Deutsches Institut für Bautechnik

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European Technical Assessment Body for construction products

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European Technical Assessment ETA-13/0419 of 14 February 2025

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General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	"Next Base SL05"
Product family to which the construction product belongs	Calcium Sulphoaluminate based Cement
Manufacturer	Buzzi Unicem S.r.l. Via Luigi Buzzi 6 15033 CASALE MONFERRATO ITALIEN
Manufacturing plant	Cement manufacturing plants of Buzzi Unicem Spa Italy
This European Technical Assessment contains	10 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 150001-01-0301
This version replaces	ETA-13/0419 issued on 11 August 2021

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Specific Part

1 Technical description of the product

The calcium sulfoaluminate (CSA) based Cement "Next Base SL05" referred to in this document is a special cement that is not covered by the harmonised European standard EN 197-1.

It is a hydraulic binder with rapid hardening features that contains a calcium sulfoaluminate (Yeelimite) content in the cement of (17,0 ± 7,0) % by mass.

The range of composition of the CSA-based cement "Next Base SL05" is listed below:

Calcium sulfoaluminate clinker	20 – 40 % by mass
Cement CEM II/A-LL according to EN 197-1	45 – 65 % by mass
Rapid setting cement according to EAD 150008-00-0301	0 % by mass
Calcium sulfate (as defined in EN 197-1, clause 5.4)	5 – 25 % by mass
Limestone (as defined in EN 197-1, clause 5.2.6)	0 % by mass
Minor additional constituents (as defined in EN 197-1, clause 5.3)	< 5 % by mass[1]
Additives (as defined in EN 197-1, clause 5.5)	< 2,0 % by mass[2]
Organic additives (as defined in EN 197-1, clause 5.5)	< 0,2 % by mass

The calcium sulfoaluminate clinker (CSAK) is made by sintering a precisely specified mixture of raw materials (raw meal, paste or slurry) containing elements, usually expressed as oxides, CaO, Al_2O_3, SiO_2, Fe_2O_3, SO_3 and small quantities of other materials.

The calcium sulfoaluminate clinker is a hydraulic material which is composed mainly of $C_4A_3\bar{S}$ (Yeelimite). The remaining consisting of calcium silicates ($2CaO \cdot SiO_2$) and other compounds.

The Yeelimite content of the calcium sulfoaluminate clinker is greater than 45 % by mass.

The CSA based cement "Next Base SL05" complies with the specifications of the standard EN 197-1 except the following properties, see Table 1

Table 1: Comparison between cement characteristics and specifications of EN 197-1

CSA based cement properties	**Specifications of EN 197-1**
Calcium sulfoaluminate clinker (CSAK) (20 – 90 % by mass)	Only Portland cement clinker
Initial setting time can be < 45 min	Initial setting time ≥ 45 min (clause 7.1.2)
Sulfate (as SO_3) content > 4,0 % by mass	Sulfate (as SO_3) content ≤ 4,0 % by mass (clause 7.3, table 4)

[1] The residues of the CSA clinker process can be integrated as minor additional constituents.

[2] EN 197-1 clause 5.5 specified: The total quantity of additives shall not exceed 1,0 % by mass of the cement (except for pigments). The quantity of organic additives on a dry basis shall not exceed 0,2 % by mass of the cement. A higher quantity may be incorporated in cements provided that the maximum quantity, in %, is declared on the packaging and/or the delivery note.

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

The CSA based cement "Next Base SL05" is a cement for production of concrete, mortar, grouts and other mixes including in particular cast-in-situ and prefabricated structural concrete[3] conforming to EN 206.

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 CSA based cement "Next Base SL05" 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.

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
Early strength ($1 \leq t \leq 24$ h)	$R_{C,24h} \geq 10{,}0$ MPa
Standard strength (28 days)	$R_{C,28d} \geq 32{,}5$ MPa
Initial setting time	IST = 80 min
Soundness	S = 0 mm
Sulfate content (expressed as SO_3)	(12,7 ± 5,0) % by mass
Chloride content	0,028 % by mass
Insoluble residue	IR = 0,35 % by mass
Loss on ignition	LOI = 7,17 % by mass
Effect of different storage temperatures on mortar which hardened under standard conditions	See Annex A, clause A1
Shrinkage of concrete	Method Shr_C: Shr_C = 0,147 mm/m Method Shr_M: No performance assessed.
Effect of different curing temperatures on mortar at early age	No performance assessed.
Sulfate resistance (external sulfate attack)	No performance assessed.
Delayed ettringite formation	No performance assessed.
Carbonation of concrete	Method C_{dcr}: See Annex A, clause A2 Method C_{rsc}: No performance assessed.
Resistance to chloride penetration	Method M_{nss}: $M_{nss,97d} = 11 \cdot 10^{-12}$ m²/s Method $D_{nss,90}$: No performance assessed.

[3] e. g. EN 490, EN 516, EN 1168, EN 1317, EN 1338, EN 1340, EN 1520, EN 1858, EN 1857, EN 1916, EN 1917, EN 13084, EN 12446, EN 12737, EN 13224, EN 15037, EN 14844, EN 12839, EN 14843, EN 13978, EN 12843, EN 12951, EN 13224, EN 13813, EN 13877, EN 14843, EN 14992, EN 15037, EN 15258, EN 15435, EN 15498

Essential characteristic	Performance
Freeze-thaw resistance without de-icing agent	Method FT_{cube}: P_{100} = 7,2 % by mass Method FT_{slab}: No performance assessed. Method FT_{beam}: No performance assessed. Method FT_{CiF}: No performance assessed.
Freeze-thaw resistance with de-icing agent	Method FTS_{CDF}: S_{28} = 0,691 kg/m²; $RDM_{UPTT,28}$ = 100,3 %; $\bar{L}$ = 0,24 mm; f_{C28} = 42,3 MPa See Annex A, clause A3 Method FT_{slab}: No performance assessed.

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Content, emission and/or release of dangerous substances	No performance assessed.

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

In accordance with EAD No. 150001-00-0301, the applicable European legal act is: Decision 97/555/EC.

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 February 2025 by Deutsches Institut für Bautechnik

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Head of Section

beglaubigt:
Wagner

ANNEX A: Assessment

A1 Effect of high temperature on mortar hardened under standard conditions

The testing procedure was done according to EAD 150001-00-0301, clause 2.2.11.

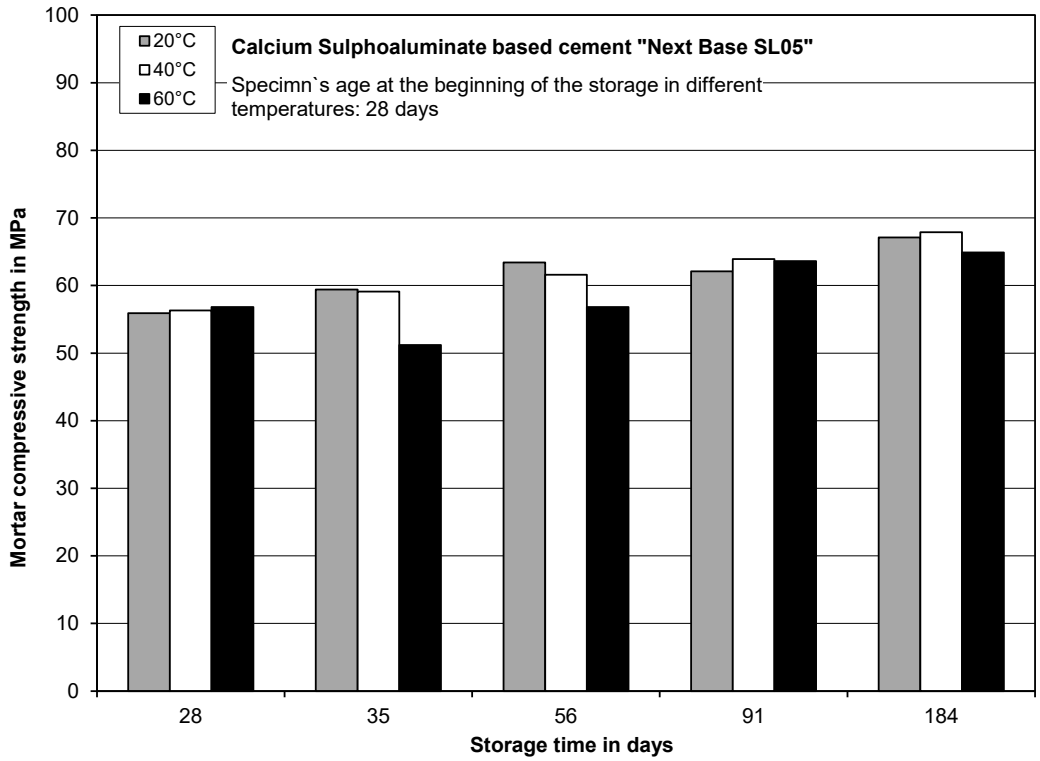

Figure A1.1: Compressive strength of mortar with CSA based cement "Next Base SL05" stored at 20°C, 40°C and 60°C

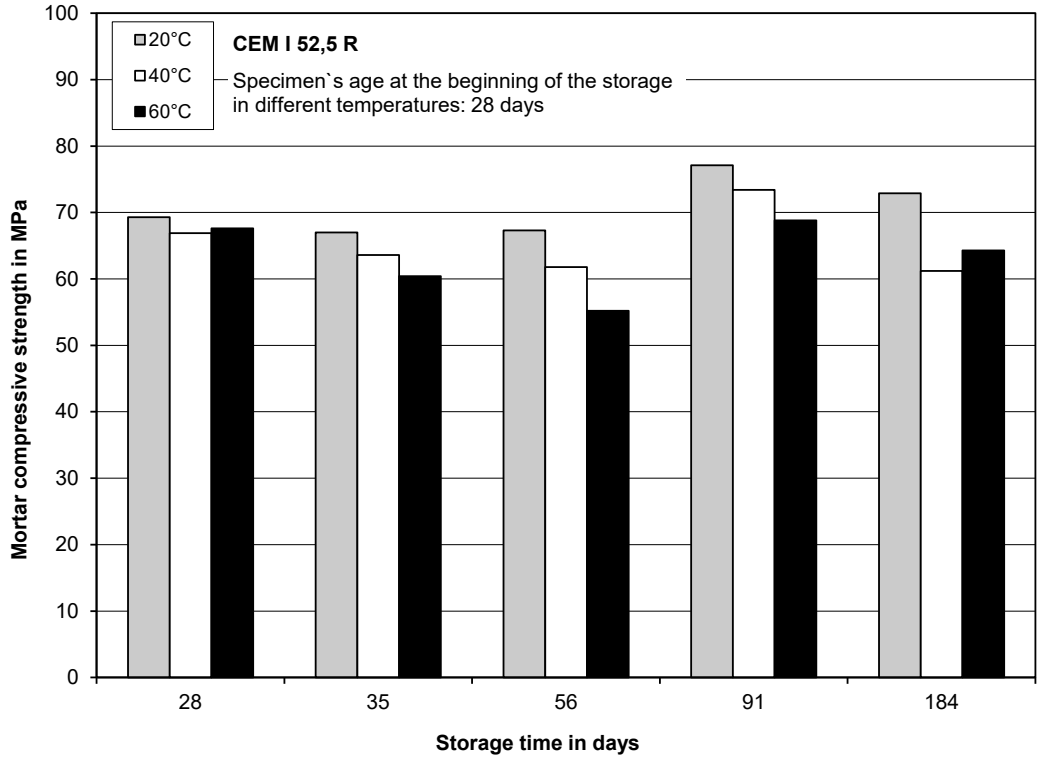

Figure A1.2: Compressive strength of mortar with CEM I 52,5 R stored at 20°C, 40°C and 60°C

A2 Carbonation of concrete – Method: Direct carbonation resistance D_{dcr}

The testing procedure was done according to EAD 150001-00-0301, clause 2.4.15.

Table A2.1: Compressive strength of concrete I[1]

age	pre-storage 7 d			pre-storage 28 d		
	MPa					
	single values		mean value	single values		mean value
1	2	3	5	6	7	9
after pre-storage	44,0	43,6	44,3	48,4	51,2	49,7
	44,8	44,9		50,8	48,6	
	44,8	43,9		49,3	49,9	
35 d	56,6	53,9	56,1	59,3	60,1	60,2
	57,9	55,1		59,0	60,8	
	56,2	56,9		60,8	60,3	
after 140 d main storage	51,6	52,1	51,9	61,6	64,3	64,3
	50,6	54,8		64,4	66,9	
	51,6	50,6		64,6	64,1	

Table A2.2: Carbonation depth of concrete I[1]

main storage	Concrete I[1]			
	pre-storage 7 d		pre-storage 28 d	
d	mm			
	single values	mean value	single values	mean value
1	2	3	4	5
14	0,1 / 0,3 / 0,3	0,2	0,0 / 0,0 / 0,0	0,0
28	2,6 / 2,6 / 2,6	2,6	0,6 / 0,5 / 0,5	0,5
56	4,8 / 3,8 / 4,3	4,3	2,3 / 2,3 / 2,1	2,2
98	5,4 / 4,3 / 5,3	5,0	2,9 / 2,8 / 2,6	2,8
140	4,9 / 4,9 / 5,0	4,9	2,9 / 2,6 / 2,0	2,5
364	6,8 / 8,5 / 8,5	7,9	4,0 / 3,9 / 3,6	3,8
728	12,1 / 10,5 / 12,8	11,8	6,9 / 6,4 / 6,0	6,4

The carbonation depth resp. the carbonation speed of the concrete I[1] is compared to data which are given in EAD 150001-00-0301, Annex D. The calculated carbonation speeds for concrete I[1] are given in Table A2.3.

Table A2.3: Calculation of the carbonation speed

No.	pre-storage time [d]	Compressive strength f_C [MPa]			Carbonation depth [mm]								Carbonation speed [mm / $d^{0,5}$]	
		after Pre-storage	35 d	140 d main-storage	14 d	28 d	56 d	98 d	140 d	1 a	2 a	5 a	$v_{C,140d}$	$v_{C,2a}$
I	7	44,3	56,1	51,9	0,2	2,6	4,3	5,0	4,9	7,9	11,8	-	0,56	0,44
I	28	49,7	60,2	64,3	0,0	0,5	2,2	2,8	2,5	3,8	6,4	-	0,35	0,25

[1] Concrete I: Fine concrete c = 500 g (CSA based cement "Next Base SL05"); w/c = 0,45

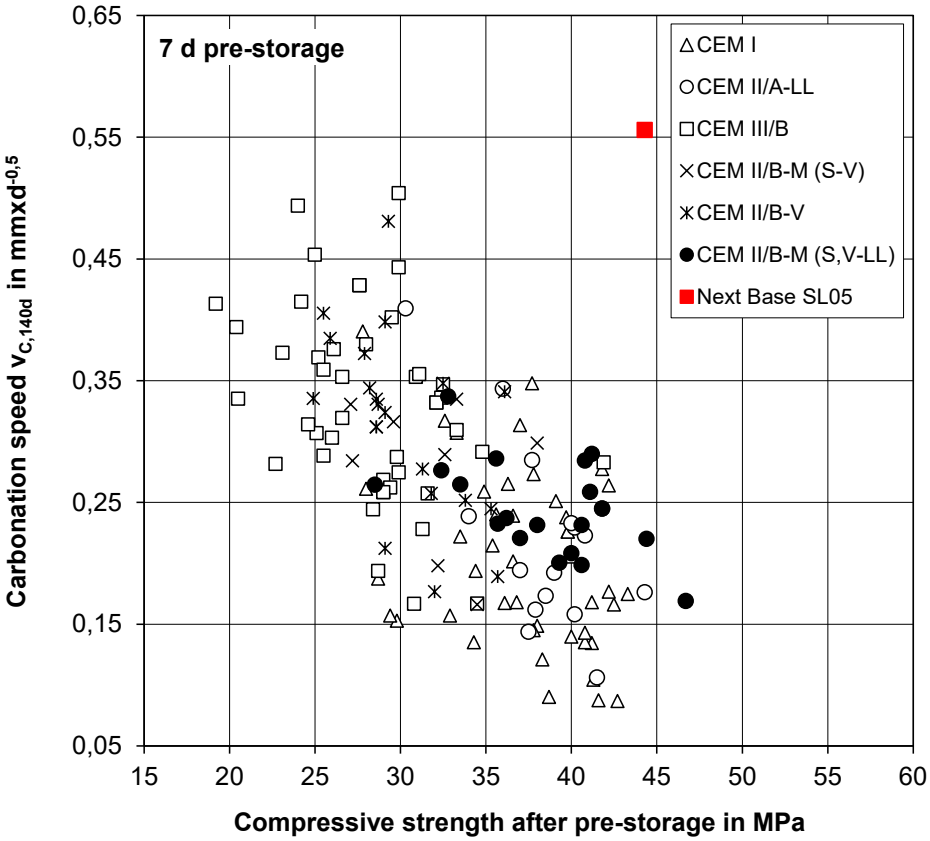

Figure A2.1: Carbonation speed compared to the compressive strength after 7 d pre-storage

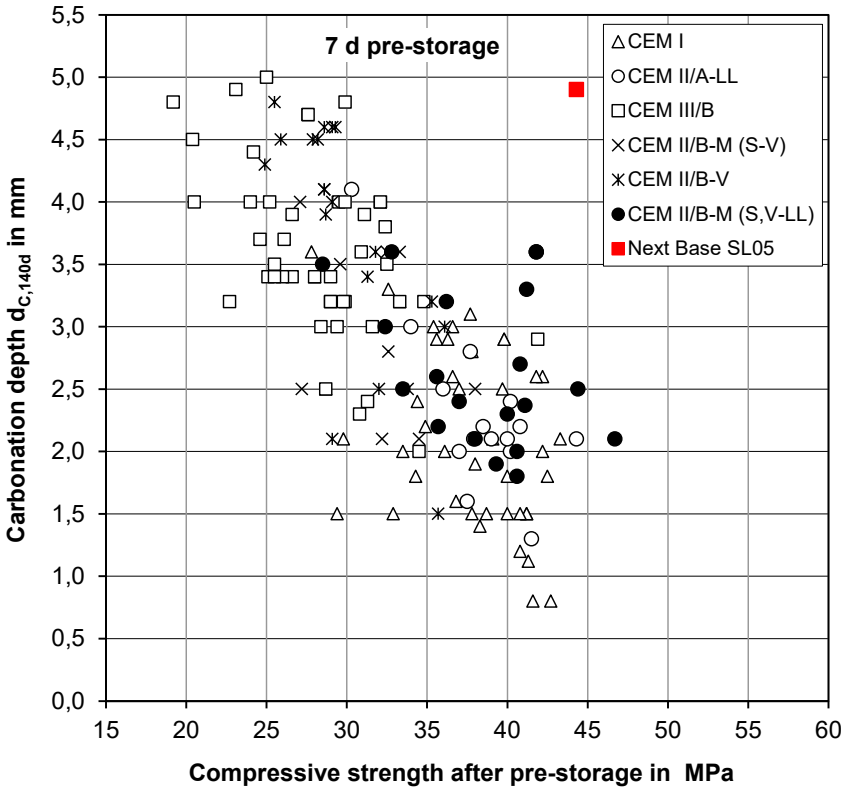

Figure A2.2: Carbonation depth compared to the compressive strength after 7 d pre-storage

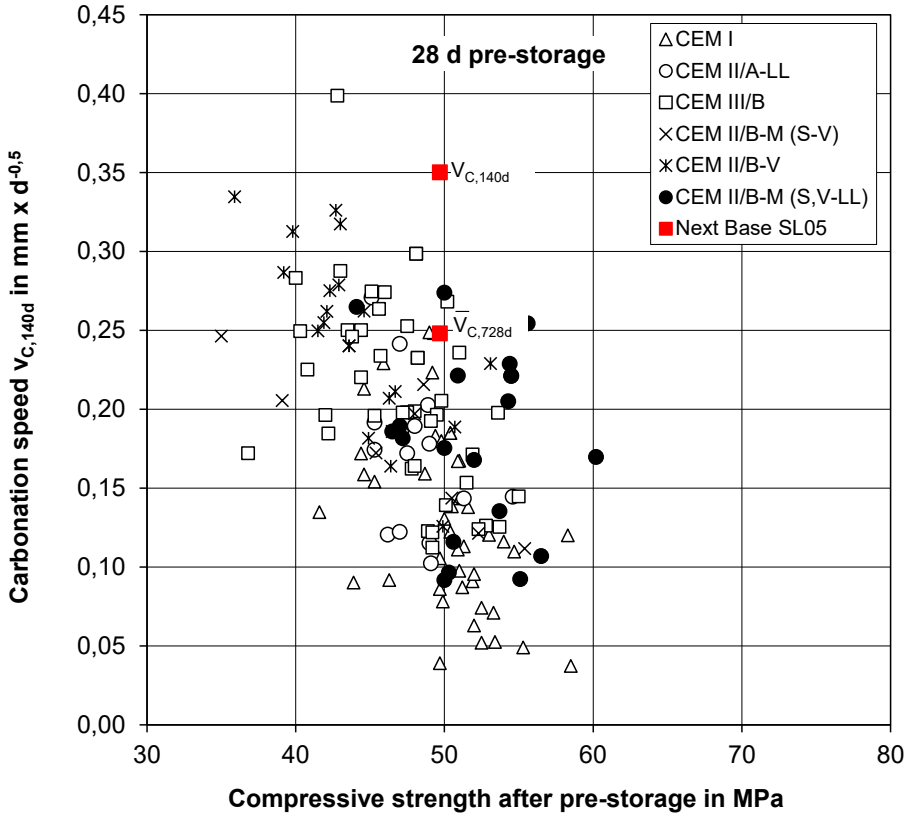

Figure A2.3: Carbonation speed compared to the compressive strength after 28 d pre-storage

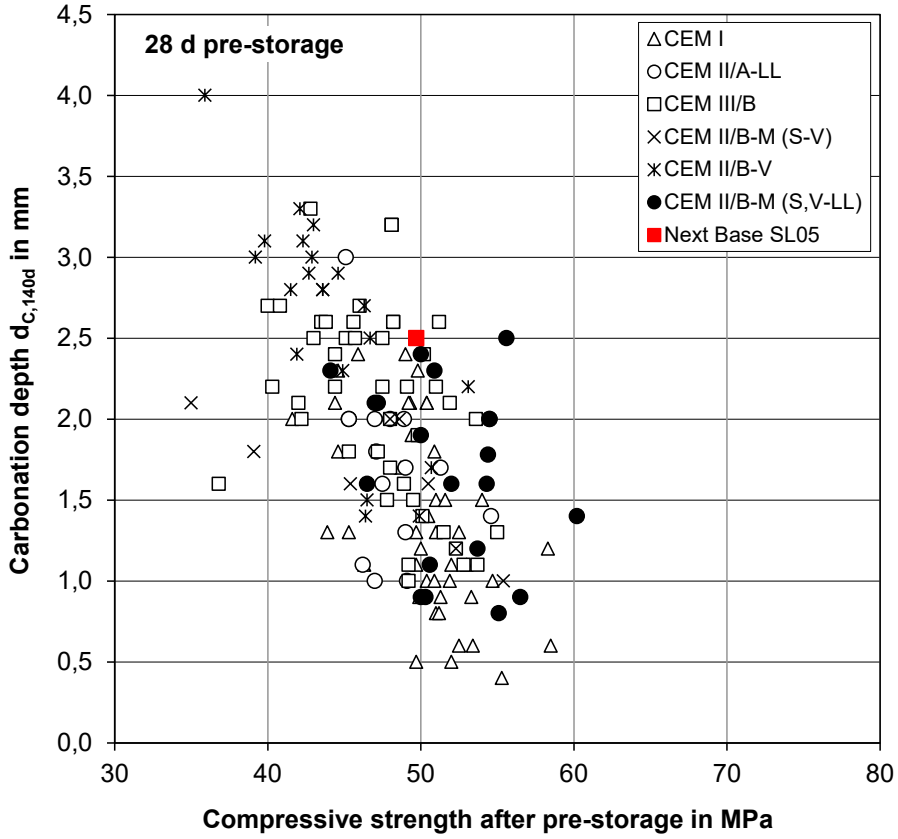

Figure A2.4: Carbonation depth compared to the compressive strength after 28 d pre-storage

A3 Freeze-thaw and de-icing salt resistance– Method: CDF Pprocedure FTS_{CDF}

The testing procedure was done according to EAD 150001-00-0301, clause 2.4.18.

Table A3.1: Fresh concrete characteristics

Characteristic	Unit	Concrete V[1)]
Degree of compactability	-	1,16*
Air content	%	4,9
Density	kg/m³	2,27
28 d compressive strength	MPa	42,3

[1)] Concrete V: CSA based cement "Next Base SL05" = 320 kg/m²; w/c = 0,50

* Class "C2" = plastic

Table A3.2: Air void parameters of concrete V

Characteristic	Unit	Result		
-	-	Single values		Mean value
Total air content A	Vol. %.	5,0	4,1	4,5
Micro air content A_{300}		1,7	1,6	1,6
Spacing factor	mm	0,26	0,23	0,24

Table A3.3: Single values, mean value und standard deviation of the scaling (CDF procedure) of concrete V

Freeze thaw cycles	Scaling of sample no.						Standard deviation
	1	2	3	4	5	Mean value	
-	kg/m²						
4	0,214	0,438	0,172	0,292	0,184	0,260	0,110
6	0,304	0,520	0,268	0,379	0,235	0,341	0,113
14	0,548	0,733	0,436	0,617	0,447	0,556	0,124
28	0,700	0,842	0,617	0,723	0,572	0,691	0,105

Table A3.4: Single values, mean value und standard deviation of the relative dynamic modulus elasticity (CDF procedure) of concrete V

Freeze thaw cycles	Relative dynamic modulus of elasticity of sample no.						Standard deviation
	1	2	3	4	5	Mean value	
-	%						
4	100,0	99,7	99,6	99,7	99,7	99,8	0,1
6	99,6	99,7	99,6	99,3	100,0	99,7	0,2
14	101,5	100,7	100,9	100,6	100,5	100,8	0,4
28	101,2	100,5	100,9	99,0	100,1	100,3	0,9