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EMACO[®] NanoCrete R4

Extra high-strength, shrinkage compensated, fibre reinforced, structural repair mortar

Description

Emaco[®] NanoCrete R4 is a single component, extra high-strength, high modulus, shrinkage compensated structural repair mortar that meets the requirements of the new European Norm EN 1504 part 3 class R4.

Emaco NanoCrete R4 is a ready-to-use material that contains Portland cement, well graded sands, specially selected polymer fibres and special additives to significantly reduce the risk and incidence of shrinkage cracking.

When mixed with water, it forms a highly thixotropic mortar that can easily be spray or trowel applied.

Field of application

Emaco[®] NanoCrete R4 is used for the structural repair of concrete elements such as:

- Columns, piers and cross beams of all bridges
- Cooling towers and chimneys and other industrial environments
- Water treatment and sewerage facilities
- Tunnels, pipes, outfalls and all below ground construction especially in harsh ground conditions
- Marine structures

Benefits

- Can be applied inside and outside, on vertical and overhead surfaces, in dry and wet environments
- Formulated with new nanotechnology, shrinkage compensation systems and fibre reinforcement to minimise crack tendency
- Highly thixotropic - can be applied up to 50 mm without the need of secondary reinforcement
- High early and ultimate strengths
- Outstanding workability for easy placing and finishing
- High modulus and excellent adhesion to host concrete ensuring load transfer



Technical Data

Property	Standard	Unit	Values
Appearance	-		Grey Powder
Grain size	-		Max. 1.5 mm
Layer thickness	-		min. 5 mm max. 50 mm
Density	-	g/cm ³	approx. 2.2
Mixing water per 25kg sack	-	litre	approx. 3.8 – 4.2
Working time	-	minutes	45 - 60
Temperature for application (support and material)	-	°C	Between +5 and +30
Compressive strength	EN 12190	N/mm ²	
- after 1 day			≥ 18
- after 7 days			≥ 40
- after 28 days			≥ 60
E-Modulus (28 days)	prEN13412	N/mm ²	≥ 20
Adhesion (28 days)	EN 1542	N/mm ²	≥ 2
Adhesion after Freeze/Thaw (50 cycles with salt)	EN 13687-1	N/mm ²	≥ 2
Adhesion after Thunder/Shower (50 cycles)	EN 13687-2	N/mm ²	≥ 2
Adhesion after dry cycling (50 cycles)	EN 13687-4	N/mm ²	≥ 2
Carbonation resistance	prEN 13295	Observed depth in mm	≤ reference concrete
Capillary absorption	EN 13057	Kg/m ² h ^{0.5}	≤ 0.5
Cracking tendency (I)	Coutinho type ring		No cracking after 180 days
Cracking tendency (II)	DIN type V-channel		No cracking after 180 days

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.

Technical data shown are statistical results and do not correspond to guaranteed minima. Tolerances are those described in appropriate performance standards

- Excellent freeze/thaw resistance
- 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 fully cured with a minimum direct tensile strength of 1.5 N/mm². All surfaces must be clean and sound 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 after 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 to ISO 8501-1 / ISO 12944-4. Ensure back of rebar is also clean.

Only in case of chloride contamination of the concrete, or when depth of cover is less than 5 mm should the reinforcement be protected by using Emaco[®] Nanocrete AP (see *technical data sheet*).

(c) Priming Concrete:

Bonding slurries are generally not required with Emaco[®] Nanocrete R4.

(d) Mixing:

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

Mix Emaco[®] Nanocrete R4 in a forced action pan mixer, or with a suitable paddle attached to a powerful electric drill for 3 minutes until a lump-free, plastic consistency is achieved. Only use drinking quality water.

Mixing water needed: 3.8 to 4.2 litres per 25kg sack depending upon consistency required

Allow the mortar to rest for 2 - 3 minutes and then remix briefly, adjusting the consistency when required, without exceeding the maximum water demand.

(e) Mortar application:

Air and substrate temperatures must be a minimum of +5°C and a maximum of +30°C. The minimum temperatures must be maintained during application and for at least 24 hours thereafter for optimum curing of the product.

The prepared substrate should be pre-soaked, preferably for 24 hours, but at least 2 hours before applying Emaco[®] Nanocrete R4. The surface must be mat-damp, but without standing water.

Emaco[®] Nanocrete R4 can be spray or hand applied. Apply mixed product directly to the prepared damp substrate, or wet in wet onto the primed surface.

Spraying the material with the necessary pressure will ensure good adhesion of the material. A thin scrape coat or contact layer before building up to the required thickness, wet on wet, will improve adhesion especially in case of hand application.

Apply to the desired layer thickness of 5 to max. 50 mm and level using a screeding bar, trowel or wooden board. Can be applied in thicker layers in smaller patches or where additional reinforcement is present.

Smoothing with a trowel or finishing by float or sponge can be done as soon as the mortar has begun to stiffen.

Cleaning of tools

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

Curing

Following curing methods are advised:

- polyethylene film
- damp cloths
- Masterkure[®] curing agents

Contact your local Degussa Construction Chemicals office for more information.

Coverage/Yield

One 25kg sack will yield approximately 11 litres of mortar.

Approx. 2.2 kg of mixed product per m² per mm layer thickness (approx. 2 kg of dry powder per m² and mm layer thickness).

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

Packaging

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

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 +30°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 Technical Department of your local Degussa 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 manipulating 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 the 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.

Degussa Construction Chemicals Belgium N.V. 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 1/04/06

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

Version 1: April 2006

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