

PRODUCT DATA SHEET

Sika MonoTop®-4012

Cementitious R4 concrete repair mortar containing recycled waste materials

PRODUCT DESCRIPTION

Sika MonoTop®-4012 is a 1-part, cementitious, fibre reinforced, low shrinkage repair mortar. It contains recycled waste materials and can reduce the carbon footprint application activity calculations.

USES

Sika MonoTop®-4012 may only be used by experienced professionals.

Repairs to all types of reinforced concrete structures and components for:

- Buildings
- Civil engineering structures
- Marine structures
- Dams
- Structures requiring a Class R4, R3, R2 or R1 mortar
- Interior and exterior use

CHARACTERISTICS / ADVANTAGES

- Uses recycled waste materials
- Layer thickness 6–120 mm.
- Sulphate resistant
- Hand and machine application (wet spray technique)
- Easy to apply
- Very low shrinkage behaviour
- Does not require a bonding primer
- Low permeability
- A1 fire rating
- Class R4 of EN 1504-3

- Restoration work (Principle 3, method 3,1 and 3,3 of EN 1504-9). Repair of spalling and damaged concrete in infrastructure and superstructure works.
- Structural strengthening (Principle 4, method 4,4 pf EN 1504-9). Increasing the bearing capacity of the concrete structure by adding mortar.
- Preserving or restoring passivity (Principle 7, method 7,1 and 7,2 of EN 1504-9) - Increasing cover with additional mortar and replacing contaminated or carbonated concrete

ENVIRONMENTAL INFORMATION

- Conformity with LEED v4 MRc 2 (Option 1): Building Product Disclosure and Optimization – Environmental Product Declarations
- Conformity with LEED v4 MRc 3 (Option 2): Building Product Disclosure and Optimization - Sourcing of Raw Materials
- Conformity with LEED v4 MRc 4 (Option 2): Building Product Disclosure and Optimization - Material Ingredients
- IBU Environmental Product Declaration (EPD)

APPROVALS / STANDARDS

- CE Marking and Declaration of Performance to EN 1504-3 - Concrete repair product for structural repair

PRODUCT INFORMATION

Chemical Base	Sulphate resistant and replacement cement, selected aggregates and additives
Packaging	25 kg bag
Shelf Life	12 months from date of production
Storage Conditions	The product must be stored in original, unopened and undamaged packaging in dry conditions at temperatures between +5 °C and +35 °C. Always refer to packaging.
Appearance / Colour	Grey powder
Maximum Grain Size	D _{max} : 2 mm
Soluble Chloride Ion Content	≤ 0,05 % (EN 1015-17)

TECHNICAL INFORMATION

Compressive Strength	Class R4		
	Time	Compressive strength	(EN 12190)
	1 day	~19 MPa	
	7 days	~43 MPa	
	28 days	~56 MPa	
Modulus of Elasticity in Compression	≥ 20 GPa		(EN 13412)
Flexural Strength	Time	Tensile strength in flexure	(EN 12190)
	1 day	~4,4 MPa	
	7 days	~7,0 MPa	
	28 days	~8,0 MPa	
Tensile adhesion strength	≥ 2,0 MPa		(EN 1542)
Shrinkage	~500 µm/m (+20 °C / 65 % relative humidity at 28 days)		(EN 12617-4)
Restrained Shrinkage / Expansion	≥ 2,0 MPa		(EN 12617-4)
Coefficient of Thermal Expansion	~16 × 10 ⁻⁶ 1/K		(EN 1770)
Electrical Resistivity	< 100 kΩ·cm		(EN 12696)

Thermal Compatibility	≥ 2,0 MPa (Part 1 - Freeze-Thaw)	(EN 13687-1)
Chloride Ion Diffusion Resistance	Low - < 2000 coulombs Chloride diffusion coefficient: $4,8 \times 10^{-12} \text{ m}^2/\text{s}$	(ASTM C 1202) (EN12390-11)
Carbonation Resistance	$dk \leq$ control concrete MC (0,45)	(EN 13295)
Reaction to Fire	Euro class A1	(EN 1504-3 cl. 5.5)

SYSTEM INFORMATION

System Structure	Bonding primer/ Reinforcement corrosion protection	
	Sika MonoTop®-1010	Normal use
	SikaTop® Armatec®-110 EpoCem®	Demanding requirements
	Concrete repair mortar	
	Sika MonoTop®-4012	High strength requirements
	Levelling mortar	
Sika MonoTop®-3020	Normal use	
Sikagard®-720 EpoCem®	Demanding requirements	

APPLICATION INFORMATION

Mixing Ratio	3,75 to 3,9 L of water for 25 kg bag	
Fresh mortar density	~2,1 kg/l	
Consumption	~2,10 kg/m ² /mm This figure 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.	
Yield	25 kg of powder yields ~13,7 L of mortar	
Layer Thickness	Horizontal	min. 6 mm / max. 120 mm
	Vertical	min. 6 mm / max. 85 mm
Ambient Air Temperature	+5 °C min. / +30 °C max.	
Substrate Temperature	+5 °C min. / +30 °C max.	
Pot Life	~60 minutes at +20 °C	

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.

- Apply only to stable, prepared substrates.
- Do not add additional water during the surface finishing as this can cause discolouration and cracking.
- Protect freshly applied material from freezing.
- Do not feather edge

FURTHER DOCUMENTS

- Site Handbook 'Repair of Concrete Structures: Patch Repair and Spray Applications
- Sika Method Statement: Concrete Repair Using Sika MonoTop® System
- Recommendations provided in EN 1504-10

LIMITATIONS

- Avoid application in direct sun and/or strong winds.
- Do not add water over recommended dosage.

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

EQUIPMENT

Select the most appropriate equipment required for the project:

Substrate preparation equipment

- Mechanical hand-held tools
- High / ultra-high pressure water blasting equipment

Steel reinforcement equipment

- Abrasive blast cleaning equipment
- High pressure water blasting equipment

Mixing equipment

- Mixing Container.
- Small quantities: low speed electric single or double paddle mixer (< 500 rpm).
- Large quantities: Forced action mixer

Application equipment

- Hand applied: Plasterers hawk, trowel
- Wet Spray: All in one mixing and spraying machine or separate spraying machine and all associated ancillary equipment to suit application volumes

Finishing equipment

- Trowel (PVC or wooden)
- Sponge

Also refer to Site Handbook 'Repair of Concrete Structures – Patch Repair and Spray Applications'

SUBSTRATE QUALITY / PRE-TREATMENT

Concrete

- The substrate must be thoroughly clean, free from dust, loose material, surface contamination and material which reduce adhesion or prevent suction or wetting by repair materials.
- Remove de-laminated, weak, damaged and deteriorated concrete and where necessary, sound concrete. Remove using mechanical hand-held tools or high / ultra-high-pressure water blasting equipment
- Make sure sufficient concrete is removed from around corroded reinforcement to allow cleaning, corrosion protection coating (where required) and compaction of the concrete repair mortar.
- Repair surface areas must be prepared to provide simple square or rectangular layouts to avoid shrinkage stress concentrations and cracking while the repair material cures. This can also avoid structural stress concentrations from thermal movement and loading during the service life.

Steel reinforcement

- Remove rust, scale, mortar, concrete, dust and other loose and deleterious material which reduces bond or contributes to corrosion.
- Prepare surfaces to bright steel using abrasive blast

cleaning or high-pressure water blasting equipment.

MIXING

Hand applied and wet spray application

1. Pour the minimum recommended clean water quantity into a mixing container / equipment.
2. While stirring slowly, add the powder to the water.
3. Mix thoroughly for at least for 3 minutes adding additional water if necessary, to the maximum specified amount.
4. Adjust to the required consistency to achieve a smooth consistent mix.
5. Check the consistency after every mix.

APPLICATION

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

Reinforcement corrosion protection coating

1. Where a reinforcement coating is required, apply to the whole exposed circumference Sika MonoTop®-1010 or SikaTop® Armatec® 110 EpoCem® (Refer to individual Product Data Sheet(s)).

Bonding primer

Note: On a well prepared and roughened substrate or for a sprayed application, a bonding primer is generally not required.

Note: When a bonding primer is required to achieve the required adhesion values, use Sika MonoTop®-1010 or SikaTop® Armatec® 110 EpoCem® (Refer to individual Product Data Sheets).

Repair Mortar

Manual application

IMPORTANT

The final pre-wetted surface must achieve a dark matt appearance (saturated surface dry).

IMPORTANT

To prevent sagging or slumping of 'built up' repair mortar layers. Allow each layer to slightly harden and remain wet before applying subsequent layers.

1. Thoroughly pre-wet the prepared substrate (2 hours recommended) before application.
2. Keep the surface wet and do not allow to dry.
3. Remove excess water from within the surface pores and cavities e.g. with a clean sponge.
4. Make a scratch coat using the repair mortar.
5. Apply the scratch coat over the complete substrate surface to form a thin layer to fill surface pores or cavities.
6. Apply the repair mortar onto the scratch coat 'wet on wet' at the minimum and maximum layer thicknesses without the formation of voids.

Sprayed application - Wet Spray

IMPORTANT

The final pre-wetted surface must achieve a dark matt appearance (saturated surface dry).

IMPORTANT

To prevent sagging or slumping of 'built up' repair mortar layers. Allow each layer to slightly harden and remain wet before applying subsequent layers.

1. Thoroughly pre-wet the prepared substrate (2 hours recommended) before application.
2. Keep the surface wet and do not allow to dry.

3. Remove excess water from within the surface pores and cavities e.g. with a clean sponge.
4. Place the wet mixed Sika MonoTop®-4012 into the spraying equipment.
5. Spray the repair mortar onto the pre-wetted substrate between the minimum and maximum layer thicknesses without the formation of voids.

Surface finishing

IMPORTANT

Do not add water during the surface finishing as this can cause discolouration and cracking.

1. Allow mortar to surface harden.
2. Surface finish to the required surface texture using a stainless steel, steel, PVC or wooden float

Cold weather working

Consider storing bags in a warm environment and using warm water to assist with achieving strength gain and maintaining physical properties.

Hot weather working

Consider storing bags in a cool environment and using cold water to assist with controlling the exothermic reaction to reduce cracking and maintaining physical properties.

CURING TREATMENT

- Protect fresh mortar immediately from premature drying using an appropriate curing method, e.g. curing compound, moist geotextile membrane, polythene sheet, etc.
- 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

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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Product Data Sheet

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