in the USA include sound-reflecting and anechoic chambers, where tests are carried out under simulated real-life conditions during the development phase



Sika Services – System Solutions Geared to Customer Needs

System Engineering

Through its System Engineering department Sika offers its customers technical support on major adhesive projects in all Market Fields. The resources of the Corporate System Engineering centre in Switzerland (Widen) are supplemented by local organisations in Germany, France, Italy, the United Kingdom, Japan and the USA.

Pumping Equipment and Applications Concepts

Application equipment from many different manufacturers is tested and pumping equipment specifications for applications and/or products are drawn up. Having collaborated for many years with leading pumping equipment suppliers worldwide, Sika has developed excellent contacts throughout the industry. At the same time Sika's independence means that customers are free to source their pumping equipment from the supplier of their choice.

Applications Feasibility Studies

When a customer is interested in developing a new application, the System Engineering department carries out feasibility studies to evaluate the risks and probability of success. So in effect Sika becomes involved in a partnership for innovation with many of its customers.

Advising on Process Design

Where a customer has no previous experience with adhesive technology, the System Engineering department is responsible for advising on process design. The principal aim is always to make the production process as economical as possible.

Production Engineering Support

In order to help manufacturers make the most effective use of adhesive application systems, Sika provides comprehensive technical support for customers when setting up and equipping their production lines. Sika has been involved in many such projects and consequently possesses an expert knowledge of the available application technologies and systems.

Collaboration with R&D

System Engineering collaborates closely with Sika's production and R&D departments. Every new product developed is tested by System Engineering. Various sequences of tests have to be carried out successfully before the product can be used by the customer.

Training Schemes

The System Engineering department also organises specific courses and training sessions for staff and customers. As bonding is a relatively young technology, training schemes of this kind serve to introduce the customer's workforce to the principles and techniques of bonding, thus ensuring that adhesive solutions are successfully implemented in practice.

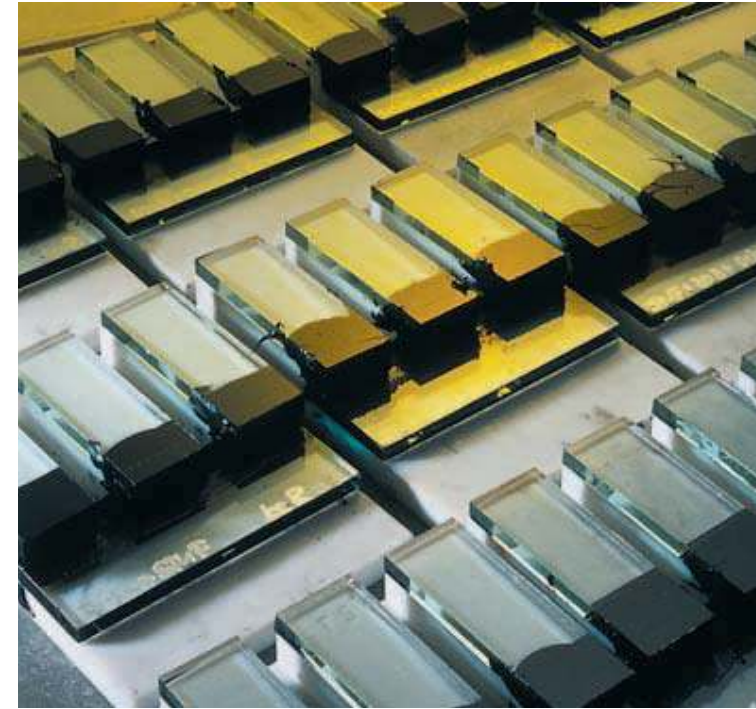
Technical Service

More than a dozen Technical Service organizations in five continents ensure that customers receive the same high standards of technical support worldwide. Every country is affiliated with one of these Technical Service organisations. The hub of the local Technical Service network is the Corporate Technical Service Centre in Zurich. Because the latter is in close contact with Sika's central R&D facility, product launches and the documentation of data for the customer and for internal research use also form an important part of its responsibilities.

Range of Services

Technical Service liaise with our customer advisers to analyse new project proposals from customers. A detailed risk analysis is carried out, reviewing not only financial and organisational aspects, but also the environmental impact, the technical options and the cost implications of a system failure. And when the project goes ahead, Technical Service are responsible for carrying out tests and verifying the suitability of the customer's design. Technical Service can then make recommendations to the customer and provide the support that is an important part of any successful solution.

Samples undergo exhaustive testing to ensure that the bond or seal will continue to perform well throughout the life of the assembly



A 600 m² test lab for customer projects at the Corporate System Engineering centre in Switzerland, as well as local organisations in three continents, ensure that customers investing in adhesive systems solutions receive full professional support

State-of-the-art robots and pump-operated dispensers from leading manufacturers allow production systems to be designed and engineered to the customer's specification



Rigorous Test Regime

Extensive tests are carried out to evaluate appropriate methods of surface preparation and to ensure that the bond or seal will perform satisfactorily throughout the projected service life of the assembly.

Training Schemes

Corporate Technical Service play a central role in the running of internal and external training schemes. The course materials incorporate a wealth of information and practical experience drawn from across the Sika Group – and in particular from the local Technical Service organisations – ensuring that staff and customers are kept abreast of the latest technical developments.



The results of the analyses carried out by our Technical Service organisations in five continents are swiftly communicated to staff and customers through our internal and external training courses



Sika – a Global Network

Sika has local teams of experienced specialists in more than 60 countries to provide on-site support for our customers worldwide.

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