



European Technical Approval ETA-13/0363

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung
Trade name

"SikaAer Solid"

Zulassungsinhaber
Holder of approval

Sika Deutschland GmbH
Geschäftsbereich Beton
Peter-Schuhmacher-Straße 8
69181 Leimen
DEUTSCHLAND

Zulassungsgegenstand
und Verwendungszweck
*Generic type and use
of construction product*

Elastische Mikrohohlkugeln als Betonzusatzmittel
Elastic micro hollow spheres as concrete admixture

Geltungsdauer:
Validity: vom
from
bis
to

17 June 2013
17 June 2018

Herstellwerk
Manufacturing plant

Sika Deutschland GmbH
Peter-Schuhmacher-Straße 8
69181 Leimen
DEUTSCHLAND

Diese Zulassung umfasst
This Approval contains

8 Seiten
8 pages

I LEGAL BASES AND GENERAL CONDITIONS

- 1 This European technical approval is issued by Deutsches Institut für Bautechnik in accordance with:
 - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products¹, modified by Council Directive 93/68/EEC² and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council³;
 - *Gesetz über das In-Verkehr-Bringen von und den freien Warenverkehr mit Bauprodukten zur Umsetzung der Richtlinie 89/106/EWG des Rates vom 21. Dezember 1988 zur Angleichung der Rechts- und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte und anderer Rechtsakte der Europäischen Gemeinschaften (Bauproduktengesetz - BauPG) vom 28. April 1998⁴, as amended by Article 2 of the law of 8 November 2011⁵;*
 - Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC⁶.
- 2 Deutsches Institut für Bautechnik is authorized to check whether the provisions of this European technical approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European technical approval and for their fitness for the intended use remains with the holder of the European technical approval.
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- 6 The European technical approval is issued by the approval body in its official language. This version corresponds fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

¹ Official Journal of the European Communities L 40, 11 February 1989, p. 12
² Official Journal of the European Communities L 220, 30 August 1993, p. 1
³ Official Journal of the European Union L 284, 31 October 2003, p. 25
⁴ *Bundesgesetzblatt Teil I 1998*, p. 812
⁵ *Bundesgesetzblatt Teil I 2011*, p. 2178
⁶ Official Journal of the European Communities L 17, 20 January 1994, p. 34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of the product and intended use

1.1 Definition of the construction product

The concrete admixture "SikaAer Solid" is a concentrated paste consisting of water and a high number of correctly sized and evenly distributed elastic micro hollow spheres acting as air voids. The admixture is chloride free and free of silicon dioxide. It increases the freeze/thaw resistance with or without de-icing agents of concrete.

1.2 Intended use

"SikaAer Solid" is an admixture for plain, reinforced and pre-stressed concrete used as site-mixed, ready-mixed concrete or concrete for precast products as well as an admixture for sprayed concrete.

The provisions made in this European technical approval are based on an assumed working life of concrete incorporating "SikaAer Solid" for the intended use of 50 years, provided that the conditions laid down in sections 4.2 and 5 for packaging, transport, storage and installation are met. 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.

2 Characteristics of the product and methods of verification

2.1 Particle size distribution

The particle size distribution shall be analyzed by laser diffraction method. The medium value of particle diameter d_{50} shall be $(40 \pm 5) \mu\text{m}$.

2.2 Colour

The colour shall be determined visually. The colour of the concrete admixture shall be uniform and similar to the description declared by the manufacturer.

2.3 Absolute density

The absolute density shall be determined in accordance with ISO 758⁷ and must not vary more than $\pm 0,015 \text{ kg/dm}^3$ from $0,200 \text{ kg/dm}^3$.

In deviation Nitrogen shall be used for determination of absolute density.

2.4 Conventional dry material content

The conventional dry material content shall be determined in accordance with EN 480-8⁸ and must not vary more than $\pm 1,0 \%$ from $10,0 \%$ by mass.

⁷ ISO 758 Liquid chemical products for industrial use; Determination of density at 20 degrees C

⁸ EN 480-8 Admixtures for concrete, mortar and grout - Test methods - Part 8: Determination of the conventional dry material content

2.5 pH-value

The pH-value shall be determined in accordance with ISO 4316⁹.

The determined value must not vary by more than ± 1 from 7,0.

2.6 Total chlorine

The total chlorine content of the admixture shall be determined according to EN ISO 1158¹⁰ and must not be greater than 0,10 % by mass.

In deviation the sample size in method B shall be increased to 0,1 g of dry admixture. Furthermore silver nitrate and ammonium thiocyanate solutions shall be used at 0,01 N.

NOTE

Where the chloride content is $\leq 0,10$ % by mass the admixture may be described as "chloride free".

2.7 Water soluble chloride

The water soluble chloride content of the admixture, expressed as Cl⁻, shall be determined in accordance with EN 480-10¹¹ and must not be greater than 0,10 % by mass.

NOTE

Where the chloride content is $\leq 0,10$ % by mass the admixture may be described as "chloride free".

2.8 Alkali content (Na₂O equivalent)

The alkali content of the admixture, expressed as Na₂O equivalent, shall be determined in accordance with EN 480-12¹² and must not exceed 0,20 % by mass.

2.9 Corrosion behaviour

The admixture contains only active substances on the approved list A.1 according to EN 934-1¹³, Annex A.

2.10 Compressive strength

The compressive strength of concrete with and without elastic micro hollow spheres "SikaAer Solid" shall be determined by the method described in EN 12390-3¹⁴ using a reference concrete on the basis of EN 480-1¹⁵. Also the bulk density of the hardened concrete shall be determined.

At 28 days the compressive strength of the test mix shall be at least 80 % of the compressive strength of the control mix.

9	ISO 4316	Surface active agents; Determination of pH of aqueous solutions; Potentiometric method
10	EN ISO 1158	Plastics - Vinyl chloride homopolymers and copolymers - Determination of chlorine content
11	EN 480-10	Admixtures for concrete, mortar and grout - Test methods - Part 10: Determination of water soluble chloride content
12	EN 480-12	Admixtures for concrete, mortar and grout - Test methods - Part 12: Determination of the alkali content of admixtures
13	EN 934-1	Admixtures for concrete, mortar and grout - Part 1: Common requirements
14	EN 12390-3	Testing hardened concrete - Part 3: Compressive strength of test specimens
15	EN 480-1	Admixtures for concrete, mortar and grout - Test methods - Part 1: Reference concrete and reference mortar for testing

2.11 Air content and bulk density of fresh concrete

The air content and bulk density of fresh concrete with and without elastic micro hollow spheres "SikaAer Solid" shall be determined according to EN 12350-7¹⁶ and EN 12350-6¹⁷ using a reference concrete III in compliance with EN 480-1¹⁴. The air content shall be determined 5 min. after mixing.

The air content of the test mix must not be greater than 2,0 % by volume above the control mix.

2.12 Effectiveness test

2.12.1 General

The effectiveness test shall be carried out with a concrete composition in compliance with a reference concrete III acc. to EN 480-1¹⁴, but with a given w/c-value of 0,50. To reach the given consistency, a water reducing admixture shall be used.

Table 1 shows the different cement types, admixture contents and mixing times for the effectiveness test.

Table 1: Concrete characteristics

Concrete	Cement	Admixture content [kg/m ³]	Mixing time [min]	Flow table Consistency [mm]
I A	CEM I 42,5 R	*	2	420 ± 50
I B		*	10***	
I C		-**	2	
II A	CEM III/A 42,5 N	*	2	
II B		*	10***	
II C		-**	2	
*: Compliance dosage in kg/m ³ concrete **: Reference concrete with air entraining admixture acc. to EN 934-2 ¹⁸ ***: Only concrete I B <u>or</u> II B is necessary.				

2.12.2 Volume of elastic micro hollow spheres in concrete

The volume of the elastic micro hollow spheres in fresh concrete shall be determined with a Roll-a-Meter in accordance with ASTM C173/C173M-01¹⁹ (see clause 4.2).

2.12.3 Freeze-thaw resistance

The test of freeze-thaw resistance of concrete with and without elastic micro hollow spheres "SikaAer Solid" shall be done (see clause 4.2).

16 EN 12350-7 Testing fresh concrete - Part 7: Air content - Pressure methods
 17 EN 12350-6 Testing fresh concrete - Part 6: Density
 18 EN 934-2 Admixtures for concrete, mortar and grout - Part 2: Concrete admixtures - Definitions, requirements, conformity, marking and labelling
 19 ASTM C173/C173M-01 Standard Test Method of Air Content of Freshly Mixed Concrete by the Volumetric Method (2001)

3 Evaluation and attestation of conformity and CE marking

3.1 System of attestation of conformity

According to the communication of the European Commission²⁰ system 2+ of the attestation of conformity applies.

This system of attestation of conformity is defined as follows:

System 2+: Declaration of conformity of the product by the manufacturer on the basis of:

(a) Tasks for the manufacturer:

- (1) initial type-testing of the product;
- (2) factory production control;
- (3) testing of samples taken at the factory in accordance with a prescribed test plan.

(b) Tasks for the approved body:

- (4) certification of factory production control on the basis of:
 - initial inspection of factory and of factory production control;
 - continuous surveillance, assessment and approval of factory production control.

Note: Approved bodies are also referred to as "notified bodies".

3.2 Responsibilities

3.2.1 Tasks for the manufacturer

3.2.1.1 Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European technical approval.

The manufacturer may only use constituents materials stated in the technical documentation of this European technical approval.

The factory production control shall be in accordance with the control plan which is part of the technical documentation of this European technical approval. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited with Deutsches Institut für Bautechnik.²¹

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

3.2.1.2 Other tasks for the manufacturer

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of elastic micro hollow spheres as concrete admixture in order to undertake the actions laid down in section 3.2.2. For this purpose, the control plan referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of this European technical approval.

²⁰ Letter of the European Commission of 13/05/2011 to EOTA

²¹ The control plan is a confidential part of the European technical approval and only handed over to the approved body involved in the procedure of attestation of conformity. See section 3.2.2.

3.2.2 Tasks for the approved bodies

The approved body shall perform the

- initial inspection of factory and of factory production control
- continuous surveillance, assessment and approval of factory production control in accordance with the provisions laid down in the control plan.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the factory production control stating the conformity with the provisions of this European technical approval.

In cases where the provisions of the European technical approval and its control plan are no longer fulfilled the certification body shall withdraw the certificate of conformity and inform Deutsches Institut für Bautechnik without delay.

3.3 CE marking

The CE marking shall be affixed on the packaging and the accompanying commercial document respectively. The letters "CE" shall be followed by the identification number of the approved certification body and be accompanied by the following additional information:

- the name and address of the producer (legal entity responsible for the manufacture),
- the last two digits of the year in which the CE marking was affixed,
- the number of the EC certificate for the factory production control
- the number of the European technical approval,
- recommended maximum dosage: 3,5 kg/m³ (7,0 kg per m³ for sprayed concrete)
- the maximum chloride content: 0,10 % by mass
- the maximum alkali content: 0,20 % by mass
- the corrosion behaviour: contains only active substances acc. to EN 934-1, A.1

4 Assumptions under which the fitness of the product for the intended use was favourably assessed

4.1 Manufacturing

The admixture "SikaAer Solid" is produced from specific constituents in the production plant in Leimen, Germany.

The European technical approval is issued for the product on the basis of agreed data/information, deposited with Deutsches Institut für Bautechnik, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to Deutsches Institut für Bautechnik before the changes are introduced. Deutsches Institut für Bautechnik will decide whether or not such changes affect the approval and consequently the validity of the CE marking on the basis of the approval and if so whether further assessment or alterations to the approval shall be necessary.

4.2 Installation

"SikaAer Solid" is an admixture for plain, reinforced and pre-stressed concrete used as site-mixed, ready-mixed concrete or concrete for precast products as well as an admixture for sprayed concrete.

The use of concrete admixtures may cause adverse effects on the properties of concrete, which may be determined.

The recommended maximum dosage of the admixture "SikaAer Solid" is 3,5 kg per m³ concrete (7,0 kg per m³ for sprayed concrete). The admixture "SikaAer Solid" is in accordance with EN 206-1²² a liquid admixture (water content of 90 %). Its water content shall be taken into account when calculating the water/cement ratio.

For each case of application initial tests shall be carried out with the intended concrete composition and the intended addition of the admixture to demonstrate that the concrete can be processed reliably with the intended consistency provided under the conditions of the site and that the required properties are achieved.

In the context of this initial test a testing of the freeze-thaw resistance of concrete with elastic micro hollow spheres with CDF-test according to CEN/TS 12390-9²³, clause 7, is required. The recommended relative dynamic modulus of elasticity according to CEN/TR 15177²⁴ is greater or equal than 0,75 and scaling less or equal than 1500 g/m² after 28 freeze-thaw cycles.

The elastic micro hollow spheres in fresh concrete shall be verified by washing-out according to ASTM C173/C173M-01¹⁹. The Roll-a-Meter value corresponding with the dosage verified by testing the freeze-thaw resistance shall be established in the initial test.

A typical reduction of the strength class as for concrete with air entraining admixtures (see Table F.1, EN 206-1²²) does not occur.

5 Indications to the manufacturer for packaging, transport and storage

Materials shall be handled and stored with care according to EN 934-6²⁵.

The bags shall be stored sheltered from desiccation.

In the production plant the admixture shall be stored in delivery packaging, suitable silos or containers.

The admixture may be delivered in suitable transport containers, which shall be clean and free of other materials. During transportation the admixture shall be prevented from pollution.

It is the responsibility of the manufacturer of the product to ensure that the information on these provisions is given to those who are concerned.

Andreas Kummerow
p. p. Head of Department

beglaubigt:
Hintzen

22	EN 206-1	Concrete - Part 1: Specification, performance, production and conformity
23	CEN/TS 12390-9	Testing hardened concrete - Part 9: Freeze-thaw resistance - Scaling
24	CEN/TR 15177	Testing the freeze-thaw resistance of concrete - Internal structural damage
25	EN 934-6	Admixtures for concrete, mortar and grout - Part 6: Sampling, conformity control and evaluation of conformity