Deutsches Institut für Bautechnik

Public-law institution jointly founded by the federal states and the Federation

European Technical Assessment Body for construction products

Member of EOTA
www.eota.eu

Designated in accordance with Article 39 of Regulation (EU) No 2024/3110 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment ETA-19/0458 of 4 September 2026

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	Rapid Set
Product family to which the construction product belongs	Belitic calcium sulfoaluminate cement
Manufacturer	CTS Cement Manufacturing Corporation 12442 Knott Street GARDEN GROVE, CA 92841 USA
Manufacturing plant	No 10
This European Technical Assessment contains	14 pages including 1 annex which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Article 95(4) of Regulation (EU) 2024/3110, on the basis of	EAD 150001-01-0301
This version replaces	ETA-19/0458 issued on 19 June 2020

The European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and shall be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may only be made with the written consent of the issuing Technical Assessment Body. Any partial reproduction shall be identified as such.

This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission in accordance with Article 36(3) of Regulation (EU) No 2024/3110.

Specific part

1 Technical description of the product

The belitic calcium sulfoaluminate cement (belitic CSA-Cement) "Rapid Set" referred to in this document is a cement with rapid hardening features. This cement is not covered by the harmonized European Standard EN 197-1.

The belitic calcium sulfoaluminate clinker (belitic CSA-Clinker) 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 belitic CSA-Clinker is composed mainly of $2CaO \cdot SiO_2$ (belite) $C_4A_3\overline{S}$ / $C_4(A,F)_3\overline{S}$ (ye'elimite).

The content of belite in the clinker is approx. 58 % by mass and the content of ye'elimite in the clinker is approx. 31 % by mass.

The composition of the belitic CSA-Cement "Rapid Set" is listed below:

Belitic CSA-Clinker	88,0 ± 7,0 % by mass
Cement CEM I and/or CEM II according to EN 197-1	0 % by mass
Calcium sulfate (as defined in EN 197-1, clause 5.4)	12,0 ± 7,0 % by mass
Limestone (as defined in EN 197-1, clause 5.2.6)	0 % by mass
Fly ash (as defined in EN 197-1, clause 5.2.4)	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 % by mass[2]
Organic additives (as defined in EN 197-1, clause 5.5)	< 0,2 % by mass

The belitic CSA-Cement "Rapid Set" complies with the specifications of EN 197-1 except the following properties, see Table 1.

Table 1: Comparison of belitic CSA-Cement characteristics and specifications of EN 197-1

Properties of the belitic CSA-Cement	Properties of common cement according to EN 197-1
This cement contains belitic CSA-Clinker (81 – 98 %) as constituent	Portland cement clinker
Initial setting time < 45 min	Initial setting time ≥ 45 min (clause 7.1.2)
Sulfate content (as SO_3) > 4,0 % by mass	Sulfate content (as SO_3) ≤ 4,0 % by mass (clause 7.3, table 4)

[1] The residues of belitic CSA-Clinker process can be integrated as minor additional constituents.

[2] EN 197-1, clause 5.5 specifies: 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 belitic CSA-Cement "Rapid Set" is cement for production of concrete, mortar, grouts and other mixes including in particular cast-in-situ and prefabricated structural concrete conforming to EN 206.

The belitic CSA-Cement "Rapid Set" is especially characterized by a rapid hardening and by a high resistance against sulfate attack on concrete.

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 belitic CSA-Cement "Rapid Set" 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)	$R_{C,3h}$ = 30 MPa (≥ 10,0 MPa)
Standard strength (28 days)	$R_{C,28d}$ ≥ 42,5 MPa
Initial setting time	IST = 13 min
Soundness	S = 0,5 mm
Sulfate content as SO_3	SO_3 = 14,0 ± 2,0 % by mass
Chloride content	Cl^- = 0,07 % by mass
Insoluble residue	No performance assessed.
Loss on ignition	LOI = 1,48 % by mass
Effect of different storage temperatures on mortar which hardened under standard conditions	See Annex A, clause A1
Shrinkage of concrete	Shr_C = -0,13 mm/m
Effect of different curing temperatures on mortar at early age	See Annex A, clause A2
Sulfate resistance (external sulfate attack)	Method SR_{FPM} = See Annex A, clause A3 Method SR_{SPM}: No performance assessed.
Delayed ettringite formation	No performance assessed.

Essential characteristics	Performance
Carbonation of concrete	Method C_{dcr}: No performance assessed. Method C_{rsc}: No performance assessed.
Resistance to chloride penetration	Method M_{nss}: No performance assessed. Method $D_{nss,90}$: No performance assessed.
Freeze-thaw resistance without de-icing agent	Method FT_{slab}: No performance assessed. Method FT_{beam}: No performance assessed. Method FT_{CIF}: S_{n28} = 0,54 kg/m²; $RDM_{UPTT,28}$ = 94 %; f_{C28} = 59,2 MPa Method FT_{cube}: No performance assessed.
Freeze-thaw resistance with de-icing agent	Method FTS_{CDF}: No performance assessed. Method FT_{slab}: No performance assessed.

3.2 Reaction to fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	No performance assessed.

3.3 Hygiene, health and the environment (BWR 3)

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. 150001-01-0301, the applicable European legal act is: Commission Decision 97/555/EC[3], as amended by the Commission Decision 2010/683/EU[4].

The system to be applied is: 1+

[3] Official Journal of the European Communities L 229 of 20 August 1997.
[4] Official Journal of the European Communities L 293 of 11 November 2010.

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 4 September 2026 by Deutsches Institut für Bautechnik

Petra Schröder
Head of Section

beglaubigt:
Wagner

ANNEX A: Assessment

A1 Effect of different storage temperatures on mortar which hardened under standard conditions

The testing procedure was done according to EAD 150001-01-0301, clause 2.2.9.

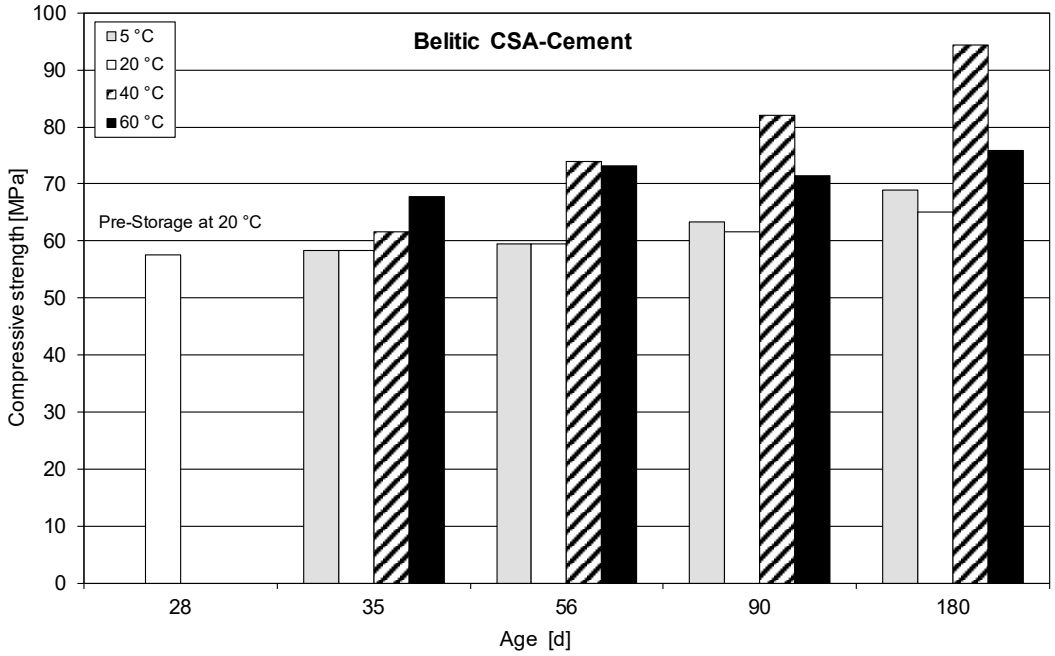

Figure A1.1: Compressive strength of mortar with belitic CSA-Cement "Rapid Set" stored at 5°C 20°C, 40°C and 60°C

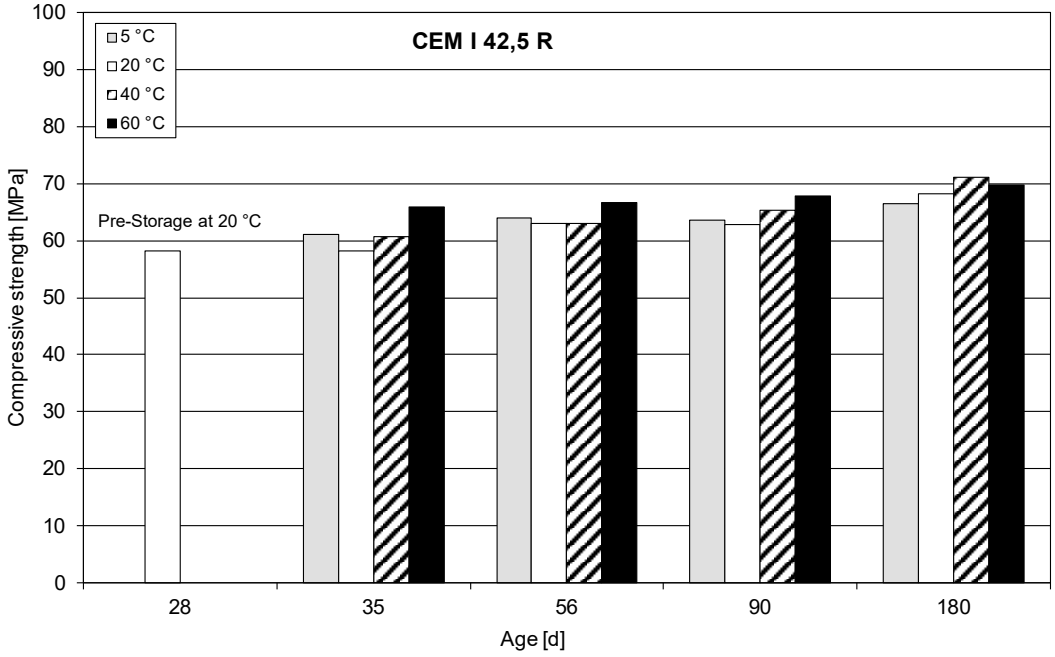

Figure A1.2: Compressive strength of mortar with CEM I 42,5 R stored at 5 °C 20 °C, 40 °C and 60 °C

A2 Effect of different curing temperatures on mortar at early age

The testing procedure was done according to EAD 150001-01-0301, clause 2.2.141.

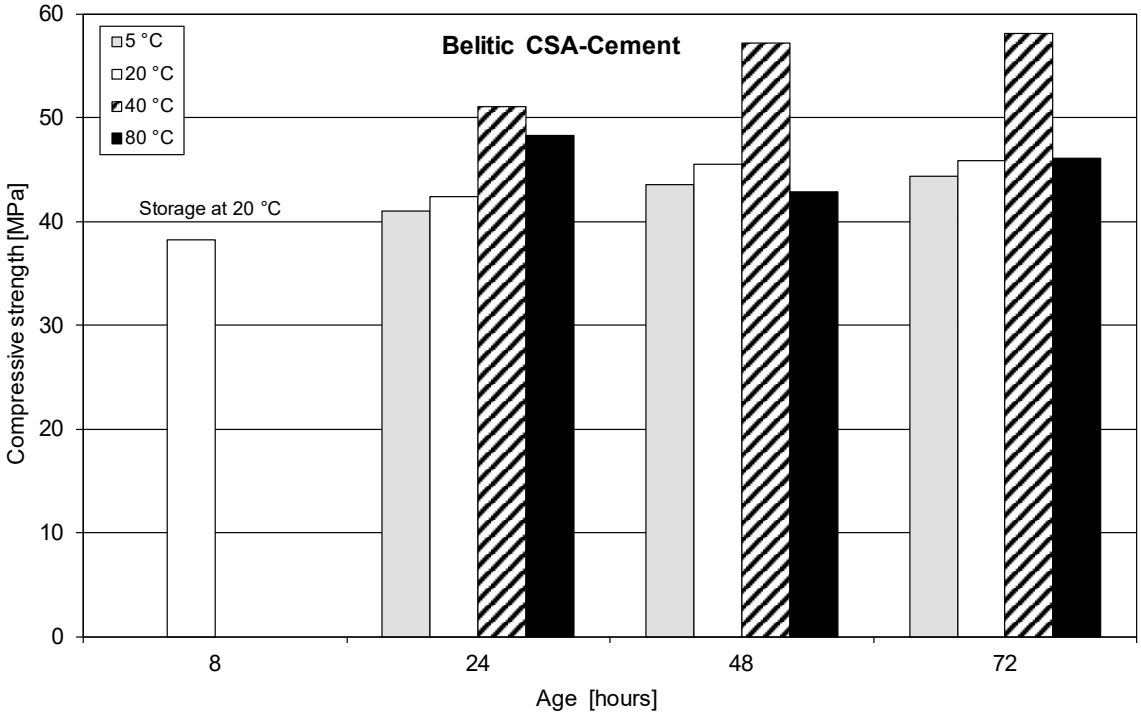

Figure A2.1: Compressive strength of mortar with belitic CSA-Cement "Rapid Set" at 5 °C, 20 °C, 40 °C and 80 °C after 8 hours storage at 20 °C

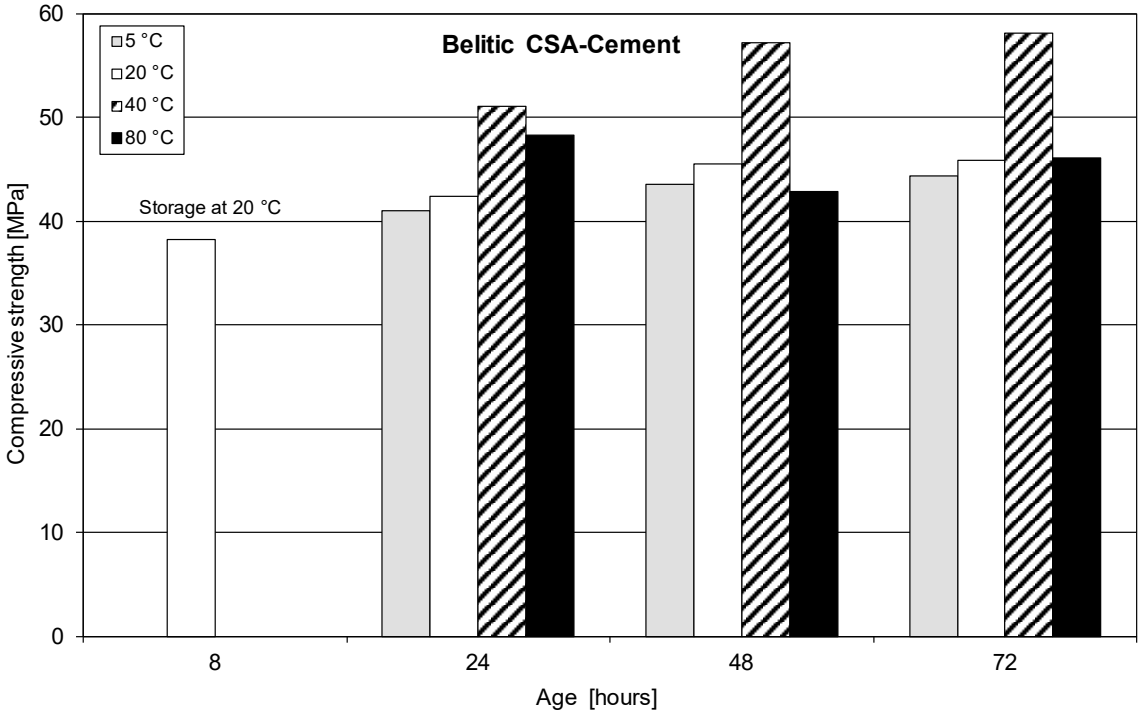

Figure A2.2: Compressive strength of mortar with CEM I 42,5 R at 5 °C, 20 °C, 40 °C and 80 °C after 8 hours storage at 20 °C

A3 Sulfate resistance – Method: Flat prism method SR_{FPM}

The testing procedure was done according to EAD 150001-01-0301, clause 2.2.12 and Annex A.

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 are given as expansion of the length. The expansion of the length for the different mortars and storages are given in Table A3.1.

Table A3.1: Expansion of length of the mortar flat prisms

	Expansion of the length [mm/m] after				
	14 days	28 days	56 days	90 days	180 days
Belitic CSA-Cement "Rapid Set" - storage at 20 °C					
Na_2SO_4 solution	0,00	0,02	0,03	0,04	0,05
$Ca(OH)_2$ solution	-0,06	-0,04	-0,04	-0,03	-0,03
ΔL	0,06	0,06	0,07	0,07	0,08
Belitic CSA-Cement "Rapid Set" - storage at 5 °C					
Na_2SO_4 solution	-0,21	-0,20	-0,16	-0,13	-
$Ca(OH)_2$ solution	-0,17	-0,17	-0,13	-0,13	-
ΔL	-0,04	-0,03	-0,03	0,00	-
CEM III/B 42,5 N-SR - storage at 20 °C					
Na_2SO_4 solution	0,04	0,03	0,08	0,12	0,15
$Ca(OH)_2$ solution	0,03	0,00	0,07	0,08	0,09
ΔL	0,01	0,03	0,01	0,04	0,06
CEM III/B 42,5 N-SR - storage at 5 °C					
Na_2SO_4 solution	-0,13	-0,11	-0,03	0,02	-
$Ca(OH)_2$ solution	-0,13	-0,10	0,06	-0,07	-
ΔL	0,01	-0,01	0,03	0,09	-
CEM I 42,5 N-SR3 - storage at 20 °C					
Na_2SO_4 solution	0,04	0,09	0,15	0,24	0,54
$Ca(OH)_2$ solution	0,01	0,04	0,04	0,05	0,09
ΔL	0,03	0,05	0,11	0,19	0,45
CEM I 42,5 N-SR3 - storage at 5 °C					
Na_2SO_4 solution	-0,08	-0,01	0,13	0,41	-
$Ca(OH)_2$ solution	-0,14	-0,08	-0,09	-0,07	-
ΔL	0,06	0,07	0,22	0,48	-

Table A3.2: Dynamic modulus of elasticity of the mortar flat prisms

	Dynamic modulus of elasticity in kN/mm² after					
	0 days	14 days	28 days	56 days	90 days	180 days
Belitic CSA-Cement "Rapid Set" - storage at 20 °C						
Na_2SO_4 solution	36,51	39,01	39,24	40,04	40,75	42,18
$Ca(OH)_2$ solution	35,98	36,67	36,93	37,16	37,97	40,69
Belitic CSA-Cement "Rapid Set" - storage at 5 °C						
Na_2SO_4 solution	36,30	38,01	38,28	38,70	39,00	-
$Ca(OH)_2$ solution	36,01	36,64	36,96	37,13	37,31	-
CEM III/B 42,5 N-SR - storage at 20 °C						
Na_2SO_4 solution	30,00	34,08	36,83	38,76	39,53	40,44
$Ca(OH)_2$ solution	30,53	32,86	36,15	38,48	39,68	40,66
CEM III/B 42,5 N-SR - storage at 5 °C						
Na_2SO_4 solution	30,56	32,56	33,11	33,82	34,63	-
$Ca(OH)_2$ solution	31,63	32,63	32,85	33,49	34,07	-
CEM I 42,5 N-SR3 - storage at 20 °C						
Na_2SO_4 solution	39,93	41,51	42,15	42,92	43,08	42,37
$Ca(OH)_2$ solution	40,48	41,35	41,90	42,77	43,45	44,03
CEM I 42,5 N-SR3 - storage at 5 °C						
Na_2SO_4 solution	36,40	37,74	38,13	38,06	37,79	-
$Ca(OH)_2$ solution	36,70	37,36	37,61	38,23	38,64	-

Table A3.3: Mass of the mortar flat prisms

	Mass in g after					
	0 days	14 days	28 days	56 days	90 days	180 days
Belitic CSA-Cement "Rapid Set" - storage at 20 °C						
Na_2SO_4 solution	152,78	153,13	153,06	153,20	152,83	152,83
$Ca(OH)_2$ solution	149,51	149,86	149,76	149,87	149,84	149,86
Belitic CSA-Cement "Rapid Set" - storage at 5 °C						
Na_2SO_4 solution	151,86	152,31	152,03	151,75	151,25	-
$Ca(OH)_2$ solution	150,30	150,54	150,85	150,76	150,67	-
CEM III/B 42,5 N-LH/SR - storage at 20 °C						
Na_2SO_4 solution	151,30	151,51	151,57	151,65	151,65	151,93
$Ca(OH)_2$ solution	151,69	151,67	151,69	151,73	151,85	152,06
CEM III/B 42,5 N-LH/SR - storage at 5 °C						
Na_2SO_4 solution	151,30	151,51	151,57	151,65	151,65	-
$Ca(OH)_2$ solution	151,69	151,67	151,69	151,73	151,85	-
CEM I 42,5 N-SR3 - storage at 20 °C						
Na_2SO_4 solution	153,60	153,76	153,86	154,14	154,70	155,22
$Ca(OH)_2$ solution	155,70	155,86	155,86	155,93	156,07	156,01
CEM I 42,5 N-SR3 - storage at 5 °C						
Na_2SO_4 solution	151,72	152,16	152,29	152,66	153,25	-
$Ca(OH)_2$ solution	149,51	149,86	149,79	149,87	149,84	-

Visual description of the specimens after sulfate storage and $Ca(OH)_2$ storage, respectively

After a testing period of 180 days or 90 days, respectively, the specimens with belitic CSA-Cement "Rapid Set" and with the two reference cements show no expansion damages, cracks or flaking based on the formation of ettringite or thaumasite, see figures A3.1 to A3.12.



Figure A3.1: Specimens with belitic CSA-Cement "Rapid Set" after 180 days of storage Na_2SO_4 solution at 20 °C



Figure A3.2: Specimens with belitic CSA-Cement "Rapid Set" after 180 days of storage in $Ca(OH)_2$ solution at 20 °C

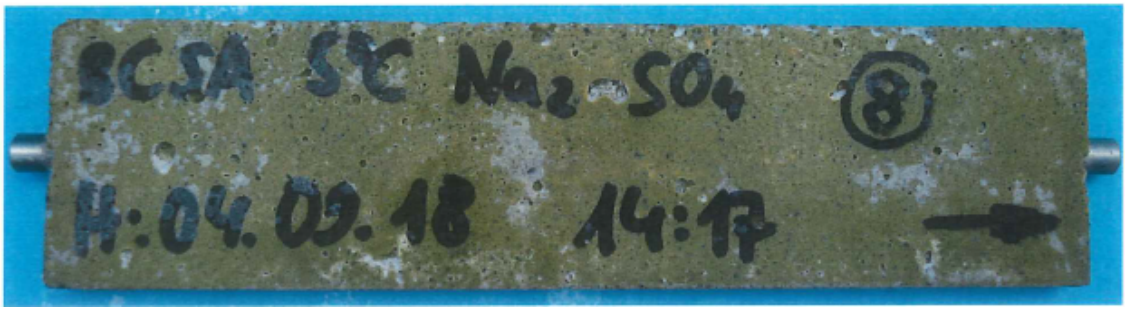

Figure A3.3: Specimens with belitic CSA-Cement "Rapid Set" after 90 days of storage in Na_2SO_4 solution at 5 °C

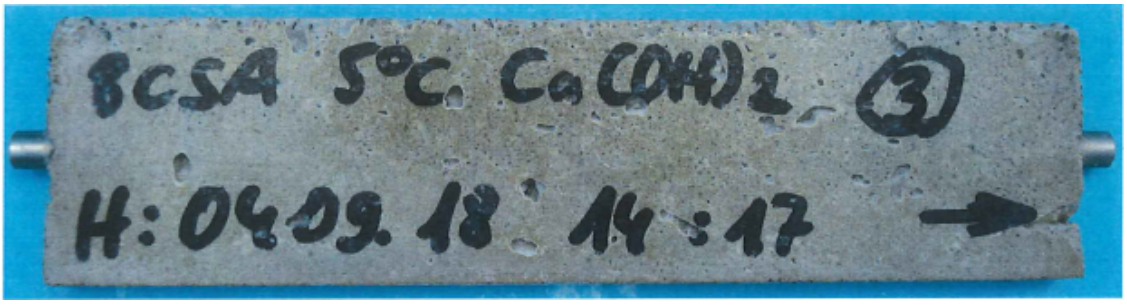

Figure A3.4: Specimens with belitic CSA-Cement "Rapid Set" after 90 days of storage in $Ca(OH)_2$ solution at 5 °C



Figure A3.5: Specimens with CEM III/B 42,5 N-SR after 180 days of storage Na_2SO_4 solution at 20 °C



Figure A3.6: Specimens with CEM III/B 42,5 N-SR after 180 days of storage in $Ca(OH)_2$ solution at 20 °C



Figure A3.7: Specimens with CEM III/B 42,5 N-SR after 90 days of storage in Na_2SO_4 solution at 5 °C



Figure A3.8: Specimens with CEM III/B 42,5 N-SR after 90 days of storage in $Ca(OH)_2$ solution at 5 °C



Figure A3.9: Specimens with CEM I 42,5 R-SR3 after 180 days of storage Na_2SO_4 solution at 20 °C



Figure A3.10: Specimens with CEM I 42,5 R-SR3 after 180 days of storage in $Ca(OH)_2$ solution at 20 °C

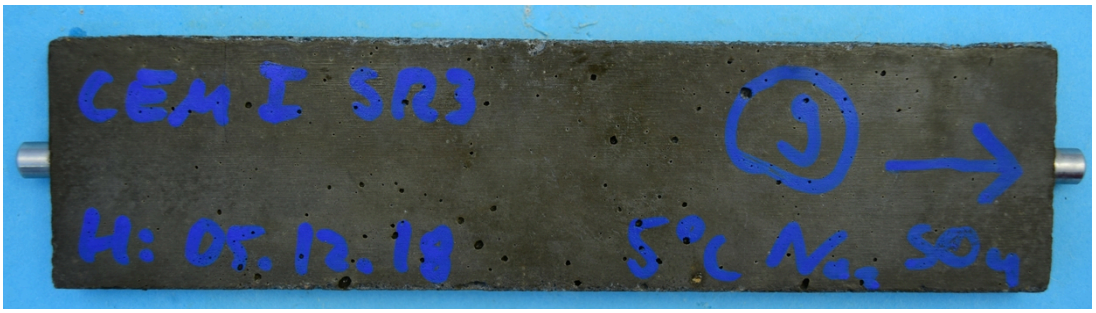

Figure A3.11: Specimens with CEM I 42,5 R-SR3 after 90 days of storage in Na_2SO_4 solution at 5 °C

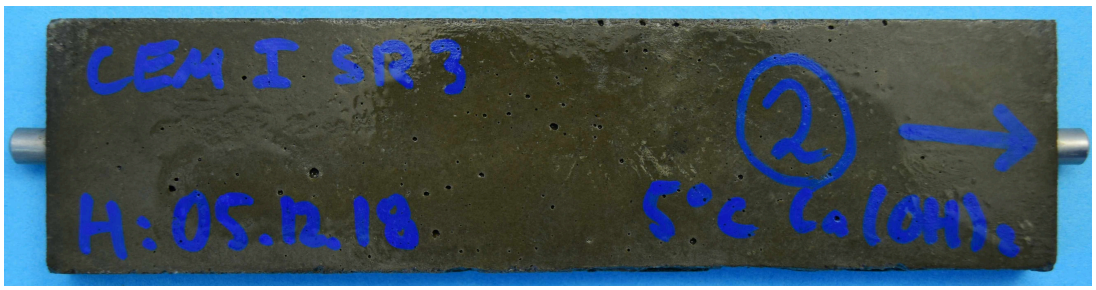

Figure A3.12: Specimens with CEM I 42,5 R-SR3 after 90 days of storage in $Ca(OH)_2$ solution at 5 °C