BUILDING TRUST

PRODUCT DATA SHEET

Sikadur®-31+

2-part Low VOC Epoxy Adhesive for Structural Bonding and Concrete Repair

PRODUCT DESCRIPTION

Sikadur®-31+ is a 2-part, low VOC epoxy based, moisture tolerant, thixotropic, structural adhesive which bonds most construction materials. It has high mechanical strengths and can also be used for structural concrete repairs, joint filling and crack sealing. Sikadur®-31+ can be used in do it yourself (DIY) applications, in addition to the traditional professional applications.

USES

Suitable 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.
Suitable for structural strengthening (Principle 4, Method 4.3 of EN 1504-9). Bonding plate reinforcement.
Suitable for structural strengthening (Principle 4, Method 4.4 of EN 1504-9). Adding mortar.
The Product can be used for interior and exterior use.

STRUCTURAL ADHESIVE FOR BONDING:
- Concrete elements.
- Hard natural stone.
- Ceramics and Fibre Cement.
- Mortar, Bricks and Masonry.
- Steel, Iron and Aluminium.
- Wood.
- Polyester and Epoxy.
- Glass.

REPAIR AND REPROFILING FOR:
- Structural (beams, columns, walls, etc.) and non-structural concrete elements.
- Small patches and edges.
- Concrete honeycombing.
- Metal profiles.
- Bonding brick slips.

FILLING AND SEALING FOR:
- Joint and crack arris.
- Sealing non-structural static cracks.
- Holes and voids.

CHARACTERISTICS / ADVANTAGES

- Easy to mix and apply.
- Very low VOC (GEV Emicode EC1PLUS).
- Very good adhesion to most construction materials.
- High initial and ultimate mechanical strength.
- Suitable for structural concrete repair, classification R4.
- Good adhesion to dry and matt damp concrete.
- Thixotropic: non-sag in vertical and overhead applications.
- No primer needed.
- Good abrasion and chemical resistance.
- Different 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

- Conforms with LEED v4 MR credit: Building product disclosure and optimization — Environmental Product Declarations (Option 1).
- Conforms with LEED v4 MR credit: Building product disclosure and optimization — Material Ingredients (Option 2).
- Conforms with LEED v4 EQ credit: Low-emitting materials.
- 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 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 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 x 1.2 kg carton box	32 boxes per pallet - 256 pieces

6 kg (A+B) container

Pre-batched container	72 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.

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)

(EN 196-1)

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

Tensile Strength

(EN ISO 527-2)

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

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 matt damp	+23 °C	> 5 MPa *
	7 days	Steel	+23 °C	> 20 MPa
	* 100% concrete failure			

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 thicknesses of >30 mm are required, apply in successive 30 mm layers once the previous layer has hardened and cooled. 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 Data Sheet are based on laboratory tests. Actual measured data may vary due to circumstances beyond our control.

LIMITATIONS

Sikadur® resins are formulated to have low creep under permanent loading. However, due to the creep behavior of all polymer materials under load, the long term structural design load must account for creep. Generally, the long term structural design load must be lower than 20–25 % of the failure load. A structural engineer must be consulted for load calculations for the specific application.

ECOLOGY, HEALTH AND SAFETY

Local safety regulations must be observed and it advisable to wear PPI when working with this product with particular attention paid to cutting and handling. Transportation Class: The product is not classified as hazardous good for transport. Disposal: The material is recyclable. Disposal must be according to local regulations. Please contact your local Sika sales organisation for more information.

APPLICATION INSTRUCTIONS

SUBSTRATE QUALITY

CONCRETE / MASONRY / MORTAR / STONE
Concrete and mortar must be at least 3–6 weeks old. Substrate surfaces must be sound, clean, dry or matt damp; free from standing water, ice, dirt, oil, grease, coatings, laitance, efflorescence, old surface treatments, all loose particles and any other surface contaminants that could affect adhesion of the adhesive.
STEEL
Surfaces must be clean, dry, free from oil, grease, coatings, rust, scale, all loose particles and any other surface contaminants that could affect adhesion of the adhesive.
WOOD
Substrate surfaces must be sound, clean, dry and free from dirt, oil, grease, coatings, all loose particles and any other surface contaminants that could affect adhesion of the adhesive.

SUBSTRATE PREPARATION

IMPORTANT
Reduced adhesion performance
Surface contamination such as dust and loose material, including that caused during substrate preparation, can reduce Sikadur®-31+'s performance.
Thoroughly clean all substrate surfaces before application of Sikadur®-31+ by vacuum / dust removal equipment.
CONCRETE / MASONRY / MORTAR / STONE
Prepare substrates mechanically using suitable abrasive blast cleaning, needle gunning, light scabbling, bush hammering, grinding or using other suitable equipment to achieve an open textured, gripping surface profile.
STEEL
Prepare surfaces mechanically using suitable abrasive blast cleaning, grinding, rotating wire brush or other suitable equipment to achieve a bright metal finish with a surface profile to satisfy the necessary tensile adhesion strength requirement.
Avoid dew point conditions before and during application.
WOOD
Prepare surfaces by planing, sanding or using other suitable equipment.

MIXING

IMPORTANT
Maintaining workability and handling time.
When using multiple units during application, do not mix the following unit until the previous one has been used.
PRE-BATCHED UNITS
1. Mix only the quantity which can be used within its pot-life.
2. Prior to mixing all parts, mix Part A (resin) briefly using a mixing spindle attached to a slow speed electric mixer (maximum 300 rpm).

3. Add Part B (hardener) to Part A and mix Parts A+B continuously for at least 3 minutes until a uniformly coloured smooth consistency mix has been achieved.
4. To ensure thorough mixing, pour materials into a clean container and mix again for approximately 1 minute. Overmixing must be avoided to minimise air entrainment. Mix full units only. Total mixing time for Parts A+B = 4.0 minutes.

APPLICATION

IMPORTANT
Provide temporary support for heavy components positioned vertically or overhead.
ADHESIVE
1. Apply mixed adhesive to the prepared surfaces with a spatula, trowel, notched trowel or by gloved hand.
2. For optimum adhesion apply adhesive to both surfaces that require bonding.
3. For heavy components positioned vertically or overhead, provide temporary support until Sikadur®-31+ has fully hardened / cured. Hardening and curing will be dependent on ambient temperatures.

REPAIR
1. Apply mixed adhesive to the prepared surfaces with a spatula, trowel or by gloved hand.
2. Use temporary formwork as required.

JOINT FILLING AND CRACK SEALING
1. Apply mixed adhesive to the prepared surfaces with a spatula or trowel.

CLEANING OF TOOLS

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

LOCAL RESTRICTIONS

Note that as a result of specific local regulations the declared data and recommended uses for this product may vary from country to country. Consult the local Product Data Sheet for the exact product data and uses.

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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