Construction

Sika Carbodur® Plates

Ultra High Modulus CFRP

Product Description	Sika CarboDur® Ultra High Modulus Plates are high performance, corrosion resistant carbon fibre plates manufactured to individual project dimensional specifications. When used in conjunction with the appropriate SikaDur® structural epoxy adhesive, they form the Sika CarboDur® Ultra High Modulus Plate System.
Uses	■ To strengthen structures for: ■ Load increase ■ Increasing the capacity of floor slabs and beams ■ Increasing the capacity of bridges to accommodate increase axle loads ■ Deterioration of original construction materials ■ Service improvements ■ Reduced deflection ■ Stress reduction in steel ■ Reduced fatigue ■ Change in structural system ■ Removal of walls or columns ■ Change of specification

Characteristics / Advantages

- Excellent durability
- Lightweight
- Low overall thickness, can be coated
- Easy transportation
- Outstanding fatigue resistance
- Minimal preparation of plate
- Combinations of high strength and modulus of elasticity available
- High alkali resistance
- Clean edges without exposed fibres
- Particularly suited to strengthening metallic structures.
- Individually manufactured plates to required dimensions.
- Excellent durability and resistance to corrosion.
- Lightweight.
- Tapered ends to minimise peel stresses.
- Single adhesive substrate/plate bond line.
- Minimum disruption to service environment.
- Fast and economical - no heavy handling and installation equipment.
- Low aesthetic impact.
- Non corrosive
- Ultra High Modulus

Product Data

Form

Appearance / Colours	Colour: Black
Dimensions	Manufactured individually on a project basis

Storage

Storage Conditions / Shelf-Life	Unlimited (no exposure to direct sunlight, dry).

Technical Data

Chemical Base	Carbon fibre reinforced polymer with an epoxy matrix
Density	~ 1.70 kg/l
Fibre Content	>55%

Mechanical / Physical Properties

Tensile strength (mean):	1110 N/mm^2
Tensile E-modulus (mean):	360,000 N/mm^2
Elongation at break:	0.3%

System Information

Application Details

Substrate Preparation

The metallic surface shall be grit blasted to ISO 8501-1 grade SA 2.5 using a hard angular grit, free from grease, oil, rust and any other contaminants which could reduce or prevent adhesion, to give a blast surface (peak to trough) amplitude between 50 and 100 microns. A maximum variation in level of plus or minus 3 mm over a distance of 300 mm in any direction should be achieved. Any inclusion or sharp arising must be ground out to give a radius of at least 10 mm.
Following grit blasting all dust shall be removed from the surface.
In the event that bonding of the carbon fibre is to take place more than 4 hours after exposure of the bare substrate. A corrosion protection primer of **Icosit® EG1** at a dry film thickness of 50-75 microns should be applied.
This primer should be allowed to cure for a minimum of 12 hours at 15℃.
The bonding surface of the plate is protected with a disposable peel ply layer. The peel ply should be fully removed immediately before the bonding operation starts. The layer is easiest to remove as a continuous strip.
The metallic surfaces must be cleaned and degreased using **Sika® Thinner C** by lightly brushing with a stiff brush prior to the application of **Icosit EG1** and **SikaDur** structural epoxy adhesive.
Be careful to avoid water condensation (dew point).
Priming can be done with Sikagard®-63N as temporary corrosion protection; or Icosit-EG1 as permanent corrosion protection.

	+10℃	+20℃	+30℃
1) Maximum waiting time between - Blastcleaning of steel and - Primer / or Sikadur®-30 or Sikadur®-31 PBA (application without priming possible, if no corrosion protection is needed)	48 hours	48 hours	48 hours
2) Minimum waiting time between - Primer and - Sikadur®-30 or Sikadur®-31 PBA application (**without** additional preparation of the Primer)	48 hours	24 hours	12 hours
3) Maximum waiting time between - Primer and - Sikadur®-30 or Sikadur®-31 PBA application (**without** additional preparation of the Primer)	7 days	3 days	36 hours
4) Waiting time between - Primer and - Sikadur®-30 or Sikadur®-31 PBA application (**with** additional preparation of the Primer)*	>7 days	>3 days	>36 hours

*If additional preparation of the primer is necessary (4), it shall be done at the earliest, the day before application. After preparation of the primer, the surface has to be cleaned/vacuumed free from dust.

Plate preparation:

Immediately prior to the application of Sikadur®-30 or Sikadur®-31 PBA, solvent wipe the bonding surface with Thinner C to remove any contaminants. Wait until the surface is dry before applying the adhesive.

Application Conditions / Limitations

Substrate Temperature	See the Product Data Sheet for Sikadur®30 or Sikadur®-31 PBA
Ambient Temperature	See the Product Data Sheet for Sikadur®30 or Sikadur®-31 PBA
Substrate Humidity	See the Product Data Sheet for Sikadur®30 or Sikadur®-31 PBA
Dew Point	See the Product Data Sheet for Sikadur®30 or Sikadur®-31 PBA

Application Instructions

Mixing	See the Product Data Sheet for Sikadur®30 or Sikadur®-31 PBA
Mixing Time	See the Product Data Sheet for Sikadur®30 or Sikadur®-31 PBA
Application Method / Tools	Place the Sika® CarboDur® plate on a table and remove the peel ply from the bonding surface. Apply the well-mixed Sikadur®-30 or Sikadur®-31 PBA adhesive with a special “dome” shaped spatula onto the clean CarboDur® plate. Apply the Sikadur®-30 or Sikadur®-31 PBA adhesive carefully to the properly cleaned and prepared substrate, with a spatula to form a thin layer. Within the open time of the adhesive, place the Sikadur®-30 or Sikadur®-31 PBA coated Sika® CarboDur® plate onto the Sikadur® coated surface. Press the plate into the adhesive until the material is forced out on both sides of the laminate. Remove surplus adhesive. **Quality assurance:** Samples must be made up on site for quality control of curing rate and strength. Average standard values after curing 7 days at +23℃ are: - Compressive strength > 75 N/mm^2 - Flexural strength > 35 N/mm^2 These values can differ by up to 20% dependent on the circumstances. The following are the most important factors which can have a negative influence on the mechanical properties: - Air entrapment in the sample (from mixing or filling into the mould!) - Curing temperature / time - Contamination of the adhesive! Therefore care should be taken to avoid these situations. **Application Tools:** Thinner C: For cleaning of Sika® CarboDur® plate before bonding, cleaning of application tools. Sika® Mixing Spindle: For minimizing air entrapment.
Cleaning of Tools	Clean all tools and application equipment with Thinner C immediately after use. Cured material can only be mechanically removed.
Pot Life	See the Product Data Sheet for Sikadur®-30 or Sikadur®-31 PBA
Notes on Application / Limitations	A suitably qualified Engineer must be responsible for the design of the strengthening works. **This application is structural and great care must be taken in selecting suitably experienced and trained specialist labourers.** Only apply plates within the open time of Sikadur®-30 or Sikadur®-31 PBA. Site quality control should be supported/monitored by an independent testing authority. Care must be taken when cutting plates. Use suitable protective clothing, gloves, eye protection and respirator. The Sika®CarboDur®System must be protected from permanent exposure to direct sunlight. Maximum permissible service temperature is approx. +50℃. The instructions in the Technical Data Sheet must be followed when applying Sikadur®-30 adhesive or Sikadur®-31 PBA. Note: Detailed advice on the above must always be obtained from Sika® Services AG.
Fire Protection	If required Sika® CarboDur® plates may be protected with fire resistant material. When the Sikadur®-30 or Sikadur®-31 PBA has cured, test for voids by tapping the surface of the plate with metallic object or impulse-thermography. Coating: The exposed plate-surface can be painted with a coating material such as Sikagard®-550W Elastic or Sikagard®-ElastoColor W.

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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.
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.
Health and Safety Information	For information and advice on the safe handling, storage and disposal of chemical products, users shall refer to the most recent Material Safety Data Sheet containing physical, ecological, toxicological and other safety-related data.
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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