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European Technical Assessment

ETA 22/0888
of 19-01-2023

General Part

Technical Assessment Body issuing the ETA:

Kiwa Nederland B.V., Sir Winston Churchillaan 273, 2288 EA Rijswijk, www.kiwa.nl

Trade name of the construction product

NT Base 4.0 (dispersion)
NT Base 5.0 (powder)

Product family to which the construction product belongs

Polymeric additive for hydraulically bound layer in road construction

Manufacturer

NanoTerra AG
Nördliche Münchner Straße 9c
82031 Grünwald, Germany

Manufacturing plant(s)

RYWA GmbH & Co. KG
Raestruper Straße 3,
48231 Warendorf, Germany

This European Technical Assessment contains

8 pages which form an integral part of this assessment

This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of

EAD 230172-00-0102

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Specific parts

1 Technical description of the product

The polymeric additive for hydraulically bound layer in road construction "NT Base 4.0" or "NT Base 5.0" is an additive to be used in cement-bound mixtures with:

- (90 ± 1) M.-% aggregate,
- (4 ± 1) M.-% cement,
- Optimum water content,
- "NT Base 4.0" or "NT Base 5.0".

For the determination of the essential characteristics, following cement-bound mixture (CBM) was used:

- 90.9 M.-% aggregate,
- 4.0 M.-% cement,
- 5.1 M.-% water,
- 3.0 M.-% "NT Base 4.0" or "NT Base 5.0" in relation to the mass of the cement.

The ratios are based on the cement-bound reference mixture (CBRM) with:

- 90.9 M.-% aggregate,
- 4.0 M.-% cement,
- 5.1 M.-% water.

The aggregate has the grain size 0/16mm (rounded granulation) with its grains sized < 0.063 mm limited to ≤ 8 M.-%.

The mixture is produced in a compulsory mixer with a mixing time of 120 s.

The product can be supplied as powder (NT Base 5.0) or dispersion (NT Base 4.0).

For the determination of all essential characteristics apart from frost resistance, a CEM II/B-M (SL) 32.5 R was used. For the frost resistance, a CEM III A/42.5 N(na) was used.

2 Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)

The polymer additive "NT Base 4.0" or "NT Base 5.0" is used to prepare hydraulically bound base courses for soil treatment, such as soil improvement, qualified soil improvement and soil stabilization. The product can be used with most types of soils that may be present. After the soil has been mixed with cement, water and the polymer additive and has been compacted, the product facilitates cement hydration, reduces crack formation and increases the hydraulically bound layer's fatigue strength. In doing so, the polymer additive helps ensure a longer service life and simplified road or pavement construction with reduced thicknesses in the surface layers. Through the exclusive use of static rollers for the compaction process prevents micro-cracks, that in return reduce the load-bearing capacity of the layers.

The verifications and assessment methods on which this European Technical Assessment is based on lead to the assumption of a working life of the processed polymer additive "NT Base 4.0" or "NT Base 5.0" in the hydraulically bound layer for the intended use of ≥ 25 years.

The indications given on the working life cannot be interpreted as a guarantee given by the producer but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

3.1 Basic Works Requirement 1: Mechanical resistance and stability

3.1.1 Compressive strength

Table 1 Compressive strength after 7 and 28 days

	CBM	CBRM
Compressive strength after 7 days in N/mm ²	3.4	3.6
Compressive strength after 28 days in N/mm ²	4.1	5.9

3.1.2 Compressive strength ratio

Table 2 Compressive strength ratios after 7 and 28 days

	CBM/CBRM
Compressive strength ratio after 7 days in %	94.4
Compressive strength ratio after 28 days in %	69.5

3.1.3 Splitting tensile strength

Table 3 Splitting tensile strength after 7 and 28 days

	CBM	CBRM
Tensile strength after 7 days in N/mm ²	0.35	0.40
Tensile strength after 28 days in N/mm ²	0.58	0.67

3.1.4 Splitting Tensile strength ratio

Table 4 Tensile strength ratios after 7 and 28 days

	CBM
Tensile strength ratio after 7 days in %	87.5
Tensile strength ratio after 28 days in %	86.6

3.1.5 Shrinkage

Table 5 Shrinkage after 28

	CBM	CBRM
Shrinkage after 28 days in ‰	-0.0164 (swelling)	-0.0184 (swelling)

Table 6 Shrinkage ratio after 28

	CBM/CBRM
Shrinkage ratio after 28 days in %	89.1

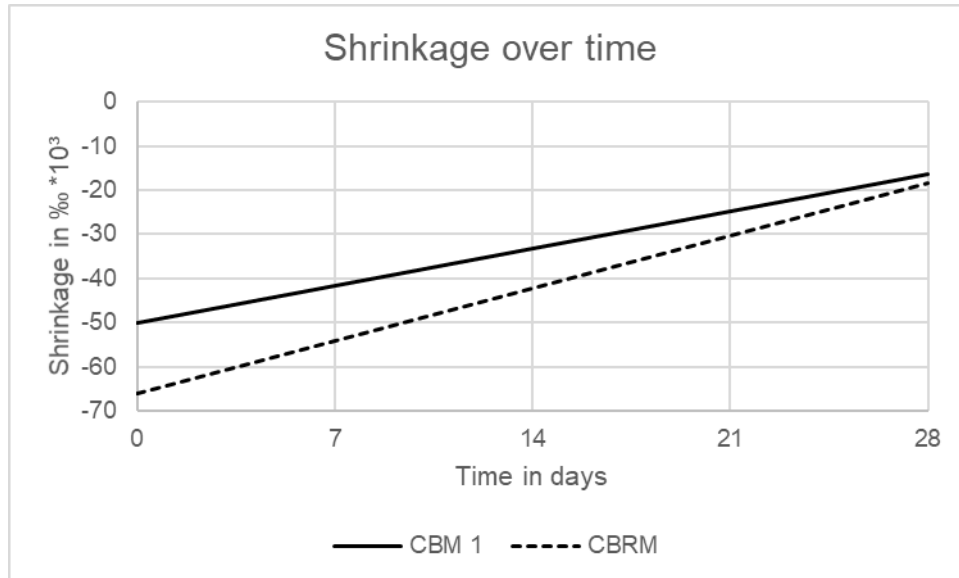


Figure 1 Shrinkage over time

The mixtures show an initial negative shrinkage (swelling) of -0.0066 ‰ (CBRM) and -0.0050 ‰ (CBM 1) followed by a shrinkage of 0.00012 ‰/day (CBRM) and 0.00017 ‰/day (CBM 1).

3.1.6 Fatigue strength

Table 7 Fatigue strength

	CBM	CBRM
Durability of the layer against fatigue after 10 ⁶ cycles in µm/m	107	87
Modulus of stiffness at a frequency of 8 Hz in N/mm ²	8 205	9 821

For a strain amplitude of 125 µm/m, the number of load cycles before fatigue increases by 642%.

3.1.7 Solid content (dispersion)

Table 8 Solid content

	"NT Base 4.0"
Solid content in M.-%	49.7

3.1.8 pH-Value (dispersion)

Table 9 pH-value

	"NT Base 4.0"
pH-Value	10.5

3.1.9 Viscosity (dispersion)

Table 10 Viscosity at rates of (25, 100, 250, 500, 1000) $\frac{1}{s}$ at 23 °C

	"NT Base 4.0"
Viscosity at 25 $\frac{1}{s}$ in mPas	7.07
Viscosity at 100 $\frac{1}{s}$ in mPas	16.01
Viscosity at 250 $\frac{1}{s}$ in mPas	28.83
Viscosity at 500 $\frac{1}{s}$ in mPas	46.79
Viscosity at 1 000 $\frac{1}{s}$ in mPas	77.27

3.1.10 Bulk density (powder)

Table 11 Bulk density

	"NT Base 5.0"
Bulk density in kg/m ³	418.4

3.1.1 Frost resistance

Table 12 Frost resistance

	CBM	CBRM
Change of length in ‰	0.05	0.14

Table 13 Frost resistance ratio after 28

	CBM/CBRM
Change of length ratio after 28 days in %	35.7

4 Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

In accordance with EAD 230172-00-0102 the applicable European legal act is: 97/555/EC.

The System to be applied is: 2+

5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan, in accordance with Section 3.2 of the EAD 230172-00-0102. The tasks of the notified body are laid down in Section 3.3 of EAD 230172-00-0102.

Issued in Rijswijk on 19-01-2023 by

A handwritten signature in black ink, appearing to read 'Ron Scheepers', with a long horizontal flourish extending to the right.

Ron Scheepers
Kiwa Nederland B.V.