

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

**ETA-22/0160**  
**of 14 July 2022**

English translation prepared by DIBt - Original version in German language

### General Part

Technical Assessment Body issuing the  
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

Blastfurnace cement CEM III/A 32,5 N-LH/SR/LA  
"Lägerdorf"  
Holcim ECOPlanet A3 LH/SR/LA

Product family  
to which the construction product belongs

Blast Furnace Cement CEM III/A with assessment of  
sulfate resistance (SR) and optional with low effective  
alkali content (LA) and/or low heat of hydration (LH)

Manufacturer

Holcim (Deutschland) GmbH  
Tropowitzstraße 5  
22529 Hamburg  
DEUTSCHLAND

Manufacturing plant

Holcim (Deutschland) GmbH  
Werk: Lägerdorf  
Sandweg 10  
25566 Lägerdorf  
DEUTSCHLAND

This European Technical Assessment  
contains

9 pages including 1 annex 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 150009-01-0301

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## Specific part

### 1 Technical description of the product

The blast furnace cement CEM III/A 32,5 N-LH/SR/LA "Lägerdorf"<sup>1</sup> is a cement which fulfils all requirements given in EN 197-1<sup>2</sup> for a common cement of strength class 32,5 N and low heat "LH".

Furthermore, the blast furnace cement CEM III/A 32,5 N-LH/SR/LA "Lägerdorf" has a high resistance against sulfate attack on concrete (SR) and a low effective alkali content (LA).

The low effective alkali content (LA) can be verified by the Na<sub>2</sub>O-equivalent (Na<sub>2</sub>O<sub>eq</sub>) and the blast furnace slag content of the blast furnace cement CEM III/A 32,5 N-LH/SR/LA "Lägerdorf":

- Blast furnace slag content between 45 to 49 % by mass and Na<sub>2</sub>O<sub>eq</sub> ≤ 0,95 % by mass or
- Blast furnace slag content of ≥ 50 % by mass and Na<sub>2</sub>O<sub>eq</sub> ≤ 1,10 % by mass

The assessment of "sulfate resisting property" (SR), "low heat of hydration" (LH) and "low effective alkali content" (LA) was done on a blast furnace cement CEM III/A 32,5 N-LH/SR/LA "Lägerdorf" with a strength class of 32,5 N with a blast furnace slag content of 52 % by mass and a maximum content of defined minor additional constituents of 3,0 % by mass and a specific surface of the cement of 380 m<sup>2</sup>/kg.

The cement was produced at the plant Lägerdorf by mixing of ground granulated blastfurnace slag<sup>3</sup> and a pre-cement<sup>3</sup>.

The cement composition shall be in the following range:

Portland cement clinker:	35 to 48 % by mass
Blast furnace slag:	52 to 65 % by mass

### 2 Specification of the intended use in accordance with the applicable European Assessment Document

The blast furnace cement CEM III/A 32,5 N-LH/SR/LA "Lägerdorf" is intended to be used for preparation of concrete, mortar, grouts and other mixes for construction and for the manufacturing of construction products.

Furthermore, the blast furnace cement CEM III/A 32,5 N-LH/SR/LA "Lägerdorf" shows a low heat of hydration (LH).

Especially the blast furnace cement CEM III/A 32,5 N-LH/SR/LA "Lägerdorf" is characterized by an evidently high resistance against sulfate attack on concrete (SR) and can be used to avoid a damaging alkali silica reaction in concrete (LA).

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of concrete incorporating the blast furnace cement CEM III/A 32,5 N-LH/SR/LA "Lägerdorf" of at least 50 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.

<sup>1</sup> The cement will also be offered under the trade name "Holcim ECOPlanet A3 LH/SR/NA"

<sup>2</sup> EN 197-1 Cement - Part 1: Composition, specification and conformity criteria for common cement

<sup>3</sup> The manufacturing plant of the pre-cement, the sources of the granulated blast furnace slag and minor additional constituents are deposited.

English translation prepared by DIBt

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

#### 3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Specific surface (Blaine)	$\rho = 380 \text{ m}^2/\text{kg}$
Early (Compressive) strength (7 days)	Class 32,5 N: $R_{c,7d} = 30,4 \text{ N/mm}^2$
Standard (Compressive) strength (28 days)	Class 32,5 N: $R_{c,28d} = 50,2 \text{ N/mm}^2$
Initial setting time	Passed (IST = 195 min)
Soundness	Passed (S = 0 mm)
Loss on ignition	Passed (LOI = 1,53 % by mass)
Insoluble residue	Passed (IR = 0,39 % by mass)
Sulfate content (as SO <sub>3</sub> )	Passed (SO <sub>3</sub> = 1,47 % by mass)
Chloride content	Passed (Cl <sup>-</sup> = 0,039 % by mass)
Sulfate resistance	see Annex A
Alkali content (Na <sub>2</sub> O <sub>eq</sub> )	Na <sub>2</sub> O <sub>eq</sub> = 0,65 % by mass
Low heat of hydration (LH)	Passed (LH = 216 J/g)

#### 3.2 Hygiene, health and the environment (BWR 3)

Essential characteristic	Performance
Content, emission and/or release of dangerous substances: Water-soluble chromium (VI) content	K = 0,0 mg/kg

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

In accordance with EAD No. 150009-01-0301, the applicable European legal act is: 97/555/EC<sup>4</sup> amended by the Commission Decision 2010/683/EU<sup>5</sup>.

The system to be applied is: 1+

### 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 deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 14 July 2022 by Deutsches Institut für Bautechnik

Dr.-Ing. Wilhelm Hintzen  
Head of Section

*beglaubigt:*  
Schröder

<sup>4</sup> Official Journal of the European Communities L 229 of 20 August 1997

<sup>5</sup> Official Journal of the European Communities L 293 of 11 November 2010

## ANNEX A: Sulfate resistance – Flat prism method

The testing procedure was done according to EAD 150009-01-0301, Annex A.

The difference in elongation between the sulfate storage (4,4 % Na<sub>2</sub>SO<sub>4</sub>-solution) and the reference storage (saturated Ca(OH)<sub>2</sub>-solution) was calculated as specific change in length.

The specific change in length of the three mortars (one with CEM III/A 32,5 N-LH/SR/LA "Lägerdorf", one with CEM III/B 32,5 N-LH/SR and one with CEM I 42,5 R-SR3) and storage temperatures (20 °C and 5 °C) depending on the storage time and on the respective test solutions are given in Table A1. The expansion of length of the flat prisms was calculated as mean value from 3 specimens.

**Table A1:** Expansion of length of the mortar flat prisms

	Expansion of the length [mm/m] after .... storage in				
	14 days	28 days	56 days	91 days	182 days
<b>CEM III/A 32,5 N-LH/SR/LA "Lägerdorf" – storage at 20 °C</b>					
Na <sub>2</sub> SO <sub>4</sub> -solution ( $\Delta I_{NS;t,20}$ )	0,20	0,21	0,19	0,29	0,46
Ca(OH) <sub>2</sub> -solution ( $\Delta I_{CH;t,20}$ )	0,07	0,06	0,01	0,08	0,10
$\Delta I_{t,20}$	0,13	0,15	0,18	0,21	0,36
<b>CEM III/A 32,5 N-LH/SR/LA "Lägerdorf" – storage at 5 °C</b>					
Na <sub>2</sub> SO <sub>4</sub> -solution ( $\Delta I_{NS;t,5}$ )	-0,07	-0,05	0,05	0,30	-
Ca(OH) <sub>2</sub> -solution ( $\Delta I_{CH;t,5}$ )	-0,05	0,00	0,05	0,06	-
$\Delta I_{t,5}$	-0,02	-0,05	0,00	0,24	-
<b>CEM III/B 32,5 N-LH/SR – storage at 20 °C</b>					
Na <sub>2</sub> SO <sub>4</sub> -solution ( $\Delta I_{NS;t,20}$ )	0,08	0,12	0,19	0,27	0,34
Ca(OH) <sub>2</sub> -solution ( $\Delta I_{CH;t,20}$ )	0,07	0,09	0,04	0,12	0,15
$\Delta I_{t,20}$	0,01	0,03	0,15	0,15	0,19
<b>CEM III/B 32,5 N-LH/SR – storage at 5 °C</b>					
Na <sub>2</sub> SO <sub>4</sub> -solution ( $\Delta I_{NS;t,5}$ )	-0,01	-0,03	0,06	0,30	-
Ca(OH) <sub>2</sub> -solution ( $\Delta I_{CH;t,5}$ )	-0,06	-0,11	-0,13	-0,04	-
$\Delta I_{t,5}$	0,05	0,08	0,19	0,34	-
<b>CEM I 42,5 R-SR3 – storage at 20 °C</b>					
Na <sub>2</sub> SO <sub>4</sub> -solution ( $\Delta I_{NS;t,20}$ )	0,07	0,23	0,34	0,68	2,99
Ca(OH) <sub>2</sub> -solution ( $\Delta I_{CH;t,20}$ )	0,06	0,04	-0,01	0,05	0,05
$\Delta I_{t,20}$	0,01	0,19	0,35	0,63	2,94
<b>CEM I 42,5 R-SR3 – storage at 5 °C</b>					
Na <sub>2</sub> SO <sub>4</sub> -solution ( $\Delta I_{NS;t,5}$ )	-0,05	-0,02	0,26	0,79	-
Ca(OH) <sub>2</sub> -solution ( $\Delta I_{CH;t,5}$ )	-0,09	-0,06	-0,12	-0,08	-
$\Delta I_{t,5}$	0,04	0,04	0,38	0,87	-

The dynamic moduli of elasticity of the three mortars (one with CEM III/A 32,5 N-LH/SR/LA "Lägerdorf", one with CEM III/B 32,5 N-LH/SR and one with CEM I 42,5 R-SR3) and storage temperatures (20 °C and 5 °C) depending on the storage time and on the respective test solutions are given in Table A2. The dynamic modulus of elasticity was calculated as mean value from the measured values of 3 specimens.

**Table A2:** Dynamic modulus of elasticity of the mortar flat prisms

	Dynamic modulus of elasticity in kN/mm <sup>2</sup> after ... storage in					
	0 days	14 days	28 days	56 days	91 days	182 days
<b>CEM III/A 32,5 N-LH/SR/LA "Lägerdorf" – storage at 20 °C</b>						
Ca(OH) <sub>2</sub> -solution (E <sub>d,CH,t,20</sub> )	30,8	33,9	35,9	38,3	39,2	40,9
Na <sub>2</sub> SO <sub>4</sub> -solution (E <sub>d,NS;t,20</sub> )	30,7	36,6	38,3	39,4	37,5	36,1
<b>CEM III/A 32,5 N-LH/SR/LA "Lägerdorf" – storage at 5 °C</b>						
Ca(OH) <sub>2</sub> -solution (E <sub>d,CH,t,5</sub> )	30,2	30,2	31,2	32,0	33,2	-
Na <sub>2</sub> SO <sub>4</sub> -solution (E <sub>d,NS;t,5</sub> )	30,5	33,1	34,8	35,7	36,6	-
<b>CEM III/B 32,5 N-LH/SR – storage at 20 °C</b>						
Ca(OH) <sub>2</sub> -solution (E <sub>d,CH,t,20</sub> )	28,4	30,2	31,4	33,6	34,9	35,9
Na <sub>2</sub> SO <sub>4</sub> -solution (E <sub>d,NS;t,20</sub> )	28,5	32,2	33,8	34,8	34,5	32,8
<b>CEM III/B 32,5 N-LH/SR – storage at 5 °C</b>						
Ca(OH) <sub>2</sub> -solution (E <sub>d,CH,t,5</sub> )	29,0	28,6	28,8	29,3	30,2	-
Na <sub>2</sub> SO <sub>4</sub> -solution (E <sub>d,NS;t,5</sub> )	28,6	30,2	31,2	32,0	32,5	-
<b>CEM I 42,5 R-SR3 – storage at 20 °C</b>						
Ca(OH) <sub>2</sub> -solution (E <sub>d,CH,t,20</sub> )	36,6	37,4	37,6	37,3	37,2	37,0
Na <sub>2</sub> SO <sub>4</sub> -solution (E <sub>d,NS;t,20</sub> )	36,5	38,6	38,9	38,7	39,2	39,5
<b>CEM I 42,5 R-SR3 – storage at 5 °C</b>						
Ca(OH) <sub>2</sub> -solution (E <sub>d,CH,t,5</sub> )	36,7	37,3	37,6	38,2	38,0	-
Na <sub>2</sub> SO <sub>4</sub> -solution (E <sub>d,NS;t,5</sub> )	36,6	37,8	38,6	37,6	36,0	-

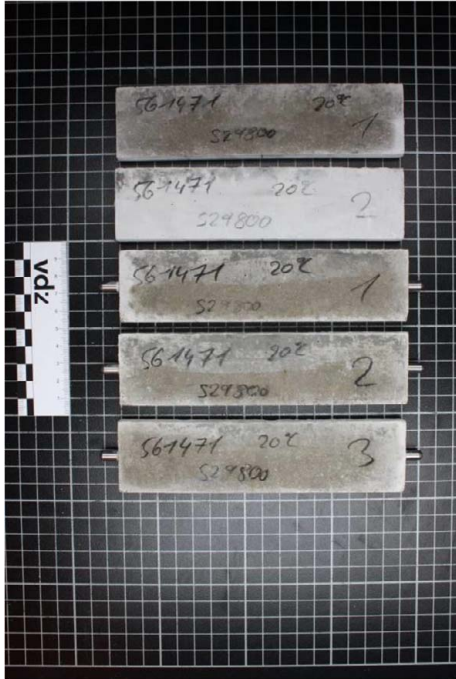
The mass of the test specimens of the three mortars (one with CEM III/A 32,5 N-LH/SR/LA "Lägerdorf", one with CEM III/B 32,5 N-LH/SR and one with CEM I 42,5 R-SR3) and storage temperatures (20 °C and 5 °C) depending on the storage time and on the respective test solutions are given in Table A3. The mass of the test specimens was calculated as mean value from the measured values from 3 specimens.

**Table A3:** Mass of the mortar flat prisms

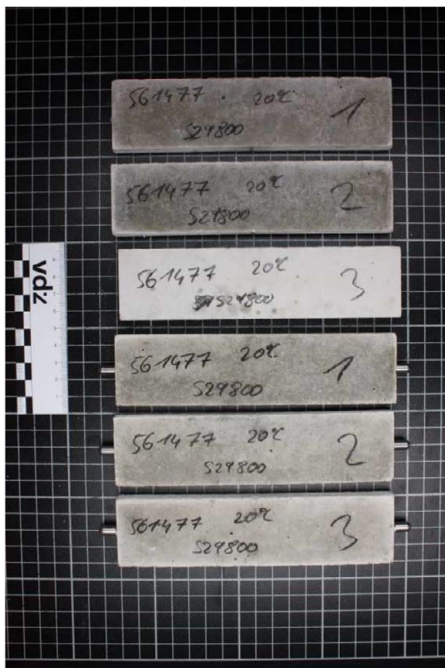
	Mass in g after .... storage in					
	0 days	14 days	28 days	56 days	91 days	182 days
<b>CEM III/A 32,5 N-LH/SR/LA "Lägerdorf" – storage at 20 °C</b>						
Ca(OH) <sub>2</sub> -solution (w <sub>CH,t,20</sub> )	146,41	147,19	147,14	147,30	148,05	147,97
Na <sub>2</sub> SO <sub>4</sub> -solution (w <sub>NS,t,20</sub> )	146,87	147,24	147,37	147,69	148,57	148,75
<b>CEM III/A 32,5 N-LH/SR/LA "Lägerdorf" – storage at 5 °C</b>						
Ca(OH) <sub>2</sub> -solution (w <sub>CH,t,5</sub> )	146,17	146,82	147,05	147,15	147,52	-
Na <sub>2</sub> SO <sub>4</sub> -solution (w <sub>NS,t,5</sub> )	146,71	147,13	147,30	147,58	148,65	-
<b>CEM III/B 32,5 N-LH/SR – storage at 20 °C</b>						
Ca(OH) <sub>2</sub> -solution (w <sub>CH,t,20</sub> )	146,17	146,82	147,05	147,15	147,52	147,57
Na <sub>2</sub> SO <sub>4</sub> -solution (w <sub>NS,t,20</sub> )	146,80	146,95	147,06	147,57	148,13	149,04
<b>CEM III/B 32,5 N-LH/SR – storage at 5 °C</b>						
Ca(OH) <sub>2</sub> -solution (w <sub>CH,t,5</sub> )	145,73	146,39	146,34	146,50	147,08	-
Na <sub>2</sub> SO <sub>4</sub> -solution (w <sub>NS,t,5</sub> )	146,02	146,30	146,29	146,42	147,27	-
<b>CEM I 42,5 R-SR3 – storage at 20 °C</b>						
Ca(OH) <sub>2</sub> -solution (w <sub>CH,t,20</sub> )	147,83	148,23333	148,25	148,43	148,40	149,03
Na <sub>2</sub> SO <sub>4</sub> -solution (w <sub>NS,t,20</sub> )	147,53	147,83	148,12	148,48	148,45	149,63
<b>CEM I 42,5 R-SR3 – storage at 5 °C</b>						
Ca(OH) <sub>2</sub> -solution (w <sub>CH,t,5</sub> )	147,18	147,80	147,62	147,75	147,68	-
Na <sub>2</sub> SO <sub>4</sub> -solution (w <sub>NS,t,5</sub> )	146,88	147,30	147,30	147,85	148,25	-

### Visual description of the specimens after sulfate storage

After a testing period of 182 days respectively 91 days the specimens show no expansion damages, cracks or flaking based on formation of ettringite and thaumasite, see Figures A1 to A3.

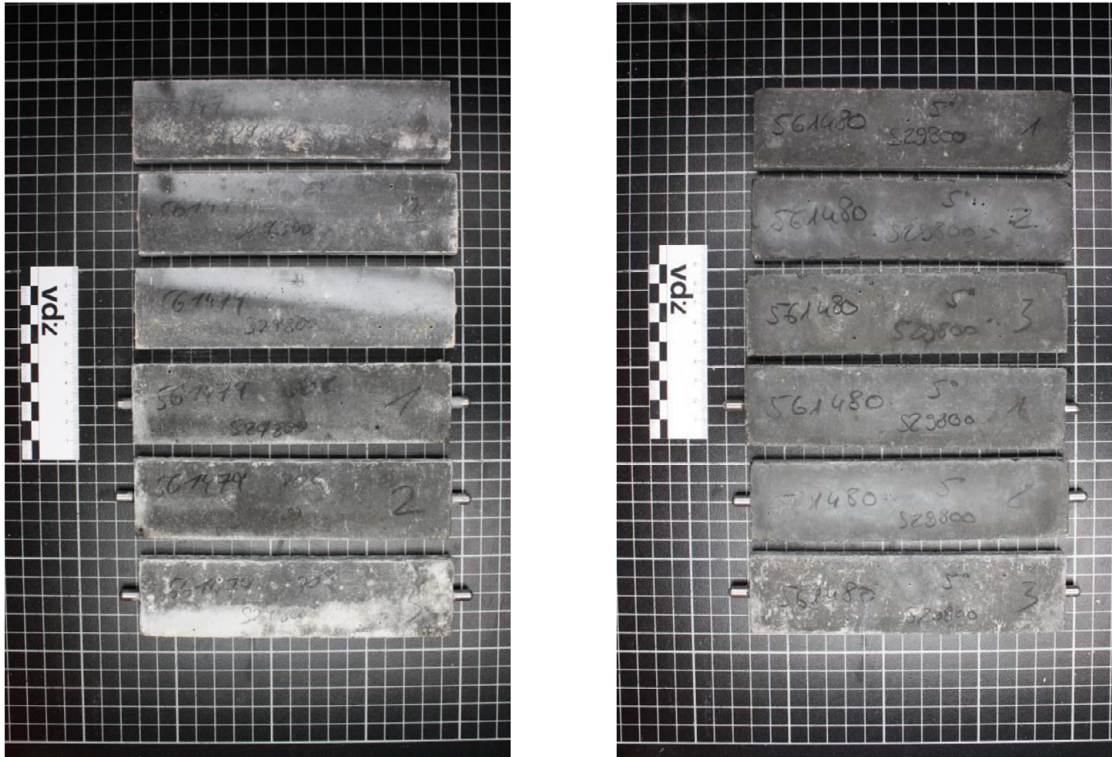


**Figure A1:** Specimens with CEM III/A 32,5 N-LH/SR/LA "Lägerdorf" after sulfate storage; on the left: after 182 days at 20 °C; on the right: after 91 days at 5 °C



**Figure A2:** Specimens with CEM III/B 32,5 N-LH/SR after sulfate storage; on the left: after 182 days at 20 °C; on the right: after 91 days at 5 °C





**Figure A3:** Specimens with CEM I 42,5 R-SR3 after sulfate storage;  
on the left: after 182 days at 20 °C;      on the right: after 91 days at 5 °C