BUILDING TRUST

PRODUCT DATA SHEET

Sikadur®-31+

Low-VOC epoxy adhesive for structural bonding and concrete repair

PRODUCT DESCRIPTION

Sikadur®-31+ is a two-part, low-VOC, moisture-tolerant epoxy structural adhesive which bonds to many construction materials. It is also used for structural concrete repairs, joint filling, and crack sealing. It can be used in both do-it-yourself (DIY) and professional applications.

USES

The Product is used as an adhesive for:
- Structural concrete repair (Principle 3, Method 3.1 of EN 1504-9). Repair of spalling and damaged concrete in buildings, bridges, infrastructure and superstructure works
- Structural strengthening (Principle 4, Method 4.3 of EN 1504-9). Bonding plate reinforcement
- Structural strengthening (Principle 4, Method 4.4 of EN 1504-9). Increasing the bearing capacity of the concrete structure by adding mortar

The Product is used for bonding the following materials:
- Concrete.
- Natural stone.
- Ceramics.
- Fibre cement.
- Mortar.
- Brick masonry.
- Brick slips.
- Steel.
- Iron.
- Wood.

The Product is used for repairing and reprofiling:
- Structural concrete elements such as beams, columns, and walls.
- Non-structural concrete elements.
- Small patches and edges.

The Product is used for filling and sealing:
- Joint arrises.
- Crack arrises.
- Non-structural static cracks.
- Holes.
- Voids.

CHARACTERISTICS / ADVANTAGES

- Easy to mix and apply
- Very low VOC (GEV Emicode EC1PLUS)
- Very good adhesion to many construction materials
- Very good initial and ultimate mechanical strength...
- Suitable for structural concrete repair, class R4 according to EN 1504-3:2005 (Structural and non-structural repair).
- Good adhesion to dry and mat damp concrete.
- Thixotropic: non-sag in vertical and overhead applications.
- No primer required.
- Good resistance to abrasion.
- Good resistance to specific chemicals.
- Differently coloured components for mixing control.
- Impermeable to most liquids and water vapour.
- Hardens without shrinkage.
- Application up to 30 mm thickness in one layer.
- Temperature application range +10 °C to +30 °C.

ENVIRONMENTAL INFORMATION

- Contributes towards satisfying Materials and Resources (MR) Credit: Building product disclosure and optimization — Environmental Product Declarations under LEED® v4.
- Contributes towards satisfying Materials and Resources (MR) Credit: Building Product Disclosure and Optimization — Material Ingredients under LEED® v4.
- Contributes towards satisfying Indoor Environmental Quality (EQ) Credit: Low-Emitting Materials under LEED® v4.
- Environmental Product Declaration (EPD) in accordance with EN 15804. EPD independently verified by Institut für Bauen und Umwelt e.V. (IBU).
- VOC emission classification GEV Emicode EC1PLUS.

APPROVALS / STANDARDS

- CE/UKCA marking and declaration of performance based on EN 1504-3:2005 Products and systems for the protection and repair of concrete structures — Structural and non-structural repair.
- CE/UKCA marking and declaration of performance based on EN 1504-4:2004 Products and systems for the protection and repair of concrete structures — Structural bonding.

PRODUCT INFORMATION

Product Declaration	▪ Complies with the general requirements of EN 1504-3: Class R4 ▪ Complies with the general requirements of EN 1504-4: Structural bonding for bonded plate reinforcement and bonded mortar or concrete
Chemical Base	Epoxy resin and selected fillers

Packaging

1.2 kg (A+B) container	8 × 1.2 kg carton box 32 boxes per pallet - 256 pieces
6 kg (A+B) container	96 containers per pallet
20 kg (A) container	22 containers (A) per pallet
10 kg (B) container	44 containers (B) per pallet

Shelf Life	24 months from date of production
Storage Conditions	The product must be stored in original, unopened and undamaged sealed packaging in dry conditions at temperatures between +5 °C and +30 °C. Always refer to packaging. Refer to the current Safety Data Sheet for information on safe handling and storage.

Colour

Part A	White
Part B	Dark grey
Part A+B mixed	Concrete grey

Density	Mixed resin (2.00 ± 0.1) kg/l. Density value at +23 °C.
Volatile organic compound (VOC) content	Compliant with VOC emission classification GEV-Emicode EC1PLUS

TECHNICAL INFORMATION

Compressive Strength

Class R4 (EN 1504-3)

~75 MPa (EN 12190)

Curing time	+10 °C	+23 °C	+30 °C
1 day	-	~50 MPa	~50 MPa
3 days	~50 MPa	~65 MPa	~70 MPa
7 days	~70 MPa	~75 MPa	~78 MPa

(EN 196-1)

Tensile Strength

Curing time	+10 °C	+23 °C
1 day	-	~8.5 MPa
3 days	~6 MPa	~16 MPa
7 days	~16 MPa	~20 MPa

(EN ISO 527-2)

Tensile Modulus of Elasticity	9 GPa (7 days at +23 °C)			(EN ISO 527-2)
Elongation at Break	0.3 % (7 days at +23 °C)			(EN ISO 527-2)
Shear Strength	~16 MPa			(EN 12615)
	50°	~35 MPa		(EN 12188)
	60°	~30 MPa		
	70°	~25 MPa		
Tensile adhesion strength	Pass			(EN 12636)
	Curing Time	**Substrate**	**Curing Temperature**	**Adhesion strength** (EN 12188; EN 1542)
	7 days	Concrete dry	+23 °C	> 5 MPa *
	7 days	Concrete mat damp	+23 °C	> 5 MPa *
	7 days	Steel	+23 °C	> 20 MPa
	* 100% concrete failure - no failure of the Product.			
Lap Shear Strength	50°	≥ 60 MPa		(EN 12188)
	60°	≥ 70 MPa		
	70°	≥ 80 MPa		
Shrinkage	~0.01 %			(EN 12617-1)
	3.0 MPa (Restrained shrinkage / expansion)			(EN 12617-4)
Coefficient of Thermal Expansion	4.8×10^{-5} ($\pm 0.2 \times 10^{-5}$) 1/K			(EN 1770)
Glass transition temperature	50 °C			(EN 12614)
Thermal Compatibility	Freeze and thaw	3.00 MPa		(EN 13687-1)
	Durability	Pass		(EN 13733)
Chemical Resistance	Resistant to many chemicals. Contact Sika Technical Services for additional information.			
Resistance to moisture	Sensitivity to water	Pass		(EN 12636)
Reaction to Fire	Class C-s1, d0 Class B_{fl}-s1			(EN 13501-1)

APPLICATION INFORMATION

Mixing Ratio	Part A : Part B = 2 : 1 by weight or volume
Consumption	~2.0 kg/m² per mm of thickness. Note: Consumption data is theoretical and does not allow for any additional material due to surface porosity, surface profile, variations in level, wastage or any other variations. Apply product to a test area to calculate the exact consumption for the specific substrate conditions and proposed application equipment.
Layer Thickness	30 mm maximum. For non-structural adhesive or other applications, if layer thickness's of >30 mm are required, apply in successive 30 mm layers or once the previous layer has hardened. The surface of the freshly applied intermediate layers should be scratched to form a key for subsequent layers. If layer application is to be longer than 2 days, the wet applied adhesive must be blinded to excess with quartz sand immediately after application
Sag Flow	Non-sag up to 20 mm thickness on vertical surfaces (EN 1799)

Product Temperature	Maximum	+30 °C
	Minimum	+10 °C
Ambient Air Temperature	Maximum	+30 °C
	Minimum	+10 °C
Dew Point	Beware of condensation. Steel substrate temperature during application must be at least +3 °C above dew point.	
Substrate Temperature	Maximum	+30 °C
	Minimum	+10 °C
Substrate Moisture Content	Substrates must be dry or matt damp (no standing water). Brush the adhesive well into the substrate if matt damp.	

Pot Life (ISO 9514)

Temperature	Pot Life
+23 °C	~60 minutes
+30 °C	~45 minutes

Open Time (EN 12189)

Temperature	Open Time
+23 °C	~75 minutes
+30 °C	~45 minutes

VALUE BASE

All technical data stated in this Product Data Sheet are based on laboratory tests. Actual measured data may vary due to circumstances beyond our control.
IMPORTANT
Damage due to excessive long-term load
Sikadur® resins are formulated to have low creep under long-term load. However, due to the creep behaviour of all polymer materials under load, the long-term structural design load must account for creep.
a) Ensure that the long-term structural design load is lower than 20 % to 25 % of the short-term failure load.

b) Consult a structural engineer for calculating the admissible load for the specific application.

ECOLOGY, HEALTH AND SAFETY

User must read the most recent corresponding Safety Data Sheets (SDS) before using any products. The SDS provides information and advice on the safe handling, storage and disposal of chemical products and contains physical, ecological, toxicological and other safety-related data.

APPLICATION INSTRUCTIONS

SUBSTRATE QUALITY

CONCRETE, MASONRY, MORTAR, STONE
Concrete and mortar must be at least 28 days old. Substrates must be sound, clean, dry or matt damp but free of standing water. Substrates must be free of contaminants such as ice, dirt, oil, grease, coatings, laitance, efflorescence, surface treatments and loose friable material.

STEEL
Surfaces must be sound, clean, dry and free of contaminants such as dirt, oil, grease, coatings and loose friable material.
WOOD
Surfaces must be sound, clean, dry and free of contaminants such as dirt, oil, grease, coatings and loose friable material.

SUBSTRATE PREPARATION

IMPORTANT
Reduced adhesion due to surface contamination
Surface contaminants such as dust and loose material, including the contaminants generated during substrate preparation, can reduce the Product's performance.
1. Before applying the Product, clean thoroughly all substrate surfaces using vacuum or dust removal equipment.

CONCRETE, MASONRY, MORTAR OR STONE
Suitable techniques for substrate preparation include the following:
- Abrasive blast cleaning
- Needle gunning
- Light scabbling
- Bush hammering
- Grinding

Prepare the substrate mechanically using a suitable technique to ensure the substrate has an open-textured, gripping surface profile.
STEEL
Suitable techniques for substrate preparation include the following:
- Abrasive blast cleaning
- Rotating wire brush
- Grinding

Prepare the substrate mechanically using a suitable technique to ensure the substrate has a bright metal

finish with a surface profile to satisfy the necessary tensile adhesion strength requirement.

WOOD

Prepare the substrate by planing, sanding or using other suitable equipment.

MIXING

IMPORTANT

Poor workability and unfavourable handling time due to wrong mixing

When using multiple units during application, do not mix the following unit until the previous unit has been used.

PRE-BATCHED UNITS

1. **IMPORTANT:** Mix full units only. Prior to mixing all parts, mix part A (resin) briefly using a mixing spindle attached to a slow-speed electric mixer (max. 300 rpm).
2. Add part A to part B (hardener) and mix parts A+B continuously for at least 3 minutes until a uniformly coloured, smooth consistency mix has been achieved.
3. **IMPORTANT:** Do not overmix. To ensure thorough mixing, pour materials into a clean container and mix again for approximately 1 minute. Mixing time for A+B = 4 minutes.

APPLICATION

IMPORTANT

Damage due to unsupported heavy components applied vertically or overhead

Full adhesion is not achieved before the Product has fully hardened. Hardening depends on ambient temperatures. Unsupported heavy components might fall down when not supported.

1. Provide temporary support for heavy components until the Product has fully hardened.

BONDING

Preconditions: Prior to application confirm dew point conditions before and during application.

1. **IMPORTANT:** On damp prepared concrete substrates, always apply the Product by brush and work the Product well into the substrate. Apply the mixed adhesive to the prepared surfaces with a spatula, trowel, notched trowel or by gloved hand.
2. For optimum adhesion apply the adhesive to both surfaces that require bonding.
3. For heavy components positioned vertically or overhead, provide temporary support until the Product has fully hardened.

REPAIR

Preconditions: Prior to application confirm dew point conditions before and during application.

1. Place temporary formwork as required.
2. **IMPORTANT:** On damp prepared concrete substrates, always apply by brush and work the Product well into the substrate. Apply the mixed adhesive to the prepared surfaces with a spatula, trowel or by gloved hand.

For repairs greater than 30 mm deep the Product must be applied in layers.

1. Roughen the surface of the freshly applied intermediate layer by scratching it to enable better adhesion of the subsequent layer.
2. Apply subsequent layers once the previous layer has hardened.
3. If the time between layers is going to be more than 2 days, blind the wet adhesive to excess with quartz sand immediately after application.

JOINT FILLING AND CRACK SEALING

1. Apply the mixed adhesive to the prepared surfaces with a spatula or trowel.

CLEANING OF TOOLS

Clean all tools and application equipment with Sika® Thinner C immediately after use. Hardened material can only be removed mechanically.

LOCAL RESTRICTIONS

Please note that as a result of specific local regulations the performance of this product may vary from country to country. Please consult the local Product Data Sheet for the exact description of the application fields.

LEGAL NOTES

The information, and, in particular, the recommendations relating to the application and end-use of Sika products, are given in good faith based on Sika's current knowledge and experience of the products when properly stored, handled and applied under normal conditions in accordance with Sika's recommendations. In practice, the differences in materials, substrates and actual site conditions are such that no warranty in respect of merchantability or of fitness for a particular purpose, nor any liability arising out of any legal relationship whatsoever, can be inferred either from this information, or from any written recommendations, or from any other advice offered. The user of the product must test the product's suitability for the intended application and purpose. Sika reserves the right to change the properties of its products. The proprietary rights of third parties must be observed. All orders are accepted subject to our current terms of sale and delivery. Users must always refer to the most recent issue of the local Product Data Sheet for the product concerned, copies of which will be supplied on request.

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