



## European Technical Approval ETA-12/0390

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung  
*Trade name*

Hochofenzement CEM III/A 42,5 N LH/SR "Deuna"  
*Blast furnace cement CEM III/A 42,5 N LH/SR "Deuna"*

Zulassungsinhaber  
*Holder of approval*

Deuna Zement GmbH  
Industriestraße 7  
37355 Deuna  
DEUTSCHLAND

Zulassungsgegenstand  
und Verwendungszweck  
*Generic type and use  
of construction product*

Sonderzement CEM III/A mit hohem Sulfatwiderstand  
*Special cement CEM III/A with high sulphate resistance*

Geltungsdauer:  
*Validity:* vom  
*from*  
bis  
*to*

15 January 2013  
15 January 2018

Herstellwerk  
*Manufacturing plant*

Deuna Zement GmbH  
Industriestraße 7  
37355 Deuna  
DEUTSCHLAND

Diese Zulassung umfasst  
*This Approval contains*

7 Seiten  
*7 pages*

## I LEGAL BASES AND GENERAL CONDITIONS

- 1 This European technical approval is issued by Deutsches Institut für Bautechnik in accordance with:
  - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products<sup>1</sup>, modified by Council Directive 93/68/EEC<sup>2</sup> and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council<sup>3</sup>;
  - *Gesetz über das In-Verkehr-Bringen von und den freien Warenverkehr mit Bauprodukten zur Umsetzung der Richtlinie 89/106/EWG des Rates vom 21. Dezember 1988 zur Angleichung der Rechts- und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte und anderer Rechtsakte der Europäischen Gemeinschaften (Bauproduktengesetz - BauPG) vom 28. April 1998<sup>4</sup>, as amended by Article 2 of the law of 8 November 2011<sup>5</sup>;*
  - Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC<sup>6</sup>.
- 2 Deutsches Institut für Bautechnik is authorized to check whether the provisions of this European technical approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European technical approval and for their fitness for the intended use remains with the holder of the European technical approval.
- 3 This European technical approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European technical approval.
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- 6 The European technical approval is issued by the approval body in its official language. This version corresponds fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

<sup>1</sup> Official Journal of the European Communities L 40, 11 February 1989, p. 12  
<sup>2</sup> Official Journal of the European Communities L 220, 30 August 1993, p. 1  
<sup>3</sup> Official Journal of the European Union L 284, 31 October 2003, p. 25  
<sup>4</sup> *Bundesgesetzblatt Teil I 1998*, p. 812  
<sup>5</sup> *Bundesgesetzblatt Teil I 2011*, p. 2178  
<sup>6</sup> Official Journal of the European Communities L 17, 20 January 1994, p. 34

## II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

### 1 Definition of the product and intended use

#### 1.1 Definition of the construction product

The blast furnace cement CEM III/A 42,5 N-LH/SR "Deuna" is a cement which fulfils all requirements given in EN 197-1<sup>7</sup> for a common cement of strength class 42,5 N and low heat of hydration (LH).

Furthermore the blast furnace cement CEM III/A 42,5 N-LH/SR "Deuna" has a high resistance against sulfate attack on concrete.

#### 1.2 Intended use

The blast furnace cement CEM III/A 42,5 N-LH/SR "Deuna" is intended to be used for preparation of concrete, mortar, grouts and other mixes for construction and for the manufacturing of construction products.

Especially the blast furnace cement CEM III/A 42,5 N-LH/SR "Deuna" is characterized by an evidently high resistance against sulfate attack on concrete.

The provisions and the verification and assessment methods included or referred to in this CUAP have been written based upon the assumed working life of concrete incorporating the blast furnace cement CEM III/A 42,5 N-LH/SR "Deuna" of 50 years when installed in the works. These provisions are based upon the current state of the art and the available knowledge and experience. 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.

### 2 Characteristics of the product and methods of verification

#### 2.1 Specifications for common cement

All specifications for a blast furnace cement CEM III/A of strength class 42,5 N and low heat of hydration (LH) shall be determined in accordance with EN 197-1<sup>7</sup>.

All requirements given in EN 197-1<sup>7</sup> for a blast furnace cement CEM III/A of strength class 42,5 N and low heat of hydration (LH) shall be fulfilled.

#### 2.2 Content of granulated blast furnace slag

The blast furnace slag content of the blast furnace cement CEM III/A 42,5 N-LH/SR "Deuna" shall be determined by an appropriate verification method<sup>8</sup> and shall be at least 48,0 % by mass.

#### 2.3 (CaO + MgO)/SiO<sub>2</sub>-ratio of the granulated blast furnace slag

The chemical composition of the granulated blast furnace slag shall be determined in accordance with EN 196-2<sup>9</sup>. The (CaO + MgO)/SiO<sub>2</sub>-ratio is calculated and shall exceed 1,30.

<sup>7</sup> EN 197-1 Cement – Part 1: Composition, specification and conformity criteria for common cement

<sup>8</sup> A appropriate verification method is the quantitative determination of the main constituents of cement, see also CEN/TR 196-4

<sup>9</sup> EN 196-2 Methods of testing cement – chemical analysis of cement

**2.4 Glass content of the granulated blast furnace slag**

The glass content of the granulated blast furnace slag shall be determined by the test method given in CUAP 03.01/40, Annex A, and shall be at least 90 %.

**2.5 Specific surface**

The specific surface of the blast furnace cement CEM III/A 42,5 N-LH/SR "Deuna" shall be determined by the air permeability method specified in EN 196-6<sup>10</sup> and shall be at least 385 m<sup>2</sup>/kg (limit value for single results: 355 m<sup>2</sup>/kg).

**2.6 Minor additional constituents**

The blast furnace cement CEM III/A 42,5 N-LH/SR "Deuna" contains minor additional constituents. These minor additional constituents shall comply with the specifications deposited by 'Deutsches Insitut für Bautechnik' and approved inspection body.

**2.7 Sulfate resistance**

The blast furnace cement CEM III/A 42,5 N-LH/SR "Deuna" shows a comparable sulfate resistance like a blast furnace cement CEM III/B-SR according to EN 197-1<sup>7</sup>.

The sulfate resistance was determined with the flat prism method.

The test specimens were made of mortar according to EN 196-1<sup>11</sup> with blast furnace cement CEM III/A 42,5 N-LH/SR "Deuna" and with two reference cements (CEM I 42,5 R-SR 3 and CEM III/B 42,5 N-LH/SR according to EN 197-1<sup>7</sup>) according to the flat prism method.

24 flat prism from each mortar with the dimensions 10 mm x 40 mm x 160 mm (12 prisms with and 12 prisms without pins) were made in accordance with EN 196-1<sup>11</sup> and were compacted on the vibrating table.

The prisms were stored for 2 days in the mould at 20 °C and a relative air humidity of > 95 % r.H..

After demoulding the prisms were pre-stored until an age of 14 days, on edge, standing on grating in a saturated Ca(OH)<sub>2</sub>-solution at 20 °C.

At an age of 14 days, a series of 3 flat prisms with measuring pins and 3 flat prisms without measuring pins were stored on edge, standing on gratings in a 4,4 % Na<sub>2</sub>SO<sub>4</sub>-solution at 5 °C and 20 °C. One series each of 3 flat prisms with measuring pins and 3 flat prisms without measuring pins were stored on edge, standing on gratings (reference storage 5 °C) in a saturated Ca(OH)<sub>2</sub> solution at 5 °C. The other two series of 3 flat prisms each remained stored in saturated Ca(OH)<sub>2</sub> solution at 20 °C (reference storage 20 °C).

The length and the dynamic modulus of elasticity of the flat prisms stored in 4,4 % Na<sub>2</sub>SO<sub>4</sub>-solution and in saturated Ca(OH)<sub>2</sub> solution were measured after 0, 14, 28, 56, 90 and 180 days.

The elongation of the flat prisms was calculated as mean value from 3 specimens. The difference in elongation between the sulfate storage and the reference storage was calculated as expansion of length.

Additionally the test specimens were examined visual after each test date.

After a testing period of 180 days the specimens show no expansion damages, cracks or flaking based on formation of thaumasite.

<sup>10</sup>

EN 196-6

Methods of testing cement – Determination of fineness

<sup>11</sup>

EN 196-1

Methods of testing cement - Part 1: Determination of strength

The blast furnace cement CEM III/A 42,5 N-LH/SR "Deuna" fulfils the following requirements for the sulfate testing:

20 °C-Storage

- after 90 days: max. expansion difference 0,5 mm/m
- after 180 days: max. expansion difference 0,8 mm/m
- Visual examination of the specimens after 180 day storage in 4,4 % Na<sub>2</sub>SO<sub>4</sub>-solution:  
The specimens show no cracks or flaking.

5 °C-Storage

- after 90 days: max. expansion difference 0,5 mm/m
- Visual examination of the specimens after 180 day storage in 4,4 % Na<sub>2</sub>SO<sub>4</sub>-solution:  
The specimens show no cracks or flaking.

### 3 Evaluation and attestation of conformity and CE marking

#### 3.1 System of attestation of conformity

According to the communication of the European Commission<sup>12</sup> the system 1+ of attestation of conformity applies.

This system of attestation of conformity is defined as follows:

System 1+: Certification of the conformity of the product by an approved certification body on the basis of:

- (a) Tasks for the manufacturer:
  - (1) factory production control;
  - (2) further testing of samples taken at the factory by the manufacturer in accordance with a prescribed test plan;
- (b) Tasks for the approved body:
  - (3) initial type-testing of the product;
  - (4) initial inspection of factory and of factory production control;
  - (5) continuous surveillance, assessment and approval of factory production control;
  - (6) audit-testing of samples taken at the factory.

Note: Approved bodies are also referred to as "notified bodies".

#### 3.2 Responsibilities

##### 3.2.1 Tasks for the manufacturer

###### 3.2.1.1 Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European technical approval.

The manufacturer may only use initial materials stated in the technical documentation of this European technical approval.

<sup>12</sup> Letter of the European Commission of 14.02.2006 to EOTA

The factory production control shall be in accordance with the control plan which is part of the technical documentation of this European technical approval. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited with Deutsches Institut für Bautechnik.<sup>13</sup>

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

#### 3.2.1.2 Other tasks for the manufacturer

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field special cement CEM III/A with high sulphate resistance in order to undertake the actions laid down in section 3.3. For this purpose, the "control plan" referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of this European Technical Approval.

#### 3.2.2 Tasks for the approved bodies

The approved body shall perform the

- initial type-testing of the product,
- initial inspection of factory and of factory production control,
- continuous surveillance, assessment and approval of factory production control,
- audit-testing of samples taken at the factory

in accordance with the provisions laid down in the control plan.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the product stating the conformity with the provisions of this European technical approval.

In cases where the provisions of the European technical approval and its control plan are no longer fulfilled the certification body shall withdraw the certificate of conformity and inform Deutsches Institut für Bautechnik without delay.

#### 3.3 CE marking

The CE marking shall be affixed on the packages and the accompanying commercial document, e.g. the EC declaration of conformity respectively. The letters "CE" shall be followed by the identification number of the approved certification body, where relevant, and be accompanied by the following additional information:

- the name and address of the producer (legal entity responsible for the manufacture),
- the last two digits of the year in which the CE marking was affixed,
- the number of the EC certificate of conformity for the product,
- the number of the European technical approval,
- the designation of the product indicating the cement product, the strength class and the notations "LH" for low heat of hydration and "SR" for high sulfate resistance and
- if so, the limit of chloride in %<sup>14</sup>.

<sup>13</sup> The control plan is a confidential part of the European technical approval and only handed over to the approved body involved in the procedure of attestation of conformity. See section 3.2.2.

<sup>14</sup> Only where the blast furnace cement CEM III/A 42,5 N-LH/SR "Deuna" is produced to meet a chloride content limit different to the value specified in Table 3 of EN 197-1.

**4 Assumptions under which the fitness of the product for the intended use was favourably assessed**

**4.1 Manufacturing**

The blast furnace cement CEM III/A 42,5 N-LH/SR "Deuna" is manufactured from a Portland cement clinker, granulated blast furnace slag, minor additional constituents and the addition of gypsum or anhydrite or any mixture of them to control setting. Grinding is carried out combined or separately with subsequent mixing. The sources of the constituents are deposited at 'Deutsches Institut für Bautechnik'.

The European Technical Approval is issued for the product on the basis of agreed data/information, deposited with 'Deutsches Institut für Bautechnik', which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to 'Deutsches Institut für Bautechnik' before the changes are introduced. 'Deutsches Institut für Bautechnik' will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alterations to the ETA shall be necessary.

**4.2 Application**

The blast furnace cement CEM III/A 42,5 N-LH/SR "Deuna" is intended to be used for preparation of concrete, mortar, grouts and other mixes for construction and for the manufacturing of construction products.

Especially the blast furnace cement CEM III/A 42,5 N-LH/SR "Deuna" is characterized by an evidently high resistance against sulfate attack on concrete.

**5 Indications to the manufacturer**

**5.1 Packaging, transport and storage**

In the production plant the blast furnace cement CEM III/A 42,5 N-LH/SR "Deuna" shall be stored in silos.

Packaging, transport, storage of the blast furnace cement CEM III/A 42,5 N-LH/SR "Deuna" shall be the same as for common cements according to EN 197-1<sup>7</sup>.

The manufacturer shall ensure that the requirements given in sections 1, 2 and 4 are made known to those involved. This can be implemented by, for example, handing over copies of the appropriate sections of the European Technical Approval.

Georg Feistel  
Head of Department

*beglaubigt:*  
Schröder