BUILDING TRUST

PRODUCT DATA SHEET

Sikacrete®-401 Rapid

Fast Setting Class R4 Dry Sprayed Micro-Concrete for Large Volume Repairs

PRODUCT DESCRIPTION

Sikacrete®-401 Rapid is a cement based, polymer modified, one-component, fast setting repair mortar containing silica fume and high range water-reducing agents, meeting the requirements of Class R4 of EN 1504-3. Formulated for machine applications using the dry spray process with set accelerators.

USES

- Large scale repairs of weathered, cracked, spalling and / or damaged structural concrete.
- Highway works.
- Bridges (columns, piers, sofits, beams, parapets, abutments, etc.).
- Marine structures (quays, piers, jetties, sea walls, docks, dry docks, marinas, offshore platforms, coffer-dams, caissons, etc.).
- New construction.
- Lining and structural enhancement of mines and tunnels.
- Viaducts and culverts.
- Façades and retaining walls.
- Embankment and rock stabilisation.
- Encasing steel sections.
- Buildings.
- Fire damaged structures.
- Cooling towers, chimneys and pylons.
- For exterior and interior use.
- In place of Class R1, R2 and R3 mortars.
- Particularly suited to limited possession and tidal works.
- Concrete restoration (Principle 3, Method 3.3 of EN 1504-9): Restoring the original concrete to the originally specified profile and function. Restoring the concrete structure by replacing part of it by spraying concrete or mortar.
- Structural strengthening (Principle 4, Method 4.4 of EN 1504-9): Increasing or restoring the structural load bearing capacity of an element of the concrete structure by adding mortar or concrete.

CHARACTERISTICS / ADVANTAGES

- One component, ready to use.
- Non-silica aggregates, so no risk of alkali silica reactivity (ASR).
- Easy and quick to set up.
- Low rebound losses and dust formation during the spraying process.
- High build - layer thicknesses in one application overhead up to 100mm are possible without any additional mesh reinforcement.
- Rapid strength gain.
- Very low shrinkage.
- Overcoatable with Sika® reprofiling / levelling / smoothing mortars and coatings.
- EN 1504-3 Class R4.
- Fast Initial and final set times.
- Ideal for limited possession work, or tidal applications.

APPROVALS / STANDARDS

CE marking and declaration of performance based on EN 1504-3 Products and systems for the protection and repair of concrete structures — Structural and non-structural repair.

PRODUCT INFORMATION

Chemical Base	Portland cement, redispersable polymers, selected aggregates, silica fume and additives
Packaging	25 kg bags

Shelf Life	6 months
Storage Conditions	Store properly in original unopened, sealed and undamaged packaging in dry and cool conditions
Appearance / Colour	Grey powder
Maximum Grain Size	D_{max}: ~2mm
Density	~2300 kg/m³ (EN 12190) NOTE: Hardened density determined after 28 days.
Soluble Chloride Ion Content	≤0.01% (EN 1015-17)
Compressive Strength	1 Day ~35 MPa (EN 12190) 3 Days ~45 MPa 7 Days ~50 MPa 28 Days ~60 MPa
Modulus of Elasticity in Compression	~33 GPa (EN 13412)
Flexural Strength	28 Days ~9 MPa (EN 12190)
Tensile adhesion strength	≥2.0 MPa (EN 1542)
Coefficient of Thermal Expansion	13.5 x 10^{-6} / °C (EN 1770)
Electrical Resistivity	28 Days ~16 kΩcm (4-Point Wenner)
Capillary Absorption	~0.36 kg·m^{-2}·$h^{-0.5}$ (EN 13057)
Freeze Thaw De-Icing Salt Resistance	Good resistance with no visible changes after 50 cycles (EN 13687-1)
Reaction to Fire	EuroClass A1

System Structure

Layer	Product	Function
Bonding Primer / Reinforcement Corrosion Protection	Sika® MonoTop®-1010	Normal Use
	SikaTop® Armatec®-110 EpoCem®	Demanding Requirements
Concrete Repair Mortar	Sikacrete®-401 Rapid	High Performance Requirements
Levellling / Smoothing Mortar	Sika® MonoTop®-3020	Normal Use
	Sikagard®-720 EpoCem®	Demanding Requirements

In addition to the above, Sika® also offer Sikagard® Anti-Carbonation protective coatings and the following Ancillary Products for Corrosion Management:

- Sika® FerroGard®-903+ Liquid Corrosion Inhibitor
- Sika® Margel VPI 580 Capsule Corrosion Inhibitor
- Sika® Galvashield® Galvanic Anodes
- Sika® Ebonex® Cathodic Protection Anodes

Consumption	~2.3 kg/m²/mm NOTE: This value is for guidance only, and actual use will depend on substrate roughness and thickness of layer applied.
Layer Thickness	Minimum 15mm / Maximum 150mm (Vertical) and 100mm (Overhead)
Ambient Air Temperature	Minimum +3°C / Maximum +30°C
Substrate Temperature	Minimum +3°C / Maximum +30°C
Initial set time	~12 minutes (EN 13294)

Final set time	~16 minutes	(EN 13294)
	NOTE: Typical set time at 20°C.	

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

- Refer to recommendations provided in 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 / or cracking.
- Protect freshly applied material from freezing.
- Do not overwork final finish as this can cause surface cracking.
- Rebound, slump and overhead layer thickness will be affected by the water:cement ratio, type of spraying equipment, presence of reinforcement, and air pressure used to convey material to the nozzle. A balance should be achieved to optimise material usage by adjusting water and air pressure and number of passes to achieve thickness build up relevant to the repair size.

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.

SUBSTRATE QUALITY / PRE-TREATMENT

Concrete:
The concrete shall be thoroughly clean, free from dust, loose material, surface contamination and materials which reduce bond or prevent suction or wetting by repair materials. Delaminated, weak, damaged and deteriorated concrete, and where necessary sound concrete, shall be removed by suitable mechanical or very high pressure waterblasting 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 Sikacrete®-401 Rapid.
Ensure sufficient concrete is removed from around the full circumference of the reinforcement to allow application of the reinforcement corrosion protection coating (if required) and compaction of the repair material.
Steel Reinforcement:
Rust, scale, mortar, concrete, dust and other loose and deleterious material which reduces bond or contrib?utes to corrosion shall be removed. Surfaces shall be prepared using abrasive blast cleaning or high pressure waterblasting techniques to a minimum standard of SA 2 (ISO 8501-1). If these techniques are not permissble, contact Sika® Ltd for alternative options using hand preparation techniques and Galvanic Anodes. Where exposed reinforcement is contaminated with chloride or other material which may cause corrosion, the reinforcement shall be cleaned by low pressure waterblasting. Reference shall be made to EN 1504-10 for specific requirements.

MIXING

Sikacrete®-401 Rapid is fed into the dry process spraying machine which should be of suitable size for the repair areas to reduce wastage and rebound. The amount of water added is controlled by the nozzleman at the nozzle and should be sufficient to prevent lump and dust. Rebound will be increased with unsuitably sized spraying machine, compressor, nozzle type, dry mixture and thin layers.

APPLICATION

Reinforcement Corrosion Protection:
Where a reinforcement coating is required, the application of the repair mortar shall be applied when the the reinforcement coating has cured (minimum finger nail hard). Refer to the System Information above for compatible Sika® products and refer to the relevant Product Data Sheet(s) for more detailed information about the reinforcement corrosion product(s). The sprayed 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', pre-wet the surface and allow to surface dry to a dark matt appearance. Sikacrete®-401 Rapid is finished by leaving ‘as shot’ or striking off with a straight edge and closing the surface with a semi stiff damp brush (thereby creating a 'brush finish'). Reference shall be made to EN 1504-10 for specific requirements, the Code of Practice for Sprayed Concrete issued by the Concrete Society and any other guidelines that are specific to the structure.

CURING TREATMENT

It is essential to cure Sikacrete®-401 Rapid 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 ap-

plied products and systems. Reference shall also be made to EN 1504-10 for specific requirements.

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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