

## PRODUCT DATA SHEET

# Sika MonoTop<sup>®</sup>-4100 Protect

Cementitious R4 mortar for repairing, protecting and waterproofing concrete structures

### PRODUCT DESCRIPTION

Sika MonoTop<sup>®</sup>-4100 Protect is a one-part, cementitious, fibre reinforced, polymer modified, low shrinkage, R4 Classification concrete repair mortar. It is suitable for repairing, protecting and waterproofing concrete structures.

### USES

Sika MonoTop<sup>®</sup>-4100 Protect may only be used by experienced professionals.

Repairs, protects and waterproofs all types of reinforced concrete structures and components for:

- Bridges
- Buildings
- Civil engineering structures
- Marine structures
- Dams
- Potable water structures
- Waste water systems unexposed to biogenic sulphuric acid corrosion (for areas subject to this, use Sika<sup>®</sup> MonoTop<sup>®</sup>-4400 MIC)
- Structures requiring a Class R4, R3, R2, R1 mortar
- Interior and exterior use

### CHARACTERISTICS / ADVANTAGES

- Does not require a bonding primer ('all-in-one' product).
- Sulphate resistant.
- Layer thickness 4 to 60 mm.
- Hand and machine application (wet spray technique).
- Easy to apply.
- Very low shrinkage behaviour.
- Low permeability.
- Suitable for contact with drinking water.
- EuroClass A1 reaction to fire rating.
- Class R4 of EN 1504-3.
- Polymer modified (categorised as a 'PCC' or 'Polymer Modified Cement Concrete' in accordance with EN 1504).
- 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.
- Moisture control (Principle 2, method 2.3 of EN 1504-9) - Coating.
- Increasing resistivity (Principle 8, method 8.3 of EN 1504-9) - Coating.

### APPROVALS / STANDARDS

- CE marking and Declaration of Performance to EN 1504-2 - Surface protection systems for concrete.
- CE marking and Declaration of Performance to EN 1504-3 - Concrete repair product for structural repair.
- CE marking and Declaration of Performance to EN 1504-7 - Reinforcement corrosion protection.
- Migration Analysis UNE EN 14944-3, Sika MonoTop<sup>®</sup>-4100 Protect, OtecRiera, Test Report No.

## PRODUCT INFORMATION

<b>Chemical Base</b>	Sulphate resistant cement, fibres, polymers, additives and selected aggregates.
<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>Product Declaration</b>	Complies with the general requirements of EN 1504-3: Class R4. Complies with the general requirements of EN 1504-2: Surface protection systems for concrete. Complies with the general requirements of EN 1504-7: Reinforcement corrosion protection.
<b>Maximum Grain Size</b>	$D_{max}$ : 2.0 mm
<b>Soluble Chloride Ion Content</b>	$\leq 0.05 \%$ (EN 1015-17)

## TECHNICAL INFORMATION

<b>Compressive Strength</b>	<b>Time</b>	<b>Strength</b>	(EN 12190)
	1 day	~15 MPa	
	7 days	~40 MPa	
	28 days	~50 MPa	
<b>Modulus of Elasticity in Compression</b>	$\geq 20$ GPa		(EN 13412)
<b>Flexural Strength</b>	<b>Time</b>	<b>Strength</b>	(EN 12190)
	1 day	~4 MPa	
	7 days	~5 MPa	
	28 days	~6 MPa	
<b>Shrinkage</b>	~500 $\mu\text{m/m}$ (+20 °C / 65 % relative humidity at 28 days)		(EN 12617-4)
<b>Restrained Shrinkage / Expansion</b>	$\geq 2.0$ MPa		(EN 12617-4)
<b>Tensile adhesion strength</b>	$\geq 2.0$ MPa		(EN 1542)
<b>Reaction to Fire</b>	EuroClass A1		(EN 1504-3 cl. 5.5)
<b>Permeability to Water Vapour</b>	$S_D = 1$ m, Class I		(EN ISO 7783)
<b>Capillary Absorption</b>	$\leq 0.1$ $\text{kg}\cdot\text{m}^{-2}\cdot\text{h}^{-0.5}$		(EN 1062-3)
<b>Water Penetration under Pressure</b>	~10 mm		(EN 12390-8)
<b>Water Penetration under Negative Pressure</b>	No humidity in the surface		
<b>Carbonation Resistance</b>	$dk \leq$ control concrete MC (0.45)		(EN 13295)

## APPLICATION INFORMATION

<b>Mixing Ratio</b>	4.4 to 4.5 litres of water for 25 kg bag
<b>Consumption</b>	~1.8 kg/m <sup>2</sup> /mm 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.
<b>Yield</b>	25 kg of powder yields ~14 litres of mortar
<b>Layer Thickness</b>	4 mm minimum / 60 mm maximum
<b>Ambient Air Temperature</b>	+5 °C minimum / +30 °C maximum
<b>Substrate Temperature</b>	+5 °C minimum / +30 °C maximum
<b>Pot Life</b>	~45 minutes at +20 °C
<b>Fresh mortar density</b>	~2.1 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.

## 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

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

### EQUIPMENT

Select the most appropriate equipment required for the project:

### Substrate Preparation

- Mechanical hand-held tools.
- High / ultra-high pressure waterblasting equipment.

### Steel Reinforcement

- Abrasive blast cleaning equipment.
- High pressure waterblasting equipment.

### Mixing

- Small quantities - low speed electric single or double paddle mixer (< 500 rpm). Mixing Container.
- Large quantities or machine application - suitable forced action mixer.

### Application

- Hand applied - Plasterer's 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

- 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. Delaminated, weak, damaged and deteriorated substrate, and where necessary sound substrate, must be removed by suitable preparation equipment. Ensure sufficient concrete is removed from around corroded reinforcement to allow cleaning, corrosion protection coating (where required) and compaction of the repair material. 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

Rust, scale, mortar, concrete, dust and other loose and deleterious material which reduces bond or contributes to corrosion must be removed. Surfaces must be prepared to Sa 2 (ISO 8501-1) using suitable preparation equipment.

## MIXING

### Hand Applied and Wet Spray Application

Pour the minimum recommended quantity of clean water into a suitable mixing container / equipment. While stirring slowly, add the powder to the water and mix thoroughly for at least for 3 minutes, adding additional water if necessary to the maximum specified amount, and adjust to the required consistency to achieve a smooth, consistent mix. The consistency must be checked 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

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

### Bonding Primer

On a well prepared and roughened substrate, or for a sprayed application, a bonding primer is generally not required. When a bonding primer is required to achieve the required adhesion values, use Sika MonoTop®-1010 or SikaTop® Armatec® 110 EpoCem® (refer to respective Product Data Sheet(s)). Apply repair mortar onto bonding primer "wet on wet".

## Repair Mortar

### Hand Application

Thoroughly pre-wet the prepared substrate (2 hours recommended) before application. Keep the surface wet and do not allow to dry. Before application, remove excess water (e.g. with a clean sponge). The surface must appear dark matt in appearance without shining, and surface pores and cavities must not contain water.

When manually applying by hand, first make a scratch coat by firmly scraping the repair mortar over the substrate surface to form a thin layer and fill any pores or cavities in the surface. Ensure the whole surface to be repaired is covered by the scratch coat. The repair mortar must be applied onto the wet scratch coat between the minimum and maximum layer thicknesses without the formation of voids. Where layers are to be built up, to prevent sagging or slumping, each layer should be allowed to harden before applying subsequent layers "wet on wet".

### Sprayed Application - Wet Spray

The wet mixed Sika MonoTop®-4100 Protect must be placed into the spraying equipment and applied onto the pre-wetted substrate (pre-wet procedure as per hand application) between the minimum and maximum layer thicknesses without the formation of voids. Where layers are to be built up, to prevent sagging or slumping, each layer must be allowed to harden before applying subsequent layers "wet on wet".

### Surface Finishing

Finishing for all types of application must be carried out to the required surface texture using suitable finishing tools as soon as the mortar has started to harden.

### 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.

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