

PRODUCT DATA SHEET

SikaEmaco® T 1400 FR

(formerly MEmaco T 1400FR)

Rapid-setting and hardening, extra-high-strength, shrinkage-compensated, flowable traffic repair mortar, reinforced with metallic fibres

DESCRIPTION

SikaEmaco® T 1400 FR is a one-part, fast-setting and fast-hardening, pourable repair and bedding mortar reinforced with metallic fibres, for horizontal applications. It meets the requirements of class R4 in accordance with EN 1504-3. It is ready-to-use, has rapid strength gain even at sub-zero temperatures, very good durability and very low drying shrinkage. When mixed with water, SikaEmaco® T 1400 FR forms a mortar with a flowable consistency which can be easily applied in a layer thickness of 10 mm to 150 mm.

USES

SikaEmaco® T 1400 FR is used for:

- Large horizontal repair areas exposed to extreme traffic loads
- Repairing defective road and bridge joints
- Bedding small to large manhole frames, using form-work
- Cold conditions, including cold store rooms
- Repair of areas requiring high ductility
- Situations where very short traffic disruption periods are required
- Concrete exposure classes XC 1-4, XF 1-4, XD 1-3, XS 1-3 and XA 1-2 as described in EN 206

SikaEmaco® T 1400 FR is used for interior and exterior applications.

Please note:

SikaEmaco® T 1400 FR may only be used by experienced professionals.

FEATURES

- Ultra-rapid strength build-up, can be opened to all traffic after just 2 hours at +20 °C
- Easy to mix and apply
- Possibility to increase layer thickness by adding aggregate
- Can be applied in sub-zero temperatures
- Ultra high ductility due to the special metallic fibres
- Good resistance to high dynamic loads and impact
- Very good early and final strength
- Two to three times higher flexural strength than ordinary repair mortars
- Very good adhesion to concrete and steel
- Very good durability
- Minimised cracking due to constrained shrinkage by PAN fibres
- Very good freeze-thaw de-icing salt resistance
- Very good reinforcement protection due to very low water absorption and good carbonation resistance
- Rough surface finish provides very good skid resistance, even in wet conditions
- Good resistance to hydrocarbon oils

CERTIFICATES AND TEST REPORTS

- CE marking and declaration of performance based on EN 1504-3:2005 Products and systems for the protection and repair of concrete structures — Structural and non-structural repair

PRODUCT INFORMATION

Composition	Portland cement, hydraulic binders, well-graded sands, galvanised steel fibres, selected polyacrylonitril (PAN) fibres, and special additives	
Packaging	Standard bag	25 kg
	Refer to the current price list for available packaging variations.	
Appearance and colour	Grey powder with metallic fibres	
Shelf life	9 months if stored at mentioned storage conditions	
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 the packaging. Refer to the current Safety Data Sheet for information on safe handling and storage.	
Maximum grain size	4.0 mm	
Total chloride ion content	≤0.05 %	(EN 1015-17)

TECHNICAL INFORMATION

Compressive strength	Time	At +20 °C ¹⁾	At +5 °C ²⁾	At -5 °C ³⁾	(EN 12190)
	2 hours	≥ 30 N/mm ²	–	–	
	3 hours	–	≥ 15 N/mm ²	≥ 8 N/mm ²	
	4 hours	≥ 40 N/mm ²	≥ 20 N/mm ²	≥ 12 N/mm ²	
	1 day	≥ 50 N/mm ²	≥ 40 N/mm ²	≥ 40 N/mm ²	
	7 days	≥ 80 N/mm ²	≥ 65 N/mm ²	≥ 70 N/mm ²	
	28 days	≥ 100 N/mm ²	≥ 90 N/mm ²	≥ 90 N/mm ²	
	¹⁾ Curing, water and powder temperature: +20 °C				
²⁾ Curing, water and powder temperature: +5 °C					
³⁾ Curing at -5°C, water and powder temperature: +20 °C					
Modulus of elasticity in compression	40,000 N/mm ²				(EN 13412)
Flexural-strength	2 hours	≥ 6 N/mm ²			(EN 196-1)
	4 hours	≥ 8 N/mm ²			
	1 day	≥ 10 N/mm ²			
	7 days	≥ 13 N/mm ²			
	28 days	≥ 15 N/mm ²			
Shrinkage	28 days	≤ 0.3 mm/m			(EN 1261-4)
Tensile adhesion strength	28 days	≥ 3.0 N/mm ²			(EN 1542)
Reaction to fire	Class A1				(EN 13501-1)
Freeze thaw de-icing salt resistance	Adhesion to concrete after freeze-thaw (50 cycles with salt)	≥ 3.0 N/mm ²			(EN 13687-1)
Capillary absorption	≤ 0.5 kg·m ⁻² ·h ^{-0.5}				(EN 13057)
Carbonation resistance	dk ≤ control concrete MC (0.45)				(EN 13295)
Service temperature	Maximum	+80 °C			
	Minimum	-30 °C			
Ring test	Coutinho Ring			No cracking after 180 days	

APPLICATION INFORMATION

Mixing ratio	Pourable consistency	2.7–3.2 L water per 25 kg bag
Consumption	Approx. 2035 kg powder is needed to prepare 1 m ³ of fresh mortar. Note: Consumption data 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 the product to a test area to calculate the exact consumption for the specific substrate conditions and proposed application equipment.	
Yield	Fresh material per standard bag	12.3 L
	Note: Consumption data 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 the product to a test area to calculate the exact consumption for the specific substrate conditions and proposed application equipment.	
Layer thickness	Maximum	150 mm
	Minimum	10 mm
Material temperature	Maximum	+30 °C
	Minimum	+5 °C
Ambient air temperature	Maximum	+35 °C
	Minimum	-5 °C
Substrate temperature	Maximum	+30 °C
	Minimum	0 °C
Pot Life	At +20 °C	15 minutes
	Pot life depends on temperature Note: Pot life will be shorter at higher temperatures. Pot life will be longer at lower temperatures.	
Applied product ready for use	Open to light traffic (at +20 °C)	60 Minutes
	Open to heavy traffic (at +20 °C)	120 Minutes
	Note: Times are approximate and will be affected by changing ambient conditions, particularly temperature and relative humidity.	
Fresh mortar density	Approx. 2.3 kg/L	

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.

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

SUBSTRATE PREPARATION

CONCRETE

1. Clean the substrate thoroughly so it is free from dust, loose material, surface contamination and material which reduces adhesion, prevents suction or wetting by the repair materials.
2. Remove delaminated, weak, damaged and deteriorated concrete, and where necessary, sound concrete. Remove using mechanical hand-held tools, high or ultra-high-pressure water blasting equipment.
3. Remove sufficient concrete from around corroded reinforcement to allow cleaning, application of a corrosion protection coating (where required) and compaction of the concrete repair mortar.

4. Prepare repair surface areas in 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.

SURFACE ROUGHENING

1. Roughen the surface using mechanical tools such as a chisel or scarifier, or using grit blasting or high-pressure water blasting equipment.

Aggregate is clearly visible on the surface of the concrete structure after surface preparation.

STEEL REINFORCEMENT

1. Remove rust, scale, mortar, concrete, dust and other loose and deleterious material which reduces bond or contributes to corrosion.
2. Prepare surfaces to bright steel, Sa 2 (ISO 8501-1), using abrasive blast cleaning or high-pressure water blasting equipment.

REPLACEMENT OF STEEL REINFORCEMENT

1. Replace heavily damaged rebar that no longer fulfils safety or structural requirements.
2. Ensure the distance between the rebar and the surface is at least 2 cm.

MANHOLE FORMWORK

1. Set the manhole frame to the required level.
2. Install watertight formwork. Inflatable formwork can be used.
3. Fill the formwork with water to test for tightness.
4. If vacuum extraction equipment is not used to remove pre-wetting water, ensure the formwork contains outlets for the pre-wetting water to drain.
5. Ensure that displaced air can escape from the formwork during repair mortar application.

PRE-WETTING

Proper pre-wetting prevents the substrate from absorbing water from the mortar.

Preconditions

The water absorbency of the substrate is known and the pre-wetting has been scheduled accordingly.

1. Saturate the substrate with clean, low-pressure water or a wet sponge up to 24 hours before application.
2. Constantly pre-wet the substrate for at least 2 hours before application.
3. Ensure that all pores and pits are thoroughly wet.
4. Just before application, remove excess surface water using a clean sponge or oil-free pressurised air.

The substrate is saturated-surface-dry (SSD): it has a dark matt appearance without standing water or glistening, and surface pores and pits do not contain water.

DEFROSTING

Although the product can be applied when the ambient air temperature is below 0 °C, the substrate temperature must be above 0 °C. Refer to the Application information section for the precise temperature ranges.

1. Defrost frozen substrates, including metal parts such as steel reinforcement and manhole frames.
2. Keep the temperature uniform during application and hardening.

MIXING

IMPORTANT

Risk of reduced strength gain and impaired physical properties in cold weather

Take the following measures in cold weather:

1. Store bags in a warm environment.
2. Use warm mixing water.

IMPORTANT

Risk of cracking and impaired physical properties in hot weather

Take the following measures in hot weather:

1. Store bags in a cool environment.
2. Use cold mixing water to assist with controlling the exothermic reaction.

ELECTRIC SINGLE OR DOUBLE-PADDLE MIXER (SMALL TO MEDIUM VOLUMES) OR FORCED-ACTION MIXER (LARGE VOLUMES)

Preconditions

The bags of SikaEmaco® T 1400 FR are full, unopened and undamaged.

1. Mix only as much material as can be used within its pot life.
2. Pour the recommended quantity of clean water for the consistency required into a suitable mixing container.
3. Stir the water slowly (max. 400 rpm).
4. Slowly and continuously add two-thirds of the bag of SikaEmaco® T 1400 FR.
5. Mix for 1 minute.
6. Add the rest of the bag of SikaEmaco® T 1400 FR and mix for a total time of 3–4 minutes.
7. Add more water as required, up to the maximum specified, and mix.

The mixture is lump-free and homogenous.

The steel fibres are bundled with a water-soluble glue. This glue helps avoiding fibre balling during mixing and ensures a homogeneous distribution of fibres throughout the mortar mix.

ADDITION OF AGGREGATE

For applications over 150 mm, add up to 30 % clean, well-graded aggregate. Select aggregates with the following features:

- Non-reactive
 - Rounded, clean, well-graded
 - 4–8 mm or 8–16 mm depending on the layer thickness
1. Use up to 30 % coarse aggregate by weight of SikaEmaco® T 1400 FR, for example, up to 7.5 kg aggregate for a 25 kg bag of SikaEmaco® T 1400 FR.
 2. Add the aggregate to the mixing container after adding the water and powder.

Do not add cement or any other materials which may affect the properties of the product.

APPLICATION

Preconditions

The ambient air temperature is not expected to fall below -5 °C within 24 hours of application.

1. Apply a bonding slurry of undiluted SikaEmaco® T 1400 FR with a brush. Work it into the concrete substrate.
2. Pour the mixed SikaEmaco® T 1400 FR wet-on-wet into the patch repair area, or place it behind the formwork.

3. Smooth the surface with a finishing trowel.
4. Do not add water or fresh mortar to a mortar mix which has already begun to set.

CURING TREATMENT

The product is self-curing. Do not wet-cure. Protect from wind, rain, frost, and direct sunlight during curing.

When working at sub-zero temperatures, cover the product with insulation materials or dry cloths until sufficiently hardened, preferably for 24 hours or until the area is to be opened for traffic.

CLEANING OF EQUIPMENT

Clean all tools and application equipment with water immediately after use. Hardened material can only be removed mechanically.

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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