



EUROPEAN ASSESSMENT DOCUMENT

EAD 150003-00-0301

January 2016

HIGH STRENGTH CEMENT

The reference title and language for this EAD is English. The applicable rules of copyright refer to the document elaborated in and published by EOTA.

This European Assessment Document (EAD) has been developed taking into account up-to-date technical and scientific knowledge at the time of issue and is published in accordance with the relevant provisions of Regulation (EU) No 305/2011 as a basis for the preparation and issuing of European Technical Assessments (ETA).

Contents

1	Scope of the EAD	4
1.1	Description of the construction product	4
1.2	Information on the intended use(s) of the construction product	4
1.2.1	Intended use(s).....	4
1.2.2	Working life/Durability.....	4
2	Essential characteristics and relevant assessment methods and criteria	5
2.1	Essential characteristics of the product	5
2.2	Methods and criteria for assessing the performance of the product in relation to essential characteristics of the product	6
2.2.1	Standard strength.....	6
2.2.2	Early strength.....	6
2.2.3	Initial setting time.....	6
2.2.4	Soundness (expansion).....	6
2.2.5	Loss on ignition.....	6
2.2.6	Insoluble residue.....	6
2.2.7	Sulfate content.....	6
2.2.8	Chloride content.....	6
3	Assessment and verification of constancy of performance	7
3.1	System(s) of assessment and verification of constancy of performance to be applied	7
3.2	Tasks of the manufacturer	7
3.3	Tasks of the notified body	8
4	Reference documents	9

1 Scope of the EAD

1.1 Description of the construction product

The construction product is a hydraulic binder which, when mixed with water, forms a paste which sets and hardens by means of hydration reactions and processes and which, after hardening, retains its strength and stability even under water. The high strength cement consists of Portland cement clinker (95÷100 %) and minor additional constituents (0÷5 %). Calcium sulfate is added to the other constituents of cement during its manufacture to control setting. The composition of the high strength cement complies with the composition of cement CEM I according to Table 1 of EN 197-1.

Performances of high strength cement covered by this EAD are in line with the characteristics for a Portland cement CEM I acc. to EN 197-1 with a strength class 52,5 R, with exception of the standard strength (28 days) which is at least 62,5 MPa.

Concerning product packaging, transport, storage, maintenance, replacement and repair it is the responsibility of the manufacturer to undertake the appropriate measures and to advise his clients on the transport, storage, maintenance, replacement and repair of the product as he considers necessary.

It is assumed that the product will be installed according to the manufacturer's instructions or (in absence of such instructions) according to the usual practice of the building professionals.

Relevant manufacturer's stipulations having influence on the performance of the product covered by this European Assessment Document shall be considered for the determination of the performance and detailed in the ETA.

1.2 Information on the intended use(s) of the construction product

1.2.1 Intended use(s)

The high strength cement is used for manufacturing high strength concrete for heavy duty applications.

1.2.2 Working life/Durability

The assessment methods included or referred to in this EAD have been written based on the manufacturer's request to take into account a working life of concrete incorporating the high strength cement for the intended use 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.

When assessing the product the intended use as foreseen by the manufacturer shall be taken into account. The real working life may be, in normal use conditions, considerably longer without major degradation affecting the basic requirements for works¹.

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by EOTA when drafting this EAD nor by the Technical Assessment Body issuing an ETA based on this EAD, but are regarded only as a means for expressing the expected economically reasonable working life of the product.

¹ The real working life of a product incorporated in a specific works depends on the environmental conditions to which that works is subject, as well as on the particular conditions of the design, execution, use and maintenance of that works. Therefore, it cannot be excluded that in certain cases the real working life of the product may also be shorter than referred to above.

2 Essential characteristics and relevant assessment methods and criteria

2.1 Essential characteristics of the product

Table 1 shows how the performance of high strength cement is assessed in relation to the essential characteristics.

Table 1 Essential characteristics of the product and methods and criteria for assessing the performance of the product in relation to those essential characteristics

No	Essential characteristic	Assessment method	Type of expression of product performance (<i>Level, class, description</i>)
Basic Works Requirement 1: Mechanical resistance and stability			
1	Standard strength (28 d)	See clause 2.2.1	Level
2	Early strength (2 d)	See clause 2.2.2	Threshold level (≥ 30 MPa acc. to EN 197-1, table 3)
3	Initial setting time	See clause 2.2.3	Threshold level (≥ 45 min acc. to EN 197-1, table 3)
4	Soundness (expansion)	See clause 2.2.4	Threshold level (≤ 10 mm acc. to EN 197-1, table 3)
5	Loss on ignition	See clause 2.2.5	Threshold level ($\leq 5,0$ % by mass acc. to EN 197-1, table 4)
6	Insoluble residue	See clause 2.2.6	Threshold level ($\leq 5,0$ % by mass acc. to EN 197-1, table 4)
7	Sulfate content	See clause 2.2.7	Threshold level ($\leq 4,0$ % by mass acc. to EN 197-1, table 4)
8	Chloride content	See clause 2.2.8	Threshold level ($\leq 0,10^a$ % by mass acc. to EN 197-1, table 4)
^a	For pre-stressing applications cements may be produced according to a lower requirement. If so, the value of 0,10 % shall be replaced by this lower value which shall be stated in the delivery note.		

2.2 Methods and criteria for assessing the performance of the product in relation to essential characteristics of the product

2.2.1 Standard strength

The standard strength of the product shall be determined in accordance with EN 196-1 at 28 days. The standard strength at 28 days shall be stated in the ETA.

2.2.2 Early strength

The early strength of the product shall be determined in accordance with EN 196-1 at 2 days. The early strength of the product at 2 days shall be at least 30 MPa acc. to EN 197-1, table 3. The early strength at 2 days shall be stated in the ETA.

2.2.3 Initial setting time

The initial setting time of the product shall be determined in accordance with EN 196-3. The initial setting time shall be at least 45 minutes acc. to EN 197-1, table 3. The initial setting time shall be stated in the ETA.

2.2.4 Soundness (expansion)

The soundness (expansion) of the product shall be determined in accordance with EN 196-3. The soundness (expansion) of the product shall not be greater than 10 mm acc. to EN 197-1, table 3. The soundness (expansion) of the product shall be stated in the ETA.

2.2.5 Loss on ignition

The loss on ignition of the product shall be determined in accordance with EN 196-2. The loss on ignition of the product shall not exceed 5,0 % by mass acc. to EN 197-1, table 4. The loss on ignition of the product shall be stated in the ETA.

2.2.6 Insoluble residue

The insoluble residue of the product shall be determined in accordance with EN 196-2. The insoluble residue of the product shall not exceed 5,0 % by mass acc. to EN 197-1, table 4. The insoluble residue of the product shall be stated in the ETA.

2.2.7 Sulfate content

The sulfate content, as stated SO_3 , of the product shall be determined in accordance with EN 196-2. The sulfate content of the product shall not exceed 4,0 % by mass acc. to EN 197-1, table 4. The sulfate content of the product shall be stated in the ETA.

2.2.8 Chloride content

The chloride content of the product shall be determined in accordance with EN 196-2. The chloride content of the product shall not exceed 0,10 % by mass acc. to EN 197-1, table 4. The chloride content of the product shall be stated in the ETA.

Note: For pre-stressing applications cements may be produced according to a lower requirement. If so, the value of 0,10 % by mass shall be replaced by this lower value which shall be stated in the delivery note.

3 Assessment and verification of constancy of performance

3.1 System(s) of assessment and verification of constancy of performance to be applied

For the products covered by this EAD the applicable European legal act is: Decision 1997/555/EC as amended by 2010/683/EC.

The system is: 1+

3.2 Tasks of the manufacturer

The cornerstones of the actions to be undertaken by the manufacturer of the product in the procedure of assessment and verification of constancy of performance are laid down in Table 2.

Table 2 Control plan for the manufacturer; cornerstones

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
Factory production control (FPC) [including testing of samples taken at the factory in accordance with a prescribed test plan]					
1	Standard strength (28 d)	See clause 2.2.1	level	acc. to EN 197-1 table 6	
2	Early strength (2 d)	See clause 2.2.2	$\geq 30,0$ MPa, acc. to EN 197-1, table 3		
3	Initial setting time	See clause 2.2.3	≥ 45 min acc. to EN 197-1, table 3		
4	Soundness (expansion)	See clause 2.2.4	≤ 10 mm acc. to EN 197-1, table 3		
5	Loss on ignition	See clause 2.2.5	$\leq 5,0$ % by mass acc. to EN 197-1, table 4		
6	Insoluble residue	See clause 2.2.6	$\leq 5,0$ % by mass acc. to EN 197-1, table 4		
7	Sulfate content (SO ₃)	See clause 2.2.7	$\leq 4,0$ % by mass acc. to EN 197-1, table 4		
8	Chloride content	See clause 2.2.8	$\leq 0,10^a$ acc. to EN 197-1, table 4		
^a For pre-stressing applications cements may be produced according to a lower requirement. If so, the value of 0,10 % shall be replaced by this lower value which shall be stated in the delivery note.					

Statistical evaluation of FPC data shall be done in accordance with EN 197-1 Clause 9.2 and EN 197-2 Clause 5.3.

3.3 Tasks of the notified body

The cornerstones of the actions to be undertaken by the notified body in the procedure of assessment and verification of constancy of performance for high strength cement are laid down in Table 3.

Table 3 Control plan for the notified body; cornerstones

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
Initial inspection of the manufacturing plant and of factory production control					
1	according to EN 197-2				
Continuous surveillance, assessment and evaluation of factory production control					
2	according to EN 197-2				
Audit-testing of samples taken by the notified product certification body at the manufacturing plant or at the manufacturer's storage facilities					
3	according to EN 197-2				

4 Reference documents

As far as no edition date is given in the list of standards thereafter, the standard in its current version at the time of issuing the European Technical Assessment, is of relevance.

EN 196-1	Methods of testing cement - Part 1: Determination of strength
EN 196-2	Methods of testing cement - Part 2: Chemical analysis of cement
EN 196-3	Methods of testing cement - Part 3: Determination of setting times and soundness
EN 197-1	Cement - Part 1: Composition, specifications and conformity criteria for common cements
EN 197-2	Cement - Part 2: Conformity evaluation