BUILDING TRUST

PRODUCT DATA SHEET

Sikacrete®-920 UHP

Ultra-high performance (UHP) cementitious concrete repair mortar with optional steel fibre-reinforcement to produce an ultra-high-performance fibre-reinforced concrete (UHPFRC)

PRODUCT DESCRIPTION

Sikacrete®-920 UHP is a one-part, cementitious, ultra-high strength concrete repair mortar which can be mixed with steel fibres on demand to obtain an ultra-high-performance fibre-reinforced concrete (UHPFRC). Suitable for strengthening of existing steel reinforced concrete structures by supplementing the steel reinforced concrete and for structures made of UHPFRC with steel reinforcement. Layer thickness up to 80 mm. Sikacrete®-920 UHP with steel fibres meets the requirements of SIA 2052 (UB).

USES

Sikacrete®-920 UHP is recommended for:

- Refurbishment of bridge structural decks and car park slabs.
- Creation of, and repair of, floors.
- Construction of prefabricated elements (e.g. drainage channels, columns, etc.).
- Other application fields (e.g. abrasion-exposed hydraulic and industrial structures).
- Reducing specified concrete thicknesses.
- Any structure requiring UHP or UHPFRC.

CHARACTERISTICS / ADVANTAGES

- Ultra-high mechanical properties.
- Adaptable - can be used with or without steel fibres.
- Ideal for structures subjected to high stress or repeated loading, but cannot be renovated regularly (e.g. highway bridges).
- When compared against conventional concrete, reduced amount required to provide same properties.
- Allows significant reduction of application thickness, or reduced area of structural elements (e.g. beams, pillars, columns, etc.).
- Homogeneous and uniform in nature - no coarse aggregate which could segregate.
- Post-crack tensile strength.
- Very high energy-absorbing properties ('toughness').
- High impact and abrasion resistance.
- Resistant to dynamic loading and seismic activity.
- Very dense material, with low porosity and permeability.
- Minimised crack tendency for long durability.
- Excellent freeze-thaw resistance.
- Rapid strength gain, accelerating construction times.
- Cost-effective (reduced thicknesses required, shortened construction times, low maintenance costs and depreciation, etc.).
- Euroclass A1 reaction to fire.

PRODUCT INFORMATION

Chemical Base	Powder component: cement, additives and selected aggregates Optional second component: steel fibres (Bekaert OL Steel Fiber 13/.20 or Krampe Harex DG 12.5/.20)
Packaging	25 kg standard bag and 900 kg bulk bags (steel fibres are available in 20kg bags)
Appearance / Colour	Grey powder
Shelf Life	6 months from date of production
Storage Conditions	Product must be stored in original, unopened and undamaged sealed pack-

	aging in dry conditions at temperatures between +5 °C and +30 °C.
Product Declaration	▪ Complies with the general requirements of EN 1504-3: Class R4. ▪ Mixed with steel fibres, it complies with the requirements of SIA 2052: Class UB.
Maximum Grain Size	Approximately 1.0 mm
Soluble Chloride Ion Content	≤ 0.05 % (EN 1015-17)

TECHNICAL INFORMATION

Abrasion Resistance	Hydraulic abrasion	CNR 0.9 (Classe RM2)	(NFP 18-490)
Compressive Strength	Sikacrete®-920 UHP without steel fibres:		
	24 hours	≥ 45 MPa	(EN 12190)
	7 days	≥ 90 MPa	
	28 days	≥ 115 MPa	
	Concrete class without steel fibres	C110/125	(EN 206)
	Sikacrete®-920 UHP with steel fibres:		
	24 hours	≥ 75 MPa	(EN 12190)
	7 days	≥ 135 MPa	
	28 days	≥ 160 MPa	
Modulus of Elasticity in Compression	Without steel fibres: ~40 GPa		(EN 13412)
Flexural Strength	Sikacrete®-920 UHP without steel fibres:		
	24 hours	≥ 6 MPa	(EN 12190)
	7 days	≥ 10 MPa	
	28 days	≥ 17 MPa	
	Sikacrete®-920 UHP with steel fibres:		
	24 hours	≥ 17 MPa	(EN 12190)
	7 days	≥ 30 MPa	
	28 days	≥ 35 MPa	
Tensile Strength	UHPFRC Type UB (with 250 kg steel fibres per m³ mortar added; 12.5%, weight % of powder)		
	f_{ute}	> 10 MPa	(SIA 2052)
	f_{utu}	> 12 MPa	
	e_{utu}	> 2 ‰	
Shrinkage	~300 µm/m after 28 days **NOTE:** Data determined with product without fibres.		(EN 12617-4)
Tensile adhesion strength	28 days	≥ 4.0 MPa	(EN 1542)
Reaction to Fire	Euroclass A1		(EN 13501-1)
Freeze Thaw De-Icing Salt Resistance	Bond strength on concrete after freeze-thaw (50 cycles with salt)	≥ 3.5 MPa	(EN 13687-1)
Capillary Absorption	**Without steel fibres:** 0.02 kg/(m² * h$^{0.5}$)	**With steel fibres:** 0.029 kg/(m² * h$^{0.5}$)	(EN 13057)
Water Penetration under Pressure	~3 mm (at 5 bar, without steel fibres)		(EN 12390-8)
Carbonation Resistance	dk ≤ control concrete MC (0.45)		(EN 13295)
Service Temperature	-30 °C to +80 °C		

Chloride Ion Ingress	Without steel fibres: < 0.134%	(EN 13396)

APPLICATION INFORMATION

Mixing Ratio	9.2 to 9.9 % water: ▪ 2.3 to 2.45 litres of water for 25 kg of powder ▪ 83 to 89 litres of water for 900 kg of powder Optional steel fibre dosage: 250 kg/m³ mortar (~3.2 Vol%) ▪ 3.12 kg of steel fibres per 25 kg of powder ▪ 112 kg of steel fibres per 900 kg of powder **NOTE:** Recommended steel fibres: Bekaert Dramix OL 13/.20 or Krampe Harex DG 12.5/.20.	
Consumption	Approximately 2,130 kg powder is needed to prepare 1 m³ of fresh mortar (~2.13 kg/m² and mm thickness). **NOTE:** Consumption depends on the roughness and absorbency of the substrate. This figure is theoretical and does not allow for any additional material due to surface porosity, surface profile, variations in level or wastage, etc.	
Yield	Without fibres: ▪ 25 kg of powder will yield ~11.7 litres of mortar. ▪ 900 kg of powder will yield ~420 litres of mortar. With fibres: ▪ 25 kg of powder will yield ~12.2 litres of mortar. ▪ 900 kg of powder will yield ~440 litres of mortar.	
Layer Thickness	20 mm to 80 mm	
Ambient Air Temperature	+5 °C to +30 °C	
Substrate Temperature	+5 °C to +30 °C	
Pot Life	with 9.2 % water	~20 to 30 minutes (at +20 °C)
	with 9.9 % water	~45 to 60 minutes (at +20 °C)
	NOTE: Pot life is strongly influenced by water demand!	
Applied Product Ready for Use	Walkable after approximately	12 hours at temperatures over +10 °C
	Trafficable after approximately	24 hours at temperatures over +10 °C
Initial set time	~3 hours at +20 °C	
Final set time	Approximately 8 to 9 hours at +20 °C	
Fresh mortar density	Without fibres: approximately 2.33 kg/l	With fibres: approximately 2.5 kg/l

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.

LIMITATIONS

- Sikacrete®-920 UHP is for professional use only!
- Do not add water over the recommended dosage.
- Apply only to stable, prepared substrates.
- Do not add additional water during the surface finish, as this can cause discolouration and cracking.
- Protect freshly applied material from freezing.
- Do not feather edge.

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

NOTES ON INSTALLATION

For professional use only!

Strictly follow installation procedures as defined in method statements, application manuals and working instructions which must always be adjusted to the actual site conditions.

SUBSTRATE PREPARATION

Concrete must be fully cured, clean and sound to ensure good adhesion. All loose traces of concrete or mortar, dust, grease oil, etc., must be removed. Damaged or contaminated concrete must be removed to obtain a keyed surface. Non-impact / vibrating cleaning methods (e.g. shot blasting, sandblasting or high-pressure water jetting) are recommended. Aggregate should be clearly visible on the surface of the concrete structure after surface preparation.
Cut the edges of the repair vertically to a minimum depth of 20 mm.

Water saturation

Saturate the concrete substrate with water for at least 12 hours before application. The surface shall be matt-damp (saturated surface dry); any standing water on the substrate must be removed.
Insufficient saturation of the substrate before application means that the UHPB does not achieve its full mechanical properties.

Bonding slurry (optional)

For very well prepared, matt-damp substrates with a roughness depth of 3 to 5 mm, a bonding bridge is generally not required.
If the bonding requirements are very high, the use of SikaScreed®-20 EBB is recommended. Alternatively, Sika MonoTop®-1010 can be used for normal bonding requirements.

MIXING

Mixing Sikacrete®-920 UHP requires a high shear mixer and qualified personnel on-site. The number of mixers should be adjusted to reduce waiting time between batches, depending on the volume of material to be placed. Since a wheelbarrow or a buggy will be used to transport the fresh material to the pouring location, the mixer(s) must be raised high enough to ensure that it discharges properly. A platform can also be used next to the mixer to allow workers to batch prorperly and safely. The mixer(s) should be kept as clean as possible between batches in order to guarantee the performance of subsequent batches. Alternative methods of transporting the prepared Sikacrete®-920 UHP can be approved, such as a vehicle mounted agitators and pumps. All alternatives should be discussed with your Sika® representative prior to commencing.

Mixing procedure: wet down the mixer and add the minimum or pre-defined amount of water and start the mixer. Add the powder while mixing and - in case of fibre addition - gradually introduce all steel fibres. Continue mixing until an homogeneous mix is achieved (typically at least 5 to 8 minutes are required). Eventually add more water untile the desired consistency is achieved, but do not exceed the maximum allowed water amount! The total mixing time should be no longer than 8 to 10 minutes.
Small amounts of material can also be mixed using a dual paddle mixer attached to a powerful electric drill using the same mixing procedure as described before.
NOTE: Suitability for installation of slopes must be demonstrated on a project-specific basis. Experience has shown that, depending on the roughness of the substrate and working with a water amount around the minimum stated, slopes of up to 3% are possible.

APPLICATION

Do not apply Sikacrete®-920 UHP in direct sunlight and / or strong wind. Do not apply Sikacrete®-920 UHP at temperatures below +5 °C, nor above +30 °C.
The mixed Sikacrete®-920 UHP mortar should be placed as quickly as possible after it has been properly mixed and discharged into a wheelbarrow or dumper. Transport the mixed mortar to the prepared application area and pour onto the prepared and matt-damp substrate. Spread the mortar to the desired thickness. Sikacrete®-920 UHP is self-consolidating and can be easily levelled.
Use the material 5 to 15 minutes after mixing to take advantage of the optimum flow properties. The placement has to be finished within the pot life of the mix (approximately 20 to 40 minutes at +20 °C, depending on the water amount used).
When finishing the surface of an overlay, it is recommended to use a vibrating screed to uniformly distribute the mortar. Adding additional water to the surface of the material for finishing purposes is not permitted. To facilitate smoothing of the surface, an intermediate treatment can be sprayed uniformly over the surface after the first smoothing.

CURING TREATMENT

Protect fresh mortar immediately from premature drying using an appropriate curing method (e.g. an approved Sika® curing compound, wetted jute, burlap or similar, moist geotextile membrane, hessian, polyethylene sheet, etc.).
The curing period is dependent on ambient conditions.
NOTE: Curing compounds must not be used when they could adversely affect subsequently applied products and systems.

CLEANING OF TOOLS

Clean all tools and application equipment with water immediately after use. Hardened material can only be mechanically removed.

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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