

## PRODUCT DATA SHEET

# Sika MonoTop®-4012

Cementitious R4 concrete repair mortar containing recycled waste materials

### 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

<b>Chemical Base</b>	Sulphate resistant and replacement cement, selected aggregates and additives
<b>Packaging</b>	25 kg bag
<b>Appearance / Colour</b>	Grey powder
<b>Shelf Life</b>	12 months from date of production
<b>Storage Conditions</b>	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.
<b>Maximum Grain Size</b>	D <sub>max</sub> : 2 mm
<b>Soluble Chloride Ion Content</b>	≤ 0,05 % (EN 1015-17)

## TECHNICAL INFORMATION

<b>Compressive Strength</b>	Class R4		
	<b>Time</b>	<b>Compressive strength</b>	(EN 12190)
	1 day	~19 MPa	
	7 days	~43 MPa	
	28 days	~56 MPa	
<b>Modulus of Elasticity in Compression</b>	≥ 20 GPa		(EN 13412)
<b>Tensile Strength in Flexure</b>	<b>Time</b>	<b>Tensile strength in flexure</b>	(EN 12190)
	1 day	~4,4 MPa	
	7 days	~7,0 MPa	
	28 days	~8,0 MPa	
<b>Tensile Adhesion Strength</b>	≥ 2,0 MPa		(EN 1542)
<b>Shrinkage</b>	~500 µm/m (+20 °C / 65 % relative humidity at 28 days)		(EN 12617-4)
<b>Restrained Shrinkage / Expansion</b>	≥ 2,0 MPa		(EN 12617-4)
<b>Thermal Compatibility</b>	≥ 2,0 MPa (Part 1 - Freeze-Thaw)		(EN 13687-1)
<b>Coefficient of Thermal Expansion</b>	~16 × 10 <sup>-6</sup> 1/K		(EN 1770)
<b>Reaction to Fire</b>	Euro class A1		(EN 1504-3 cl. 5.5)
<b>Capillary Absorption</b>	≤ 0,5 kg/(m <sup>2</sup> ·h <sup>0,5</sup> )		(EN 13057)
<b>Chloride Ion Diffusion Resistance</b>	Low - < 2000 coulombs		(ASTM C 1202)
	Chloride diffusion coefficient: 4,8 × 10 <sup>-12</sup> m <sup>2</sup> /s		(EN12390-11)
<b>Carbonation Resistance</b>	dk ≤ control concrete MC (0,45)		(EN 13295)
<b>Electrical Resistivity</b>	< 100 kΩ·cm		(EN 12696)

## SYSTEM INFORMATION

System Structure	<b>Bonding primer/ Reinforcement corrosion protection</b>	
	Sika MonoTop®-1010	Normal use
	SikaTop® Armatec®-110 EpoCem®	Demanding requirements
	<b>Concrete repair mortar</b>	
	Sika MonoTop®-4012	High strength requirements
	<b>Levelling mortar</b>	
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 <sup>2</sup> /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	

## BASIS OF PRODUCT DATA

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.

## 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.
- 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

## ECOLOGY HEALTH AND SAFETY

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

## 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

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. It may be necessary to adapt the above disclaimer to specific local laws and regulations. Any changes to this disclaimer may only be implemented with permission of Sika® Corporate Legal in Baar.

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### Product Data Sheet

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