Deutsches Institut für Bautechnik

DIBt

Allgemeine bauaufsichtliche Zulassung

Zulassungsstelle für Bauprodukte und Bauarten

Bautechnisches Prüfamt

Eine vom Bund und den Ländern
gemeinsam getragene Anstalt des öffentlichen Rechts

Mitglied der EOTA, der UEAtc und der WFTAO

Date: 30.06.2016

Reference: I 42-1.3.79-36/15

English translation prepared by DIBt – Original version in German language

Approval number:
Z-3.79-2126

Validity
from: **30 June 2016**
to: **30 June 2021**

Applicant:
ReforceTech Ltd
Pamdohlen House
DOORADOYLE RAD, LIMERICK
REPUBLIK IRLAND

Subject of approval:
"Basalt MiniBars" for concrete

The subject of approval mentioned above is herewith generally approved in the field of construction.
This *allgemeine bauaufsichtliche Zulassung* ('national technical approval') comprises seven pages.

I GENERAL PROVISIONS

1 With the *allgemeine bauaufsichtliche Zulassung* ('national technical approval') the fitness for use and the applicability of the subject of approval according to the *Landesbauordnungen* ('Building Regulations of the Land') have been verified.

2 If, in the *allgemeine bauaufsichtliche Zulassung* ('national technical approval') requirements are made concerning the special expertise and experience of persons entrusted with the manufacture of construction products and types of construction according to the relevant regulations of the Land following section 17, sub-section 5 *Musterbauordnung* ('Model Building Code'), it is to be noted that this expertise and experience can also be proven by equivalent verifications from other Member States of the European Union. If necessary, this also applies to verifications presented within the framework of the Agreement on the European Economic Area (EEA) or other bilateral agreements.

3 The *allgemeine bauaufsichtliche Zulassung* ('national technical approval') does not replace the permits, approvals and certificates prescribed by law for carrying out building projects.

4 The *allgemeine bauaufsichtliche Zulassung* ('national technical approval') will be granted without prejudice to the rights of third parties, in particular private property rights.

5 Notwithstanding further regulations in the "Specific Provisions" manufacturers and distributors of the subject of approval shall make copies of the *allgemeine bauaufsichtliche Zulassung* ('national technical approval') available to the user and point out that the *allgemeine bauaufsichtliche Zulassung* ('national technical approval') has to be available at the place of use. Upon request copies of the *allgemeine bauaufsichtliche Zulassung* ('national technical approval') shall be placed at the disposal of the authorities involved.

6 The *allgemeine bauaufsichtliche Zulasssung* ('national technical approval') may be reproduced in full only. Publication in the form of extracts requires the consent of *Deutsches Institut für Bautechnik*. Texts and drawings of advertising brochures may not be in contradiction to the *allgemeine bauaufsichtliche Zulassung* ('national technical approval'). Translations of the *allgemeine bauaufsichtliche Zulassung* ('national technical approval') have to contain the note "Translation of the German original, not checked by *Deutsches Institut für Bautechnik*".

7 The *allgemeine bauaufsichtliche Zulassung* ('national technical approval') is granted until revoked. The provisions of the *allgemeine bauaufsichtliche Zulassung* ('national technical approval') can subsequently be supplemented and amended in particular, if this is required by new technical findings.

II SPECIFIC PROVISIONS

1 Subject of approval and field of application

Subject of approval are "Basalt MiniBars" for concrete. The basalt fibres are twisted using a sacrificial thread and saturated and coated with epoxy resin. Thereby the macro fibres possess a helix structure.

They may be used as fibres in concrete according to DIN EN 206-1[1] in conjunction with DIN 1045-2[2] with proven effectiveness to reduce the formation of shrinkage cracks[3,4].

2 Provisions for the construction product

2.1 Properties and composition

2.1.1 General

The "Basalt MiniBars" are produced by twisting AR glass fibres and saturating and coating them with epoxy resin.

2.1.2 Dimensions and properties

Property	Declared value/ Characteristic	Deviation of the individual value relative to the declared value	Deviation of the average value relative to the declared value
Shape/Cross section	circular	-	-
Equivalent diameter	0.72 mm	± 50 %	± 5 %
Length	43 mm	± 10%	± 5 %
Density	2.09 g/cm³	-	-
Modulus of elasticity	> 49.000 N/mm²	-	-
Tensile strength	> 1.100 N/mm²	-	-
Point of ignition	420 °C	-	-
Loss on ignition[5]	13,9 M.-%	± 2,0 M.-%	± 1,5 M.-%

1 DIN EN 206-1:2001-07 Beton; Teil 1: Festlegung, Eigenschaften, Herstellung und Konformität; Deutsche Fassung EN 206-1:2000 - Concrete - Part 1: Specification, performance, production and conformity
DIN EN 206-1/A1:2004-10 Beton; Teil 1: Festlegung, Eigenschaften, Herstellung und Konformität; Deutsche Fassung EN 206-1:2000/A1:2004
DIN EN 206-1/A2:2005-09 Beton - Teil 1: Festlegung, Eigenschaften, Herstellung und Konformität; Deutsche Fassung EN 206-1:2000/A2:2005

2 DIN 1045-2:2008-08 Tragwerke aus Beton, Stahlbeton und Spannbeton; Teil 2: Beton - Festlegung, Eigenschaften, Herstellung und Konformität - Anwendungsregeln zu DIN EN 206-1 Concrete, reinforced and prestressed concrete structures - Part 2: Concrete - Specification, properties, production and conformity - Application rules for DIN EN 206-1

3 The verification of reduction of the formation of shrinkage cracks was carried out with an addition of 5.0 kg fibres per m³ concrete.

4 The long-term durability of the "Basalt MiniBars" in hardened concrete has not been tested in the approval process.

5 Determination of the loss on ignition of the "Basalt MiniBars" in accordance with DIN EN 196-2:2013-10, section 5.4, at a temperature of 600°C for 3 hours.

2.1.3 Chemical composition

2.1.3.1 General

The chemical composition of the "Basalt MiniBars" shall comply with the composition deposited at *Deutsches Institut für Bautechnik.*

2.1.3.2 Basalt

The core material of the "Basalt MiniBars" shall consist of basalt, whose chemical composition shall comply with the composition deposited at *Deutsches Institut für Bautechnik* in Berlin.

2.1.3.3 Epoxy resin

The chemical composition of the epoxy resin coating shall comply with the composition deposited at *Deutsches Institut für Bautechnik*. The per cent by mass of the epoxy resin coating shall comply with the value deposited at *Deutsches Institut für Bautechnik*. The moisture content of the basalt thread with sizing shall not be more than 0.50 % by mass.

2.1.3.4 Infrared spectroscopy (IR)

The infrared spectrogram of the epoxy resin shall comply with the spectrogram deposited at *Deutsches Institut für Bautechnik*.

2.2 Production, packaging, transport, storage and marking

2.2.1 Production

The "Basalt MiniBars" made from the deposited constituents according to section 2.1.3 are manufactured in the production plant of ReforceTech Ltd, 3440 Royken, Norway.

The production is an automated wet layup process. The helix structure of the basalt thread is created using a sacrificial thread. Then the fibre strand is saturated with epoxy resin. After the curing of the matrix the "Basalt MiniBars" are cut into length. Prior to packaging the "Basalt MiniBars" are post cured.

2.2.2 Packaging, transport, storage

For packaging and storage DIN EN 14020-2[6], section 8.1 applies. The packaging shall be removed not until the immediate use.

The wrapping bag of the unit packs shall consist of polyethylene, paper or vinyl alcohol bags.

For transport, storage and handling the safety data sheet of the company ReforceTech Ltd according to EEC-Directive 91/155/EEC (Material safety data sheet for chemicals and substances and chemical formulations) deposited at *Deutsches Institut für Bautechnik* applies.

The packaging shall be marked in such a way that a delivery note can be definitely related to each bag. The packaging shall be removed not until the immediate use.

2.2.3 Marking

The packaging and delivery note of the construction product shall be marked by the manufacturer with the conformity mark (Ü-mark) according to the *Übereinstimmungszeichen-Verordnungen der Länder* ('Regulations on the conformity mark of the states of the Federal Republic of Germany').

The marking may only be carried out if the requirements according to Section 2.3 *Übereinstimmungsnachweis* ('Verification of conformity') have been met.

Furthermore the packaging and delivery note shall contain the following information:

Designation:	"Basalt MiniBars"
Production plant:	3440 Royken, Norwegen

[6] DIN EN 14020-2:2003-03 Verstärkungsfasern; Spezifikation für Textilglasrovings; Teil 2: Prüfverfahren und allgemeine Anforderungen; Deutsche Fassung EN 14020-2:2002 Reinforcements - Specification for textile glass rovings - Part 2: Methods of test and general requirements; German version EN 14020-2:2002

Übereinstimmungszeichen ('conformity mark') with approval number:	Z-3.79-2126
Date of production:	.....
Packaging weight:	.....
Charge number:	.....

as well as the note:

"Initial type test according to DIN EN 206-1 in conjunction with DIN 1045-2 required"

2.3 Übereinstimmungsnachweis ('Verification of conformity')

2.3.1 General

Each manufacturing plant shall confirm that the construction product complies with the provisions of this *allgemeine bauaufsichtliche Zulassung* by means of a certificate of conformity based on the factory production control and a regular external surveillance, including initial testing of the construction product in accordance with the following provisions.

The manufacturer of the construction product shall organise a recognised certification body and a recognised inspection body to issue a certificate of conformity and for the external surveillance, including product testing that has to be carried out.

The manufacturer shall state by marking the products with the conformity mark (Ü-mark) with reference to the intended use, that the certificate of conformity is issued.

The certification body shall send a copy of the issued certificate of conformity and a copy of the initial type test report to *Deutsches Institut für Bautechnik*.

2.3.2 Factory production control

Each manufacturing plant shall set up and carry out a factory production control. Factory production control is a continuous surveillance of production by the manufacturer who thus ensures that the manufactured construction product is in conformity with the provisions of this *allgemeine bauaufsichtliche Zulassung* ('national technical approval').

The factory production control shall enclose at least the provisions of DIN EN 14889-2[7] and the following provisions:

- Description and control of the raw material and components (incoming inspection) for every batch:
  - Inspection certificate "3.1" according to DIN EN 10204[8] of all raw materials
  - Control of the compliance with the provisions according to section 2.1.3
- Verification and tests to be carried out on the finished construction product:
  - Determination of loss on ignition of the "Basalt MiniBars": 1 test/day/production line

The results of factory production control shall be recorded and evaluated. The records shall include at least the following information:

- Designation of the construction product respectively the raw material and its components
- Type of control or test
- Date of manufacture and test of the construction product respectively of the raw material or components

[7] DIN EN 14889-2:2006-11 Fasern für Beton - Teil 2: Polymerfasern - Begriffe, Festlegungen und Konformität
Fibres for concrete - Part 2: Polymer fibres - Definitions, specifications and conformity; German version EN 14889-2:2006

[8] DIN EN 10204:2005-01 Metallische Erzeugnisse - Arten von Prüfbescheinigungen; Deutsche Fassung EN 10204:2004
Metallic products - Types of inspection documents; German version EN 10204:2004

- Results of control and tests and, if applicable, a comparison with requirements
- A signature of the person responsible for factory production control.

The records shall be deposited for at least five years and presented to the recognised external surveillance body. On request, they shall be submitted to *Deutsches Institut für Bautechnik* and to the *zuständige oberste Bauaufsichtsbehörde* ('responsible building authority').

If the test results are unsatisfactory, the manufacturer shall immediately take the action necessary to eliminate the deficiency. Construction products which do not meet requirements shall be treated in such a way that confusion with conforming products is excluded. Once the deficiency has been eliminated, the original test shall be repeated immediately, provided that this is technically possible and also required to verify the elimination of the deficiency.

2.3.3 External surveillance

In each production plant, external surveillance shall be carried out regularly, but at least twice a year, to check the factory production control.

During external surveillance, initial testing of the "Basalt MiniBars" shall be carried out. Sampling and testing are done on responsibility of the recognized surveillance body.

For the initial type testing, the initial inspection of the production plant and the factory production control and for the continuous surveillance, assessment and verification of the factory production control the provisions according to DIN EN 14889-2[7] apply, as long as nothing else is given below.

The inspections and assessment during the external surveillance shall be in accordance with the provisions of the control plan, which is deposited by *Deutsches Institut für Bautechnik* and part of this *allgemeine bauaufsichtliche Zulassung* ('national technical approval').

The results of certification and external surveillance shall be deposited for at least five years. On request, they shall be submitted to *Deutsches Institut für Bautechnik* and to the *zuständige oberste Bauaufsichtsbehörde* ('responsible building authority') by the certification body respectively by the surveillance body.

3 Provisions for application

When using the "Basalt MiniBars" the concrete composition shall always be defined by an initial type test according to DIN EN 206-1[1] in conjunction with DIN 1045-2[2]. The use for grout according to DIN EN 447[9] is not approved.

The specification of the fibre content in concrete shall be in % by volume. When using the "Basalt MiniBars" for concrete in accordance with DIN EN 206-1[1] in conjunction with DIN 1045-2[2] the fibre content shall not exceed 1.0 % by volume. Here the mixing procedure, the fibre length and the fibre content shall also be adjusted among each other. The use of "Basalt MiniBars" may increase the air content in concrete.

The installation for measuring and addition of the "Basalt MiniBars" and the mixing unit shall provide an equal distribution of the glass fibres in concrete without their damage. Rotary-drum mixers are particularly suitable.

The "Basalt MiniBars" shall be added with an accuracy of 3 %. The bulk density of the "Basalt MiniBars" is 2.09 g/cm³.

When using other fine-grained concrete additions and admixtures, their compatibility with the "Basalt MiniBars" shall be verified.

[9] DIN EN 447 Einpreßmörtel für Spannglieder; Anforderungen für üblichen Einpreßmörtel
Grout for prestressing tendons - Basic requirements; German version EN 447:2007

Concrete admixtures that apply non-hazardous with regard to their alkali content in terms of the *Alkali-Richtlinie*[10] (when applying the recommended maximum dosage of the concrete admixture, the alkalis in concrete, as Na_2O equivalent, amount to less than 0,02 % by mass of cement) are considered to meet the requirement.

Wilhelm Hintzen
Head of Section

Beglaubigt
Bahlmann

[10] Deutscher Ausschuss für Stahlbeton DAfStb (Hrsg.): "DAfStb-Richtlinie Vorbeugende Maßnahmen gegen schädigende Alkalireaktionen im Beton (Alkali-Richtlinie) - Oktober 2013 -"
Beuth Verlag GmbH Berlin (Vertriebs-Nr. 65265)