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EAD 260048-00-0301

September 2019

European Assessment Document for

Calcium carbonate filler aggregate with additional characteristics



CE

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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) 305/2011 as a basis for the preparation and issuing of European Technical Assessments (ETA).

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1 SCOPE OF THE EAD

1.1 Description of the construction product

Calcium carbonate filler aggregate with additional characteristics (in the following referred to as filler aggregate) is a filler aggregate for use in concrete obtained by processing (grinding) natural calcium carbonate. The calcium carbonate filler aggregate possesses the following additional characteristics according to EN 197-1¹, clause 5.2.6, for limestone (LL):

- CaCO₃ content ≥ 75 % by mass,
- clay content² ≤ 1,20 g/100 g and
- total organic carbon (TOC) content ≤ 0,20 % by mass.

Furthermore, the chloride content complies with EN 197-1, clause 7.3:

- chloride content ≤ 0,10 % by mass.

The filler aggregate is not fully covered by the following harmonised technical specification: EN 12620, because the declaration of the above-mentioned additional characteristics (CaCO₃, clay content, TOC) is not possible according to EN 12620.

In comparison to EN 12620, Annex ZA, table ZA.1b³, the following essential characteristics are not (fully) included.

- Fineness/particle size and density
The standard refers to clause 5.5 *Particle density and water absorption* according to EN 1097-6. Filler aggregate is aggregate, the majority of which passes a 0,063 mm sieve. For this reason, EN 1097-6 is not the appropriate standard. Therefore, clause 2.2.2 of the EAD requires the determination of the particle density according to EN 1097-7 (Determination of particle density of filler – Pycnometer method).
- Volume stability
The standard refers to clause 5.7.2 *Volume stability – drying* in accordance with EN 1367-4. Not applicable for calcium carbonate filler aggregate, because according to EN 1367-4, clause 9 aggregates from 20 to 4 mm and sand are tested.
The same applies to clause 6.4.2 *Constituents which affect the volume stability of air-cooled blast furnace slag*. – The clause is applicable for blast furnace slag, not for calcium carbonate filler aggregate.
- Durability against freeze-thaw
The standard refers to clause 5.7.1 *Freeze/thaw resistance of coarse aggregate* in accordance with EN 1367-1. - The standard is applicable for aggregates from 4 to 63 mm, not for calcium carbonate filler aggregate.

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 All undated references to standards or to EADs in this EAD are to be understood as references to the dated versions listed in chapter 4.

2 Included in "fines quality" in EN 12620, clause 4.7.

3 This EAD covers a filler aggregate and not a fine or coarse aggregate. Thus, table ZA.1a of EN 12620 is not relevant.

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

1.2.1 Intended uses

Calcium carbonate filler aggregate with additional characteristics is a type I addition for concrete conforming to European standard EN 206, i.e., concrete for structures cast in situ, precast structures, and structural precast products for buildings and civil engineering structures. The concrete can be mixed on site, ready-mixed or produced in a plant for precast concrete products. The filler aggregate is also intended to be used for self-compacting concrete (SCC).

The calcium carbonate filler aggregate with additional characteristics is also a specific addition that is intended to be used in combination with a specific cement according to the principles of the Equivalent Concrete Performance Concept (ECPC, see EN 206, 5.2.5.3). According to EN 206, clause 5.2.5.1 (2), type I additions may be taken into account in the concrete composition with respect to the cement content and the water/cement ratio if the suitability has been established in provisions valid in the place of use.

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 calcium carbonate filler aggregate with additional characteristics for the intended use of 50 years when installed in the works (provided that the concrete incorporating calcium carbonate filler aggregate with additional characteristics is subject to appropriate installation (see 1.1)) 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 works⁴.

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.

⁴ 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 2.1.1 shows how the performance of calcium carbonate filler aggregate with additional characteristics is assessed in relation to the essential characteristics.

Table 2.1.1 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
Basic Works Requirement 1: Mechanical resistance and stability			
1	Particle size distribution	EN 12620, clause 4.3.6	Level
2	Specific surface	2.2.1	Level
3	Particle density	2.2.2	Level
4	CaCO ₃ content	2.2.3	Level
5	Clay content	2.2.4	Level
6	Total organic carbon (TOC) content	2.2.5	Level
7	MgCO ₃ content	2.2.6	Level
8	Chloride content	2.2.7	Level
9	Sulfate content (SO ₃)	EN 12620, clause 6.3.1	Category AS
10	Total content of sulfur	EN 12620, clause 6.3.2	Pass/fail threshold value
11	Constituents which alter the rate of setting and hardening of concrete	EN 12620, clause 6.4.1	Pass/fail threshold value
12	Initial setting time	2.2.8	Level
13	Soundness	2.2.9	Level
Basic Works Requirement 3: Hygiene, health and the environment			
14	Content, emission and/or release of dangerous substances	2.2.10	Level

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

This chapter is intended to provide instructions for TABs. Therefore, the use of wordings such as “shall be stated in the ETA” or “it has to be given in the ETA” shall be understood only as such instructions for TABs on how results of assessments shall be presented in the ETA. Such wordings do not impose any obligations for the manufacturer and the TAB shall not carry out the assessment of the performance in relation to a given essential characteristic when the manufacturer does not wish to declare this performance in the Declaration of Performance.

The following tests shall be performed on three samples taken with an interval of at least three production days. As test cement (2.2.12 and 2.2.13) a CEM I 42,5 R in accordance with EN 197-1 and EN 450-1, clause 3.3 and 5.3.2, shall be used.

2.2.1 Specific surface

The specific surface shall be determined in accordance with the air permeability method (Blaine) specified in EN 196-6, clause 4, on three specimens, one from each sample.

The result shall be stated in the ETA.

2.2.2 Particle density

The particle density shall be determined in accordance with EN 1097-7 on three specimens, one from each sample.

The result shall be stated in the ETA.

2.2.3 CaCO₃ content

Methods to determine the CaO content are stated below. Method 1 is the reference method.

Method 1 (EGTA):

The CaO content shall be determined in accordance with EN 196-2, clause 4.5.12, on three specimens, one from each sample.

Method 2 (XRF):

The CaO content shall be determined in accordance with EN 196-2, clause 5, on three specimens, one from each sample.

The CaCO₃ content shall be calculated from the CaO content according to the equation below, taking into account molecular weight of compounds:

$$C(\text{CaCO}_3) = 1,785 \times C(\text{CaO})$$

where:

C (CaCO₃) ... CaCO₃ content [%]
C (CaO) ... CaO content [%].

The result shall be stated in the ETA.

2.2.4 Clay content

The clay content shall be determined by methylene blue test in accordance with EN 933-9, on three specimens, one from each sample. For this test the limestone shall be ground to a fineness of approximately 5000 cm²/g determined as specific surface in accordance with EN 196-6.

The clay content shall be in accordance with EN 197-1, clause 5.2.6 b), i.e., $\leq 1,20$ g/100 g. The result shall be stated in the ETA.

2.2.5 Total organic carbon (TOC) content

Total organic content shall be determined in accordance with EN 13639, clause 6 (reference method), on three specimens, one from each sample. Alternatively, the methods in accordance with clause 7, 8, 9 or 10 shall be used. The methods can be considered equivalent.

The values of the total organic content shall be in accordance with EN 197-1, clause 5.2.6 c1), i.e., $\leq 0,20$ % by mass. The result shall be stated in the ETA.

2.2.6 MgCO₃ (Dolomite) content

Methods to determine the MgO content are stated below. Method 1 is the reference method.

Method 1 (DCTA):

The MgO content shall be determined in accordance with EN 196-2, clause 4.5.13, on three specimens, one from each sample.

Method 2 (XRF):

The MgO content shall be determined in accordance with EN 196-2, clause 5, on three specimens, one from each sample.

The MgCO₃ content shall be calculated from the MgO content according to the equation below, taking into account molecular weight of compounds:

$$C (\text{MgCO}_3) = 2,092 \times C (\text{MgO})$$

where:

C (MgCO₃) ... MgCO₃ content [%]
C (MgO) ... MgO content [%].

The result shall be stated in the ETA.

2.2.7 Chloride content

The chloride content shall be determined in accordance with EN 196-2, clause 4.5.16, on three specimens, one from each sample.

The values of the chloride content shall be in accordance with EN 197-1, clause 7.3, i.e., $\leq 0,10$ % by mass. The result shall be stated in the ETA.

2.2.8 Initial setting time

The initial setting time shall be determined on three specimens, one from each sample, on cement paste with and without filler aggregate in accordance with EN 196-3, clause 6. Test specimens with filler aggregate shall be prepared in such a way that 25 % of the test cement is replaced with the filler aggregate (by mass).

The values of the initial setting time of the sample with filler aggregate shall be in accordance with EN 450-1, clause 5.3.5. The results shall be stated in the ETA.

2.2.9 Soundness

The soundness shall be determined on three specimens, one from each sample, on cement paste with filler aggregate in accordance with EN 196-3, clause 7. Test specimens with filler aggregate shall be prepared in such a way that 30 % of the test cement is replaced with the filler aggregate (by mass)

The individual values of the soundness shall be in accordance with EN 450-1, clause 5.3.3. The results shall be stated in the ETA.

2.2.10 Content, emission and/or release of dangerous substances

2.2.10.1 General

The performance of the calcium carbonate filler aggregate related to the emissions and/or release and, where appropriate, the content of dangerous substances will be assessed on the basis of any information provided by the manufacturer⁵ after identifying the release scenarios taking into account the intended use of the product and the Member States where the manufacturer intends his product to be made available on the market.

The identified intended release scenarios for this calcium carbonate filler aggregate and intended use with respect to dangerous substances are:

S/W1: Product with direct contact to soil, ground- and surface water.

S/W2: Product with indirect contact to soil, ground- and surface water.

S/W3: Product with no contact to soil, ground- and surface water

2.2.10.2 Test on solids and leaching test

The total content and the leachable substances of the calcium carbonate filler aggregate shall be determined.

For the following parameters, the total content shall be determined on three representative samples after aqua regia digestion in accordance with CEN/TS 17196:

arsenic (As), lead (Pb), cadmium (Ca), total chromium (Cr), copper (Cu), nickel (Ni), mercury (Hg), thallium (Tl), zinc (Zn).

The analysis of the parameters shall be in accordance with CEN/TS 17201. The average of the measured values of each parameter shall be expressed in mg/kg and stated in the ETA.

Three representative samples of the calcium carbonate filler aggregate shall be eluted in accordance with EN 12457-4.

The following parameters in the eluate shall be determined using the methods for analysis in accordance with CEN/TS 17195:

1. arsenic (As), lead (Pb), cadmium (Ca), total chromium (Cr), copper (Cu), nickel (Ni), mercury (Hg), zinc (Zn), chloride (Cl⁻), sulphate (SO₄²⁻) and
2. pH value, electrical conductivity

The average of the measured values of each substance mentioned in No.1 shall be expressed in µg/L, or mg/l and stated in the ETA.

⁵ The manufacturer may be asked to provide to the TAB the REACH related information which he must accompany the DoP with (cf. Article 6(5) of Regulation (EU) No 305/2011).

The manufacturer is **not** obliged:

- to provide the chemical constitution and composition of the product (or of constituents of the product) to the TAB, or
 - to provide a written declaration to the TAB stating whether the product (or constituents of the product) contain(s) substances which are classified as dangerous according to Directive 67/548/EEC and Regulation (EC) No 1272/2008 and listed in the "Indicative list on dangerous substances" of the SGDS, taking into account the installation conditions of the construction product and the release scenarios resulting from there.
- Any information provided by the manufacturer regarding the chemical composition of the products may not be distributed to EOTA or to TABs.

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 Commission Decision 1999/469/EC(EU), as amended by Commission Decision 2001/596/EC.

The system is 2+.

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 3.2.1.

Table 3.2.1 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	Particle size distribution	EN 12620, clause 4.3.6	According to control plan	1	1/month
2	Specific surface	2.2.1	According to control plan	1	1/week
3	Particle density	2.2.2	According to control plan	1	6/year
4	CaCO ₃ content	2.2.3	According to control plan	1	1/month
5	Clay content	2.2.4	According to control plan	1	1/month
6	Total organic carbon (TOC) content	2.2.5	According to control plan	1	1/month
7	MgCO ₃ content	2.2.6	According to control plan	1	1/month
8	Chloride content	2.2.7	According to control plan	1	1/month
9	Sulfate content (SO ₃)	EN 12620, clause 6.3.1	According to control plan	1	6/year
10	Total content of sulfur	EN 12620, clause 6.3.2	According to control plan	1	6/year
11	Constituents which alter the rate of setting and hardening of concrete	EN 12620, clause 6.4.1	According to control plan	1	6/year
12	Content, emission and/or release of dangerous substances	2.2.10	According to control plan	1	4/year or in case of discontinuous production 1/5000t

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 of the product are laid down in Table 3.3.1.

Table 3.3.1 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	Control of the manufacturing plant and of the factory production control carried out by the manufacturer regarding the constancy of performance (according to control plan and EN 450-2)	Verification of the complete FPC as described in the control plan agreed between the TAB and the manufacturer	According to control plan	According to control plan	When starting the production
Continuous surveillance, assessment and evaluation of factory production control					
2	Continuous surveillance, assessment and evaluation of the factory production control carried out by the manufacturer regarding the constancy of performance (according to control plan and EN 450-2)	Verification of the controls carried out by the manufacturer as described in the control plan agreed between the TAB and the manufacturer with reference to the raw materials, to the process and to the product as indicated in Table 3.2.1	According to control plan	According to control plan	2/year

4 REFERENCE DOCUMENTS

EN 196-2:2013	Method of testing cement - Part 2: Chemical analysis of cement
EN 196-3:2016	Methods of testing cement - Part 3: Determination of setting times and soundness
EN 196-6:2018	Methods of testing cement – Part 6: Determination of fineness
EN 197-1:2011	Cement - Part 1: Composition, specifications and conformity criteria for common cements
EN 206:2013+A2:2021	Concrete - Specification, performance, production and conformity
EN 450-1:2012	Fly ash for concrete - Part 1: Definition, specifications and conformity criteria
EN 450-2:2005	Fly ash for concrete - Part 2: Conformity evaluation
EN 933-9:2022	Tests for geometrical properties of aggregates - Part 9: Assessment of fines - Methylene blue test
EN 1097-6:2022	Tests for mechanical and physical properties of aggregates – Part 6: Determination of particle density and water absorption
EN 1097-7:2022	Tests for mechanical and physical properties of aggregates – Part 7: Determination of the particle density of filler – Pyknometer method
EN 1367-1:2007	Tests for thermal and weathering properties of aggregates - Part 1: Determination of resistance to freezing and thawing
EN 1367-4:2008	Tests for thermal and weathering properties of aggregates - Part 4: Determination of drying shrinkage
EN 12457-4:2002	Characterization of waste - Leaching; Compliance test for leaching of granular waste materials and sludges - Part 4: One stage batch test at a liquid to solid ratio of 10 l/kg for materials with particle size below 10 mm (without or with limited size reduction)
EN 12620:2002+A1:2008	Aggregates for concrete
EN 13639:2017	Determination of total organic carbon in limestone
CEN/TS 17195:2018	Construction products: Assessment of release of dangerous substances - Analysis of inorganic substances in eluates
CEN/TS 17196:2018	Construction products - Assessment of release of dangerous substances - Digestion by aqua regia for subsequent analysis of inorganic substances
CEN/TS 17201:2018+AC:2018	Construction products - Assessment of release of dangerous substances - Content of inorganic substances - Methods for analysis of aqua regia digests