

SOLAR SOLUTIONS

NEW HORIZONS IN SEALING AND BONDING FOR PHOTOVOLTAICS

BUILDING TRUST





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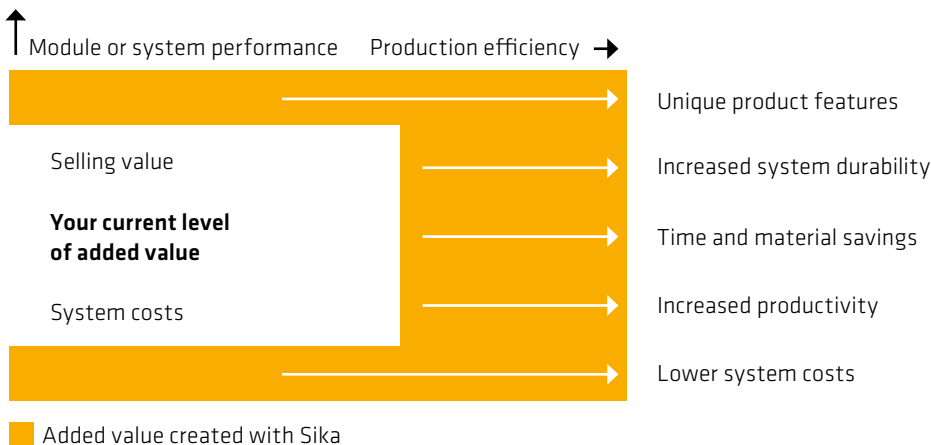
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NEW HORIZONS – ADDING VALUE WITH ADHESIVES AND SEALANTS

AS MARKET CONDITIONS PUT HIGH PRESSURE ON COST STRUCTURES, while demanding top quality and long-term performance of photovoltaic systems, the industry is forced to consider optimizations in production and installation processes as well as new innovative designs. This also leads to new materials and joining techniques which have to be implemented into production and installation. The appropriate adhesive technology enables to save cost, increase production efficiency and even allows to add unique features to the final PV system. Sika assists you with comprehensive project support in all phases from design to implementation and after-sales service with the optimal solution to achieve your targets.

THE SIKA ADDED VALUE CONCEPT



	Adhesive features	Benefits for the photovoltaic system
Substrate-friendly joining method	<ul style="list-style-type: none"> ■ Absorbs shocks and reduces vibrations ■ Optimal load distribution across the surface ■ Accommodates the different thermal expansion coefficients of the construction and glass ■ Compensates for manufacturing tolerances ■ Bonding of finished materials (e.g. aluminum – glass) 	<ul style="list-style-type: none"> ■ Eliminated stress peaks for reduced glass breakage ■ Diminished formation of micro cracks in cells ■ Higher yield over service life ■ Withstands all climatic zones ■ Simplified automation and fewer upstream process steps ■ No damage to corrosion protection as a result of drilling or screwing
Scope for design	<ul style="list-style-type: none"> ■ Concealed bonding makes for smooth, barrier-free surfaces ■ Weight reduction 	<ul style="list-style-type: none"> ■ Elimination of frames or mechanical fixing ■ Increased self cleaning of modules for higher yield ■ Appeal for BIPV solutions ■ Lower transport costs ■ Simplified installation ■ Wider range of applications
Dynamic load capacity	<ul style="list-style-type: none"> ■ Wind and other loads can be transferred evenly into the sub construction 	<ul style="list-style-type: none"> ■ Less glass breakage and fewer micro-cell cracks ■ Improved long-term durability ■ Reduced operating costs ■ Less maintenance work
Product performance	<ul style="list-style-type: none"> ■ Different curing speeds and technologies available ■ Widely approved (e.g. IEC 61215/61646/61730, EOTA ETAG 002, UL 94 / 764) 	<ul style="list-style-type: none"> ■ Curing speed fits the process to eliminate curing zones ■ Moisture independent curing possible ■ Secured system durability and performance



BONDING MODULES TO MOUNTING DEVICES

NOWADAYS PHOTOVOLTAIC MODULES are typically mounted to the sub construction by clips, frames and screws or other mechanical devices. This system is not only very labor- and time- consuming in the field but also in terms of small parts handling. In addition to this, the wrong or over-tightened fixing can cause glass breakage or damage in the cells. Furthermore, savings in materials can be achieved by moving from frames to a bonded frameless mounting solution. As the industry is currently striving to reduce costs and improve long-term performance, the bonding of modules to structures in production or on-site is the reasonable way forward.

KEY SYSTEM BENEFITS

Reduced costs in production and installation

- Savings in costs of up to 15% compared to common framing and installation systems
- Reduced installation time on-site of up to 40%
- Savings in backrail material of up to 15% compared to tape solutions
- Value added through mounting integration, new designs for BIPV and architectural appeal
- Elimination of electrical grounding
- Minimized material handling compared to clamping

Increased durability and performance

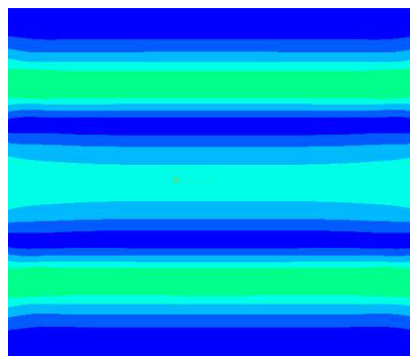
- Reduced glass breakage through elimination of stress peaks
- Minimized micro cracks on cells due to stress distribution imply higher yield over service life
- Elimination of raised edges from frames that trap dirt, snow or water which harm the laminate and reduce the power output
- Structurally bonded with an adhesive technology which meets stringent durability requirements
- Simplified tolerance compensation of bonded components

ELIMINATION OF STRESS PEAKS

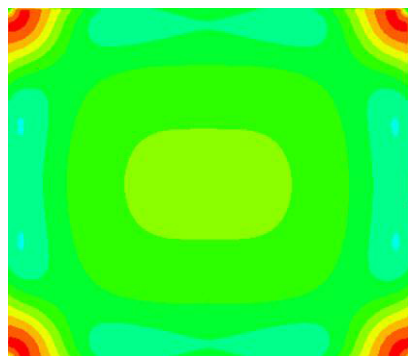
Illustrations show FEM calculation with a load of 1.8 kN/m².

Red colour indicates the highest and dark blue the lowest stresses on the module/glass.

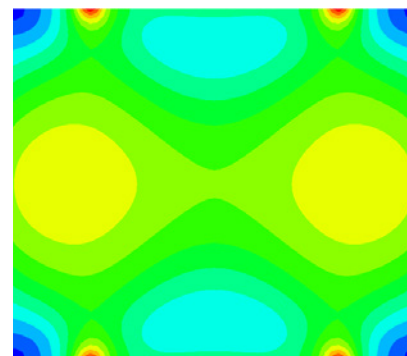
Frameless Module
Bonded linear fixation



Framed Module
Fixed with clamps



Frameless Module
Fixed with clamps



- Homogeneous stress distribution
- Reduced stress by up to 60%
- Minimizes risk of cracks
- Damping of dynamic loads
- Less deflection under load by up to 85%

BONDING MOUNTING DEVICE IN PRODUCTION

Best recommended Sika products

Sikasil® AS-780	Fast curing two-part silicone adhesive with exceptional initial strength, UL 94 HB
Sikasil® AS-785	High strength and fast curing two-part silicone adhesive, meets EOTA ETAG 002, UL 94 V-1

SYSTEM BENEFITS

- Heavy reduction in manual labor
- Simplified in-line bonding feasible within existing cycle times
- Elimination of pre-fixation means or complex curing zones
- Easier quality control in production compared to field
- Minimized climatic impact



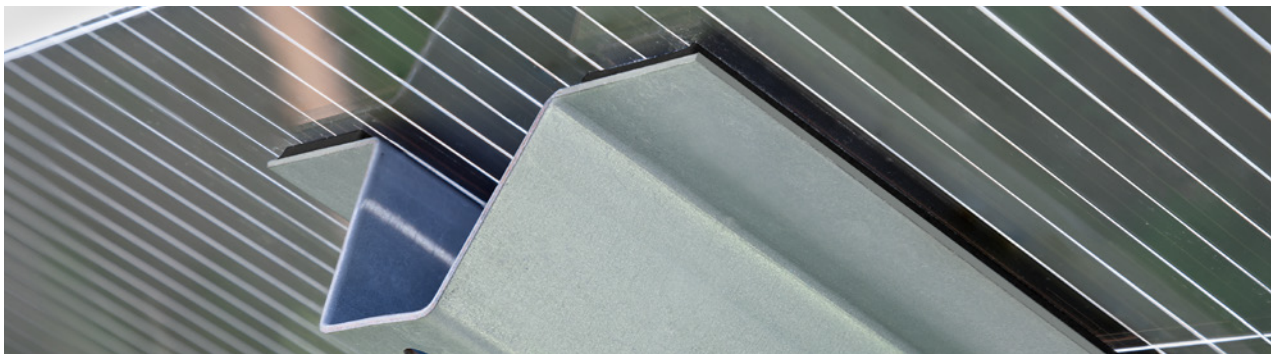
BONDING MODULES TO RACKING SYSTEMS ON-SITE

Best recommended Sika products

Sikasil® AS-70	High strength one-part silicone, meets EOTA ETAG 002, UL 94 HB
Sika® Tape FA-22	High performance acrylic tape for pre-fixation

SYSTEM BENEFITS

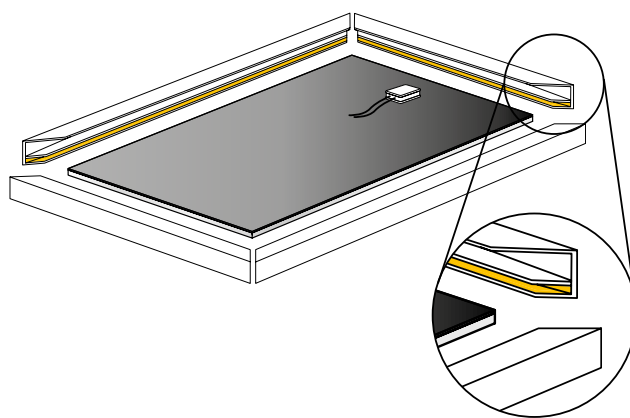
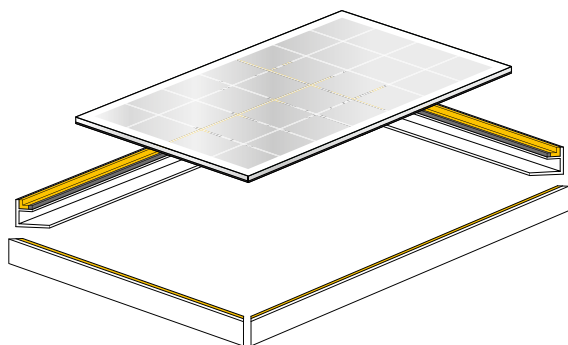
- Simplified manual application
- From box-to-racking, no module handling in between
- Flexibility in racking systems



BONDING OF MODULE FRAMES

ALUMINUM FRAMES serve as edge protection from environmental conditions and glass breakage as well as mounting support to different substructures on fields or roofs. Sika's adhesives and sealants not only meet the demand of weathering and UV resistance for long term performance but also provide options for increased production efficiency with fast curing technologies.

On the other hand, Sika's structural and fast curing adhesive systems allow new frame design options where additional material savings and process optimizations can be achieved. Besides the architectural appeal, this new construction has an evident functional effect - with an even module surface dirt, leaves or snow glide off more easily, ensuring the module returns faster to full energy production. As dirt or water do not get trapped in an overlapping edge, the module laminate is protected from the damage this may cause.



Best recommended Sika products

Sikasil® AS-60	General purpose one-part silicone sealant, UL 94 HB, RTI 105°C
Sikasil® AS-70	One-part high performance structural silicone adhesive, UL 94 HB, RTI 105°C, meets EOTA ETAG 002
Sikasil® AS-785	Two-part fast curing structural silicone adhesive for semi and fully automated applications, UL 94 V-1, RTI 105°C, meets EOTA ETAG 002

SYSTEM BENEFITS

- Shortens curing times for high production efficiency
- Eliminates air-conditioned curing zones thanks to two-part technologies
- Facilitates new frame designs without raised edges
- Simplifies automation of production
- Offers best in class load and weathering resistance
- Allows reduced materials and process costs
- Simplifies corner design thanks to structural bonding



BONDING AND POTTING OF JUNCTION BOXES

JUNCTION BOXES ARE CRUCIAL to the functionality of the photovoltaic system. The box covering, the bonding and the potting together provide protection of the electrical parts against environmental conditions or mechanical forces. Sika's junction box bonding and sealing products ensure a permanent reliable connection between junction boxes and backsheets or glasses. To accommodate all production speeds and processes, Sika offers a wide range of curing rates.

Best recommended Sika products

Junction box bonding

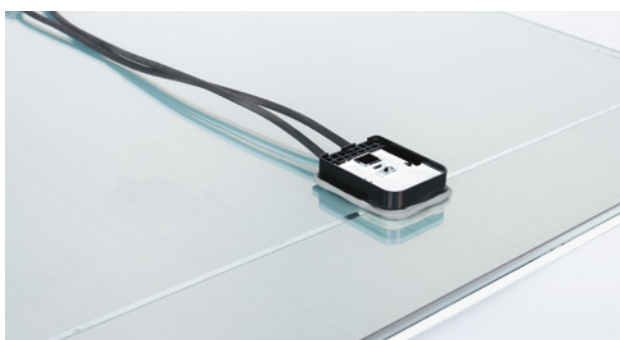
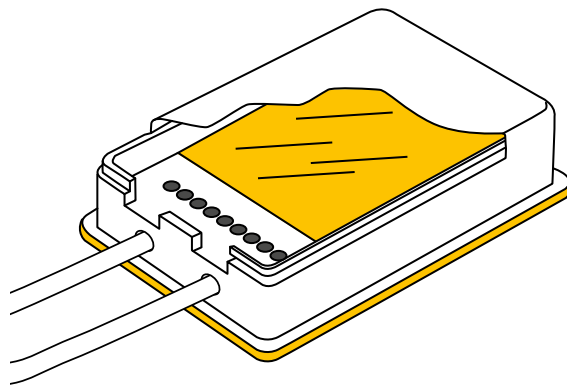
Sikasil® AS-60	General purpose one-part silicone sealant, UL 94 HB, RTI 105°C
Sikasil® AS-70	One-part high performance structural silicone adhesive, UL 94 HB, RTI 105°C
Sikasil® AS-785	Two-part fast curing structural silicone adhesive for semi and fully automated applications, UL 94 V-1, RTI 105°C
Sikasil® AS-790	Two-part ultra-fast curing silicone adhesive for high speed production lines, RTI 105°C

Junction box potting

Sikasil® AS-787 SL	Liquid two-part fast curing silicone potting agent with very short non-flow time, UL 94 V-0, HWI 3, HAI 0, CTI 0, RTI 105°C
Sikasil® AS-785 SL	Two-part self-leveling and fast curing silicone potting agent, UL 94 V-0, HWI 2, HAI 0, CTI 0, RTI 105°C

SYSTEM BENEFITS

- Shortens cycle times thanks to short "non-flow" and curing times for potting
- Fast handling due to fast reacting products
- Shows durable water-tightness and insulation
- Demonstrates excellent adhesion and flammability rating
- Provides long lasting environmental protection
- Eliminates settling of components thanks to balanced formulation



BONDING IN CONCENTRATED PHOTOVOLTAICS

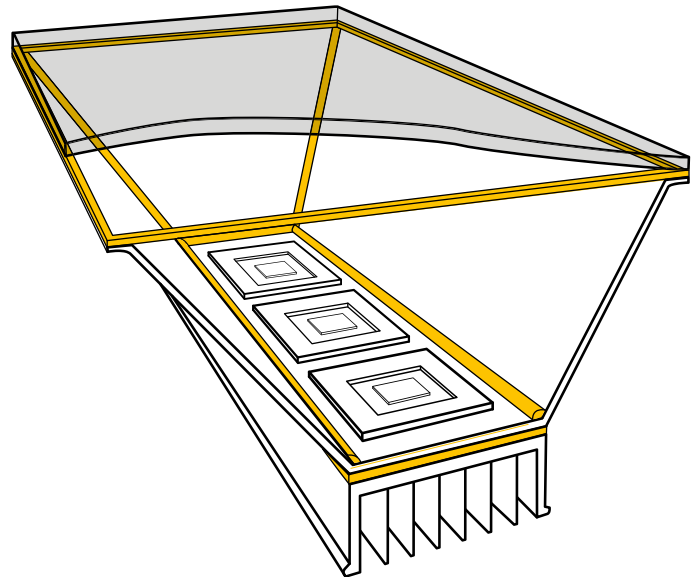
THE CONCENTRATED PHOTOVOLTAIC SYSTEM is a sophisticated technology which requires bonding and sealing products compatible with the diverse materials and processes. Sika offers a wide range of products for glass or PMMA lens bonding, the assembly of housing, or bonding of the cooling fins. As a result of the sophisticated technology, the precise structural bonding and weatherproof sealing is crucial.

Best recommended Sika products

Sikasil® AS-60	General purpose one-part silicone sealant, UL 94 HB, RTI 105°C
Sikasil® AS-70	One-part high performance structural silicone adhesive, UL 94 HB, RTI 105°C
Sikasil® AS-780	Fast curing two-part silicone adhesive with exceptional initial strength, UL 94 HB, RTI 105°C
Sikasil® AS-785	Two-part fast curing structural silicone adhesive, UL 94 V-1, RTI 105°C
Sikasil® AS-790	Two-part ultra-fast curing silicone adhesive, for high speed production lines, RTI 105°C

SYSTEM BENEFITS

- Shortens curing times for high production performance
- Allows simplified housing design
- Simplifies automation of production
- Offers best in class load and weathering resistance



FIXATION OF FLEXIBLE PHOTOVOLTAIC MODULES

FLEXIBLE PHOTOVOLTAIC TECHNOLOGIES take their role in the photovoltaic sector. As a light-weight solution, it is especially applicable for weight-sensitive applications, e.g. rooftop installations. However, even here, the fixing of the PV laminate to the sub-assembly is crucial. Sika has developed a special fixation solution for this application that has a proven track record following many years in the field. The tape is most suitable for roll-to-roll applications in production and for bonding on common module back sheets as well as metallic sheets.

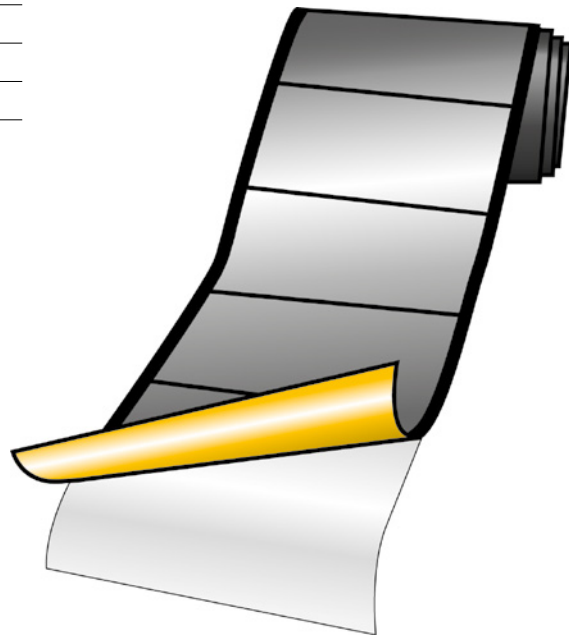
Best recommended Sika products

SikaLastomer®-68 Ethylene propylene copolymer tape

SikaLastomer®-18 Butyle tape

SYSTEM BENEFITS

- Ready-to-use system
- Full surface bonding
- Shows very good adhesion to numerous substrates
- Easy to use both during manufacturing and on-site



SOLUTIONS FOR BUILDING INTEGRATED PHOTOVOLTAICS (BIPV)

BUILDING INTEGRATED PHOTOVOLTAICS is an area where architectural design meets ecological responsibility. There is a challenge of getting the right balance between architectural appeal, optimal energy conversion and building functionality. Sika can call upon decades of experience with facade and insulating glass construction to support in planning and implementation for photovoltaic integrated designs.

Best recommended Sika products

Facades

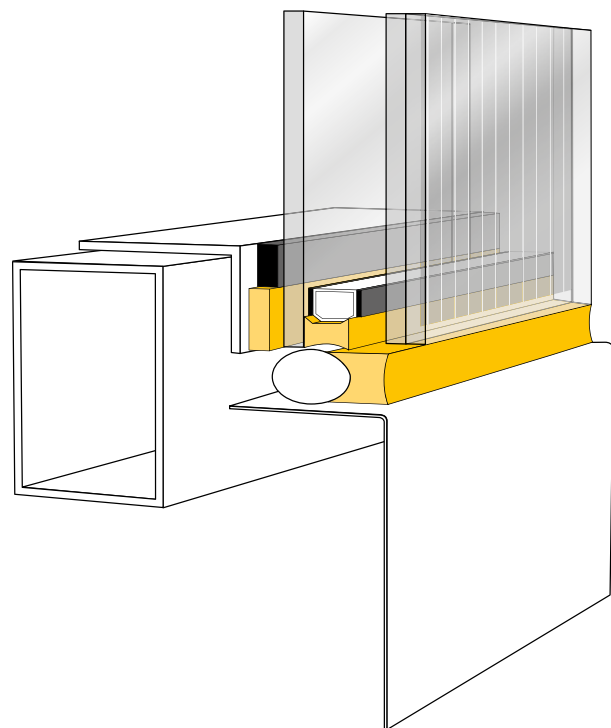
Sikasil® SG-500	Two-part structural glazing silicone
Sikasil® SG-20	One-part structural glazing silicone
Sikasil® WS-605 S	One-part silicone weather sealant
Sika® Spacer Tape HD	PU spacer tape
SikaMembran®	Water/Vapour-proofing EPDM membrane System

Insulating Glass

SikaGlaze® IG-5 PIB	Butyl IG primary seal
Sikasil® IG-16	One-part silicone for inert gas-filled IGU
Sikasil® IG-25	Two-part silicone for air-filled IGU
Sikasil® IG-25 HM Plus	Two-part silicone for inert gas-filled IGU

SYSTEM BENEFITS

- Gives increased architectural appeal
- Safety through aligned and tested products
- Savings in material thanks to structural bonding
- Manifold design options
- Proven solutions from facade and insulating glass industry
- Given EOTA ETAG 002 and ASTM approvals



SOLUTIONS FOR BUILDING ATTACHED PHOTOVOLTAICS (BAPV)

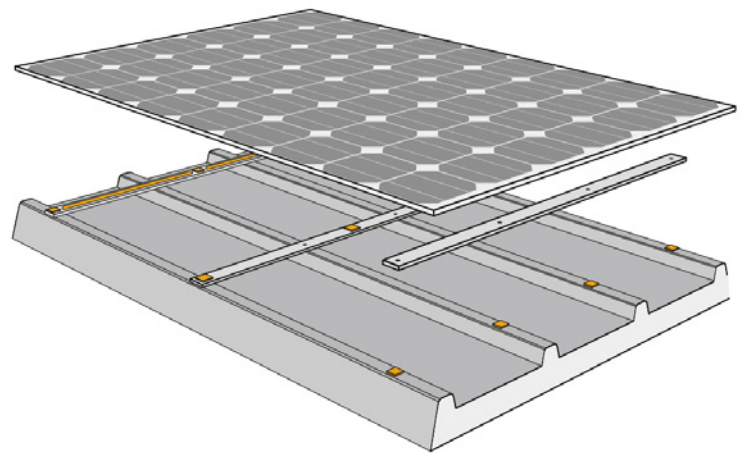
ESPECIALLY ON LIGHT WEIGHT ROOFS, bonded frameless modules show their greatest benefits. The bonding technology allows the construction of simplified BAPV systems for diverse roof constructions. It enables the usage of roofs as an energy provider with the most limited material consumption. Thanks to its simplicity, the limited material usage and material handling, it facilitates a faster and more cost effective way of roof installation by even increasing the aesthetical appeal.

Best recommended Sika products

Sikasil® SG-20	Structural one-part silicone adhesive, certified according to EOTA ETAG 002 and ASTM
Sikasil® AS-70	One-part high performance structural silicone adhesive, UL 94 HB, meets EOTA ETAG 002
Sika® Tape FA-22	High performance acrylic tape for pre-fixation and drill hole sealing

SYSTEM BENEFITS

- Reduces system costs thanks to material and time savings
- Eliminates heavy mounting constructions on roofs
- Shortens installation times on existing roofs
- Allows installations on light weight roofs
- Minimized material handling
- Facilitates self cleaning of modules by frameless systems



OUR PERFORMANCE – YOUR BENEFITS

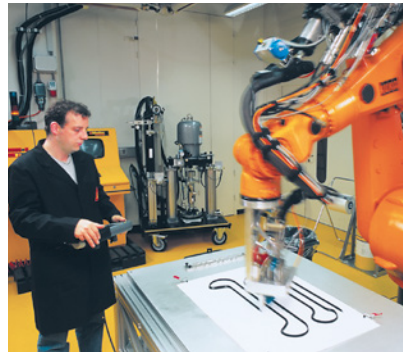
Performance	Benefit
Construction consultancy	<ul style="list-style-type: none"> ■ Review and consultancy of existing and new photovoltaic systems with regard to suitability for bonding ■ Advice on system improvements e.g. material choice or dimensioning
Functional testing	<ul style="list-style-type: none"> ■ Support with prototyping ■ Functional tests / test plan of entire system for compatibility, adhesion and function
Application technology	<ul style="list-style-type: none"> ■ Active consulting, including the selection of right application technology ■ Assist in system and equipment engineering for bonding technology ■ Support with application and quality procedures
Applicator training	<ul style="list-style-type: none"> ■ Preparation of operating manuals for bonding in conformity with ISO ■ Factory and on-site training of applicators
External approvals	<ul style="list-style-type: none"> ■ Best practice sample preparation

OUR CORE COMPETENCE – FROM DESIGN TO FIELD



Sika develops bonding and sealing solutions in close cooperation with its customers in the photovoltaic industry. To Sika, this means not only developing best-in-class technology solutions to match the customer's technical and commercial requirements, but also ensuring appropriate performance throughout the design, prototyping, validation and full production phases. Experts in Sika's R&D, Technical Service and System Engineering specialize in devising unique client-oriented solutions.

DESIGN AND SYSTEM ENGINEERING



Application oriented adhesives and sealants, as well as innovative construction methods are currently in high demand, which calls for design and application support. At Sika Solar Competence Centers, the most suitable solutions are developed in partnership with our customers to achieve the targeted results. Ultimately, this means reduced production costs, greater product reliability, improved aesthetic appeal and faster turn-around times, adding value to the activities of Sika customers.

TECHNICAL SERVICE



Sika Technical Service teams are located around the world and are dedicated to providing best practice selection, validation and application of Sika materials. By being located close to our customers, Sika Technical Service provides fast and reliable tests based on international or local standards and can assure optimum local language communication and understanding throughout the technical application development process to ensure the best possible results.



- 1 Bonded crystalline modules on light-weight roof
- 2 Bonding thin-film modules on roof
- 3 Bonded crystalline modules on catamaran

GLOBAL BUT LOCAL PARTNERSHIP



FOR MORE SOLAR SOLUTION INFORMATION:



www.sika.com/solar

WHO WE ARE

Sika AG, Switzerland, is a globally active specialty chemicals company. Sika supplies the building and construction industry as well as manufacturing industries (automotive, bus, truck, rail, solar and wind power plants as well as facades). Sika is a leader in processing materials used in sealing, bonding, damping, reinforcing and protecting loadbearing structures. Sika's product lines feature high-quality concrete admixtures, specialty mortars, sealants and adhesives, damping and reinforcing materials, structural strengthening systems, industrial flooring as well as roofing and waterproofing systems.

Our most current General Sales Conditions shall apply.
Please consult the Data Sheet prior to any use and processing.



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