

EMACO[®] Nanocrete R4 Fluid

Single component, high strength, high modulus, fibre reinforced, shrinkage compensated, flowable structural repair mortar

Description

Emaco[®] Nanocrete R4 Fluid is a single component, high strength, shrinkage compensated, fluid or flowable mortar for structural repair works. The product meets the requirements of the new European Norm EN1504 part 3 - Class R4.

Emaco[®] Nanocrete R4 Fluid is a ready-to-use material that contains Portland cement, well graded sands, carefully selected polymer fibres and special additives to reduce shrinkage and the risk for cracking, and improve physical and application properties.

When mixed with water, it forms a mortar with a fluid or flowable consistency which can be easily machine or hand applied. Emaco[®] Nanocrete R4 Fluid can be used in thicknesses from 20 mm up to 200 mm.

Fields of application

Emaco[®] Nanocrete R4 Fluid is designed for the repair of concrete elements such as:

- columns, cross beams and piers of all bridges, marine and other civil structures
- water treatment and sewerage facilities
- large area structural repairs using formwork and casting method
- areas of congested reinforcement where hand or spray application is not possible

Emaco[®] Nanocrete R4 Fluid can also be used in structural strengthening applications where the load bearing capacity of a structure needs to be increased by installing new additional reinforcement embedded in a self-compacting high strength, high modulus micro-concrete.

Emaco[®] Nanocrete R4 Fluid is intended for inside and outside use, on vertical and overhead surfaces, in dry and wet environments.

In a flowable consistency, Emaco[®] Nanocrete R4 Fluid can be used for horizontal patch repairs. NB: This material is not intended as a flooring mortar for large horizontal areas!



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BASF Construction Chemicals Belgium NV Nijverheidsweg 89, B-3945 Ham	
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0749 - CPD BC2-563-0013-0002-001	
EN 1504-3 Concrete repair product for structural repair CC mortar (based on hydraulic cement)	
Compressive strength	class R4
Chloride ion content	≤ 0,05 %
Adhesive bond	≥ 2,0 MPa
Restrained shrinkage	≥ 2,0 MPa
Carbonation resistance	passes
Elastic modulus	≥ 25 GPa
Thermal compatibility	
- Freeze-Thaw	≥ 2,0 MPa
- Thunder Shower	≥ 2,0 MPa
- Dry cycling	≥ 2,0 MPa
Capillary Absorption	≤ 0,5 kg m ⁻² h ^{0,5}
Reaction to fire	A1
Dangerous substances	complies with 5.4



Technical Data

Property	Standard	Unit	Values
Appearance	-		Grey Powder
Grain size	-	mm	Max. 1.5
Layer thickness: Minimum	-	mm	20
: Maximum		mm	200
Density of fresh mortar	-	g/cm ³	approx. 2.2
Mixing water per sack of 25kg	-	litre	Fluid: approx. 3.5 – 4.0 Flowable: approx. 3.1 – 3.5
Working time	-	minutes	approx. 60
Temperature for application (support and material)	-	°C	Between +5 and +30
Compressive strength	EN 12190	N/mm ²	
- after 1 day			≥ 15
- after 7 days			≥ 40
- after 28 days			≥ 55
E-Modulus (28 days)	prEN13412	N/mm ²	≥ 20,000
Carbonation resistance	EN13295	Observed depth in mm	≤ reference concrete
Adhesion to concrete (28 days)	EN 1542	N/mm ²	≥ 2.0
Adhesion to concrete after Freeze/Thaw (50 cycles with salt)	EN 13687-1	N/mm ²	≥ 2.0
Adhesion to concrete after Thunder/Shower (30 cycles)	EN 13687-2	N/mm ²	≥ 2.0
Adhesion to concrete after Dry Cycling (30 cycles)	EN 13687-4	N/mm ²	≥ 2.0
Cracking tendency (I)	Coutinho type ring		No cracking after 180 days
Cracking tendency (II)	DIN type V-channel		No cracking after 180 days
Capillary absorption	EN 13057	kg.m ⁻² .h ^{-0.5}	≤ 0.5

Hardening times are measured at 21°C ± 2°C and 60% ± 10% relative humidity. Higher temperatures will reduce these times and lower temperatures will extend them.

Features and benefits

- Formulated with nanotechnology to minimise shrinkage and crack tendency
- Flowable or fluid consistency
- No segregation or bleeding
- Long open time
- High flow for full compaction even in areas with congested steelwork
- For hand or machine application
- For concrete replacements up to 200 mm thick in one layer
- Can be extended with clean, dry aggregate for thicknesses greater than 200 mm
- Good strength development exceeding requirement of Class R4 of EN1504 part 3
- Extra low shrinkage for durability
- Only simple standard surface preparation required
- Freeze-thaw resistant
- High carbonation resistance
- Sulphate resistant
- Very low permeability to water and chlorides
- Low chromate (Cr[VI] < 2 ppm)
- Chloride-free.

Application guidelines

(a) Surface preparation: Concrete

Concrete must be clean and structurally sound with a direct tensile strength of 1.5 N/mm² to ensure good adhesion. All loose traces of concrete or mortar, dust, grease oil, etc. must be removed.

Damaged or contaminated concrete shall be removed to obtain a keyed surface. Non-impact/vibrating cleaning methods, e.g. grit or high water pressure blasting are recommended. The aggregate should be clearly visible on the surface of the concrete structure after surface preparation.

Cut the edges of the repair vertically to a minimum depth of 5 mm.

(b) Surface preparation: Reinforcing steel

Clean all exposed reinforcement to a minimum grade of Sa 2 according ISO 8501-1 / ISO 12944-4. Ensure that the back of the rebar is also clean.

Only in case of high chloride contamination of the concrete should the reinforcement be protected by using Emaco[®] Nanocrete AP (see technical data sheet)

(c) Formwork preparation:

The formwork shall be sound and watertight. Use a light application of RHEOFINISH[®] chemical release agent to the inner face of the formwork.

Fill the formwork with water to test for tightness and pre-soak substrate.

Provision must be made for draining of pre-soaking water and air venting during placement.

The concrete substrate shall be water saturated, without free standing water, at the moment of application.

(d) Mixing:

It is strongly recommended that only full sacks are mixed. Damaged or opened sacks should not be used.

Mix Emaco[®] Nanocrete R4 Fluid with a suitable paddle attached to a powerful, slow speed electric drill or in a forced action pan mixer for 3 minutes until a lump-free, fluid or flowable consistency is achieved. Only use clean tap water.

Mixing water needed: 3.5 – 4.0 litres per 25kg sack are required for a fluid consistency.

A flowable consistency can be achieved by mixing 3.1 – 3.5 litres per 25 bag.

NB: Never exceed the maximum water demand.

For applications exceeding 200 mm, the mix must be extended with clean aggregate with a suitable grading (e.g. 4 - 8 or 8 - 16 mm) up to max. 30 to 35% of the total weight of the dry mix.

(d) Mortar application:

The minimum temperatures must be maintained during application and for at least 24 hours thereafter for optimum curing of the product.

The material can be placed or pumped behind the formwork, or poured into the patch repair area.

With formwork: Emaco[®] Nanocrete R4 Fluid is cast in situ continuously with a fluid consistency, placing it inside the formwork from one side ONLY to allow air to escape. It is self-compacting without requiring vibration even in structures that are heavily reinforced or have a complex shape.



The Chemical Company

In open repairs: Emaco[®] Nanocrete R4 Fluid is placed in a pourable consistency in horizontal patch repair areas, brushing the first poured material into the surface roughness of the substrate. Wet in wet pour further material up to the required thickness.

Leave the formwork in place for as long as possible and/or ensure proper curing, using e.g. Masterkure[®] curing compounds.

Cleaning of tools

While still wet clean with water. Once dry/cured the material can only be removed mechanically.

Coverage / Yield

Fluid consistency: One 25 kg sack will yield approximately 13 litres of mortar.

Or, approx. 76 sacks of material are required for 1 m³ of mortar.

Flowable consistency: one 25 kg sack will yield approximately 12.8 litres of mortar. Approximately 78 bags are required for 1 m³ of mortar.

This consumption is theoretical and depends on the roughness of the support and the amount of reinforcement for which reason it should be adjusted in each particular job by means of "in situ" tests.

Packaging

Emaco[®] Nanocrete R4 Fluid is available in 25 kg bags.

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Storage

Store in cool and dry warehouse conditions. Shelf life in these conditions is 12 months in unopened original sacks.

Watch points

- Do not apply at temperatures below +5°C nor above +35°C.
- Do not add cement, sand or other substances that could affect the properties of the material.
- Never add water or fresh mortar to a mortar mix which has already begun to set.
- Contact the Technical Department of your local BASF Construction Chemicals office regarding any information required not mentioned here.

Handling and transport

Usual preventive measures for the handling of chemical products should be observed when using this product, for example do not eat, smoke or drink while working and wash your hands when taking a break or when the job is completed.

Specific safety information in the handling and transport of this product can be found in the Material Safety Data Sheet.

Avoid contact with eyes and prolonged contact with skin. In case of contact with eyes, immediately flush with plenty of water for at least 15 minutes. Call a physician. In case of contact with skin, wash skin thoroughly.

The disposal of the product and its container should be carried out according to local legislation in force. Responsibility for this lies with the final owner of the product.

NOTE:

Similar to all the other recommendations and technical information, this technical data sheet serves only as a description of the product characteristics, mode of use and applications. The data and information given are based on our technical knowledge obtained in the bibliography, laboratory tests and in practice. The data on consumption and dosage contained in this data sheet are based on our own experience and are therefore subject to variations due to different work conditions. Real consumption and dosage should be determined on the job by means of prior tests and are the liability of the client. Our Technical Service is at your disposal for any additional advice.

BASF Construction Chemicals reserves the right to modify the composition of the products provided these continue to comply with the characteristics described in the data sheet. Other applications of the product not covered by those indicated shall not be our liability. In the case of defects in the manufacturing quality of our products we provide a guarantee, any additional claims being exempt and our liability being only to return the value of the goods supplied. The possible reservations with respect to patents or third party rights should be noted.

Edition 01/08

The present data sheet becomes null and void on issuance of a new edition.

