

APPENDIX A

Typical Photographs



Photograph 1



Photograph 2



Photograph 3



Photograph 4



Photograph 5



Photograph 6



Photograph 7



Photograph 8



Photograph 9



Photograph 10



Photograph 11



Photograph 12



Photograph 13



Photograph 14



Photograph 15



Photograph 16



Photograph 17



Photograph 18



Photograph 19



Photograph 20



Photograph 21



Photograph 22



Photograph 23



Photograph 24



Photograph 25



Photograph 26



Photograph 27



Photograph 28



Photograph 29



Photograph 30



Photograph 31



Photograph 32



Photograph 33



Photograph 34



Photograph 35



Photograph 36



Photograph 37



Photograph 38



Photograph 39



Photograph 40



Photograph 41



Photograph 42



Photograph 43



Photograph 44



Photograph 45



Photograph 46



Photograph 47



Photograph 48



Photograph 49



Photograph 50



Photograph 51



Photograph 52



Photograph 53



Photograph 54



Photograph 55



Photograph 56



Photograph 57



Photograph 58



Photograph 59



Photograph 60



Photograph 61



Photograph 62



Photograph 63



Photograph 64



Photograph 65



Photograph 66



Photograph 67



Photograph 68



Photograph 69



Photograph 70



Photograph 71



Photograph 72



Photograph 73



Photograph 74



Photograph 75



Photograph 76



Photograph 77



Photograph 78



Photograph 79



Photograph 80



Photograph 81



Photograph 82

APPENDIX B

Sika Technical Details

Product Data Sheet
Edition 02/04/2009
Identification no:
01 03 02 04 001 0 000004
Sika® MonoTop-612



BS EN 1504-3

08

0086 CPD - 541325

Sika® MonoTop-612

R4 Hand Placed / Wet Spray Repair Microconcrete

Product Description

Sika® MonoTop-612 is a cement-based, one component low permeability repair microconcrete, containing silica fume and polymer, meeting the requirements of Class R4 of BS EN 1504-3.

Uses

- For repairing all types of structures
- Horizontal, vertical and overhead repairs
- Hand applied repairs
- Spray applied repairs
- For exterior and interior use
- In place of R1, R2 & R3 mortars

Characteristics / Advantages

- Pre bagged for quality
- Compatible with Sika® FerroGard® corrosion inhibitors
- Easy to mix and apply
- Low shrinkage
- Good mechanical properties
- Adjustable consistency
- Suitable for drinking water contact

Tests

Approval / Standards

Resistivity: Mott MacDonald Report No. 37423/DA/001.Rev A
Conforms to the requirements of BS EN 1504-3 R4 Classification

Product Data

Form

Appearance / Colours

Grey powder

Packaging

25 kg bag

Storage

Storage Conditions/ Shelf-Life

6 months from date of production if stored properly in original unopened, sealed and undamaged packaging in dry and cool conditions.

Construction



Technical Data

Chemical Base	Portland cement, polymer redispersable powder, selected aggregates and additives
Density	Fresh mortar density: ~ 2.10 kg/l
Grading	D _{max} : 3 mm
Layer Thickness	5.0 mm min. / 30 mm max.
Thermal Expansion	Coefficient 12.0 x 10 ⁻⁶ m/m °C

Mechanical / Physical Properties

Compressive Strength	1 day ~ 25 N/mm ² 7 days ~ 60 N/mm ² 28 days ~ 70 N/mm ²
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Flexural Tensile Strength	28 days ~ 7-9 N/mm ²
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CE Requirements Requirements as per BS EN 1504-3 Class R4

	Results	Requirements (R4)
Compressive Strength	~ 70 N/mm ² (MPa)	> 45 N/mm ² (MPa)
Chloride Ion Content	< 0.007%	< 0.05%
Adhesive Bond	~ 3.0 N/mm ² (MPa)	≥ 2.0 N/mm ² (MPa)
Restrained Shrinkage/Expansion	~ 2.5 N/mm ² (MPa)	≥ 2.0 N/mm ² (MPa)
Carbonation Resistance	NPD	Not required if coated
Elastic Modulus	~ 22.0 kN/mm ² (GPa)	≥ 20 kN/mm ² (GPa)
Capillary Absorption	0.13 kg.m ⁻² .h ^{-0.5}	< 0.5 kg.m ⁻² .h ^{-0.5}

Resistance

Resistivity (kohm.cm)

RH%	Resistivity
100	46
81	90
65	136
44	176

System Information

System Structure	Sika® MonoTop-612 is part of the Sika® MonoTop Concrete Repair System
Sika® MonoTop-610:	Bonding primer and reinforcement coating
Sika® MonoTop-612:	Hand and wet spray applied repair mortar
Sika® MonoTop-615:	Hand and wet spray applied high build repair mortar
Sika® MonoTop-620:	Smoothing coat
Sika® FerroGard®-903:	Corrosion inhibitor

Application Details

Consumption This depends on the substrate roughness and thickness of layer applied.
As a guide, ~ 2.11 kg/m²/mm.

Substrate Quality *Concrete*

The concrete shall be free from dust, loose material, surface contamination and materials which reduce bond or prevent suction or wetting by repair materials.

Steel reinforcement

Rust, scale, mortar, concrete, dust and other loose and deleterious material which reduces bond or contributes to corrosion shall be removed to a minimum standard of SA2½.

Reference should also be made to BS EN1504-10:2003 for specific requirements.

**Substrate Preparation /
Bonding Primer/
Reinforcement Coating**

Concrete:

Delaminated, weak, damaged and deteriorated concrete and where necessary sound concrete shall be removed by suitable mechanical or very high pressure waterblasting [up to 110 mPa (16500 psi)] techniques.

Tying wire fragments, nails and other metal debris embedded in the concrete should be removed where possible.

The edges where concrete is removed should be cut at a minimum angle of 90° to avoid undercutting and a maximum angle of 135° to reduce the possibility of debonding with the top surface of the adjacent sound concrete and should be roughened sufficiently to provide a mechanical key between the original material and Sika® MonoTop-612.

Ensure sufficient concrete is removed from around reinforcement to allow coating and compaction of the repair material.

Steel reinforcement:

Surfaces should be prepared using abrasive blast cleaning techniques or high pressure waterblasting [up to 60 mPa (9000 psi)] techniques.

Where exposed reinforcement is contaminated with chloride or other material which may cause corrosion, the reinforcement shall be cleaned by low pressure waterblasting [up to 18 mPa (2700 psi)].

Bonding primer:

On a well prepared and roughened substrate a bonding primer is generally not required.

When a bonding primer is not required pre-wet the surface. The surface should not be allowed to dry before application of the concrete repair mortar. The surface should achieve a dark matt appearance without glistening and surface pores and pits should not contain water.

When a bonding primer is necessary apply Sika® MonoTop-610 or SikaTop® Armatec-110 EpoCem® (Refer to the relevant Product Data Sheets).

Site adhesion values - Structural Repair 1.2-1.5 mPa

Non Structural repairs minimum value 0.7 mPa

Reinforcement coating:

Where a reinforcement coating is required as a barrier, apply to the whole exposed circumference two coats of Sika® MonoTop-610 or SikaTop® Armatec-110 EpoCem®. (Refer to the relevant Product Data Sheet).

Reference should also be made to BS EN1504-10:2003 for specific requirements.

Application Conditions / Limitations

Substrate Temperature +5°C min. / +30°C max.

Air Temperature +5°C min. / +30°C max.

Application Instructions

Mixing Wet Spray Application : 2.5 to 3.5 L of water for 25kg powder
Hand Application: ~ 2.5 to 2.7 L of water for 25 kg powder

Mixing Time Sika® MonoTop-612 can be mixed with a slow speed (< 500 rpm) electric drill mixer.
In small quantities only, product can also be mixed by hand.
Pour the water in the correct proportion into a suitable mixing container. While stirring slowly, add the powder to the water. Mix thoroughly for at least 3 minutes to the required consistency.

Application Method / Tools*Hand Applied*

If a bonding primer has been used apply repair mortar “wet on wet”.

The repair mortar shall be worked into the prepared pre-wetted substrate between the minimum and maximum layer thicknesses and shall be compacted without inclusion of entrapped air pockets using a trowel or gloved hand.

Where layers are to be built up to prevent sagging or slumping, each layer should be allowed to stiffen before applying subsequent layers “wet on wet”. When layers cannot be applied “wet on wet”, or if more than 24 hours between layers elapses apply a bonding primer of Sika® MonoTop-610 or SikaTop® Armatec-110 EpoCem® and apply repair mortar “wet on wet”.

Sprayed application:

The repair mortar shall be placed onto the pre-wetted substrate between the minimum and maximum layer thicknesses without the formation of voids and loose rebound material. Where layers are to be built up to prevent sagging or slumping, each layer should be allowed to stiffen before applying subsequent layers “wet on wet”. When layers cannot be applied “wet on wet”, or if more than 24 hours between layers apply a bonding primer of Sika® MonoTop-610 or SikaTop® Armatec-110 EpoCem® and apply repair mortar “wet on wet”.

Finishing for both hand and spray application should be done to the required surface texture as soon as mortar has started to stiffen.

Reference shall be made to BS EN1504-10:2003 for specific requirements.

Cleaning of Tools Clean all tools and application equipment with water immediately after use. Hardened/cured material can only be mechanically removed.

Potlife ~ 30-50 minutes (at +23°C)

Notes on Application / Limitations

Refer to recommendations provided in BS EN 1504-10.

Avoid application in direct sun and/or strong wind and/or rain.

Do not add water over recommended dosage.

Apply only to sound, prepared substrates.

Do not add additional water during the surface finishing as this will cause discoloration and cracking.

Protect freshly applied material from freezing.

Curing Details

Curing Treatment

It is essential to cure the repair mortar immediately after application for a minimum of 3 days to ensure full cement hydration and to minimise cracking. Use polythene sheeting taped down at the edges or other approved method.

Curing compounds shall not be used when they adversely affect subsequently applied products and systems.

Reference shall also be made to BS EN1504-10:2003 for specific requirements.

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.

CE Labelling

The harmonised European standard EN 1504-3 “Products and systems for the protection and repair of concrete structures – Definitions, requirements, quality control and evaluation of conformity – Part 3 Structural and non-structural repair” specifies the identification, performance (including durability) and safety of products and systems to be used to repair concrete surfaces (either building or civil engineering structures).

Non-structural repair fall under this specification – they need to be CE-labelled as per Annex ZA.2, table ZA.2 conformity 2+ and fulfil the requirements of the given mandate of the EU Construction Products Directive (89/106/CE).

 0086	
Sika Ltd, Welwyn Garden City, Herts AL7 1BQ, UK 08 0086 CPD - 541325 BS EN 1504 -3 Concrete Repair Product for Structural Repair PCC Mortar (based on hydraulic cement)	
Product Compressive Strength Chloride ion Content Adhesive Bond Restrained Shrinkage /Expansion Carbonation Resistance Elastic Modulus Capillary Absorption Dangerous Substances Reaction to Fire	Sika MonoTop 612 Class R4 ≤ 0.05% ≥ 2.0 MPa ≥ 2.0 MPa NPD ≥ 20 GPa ≤ 0.5 kg.m².h^{0.5} Complies with 5.4 Class A1



Sika Limited
 Watchmead
 Welwyn Garden City
 Hertfordshire
 AL7 1BQ
 United Kingdom

Phone +44 1707 394444
 Telefax +44 1707 329129
www.sika.co.uk, email: sales@uk.sika.com

