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wyrobów budowlanych
(89/106/EWG)

Członek EOTA

European Technical Approval ETA-09/0140

(English language translation – the original version is in Polish language)

Nazwa handlowa *Trade name*	**BOSSONG BCR V PLUS** *BOSSONG BCR V PLUS*
Właściciel aprobaty *Holder of approval*	**Bossong spa** **24050 Grassobbio (Bg) - Via Enrico Fermi, 51, Italy**
Rodzaj i przeznaczenie wyrobu *Generic type and use of construction products*	**Kotwy wklejane z prętami ze stali ocynkowanej lub stali odpornej na korozję o średnicach M8, M10, M12, M16, M20 i M24 do wykonywania zamocowań w betonie niezarysowanym** *Bonded anchor with anchor rod made of galvanized steel or stainless steel of sizes M8, M10, M12, M16, M20 and M24 for use in non-cracked concrete*
Termin ważności **od** *Valid from* **do** *to*	**29. 07. 2009** **29. 07. 2014**
Zakład produkcyjny *Manufacturing plant*	**Bossong spa** **24050 Grassobbio (Bg) - Via Enrico Fermi, 51, Italy**
Niniejsza Europejska Aprobata Techniczna zawiera *This European Technical Approval contains*	25 stron, w tym 16 Załączników *25 pages including 16 Annexes*

I LEGAL BASES AND GENERAL CONDITIONS

1. This European Technical Approval is issued by Instytut Techniki Budowlanej 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 products[1], amended by the Council Directive 93/68/EEC of 22 July 1993[2];
   - ustawa z dnia 16 kwietnia 2004 r. o wyrobach budowlanych (law on construction products from 16th April 2004)[3];
   - rozporządzenie Ministra Infrastruktury z dnia 14 października 2004 r. w sprawie europejskich aprobat technicznych oraz polskich jednostek organizacyjnych upoważnionych do ich wydawania (regulation of the Ministry of Infrastructure of 14th October 2004 on the European Technical Approvals and Polish bodies entitled to issue them)[4];
   - Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex of Commission Decision 94/23/EC[5];
   - Guideline for European Technical Approval of "*Metal anchors for use in concrete – Part 5: Bonded anchors*", ETAG 001-05;

2. Instytut Techniki Budowlanej 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.

3. This European Technical Approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European Technical Approval.

4. This European Technical Approval may be withdrawn by Instytut Techniki Budowlanej, in particular after information by the Commission on the basis of Article 5(1) of Council Directive 89/106/EEC.

5. Reproduction of this European Technical Approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of Instytut Techniki Budowlanej. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European Technical Approval.

6. The European Technical Approval is issued by the approval body in its official language. This version corresponds 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, 11.02.1989, p. 12
[2] Official Journal of the European Communities № L 220, 30.08.1993, p. 1
[3] Official Journal of Polish Republic № 92/2004, pos. 881
[4] Official Journal of Polish Republic № 237/2004, pos. 2375
[5] Official Journal of the European Communities № L 17, 20.01.1994, p. 34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of product and intended use

1.1 Definition of product

BOSSONG BCR V PLUS are the bonded anchors (injection type) consisting of a injection mortar cartridge using an applicator gun equipped with a special mixing nozzle and threaded anchor rod of the sizes M8 to M24 made of galvanized carbon steel or stainless steel A4-70 or A4-80: 1.4401, 1.4404, 1.4571 or high corrosion resistant stainless steel in strength class 70: 1.4529, 1.4565, 1.4547 with hexagon nut and washer.

The threaded rod is placed into a drilled hole previously injected with a mortar with a slow and slight twisting motion. The threaded rod is anchored by the bond between rod, mortar and concrete.

The threaded rods are available for all diameters with three type of tip end: a one side 45° chamfer, a two sides 45° chamfer or a flat. The threaded rods are either delivered with the mortar cartridges or commercial standard threaded rods purchased separately. The mortar cartridges are available in different sizes: 165 ml to 400 ml and types: two part foil capsules in one cartridge (CIC), coaxial or side by side. The anchors are intended to be used with embedment depth given in Annex 2, Table 1.

For the installed anchor see Figure given in Annex 1.

1.2 Intended use

The anchors are intended to be used for anchorages for which requirements for mechanical resistance and stability and safety in use in the sense of the Essential Requirements 1 and 4 of Council Directive 89/106/EEC shall be fulfilled and failure of anchorages made with these products would compromise the stability of the works, cause risk to human life and/or lead to considerable economic consequences. Safety in the case of fire (Essential Requirement 2) is not covered by this ETA. The anchors are to be used only for anchorages subject to static or quasi-static loading in reinforced or unreinforced normal weight concrete of strength class C20/25 at minimum to C50/60 at maximum according to EN 206-1.

The anchors may be anchored in non-cracked concrete only.

The anchors may be installed in dry or wet concrete (use category 1) or in flooded holes with the exception of seawater (use category 2). All the diameters (from M8 to M24) may be used overhead.

The anchors may be used in the following temperature range:

a) -40°C to +80°C (max. short term temperature +80°C and max. long term temperature +50°C),

b) -40°C to +120°C (max. short term temperature +120°C and max. long term temperature +72°C).

Elements made of galvanized steel may be used in structures subject to dry internal conditions only.

Elements made of stainless steel may be used in structures subject to dry internal conditions and also in concrete subject to external atmospheric exposure (including industrial and marine environment) or exposure in permanently damp internal conditions if no particular aggressive conditions exist. Such particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

Elements made of high corrosion resistant steel may be used in structures subject to dry internal conditions and also in concrete subject to external atmospheric exposure or exposure in permanently damp internal conditions or in other particular aggressive conditions. Such particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

The provisions made in this European Technical Approval are based on an assumed intended working life of the anchor of 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer or Approval Body, 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 product and methods of verification

2.1 Characteristics of product

The anchors of the sizes of M8 to M24 and the mortar cartridges correspond to the drawings and provisions given in Annexes 1 to 4. The characteristic material values, dimensions and tolerances of the anchors not indicated in Annexes shall correspond to the respective values laid down in the technical documentation[6] of this European Technical Approval.

The characteristic anchor values for the design of anchorages are given in Annexes 8 to 16.

Each mortar cartridge is marked with the identifying mark of the producer and with the trade name. The threaded rods are either delivered with the mortar cartridges or commercial standard threaded rods are purchased separately.

The two components of the BOSSONG BCR V PLUS injection mortar are delivered in unmixed condition in mortar cartridges in a size of 165 ml and 300 ml in the case of two part foil capsules in the cartridge (CIC - foil cartridge), 345 ml in the case of side by side cartridges and 400 ml in the case of coaxial cartridges in accordance with Annex 4.

2.2 Methods of verification

The assessment of fitness of the anchors for the intended use in relation to the requirements for mechanical resistance and stability and safety in use in the sense of the Essential Requirements 1 and 4 has been made in accordance with the ETAG

[6] The technical documentation of this European Technical Approval is deposited at Instytut Techniki Budowlanej and, as far as relevant for the tasks of the approved body involved in the attestation of conformity procedure, may be handed over only to the approved body involved.

001 Guideline for European Technical Approval of *"Metal anchors for use in concrete*", Part 1: "*Anchors in general*" and Part 5: "*Bonded anchors*", on the basis of Option 7.

In addition to the specific clauses relating to dangerous substances contained in this European Technical Approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Directive, these requirements need also to be complied with, when and where they apply.

3 Evaluation of Conformity and CE marking

3.1 System of attestation of conformity

The system of attestation of conformity 2 (i) (referred to as system 1) according to Council Directive 89/106/EEC Annex III laid down by the European Commission provides:

(a) Tasks of the manufacturer:

1) factory production control,
2) further testing of samples taken at the factory by the manufacturer in accordance with a prescribed test plan;

(b) Tasks of the approved body:

3) initial type-testing of the product,
4) initial inspection of factory and of factory production control,
5) continuous surveillance, assessment and approval of factory production control.

3.2 Responsibilities

3.2.1 Tasks of the manufacturer; factory production control

The manufacturer has a factory production control system in the plant and shall exercises permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer are documented in a systematic manner in the form of written policies and procedures. This production control system ensures that the product is in conformity with the European Technical Approval.

The manufacturer shall only use raw materials supplied with the relevant inspection documents as laid down in the control plan[7]. The incoming raw materials shall be subject to controls and tests by the manufacturer before acceptance. Check of incoming materials such as nuts, washers, threaded rods, resin, hardeners shall include control of the inspection documents presented by suppliers (comparison with nominal values) by verifying dimensions and determining material properties.

The frequency of controls and tests conducted during production is laid down in the control plan taking account of the automated manufacturing process of the anchors.

[7] The control plan has been deposited at Instytut Techniki Budowlanej and may be handed over only to the approved body involved in the attestation of conformity procedure.

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

- designation of the product, basic material and components,
- type of control or testing,
- date of manufacture of the product and date of testing of the product or basic material or components,
- result of control and testing and, if appropriate, comparison with requirements,
- signature of person responsible for factory production control.

The records shall be presented to the approved body involved in continuous surveillance. On request, they shall be presented to Instytut Techniki Budowlanej.

Details of the extent, nature and frequency of testing and controls to be performed within the factory production control shall correspond to the control plan which is part of the technical documentation of this European Technical Approval.

3.2.2 Tasks of the approved body

3.2.2.1 Initial type-testing of the product

For initial type-testing the results of the tests performed as part of the assessment for the European Technical Approval shall be used unless there are changes in the production line or plant. In such cases the necessary initial type-testing has to be agreed between the Instytut Techniki Budowlanej and the approved body involved.

3.2.2.2 Initial inspection of factory and of factory production control

The approved body shall ascertain that, in accordance with the control plan, the factory, in particular the staff and equipment, and the factory production control are suitable to ensure continuous and orderly manufacturing of the anchor according to the specifications mentioned in clause 2.1 as well as to the Annexes to this European Technical Approval.

3.2.2.3 Continuous surveillance

Continuous surveillance and assessment of factory production control have to be performed according to the control plan.

The approved body shall visit the factory at least once a year for surveillance. It has to be verified that the system of factory production control and the specified automated manufacturing process are maintained taking account of the control plan.

The results of continuous surveillance shall be made available on demand by the approved body to Instytut Techniki Budowlanej. In cases where the provisions of the European Technical Approval and the control plan are no longer fulfilled the conformity certificate shall be withdrawn.

3.3 CE–marking

The CE marking shall be affixed on each packaging of the anchors. The letters “CE” shall be accompanied by the following information:

- identification number of the approved body,
- name and address of the holder of the approval,
- last two digits of the year in which the CE marking was affixed,
- number of the EC certificate of conformity,
- number of the European Technical Approval,

- number of the guideline for the European Technical Approval,
- use category (ETAG 001-01, Option 7),
- size.

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

4.1 Manufacturing

The anchors are manufactured in accordance with the provisions of the European Technical Approval using the automated manufacturing process as identified during inspection of the plant by Instytut Techniki Budowlanej and laid down in the technical documentation.

4.2 Installation

4.2.1 Design of anchorages

The fitness of the anchors for the intended use is given under the following conditions:

- the anchorages are designed in accordance with the Guideline for European Technical Approval ETAG 001 "*Metal anchors for use in concrete*", Annex C, Method A, and EOTA Technical Report 029 "*Design of bonded anchors*" (TR 029) under the responsibility of an engineer experienced in anchorages and concrete work,
- verifiable calculation notes and drawings are prepared taking account of the loads to be anchored,
- the position of the anchor is indicated on the design drawings (e.g. position of the anchor relative to reinforcement or to support, etc.).

For the verifications according to ETAG 001, Annex C the following shall be observed:

- for the pull-out failure (clause 5.2.2.3, Annex C) $N_{Rk,p}$ shall be assumed equal to N_{Rk} according to Table 7, Annex 8 and subsequent up to Table 12, Annex 13;
- for the concrete cone failure (clause 5.2.2.4, Annex C) $N_{Rk,c}$ shall be determined according to ETAG 001 Part 5: "*Bonded anchors*", clause 7.1 "*Design methods for anchorages*", with N_{Rk} according to Table 7, Annex 8 and subsequent up to Table 12, Annex 13.

For the verifications according to EOTA Technical Report 029 the following shall be observed:

- for the combined pull-out and concrete cone failure (clause 5.2.2.3, TR 029) $N_{Rk,p}$ shall be determined according to equation (5.2); $N^0_{Rk,p}$ shall be assumed equal to N_{Rk} according to Table 7, Annex 8 and subsequent up to Table 12, Annex 13. $S_{cr,Np}$ – $C_{cr,Np}$ shall be assumed according to Table 7, Annex 7 and subsequent up to Table 12, Annex 13;
- for the concrete cone failure (clause 5.2.2.4, TR 029) the values of $S_{cr,N}$ – $C_{cr,N}$ shall be assumed according to Table 7, Annex 8 and subsequent up to Table 12, Annex 13.

4.2.2 Installation of the anchors

The fitness for use of the anchors can only be assumed if the anchors are installed as follows:

- anchors installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters on the site,
- use of the anchor only as supplied by the manufacturer without exchanging the components of an anchor,
- use of the anchor with commercial standard threaded rods (in the case of rods made of galvanized steel – standard rods of the strength class ≤ 8.8 only), washers and hexagonal nuts under the following requirements:
  - material, dimensions and mechanical properties according to the specifications given in Annexes 2 to 3,
  - confirmation of material and mechanical properties by inspection certificate 3.1 according to EN-10204:2004; the documents should be stored,
  - marking of the threaded rod with the envisaged embedment depth; this may be done by the manufacturer of the rod or the person on a job site,
- anchors installation in accordance with the Annex 6, manufacturer's specifications and drawings using the tools indicated in the technical documentation of this European Technical Approval,
- checks before placing the anchor to ensure that the strength class of the concrete in which the anchor is to be placed is in the range given and is not lower than that of the concrete to which the characteristics loads apply,
- check of concrete being well compacted, e.g. without significant voids,
- keeping the effective anchorage depth,
- keeping of the edge distance and spacing to the specified values without minus tolerances,
- positioning of the drill holes without damaging the reinforcement,
- in case of aborted drill hole: the drill hole shall be filled with mortar,
- clearing the hole of drilling dust: the hole shall be cleaned by at least four blowing operations, by at least four brushing operations followed again by at least four blowing operations, before brushing cleaning the brush and checking whether the brush diameter according to Annex 5, Table 4 is sufficient,
- anchor installation ensuring the specified embedment depth, that is the appropriate depth marking of the anchor not exceeding the concrete surface or embedment depth control,
- mortar injection by using the equipment including the special mixing nozzle (mixer) shown in Annex 4; discarding the first swings of mortar of each new cartridge until an homogeneous color is achieved; taking from the manufacturer instruction the admissible processing time (open time) as a function of the ambient temperature of the concrete; filling the drill hole uniformly from the drill hole bottom, in order to avoid entrapment of air; removing the special mixing nozzle slowly bit by bit during pressing-out; filling the drill hole with a quantity of the injection mortar corresponding to 2/3 of the drill hole depth; inserting immediately the threaded rod, slowly and with a slight twisting motion, removing excess of injection mortar around the rod; observing the loading (curing) time according to Annex 3, Table 3 until the rod may be loaded;

- anchor component installation temperature shall be at least +5°C,
- during installation and curing of the injection mortar the temperature of the concrete must not fall below +5°C,
- application of the torque moment given in Annex 7, Table 5 using a calibrated torque wrench.

4.2.3 Responsibility of the manufacturer

It is the manufacturer's responsibility to ensure that the information on the specific conditions according to (1) and (2) including Annexes referred to in 4.2.1 and 4.2.2 is given to those who are concerned. This information may be made by reproduction of the respective parts of the European Technical Approval. In addition all installation data shall be shown clearly on the package and/or on an enclosed instruction sheet, preferably using illustration(s).

The minimum data required are:

- drill bit diameter,
- threaded rod diameter,
- minimum installation depth,
- maximum thickness of the fixture,
- required torque moment,
- admissible service temperature range,
- loading (curing) time of the bonding material depending on the installation temperature,
- information on the installation procedure, including cleaning of the hole, preferably by means of the illustrations,
- reference to any special installation equipment needed,
- identification of the manufacturing batch.

All the data shall be presented in a clear and explicit form.

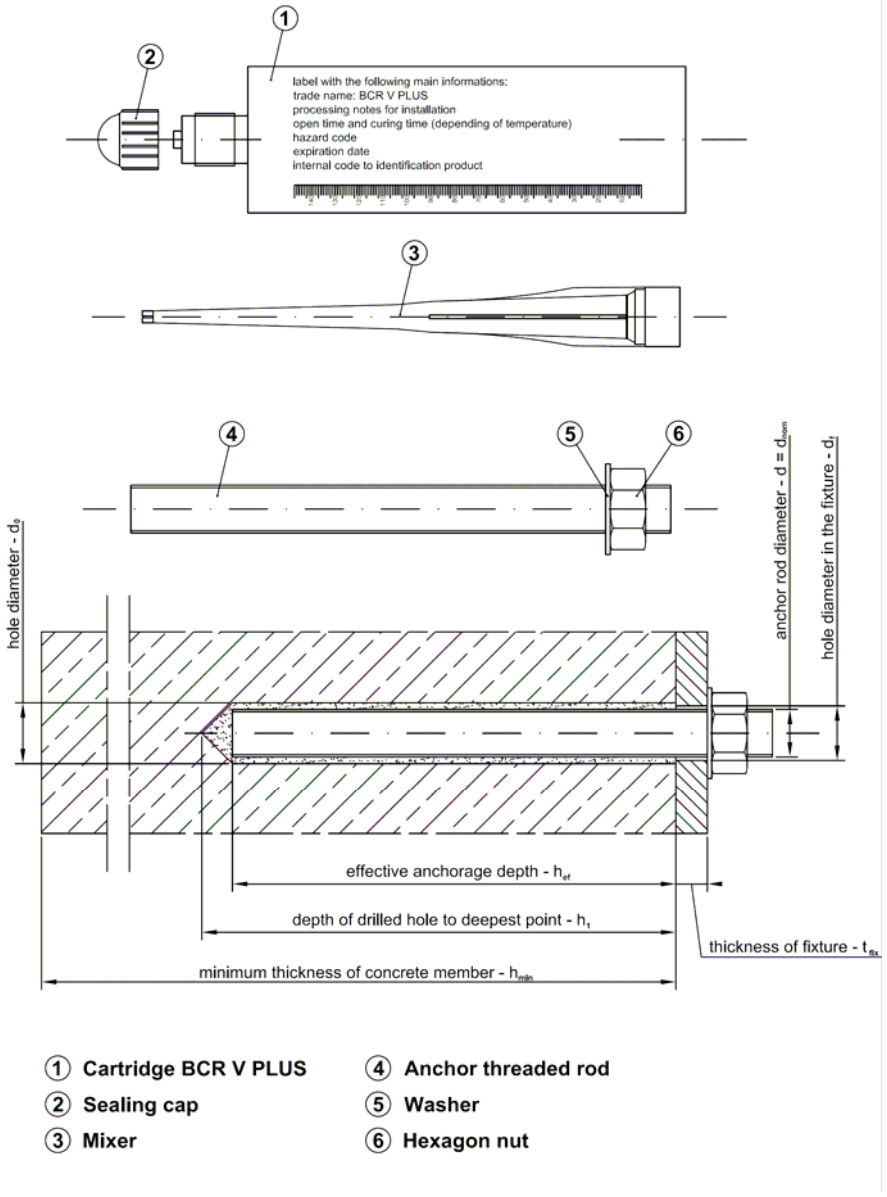
5 Recommendations on packaging, transport and storage

The mortar cartridges shall be protected against sun radiation and shall be stored according to the manufacturer's instructions in dry conditions at temperatures of at least +5°C to not more than +30°C.

Mortar cartridges with expired shelf life must no longer be used.

On behalf of Instytut Techniki Budowlanej

Jan Bobrowicz
Deputy Director of ITB



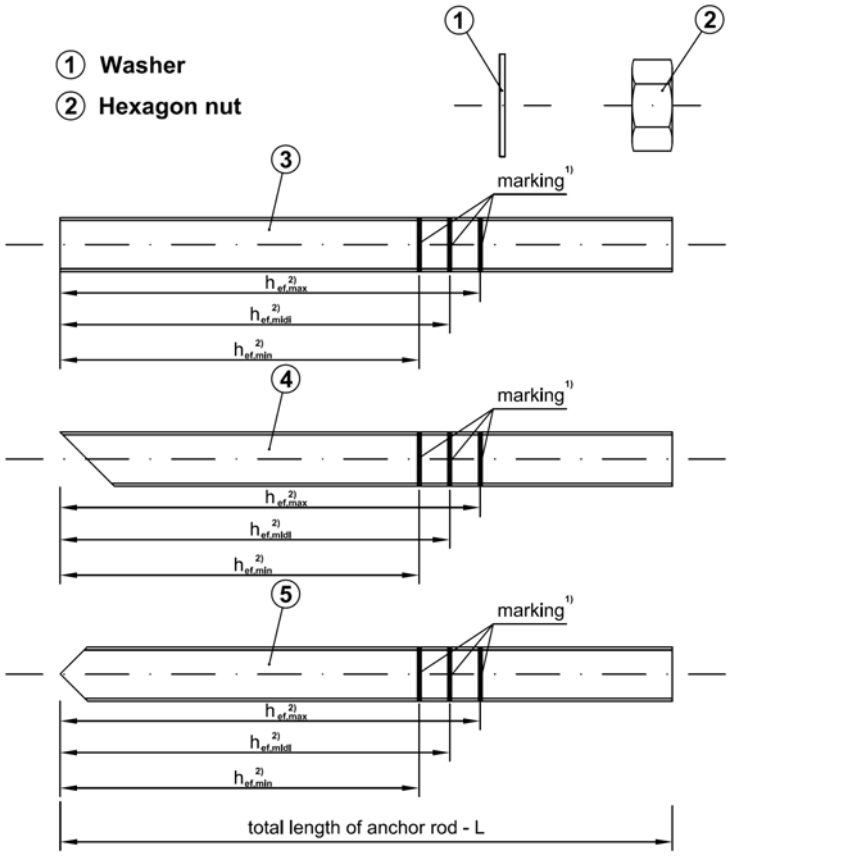
① **Cartridge BCR V PLUS**
② **Sealing cap**
③ **Mixer**
④ **Anchor threaded rod**
⑤ **Washer**
⑥ **Hexagon nut**

Use in non-cracked concrete only. Overhead installation is allowable.

Use category: installation in dry or wet concrete or in a flooded holes (not sea water)

Temperature range: -40°C to +80°C (max. short term temperature +80°C and max. long term temperature +50°C)
-40°C to +120°C (max. short term temperature +120°C and max. long term temperature +72°C)

BOSSONG BCR V PLUS	**Annex 1** of European Technical Approval ETA-09/0140
Product and intended use	



③ Version 1 - rod with flat end with marking on $h_{ef,min}$ or $h_{ef,midi}$ or $h_{ef,max}$

④ Version 2 - rod with 45° cutted end with marking on $h_{ef,min}$ or $h_{ef,midi}$ or $h_{ef,max}$

⑤ Version 3 - rod with V shape end with marking on $h_{ef,min}$ or $h_{ef,midi}$ or $h_{ef,max}$

Table 1: Anchor rod dimensions

Size	d [mm]	$h_{ef,min}$ [mm]	$h_{ef,midi}$ [mm]	$h_{ef,max}$ [mm]
M8	8	60	80	95
M10	10	70	90	120
M12	12	80	110	145
M16	16	100	140	190
M20	20	120	180	240
M24	24	145	220	290

1) Marking according to clause 2.1.2. of ETAG 001 – Part five, February 2008

2) Effective anchorage depths according to table 1

BOSSONG BCR V PLUS	**Annex 2** of European Technical Approval ETA-09/0140
Anchor rod types and dimensions	

Table 2: Materials

Part	Designation		
	Steel, zinc plated ≥ 5 µm acc. to EN ISO 4042	**Stainless steel**	**High corrosion resistance stainless steel**
Anchor rod	Steel, property class 4.8 to 12.9, acc. to EN ISO 898-1	Material 1.4401, 1.4404, 1.4571 acc. to EN 10088; property class 70 and 80 (A4-70 and A4-80) acc. to EN ISO 3506	Material 1.4529, 1.4565, 1.4547 acc. to EN 10088; property class 70 acc. to EN ISO 3506
Hexagon nut	Steel, property class 4 to 12, acc. to EN 20898-2; corresponding to anchor rod material	Material 1.4401, 1.4404, 1.4571 acc. to EN 10088; property class 70 and 80 (A4-70 and A4-80) acc. to EN ISO 3506	Material 1.4529, 1.4565, 1.4547 acc. to EN 10088; property class 70 acc. to EN ISO 3506
Washer	Steel, acc. to EN ISO 7089; corresponding to anchor rod material	Material 1.4401, 1.4404, 1.4571 acc. to EN 10088; corresponding to anchor rod material	Material 1.4529, 1.4565, 1.4547 acc. to EN 10088; corresponding to anchor rod material
Injection mortar	Additive: quartz Bonding agent: vinyl ester resin styrene free Hardener: dibenzoyl peroxide		

Commercial standard threaded rods (in the case of rods made of galvanized steel – standard rods of the strength class ≤ 8.8 only), with:

- material and mechanical properties according to Table 2,
- confirmation of material and mechanical properties by inspection certificate 3.1 according to EN-10204:2004,
- marking of the threaded rod with the embedment depth.

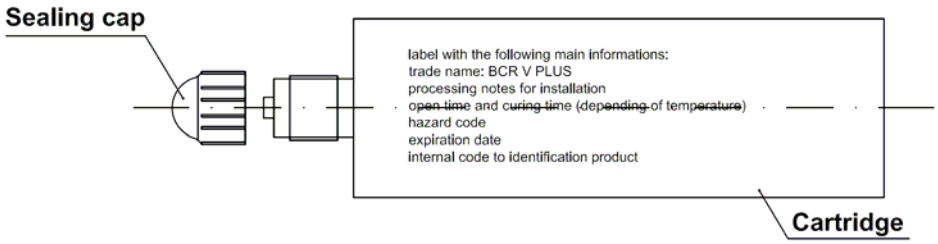
Table 3: Minimum curing time[1)]

Concrete temperature	Processing time, minutes	Minimum curing time[1)], hours
5°C	25	8
10°C	16	4
15°C	11,5	3
20°C	7,5	2
25°C	5	1,5
30°C	3	1
35°C	2	0,75

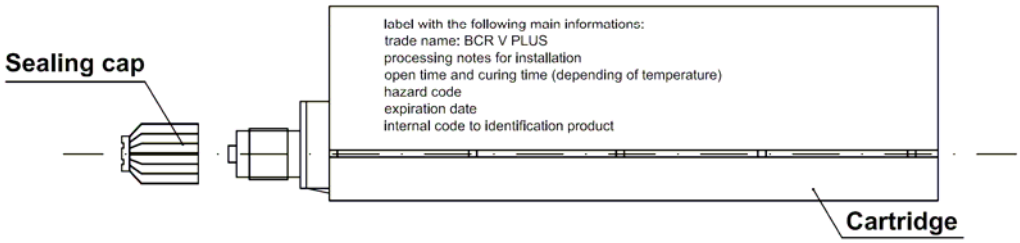
[1)] the minimum time from the end of the mixing to the time when the anchor may be torque or loaded (whichever is longer)

BOSSONG BCR V PLUS	**Annex 3** of European Technical Approval ETA-09/0140
Materials and curing time	

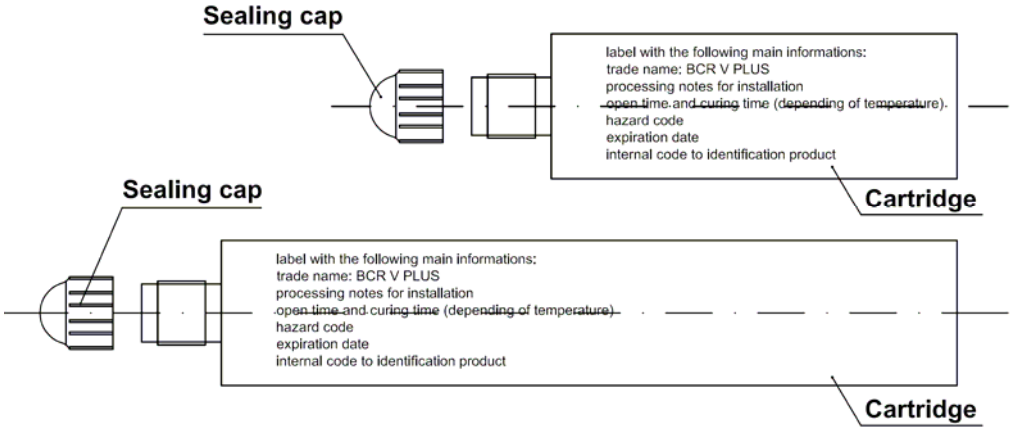
BCR V PLUS - 400 ml cartridge - coaxial cartridge



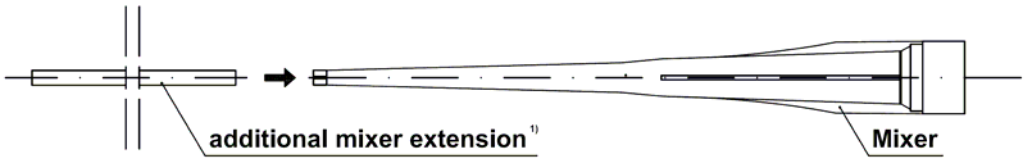
BCR V PLUS - 345 ml cartridge - side by side cartridge



BCR V PLUS - 300 ml and 165 ml cartridge - foil cartridge



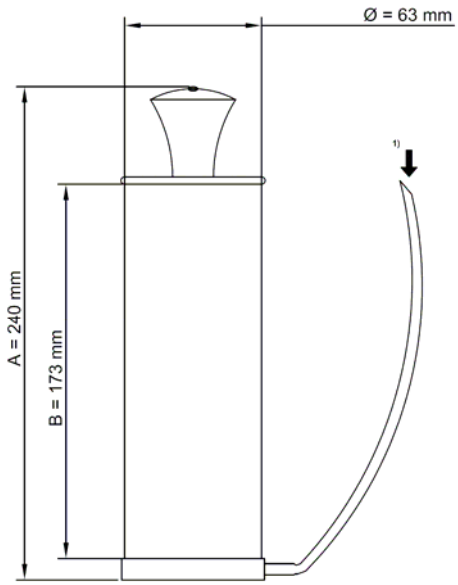
MIXER - the mixer is suitable for each type of cartridge



1) Variable length from 380 mm up to 1000 mm

BOSSONG BCR V PLUS	**Annex 4** of European Technical Approval ETA-09/0140
Cartridge types and sizes	

Manual Blower pump: nominal dimensions



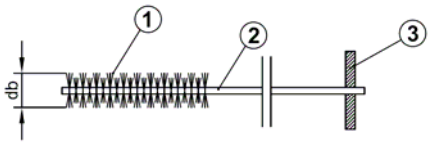
It is possible to use the mixer extension (see Annex 4) with the manual blower pump.

However it is possible to blow the hole using the mechanical air system (compressed air) also with the mixer estension

Suitable min pressure 6 bar at 6 m³/h
Oil-free compressed air
Recommended air gun with an orifice opening of minimum 3.5 mm in diameter

1) Position to insert the mixer extension

Brush

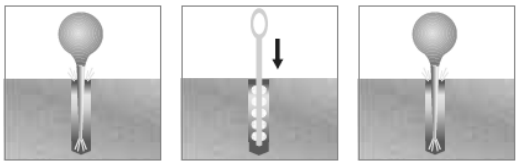
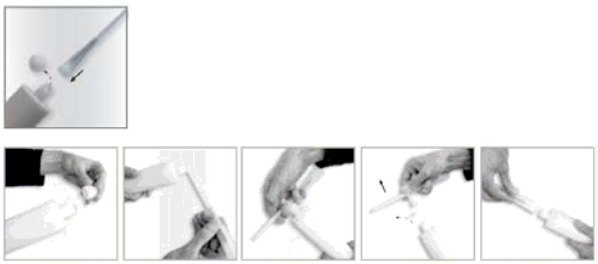
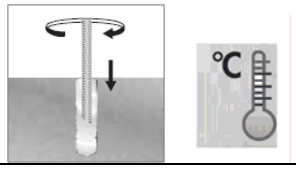
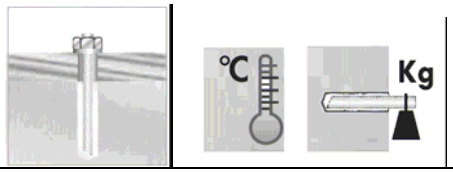


(1) Steel bristles
(2) Steel stem
(3) Wood handle

Table 4: Brush diameter

Size of the anchor - d			**M8**	**M10**	**M12**	**M16**	**M20**	**M24**
$\mathbf{d_0}$	Nominal drill hole	[mm]	10	12	14	18	24	28
$\mathbf{d_b}$	Brush diameter	[mm]	12	14	16	20	26	30

BOSSONG BCR V PLUS	**Annex 5** of European Technical Approval ETA-09/0140
Cleaning tools	

1		Drill the hole with the correct diameter and depth (Annex 7, Table 5) using a rotary percussive machine (hammer drill). Check the perpendicularity of the hole during the drilling operation.
2		Clean the hole from the drilling dust: the hole shall be cleaned by at least four blowing operations, by at least four brushing operations followed again by at least four blowing operations; before brushing clean the brush and check (according to Annex 5, Table 4) if the brush diameter is sufficient. For the blower tools see Annex 5.
3		For sizes 400 ml and 345 ml unscrew the front cup, screw on the mixer and insert the cartridge in the gun. For the size 300 ml and 165 ml, unscrew the front cup, pull-out the steel closing clip according to the following operations: - insert the mixer in the eye of the plastic extractor, - pull the extractor to unhook the steel closing clip of the foil. After that, screw on the mixer and insert the cartridge in the gun.
4		Before starting to use the cartridge, eject a first part of the product, being sure that the two components are completely mixed. The complete mixing is reached only after that the product, obtained by mixing the two component, comes out from the mixer with an uniform color.
5		Fill the drilled hole uniformly starting from the drilled hole bottom, in order to avoid entrapped air; remove the mixer slowly bit by bit during pressing-out; filling the drill hole with a quantity of the injection mortar corresponding to 2/3 of the drill hole depth.
6		Insert immediately the threaded rod, marked according to Annex 2, slowly and with a slight twisting motion, removing excess of injection mortar around the rod. Observe the processing time according to Annex 3, Table 3.
7		Wait the curing time according to Annex 3, Table 3. After that attach the fixture and tighten the nut to the required torque moment according to Annex 7, Table 5.

BOSSONG BCR V PLUS	**Annex 6**
Installation instruction	of European Technical Approval ETA-09/0140

Table 5: Installation data

Size	Drilling diameter	Maximum diameter hole in the fixture	Depth of the drilling hole	Embedment depth	Minimum thickness of the slab	Torque moment	Maximum thickness to be fixed
d	d_o	d_{fix}	h_1	h_{ef}	h_{min}	T_{inst}	t_{fix}
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[Nm]	[mm]
M8	10	9	65	60	100	10	10
			85	80	110		
			100	95	125		
M10	12	12	75	70	100	20	20
			95	90	120		
			125	120	150		
M12	14	14	85	80	110	40	30
			115	110	140		
			150	145	175		
M16	18	18	105	100	136	80	40
			145	140	180		
			195	190	226		
M20	24	22	125	120	168	130	50
			185	180	230		
			245	240	288		
M24	28	26	150	145	201	200	55
			225	220	280		
			295	290	346		

Table 6: Minimum thickness, spacing and edge distance

Size			M8	M10	M12	M16	M20	M24
Minimum thickness	h_{min} [mm]	$h_{ef,min}$	100	100	110	136	168	201
		$h_{ef,midi}$	110	120	140	180	230	280
		$h_{ef,max}$	125	150	175	226	288	346
Minimum spacing	s_{min} [mm]	$h_{ef,min}$	40	40	40	50	60	75
		$h_{ef,midi}$	40	45	55	70	90	110
		$h_{ef,max}$	50	60	75	95	120	145
Minimum edge distance	c_{min} [mm]	$h_{ef,min}$	40	40	40	50	60	75
		$h_{ef,midi}$	40	45	55	70	90	110
		$h_{ef,max}$	50	60	75	95	120	145

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Installation data

Annex 7

of European Technical Approval ETA-09/0140

Table 7: Tension loads for temperature range -40ºC to +80ºC and $h_{ef,min}$

Size			M8	M10	M12	M16	M20	M24
Steel failure								
Steel failure with standard threaded rod grade 4.8								
Characteristic resistance	$N_{Rk,s}$	[kN]	15	23	34	63	98	141
Partial safety factor	γ_{Ms}	[-]	1,50					
Steel failure with standard threaded rod grade 5.8								
Characteristic resistance	$N_{Rk,s}$	[kN]	18	29	42	78	122	176
Partial safety factor	γ_{Ms}	[-]	1,50					
Steel failure with standard threaded rod grade 8.8								
Characteristic resistance	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial safety factor	γ_{Ms}	[-]	1,50					
Steel failure with standard threaded rod grade 10.9								
Characteristic resistance	$N_{Rk,s}$	[kN]	37	58	84	157	245	353
Partial safety factor	γ_{Ms}	[-]	1,40					
Steel failure with standard threaded rod grade 12.9								
Characteristic resistance	$N_{Rk,s}$	[kN]	44	70	101	188	294	424
Partial safety factor	γ_{Ms}	[-]	1,40					
Steel failure with standard stainless steel threaded rod A4-70								
Characteristic resistance	$N_{Rk,s}$	[kN]	26	41	59	110	171	247
Partial safety factor	γ_{Ms}	[-]	1,87					
Steel failure with standard stainless steel threaded rod A4-80								
Characteristic resistance	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial safety factor	γ_{Ms}	[-]	1,60					
Steel failure with high corrosion resistant steel grade 70								
Characteristic resistance	$N_{Rk,s}$	[kN]	26	41	59	110	171	247
Partial safety factor	γ_{Ms}	[-]	1,87					
Pullout and concrete cone failure								
Characteristic resistance in non-cracked concrete C20/25[1)]	N_{Rk}	[kN]	**16**	**16**	**25**	**40**	**50**	**75**
Increasing factor C30/37	ψ_c	[-]	1,12					
Increasing factor C40/50			1,23					
Increasing factor C50/60			1,30					
Partial safety factors for in use category 1 (γ_2 = 1,2 included)	γ_{Mc}	[-]	1,80					
Partial safety factors for in use category 2 (γ_2 = 1,2 included)			1,80					
Splitting failure								
Effective anchorage depth	h_{ef}	[mm]	**60**	**70**	**80**	**100**	**120**	**145**
Partial safety factors for in use category 1 (γ_2 = 1,2 included)	γ_{Mp}	[-]	1,80					
Partial safety factors for in use category 2 (γ_2 = 1,2 included)			1,80					
Spacing	$s_{cr,N} = s_{cr,Np}$	[mm]	120	140	160	200	240	290
	$s_{cr,sp}$	[mm]	300	350	320	400	360	435
Edge distance	$c_{cr,N} = c_{cr,Np}$	[mm]	60	70	80	100	120	145
	$c_{cr,sp}$	[mm]	150	175	160	200	180	218

[1)] see clause 4.2.1 of ETA

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Characteristic resistance under tension loads – design method A

Annex 8

of European Technical Approval ETA-09/0140

Table 8: Tension loads for temperature range -40ºC to +80ºC and $h_{ef,midi}$

Size			M8	M10	M12	M16	M20	M24
Steel failure								
Steel failure with standard threaded rod grade 4.8								
Characteristic resistance	$N_{Rk,s}$	[kN]	15	23	34	63	98	141
Partial safety factor	γ_{Ms}	[-]	1,50					
Steel failure with standard threaded rod grade 5.8								
Characteristic resistance	$N_{Rk,s}$	[kN]	18	29	42	78	122	176
Partial safety factor	γ_{Ms}	[-]	1,50					
Steel failure with standard threaded rod grade 8.8								
Characteristic resistance	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial safety factor	γ_{Ms}	[-]	1,50					
Steel failure with standard threaded rod grade 10.9								
Characteristic resistance	$N_{Rk,s}$	[kN]	37	58	84	157	245	353
Partial safety factor	γ_{Ms}	[-]	1,40					
Steel failure with standard threaded rod grade 12.9								
Characteristic resistance	$N_{Rk,s}$	[kN]	44	70	101	188	294	424
Partial safety factor	γ_{Ms}	[-]	1,40					
Steel failure with standard stainless steel threaded rod A4-70								
Characteristic resistance	$N_{Rk,s}$	[kN]	26	41	59	110	171	247
Partial safety factor	γ_{Ms}	[-]	1,87					
Steel failure with standard stainless steel threaded rod A4-80								
Characteristic resistance	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial safety factor	γ_{Ms}	[-]	1,60					
Steel failure with high corrosion resistant steel grade 70								
Characteristic resistance	$N_{Rk,s}$	[kN]	26	41	59	110	171	247
Partial safety factor	γ_{Ms}	[-]	1,87					
Pullout and concrete cone failure								
Characteristic resistance in non-cracked concrete C20/25[1)]	N_{Rk}	[kN]	**20**	**25**	**35**	**60**	**75**	**115**
Increasing factor C30/37	ψ_c	[-]	1,12					
Increasing factor C40/50			1,23					
Increasing factor C50/60			1,30					
Partial safety factors for in use category 1 (γ_2 = 1,2 included)	γ_{Mc}	[-]	1,80					
Partial safety factors for in use category 2 (γ_2 = 1,2 included)			1,80					
Splitting failure								
Effective anchorage depth	h_{ef}	[mm]	**80**	**90**	**110**	**140**	**180**	**220**
Partial safety factors for in use category 1 (γ_2 = 1,2 included)	γ_{Mp}	[-]	1,80					
Partial safety factors for in use category 2 (γ_2 = 1,2 included)			1,80					
Spacing	$s_{cr,N} = s_{cr,Np}$	[mm]	160	180	220	280	360	440
	$s_{cr,sp}$	[mm]	400	450	440	560	540	660
Edge distance	$c_{cr,N} = c_{cr,Np}$	[mm]	80	90	110	140	180	220
	$c_{cr,sp}$	[mm]	200	225	220	280	270	330

[1)] see clause 4.2.1 of ETA

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Characteristic resistance under tension loads – design method A

Annex 9

of European Technical Approval ETA-09/0140

Table 9: Tension loads for temperature range -40ºC to +80ºC and $h_{ef,max}$

Size			M8	M10	M12	M16	M20	M24
Steel failure								
Steel failure with standard threaded rod grade 4.8								
Characteristic resistance	$N_{Rk,s}$	[kN]	15	23	34	63	98	141
Partial safety factor	γ_{Ms}	[-]	1,50					
Steel failure with standard threaded rod grade 5.8								
Characteristic resistance	$N_{Rk,s}$	[kN]	18	29	42	78	122	176
Partial safety factor	γ_{Ms}	[-]	1,50					
Steel failure with standard threaded rod grade 8.8								
Characteristic resistance	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial safety factor	γ_{Ms}	[-]	1,50					
Steel failure with standard threaded rod grade 10.9								
Characteristic resistance	$N_{Rk,s}$	[kN]	37	58	84	157	245	353
Partial safety factor	γ_{Ms}	[-]	1,40					
Steel failure with standard threaded rod grade 12.9								
Characteristic resistance	$N_{Rk,s}$	[kN]	44	70	101	188	294	424
Partial safety factor	γ_{Ms}	[-]	1,40					
Steel failure with standard stainless steel threaded rod A4-70								
Characteristic resistance	$N_{Rk,s}$	[kN]	26	41	59	110	171	247
Partial safety factor	γ_{Ms}	[-]	1,87					
Steel failure with standard stainless steel threaded rod A4-80								
Characteristic resistance	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial safety factor	γ_{Ms}	[-]	1,60					
Steel failure with high corrosion resistant steel grade 70								
Characteristic resistance	$N_{Rk,s}$	[kN]	26	41	59	110	171	247
Partial safety factor	γ_{Ms}	[-]	1,87					
Pullout and concrete cone failure								
Characteristic resistance in non-cracked concrete C20/25[1)]	N_{Rk}	[kN]	**25**	**30**	**40**	**75**	**95**	**140**
Increasing factor C30/37	ψ_c	[-]	1,12					
Increasing factor C40/50			1,23					
Increasing factor C50/60			1,30					
Partial safety factors for in use category 1 (γ_2 = 1,2 included)	γ_{Mc}	[-]	1,80					
Partial safety factors for in use category 2 (γ_2 = 1,2 included)			1,80					
Splitting failure								
Effective anchorage depth	h_{ef}	[mm]	**95**	**120**	**145**	**190**	**240**	**290**
Partial safety factors for in use category 1 (γ_2 = 1,2 included)	γ_{Mp}	[-]	1,80					
Partial safety factors for in use category 2 (γ_2 = 1,2 included)			1,80					
Spacing	$s_{cr,N} = s_{cr,Np}$	[mm]	190	240	290	380	480	580
	$s_{cr,sp}$	[mm]	475	600	580	760	720	870
Edge distance	$c_{cr,N} = c_{cr,Np}$	[mm]	95	120	145	190	240	290
	$c_{cr,sp}$	[mm]	240	300	290	380	360	435

[1)] see clause 4.2.1 of ETA

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Characteristic resistance under tension loads – design method A

Annex 10

of European Technical Approval ETA-09/0140

Table 10: Tension loads for temperature range -40ºC to +120ºC and $h_{ef,min}$

Size			M8	M10	M12	M16	M20	M24
Steel failure								
Steel failure with standard threaded rod grade 4.8								
Characteristic resistance	$N_{Rk,s}$	[kN]	15	23	34	63	98	141
Partial safety factor	γ_{Ms}	[-]	1,50					
Steel failure with standard threaded rod grade 5.8								
Characteristic resistance	$N_{Rk,s}$	[kN]	18	29	42	78	122	176
Partial safety factor	γ_{Ms}	[-]	1,50					
Steel failure with standard threaded rod grade 8.8								
Characteristic resistance	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial safety factor	γ_{Ms}	[-]	1,50					
Steel failure with standard threaded rod grade 10.9								
Characteristic resistance	$N_{Rk,s}$	[kN]	37	58	84	157	245	353
Partial safety factor	γ_{Ms}	[-]	1,40					
Steel failure with standard threaded rod grade 12.9								
Characteristic resistance	$N_{Rk,s}$	[kN]	44	70	101	188	294	424
Partial safety factor	γ_{Ms}	[-]	1,40					
Steel failure with standard stainless steel threaded rod A4-70								
Characteristic resistance	$N_{Rk,s}$	[kN]	26	41	59	110	171	247
Partial safety factor	γ_{Ms}	[-]	1,87					
Steel failure with standard stainless steel threaded rod A4-80								
Characteristic resistance	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial safety factor	γ_{Ms}	[-]	1,60					
Steel failure with high corrosion resistant steel grade 70								
Characteristic resistance	$N_{Rk,s}$	[kN]	26	41	59	110	171	247
Partial safety factor	γ_{Ms}	[-]	1,87					
Pullout and concrete cone failure								
Characteristic resistance in non-cracked concrete C20/25[1)]	N_{Rk}	[kN]	**9**	**9**	**12**	**20**	**25**	**40**
Increasing factor C30/37	ψ_c	[-]	1,12					
Increasing factor C40/50			1,23					
Increasing factor C50/60			1,30					
Partial safety factors for in use category 1 (γ_2 = 1,2 included)	γ_{Mc}	[-]	1,80					
Partial safety factors for in use category 2 (γ_2 = 1,2 included)			1,80					
Splitting failure								
Effective anchorage depth	h_{ef}	[mm]	**60**	**70**	**80**	**100**	**120**	**145**
Partial safety factors for in use category 1 (γ_2 = 1,2 included)	γ_{Mp}	[-]	1,80					
Partial safety factors for in use category 2 (γ_2 = 1,2 included)			1,80					
Spacing	$s_{cr,N} = s_{cr,Np}$	[mm]	120	140	160	200	240	290
	$s_{cr,sp}$	[mm]	300	350	320	400	360	435
Edge distance	$c_{cr,N} = c_{cr,Np}$	[mm]	60	70	80	100	120	145
	$c_{cr,sp}$	[mm]	150	175	160	200	180	218

[1)] see clause 4.2.1 of ETA

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Characteristic resistance under tension loads – design method A

Annex 11

of European Technical Approval ETA-09/0140

Table 11: Tension loads for temperature range -40ºC to +120ºC and $h_{ef,midi}$

Size			M8	M10	M12	M16	M20	M24
Steel failure								
Steel failure with standard threaded rod grade 4.8								
Characteristic resistance	$N_{Rk,s}$	[kN]	15	23	34	63	98	141
Partial safety factor	γ_{Ms}	[-]	1,50					
Steel failure with standard threaded rod grade 5.8								
Characteristic resistance	$N_{Rk,s}$	[kN]	18	29	42	78	122	176
Partial safety factor	γ_{Ms}	[-]	1,50					
Steel failure with standard threaded rod grade 8.8								
Characteristic resistance	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial safety factor	γ_{Ms}	[-]	1,50					
Steel failure with standard threaded rod grade 10.9								
Characteristic resistance	$N_{Rk,s}$	[kN]	37	58	84	157	245	353
Partial safety factor	γ_{Ms}	[-]	1,40					
Steel failure with standard threaded rod grade 12.9								
Characteristic resistance	$N_{Rk,s}$	[kN]	44	70	101	188	294	424
Partial safety factor	γ_{Ms}	[-]	1,40					
Steel failure with standard stainless steel threaded rod A4-70								
Characteristic resistance	$N_{Rk,s}$	[kN]	26	41	59	110	171	247
Partial safety factor	γ_{Ms}	[-]	1,87					
Steel failure with standard stainless steel threaded rod A4-80								
Characteristic resistance	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial safety factor	γ_{Ms}	[-]	1,60					
Steel failure with high corrosion resistant steel grade 70								
Characteristic resistance	$N_{Rk,s}$	[kN]	26	41	59	110	171	247
Partial safety factor	γ_{Ms}	[-]	1,87					
Pullout and concrete cone failure								
Characteristic resistance in non-cracked concrete C20/25[1)]	N_{Rk}	[kN]	**12**	**12**	**16**	**30**	**40**	**60**
Increasing factor C30/37	ψ_c	[-]	1,12					
Increasing factor C40/50			1,23					
Increasing factor C50/60			1,30					
Partial safety factors for in use category 1 (γ_2 = 1,2 included)	γ_{Mc}	[-]	1,80					
Partial safety factors for in use category 2 (γ_2 = 1,2 included)			1,80					
Splitting failure								
Effective anchorage depth	h_{ef}	[mm]	**80**	**90**	**110**	**140**	**180**	**220**
Partial safety factors for in use category 1 (γ_2 = 1,2 included)	γ_{Mp}	[-]	1,80					
Partial safety factors for in use category 2 (γ_2 = 1,2 included)			1,80					
Spacing	$s_{cr,N} = s_{cr,Np}$	[mm]	160	180	220	280	360	440
	$s_{cr,sp}$	[mm]	400	450	440	560	540	660
Edge distance	$c_{cr,N} = c_{cr,Np}$	[mm]	80	90	110	140	180	220
	$c_{cr,sp}$	[mm]	200	225	220	280	270	330

[1)] see clause 4.2.1 of ETA

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Characteristic resistance under tension loads – design method A

Annex 12

of European Technical Approval ETA-09/0140

Table 12: Tension loads for temperature range -40ºC to +120ºC and $h_{ef,max}$

Size			M8	M10	M12	M16	M20	M24
Steel failure								
Steel failure with standard threaded rod grade 4.8								
Characteristic resistance	$N_{Rk,s}$	[kN]	15	23	34	63	98	141
Partial safety factor	γ_{Ms}	[-]	1,50					
Steel failure with standard threaded rod grade 5.8								
Characteristic resistance	$N_{Rk,s}$	[kN]	18	29	42	78	122	176
Partial safety factor	γ_{Ms}	[-]	1,50					
Steel failure with standard threaded rod grade 8.8								
Characteristic resistance	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial safety factor	γ_{Ms}	[-]	1,50					
Steel failure with standard threaded rod grade 10.9								
Characteristic resistance	$N_{Rk,s}$	[kN]	37	58	84	157	245	353
Partial safety factor	γ_{Ms}	[-]	1,40					
Steel failure with standard threaded rod grade 12.9								
Characteristic resistance	$N_{Rk,s}$	[kN]	44	70	101	188	294	424
Partial safety factor	γ_{Ms}	[-]	1,40					
Steel failure with standard stainless steel threaded rod A4-70								
Characteristic resistance	$N_{Rk,s}$	[kN]	26	41	59	110	171	247
Partial safety factor	γ_{Ms}	[-]	1,87					
Steel failure with standard stainless steel threaded rod A4-80								
Characteristic resistance	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial safety factor	γ_{Ms}	[-]	1,60					
Steel failure with high corrosion resistant steel grade 70								
Characteristic resistance	$N_{Rk,s}$	[kN]	26	41	59	110	171	247
Partial safety factor	γ_{Ms}	[-]	1,87					
Pullout and concrete cone failure								
Characteristic resistance in non-cracked concrete C20/25[1)]	N_{Rk}	[kN]	**12**	**16**	**25**	**40**	**50**	**75**
Increasing factor C30/37	ψ_c	[-]	1,12					
Increasing factor C40/50			1,23					
Increasing factor C50/60			1,30					
Partial safety factors for in use category 1 (γ_2 = 1,2 included)	γ_{Mc}	[-]	1,80					
Partial safety factors for in use category 2 (γ_2 = 1,2 included)			1,80					
Splitting failure								
Effective anchorage depth	h_{ef}	[mm]	**95**	**120**	**145**	**190**	**240**	**290**
Partial safety factors for in use category 1 (γ_2 = 1,2 included)	γ_{Mp}	[-]	1,80					
Partial safety factors for in use category 2 (γ_2 = 1,2 included)			1,80					
Spacing	$s_{cr,N} = s_{cr,Np}$	[mm]	190	240	290	380	480	580
	$s_{cr,sp}$	[mm]	475	600	580	760	720	870
Edge distance	$c_{cr,N} = c_{cr,Np}$	[mm]	95	120	145	190	240	290
	$c_{cr,sp}$	[mm]	240	300	290	380	360	435

[1)] see clause 4.2.1 of ETA

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Characteristic resistance under tension loads – design method A

Annex 13

of European Technical Approval ETA-09/0140

Table 13: Shear loads for steel failure without lever arm

Size			M8	M10	M12	M16	M20	M24
Steel failure with standard threaded rod grade 4.8								
Characteristic resistance	$V_{Rk,s}$	[kN]	7	12	17	31	49	71
Partial safety factor	γ_{Ms}	[-]	1,25					
Steel failure with standard threaded rod grade 5.8								
Characteristic resistance	$V_{Rk,s}$	[kN]	9	14	21	39	61	88
Partial safety factor	γ_{Ms}	[-]	1,25					
Steel failure with standard threaded rod grade 8.8								
Characteristic resistance	$V_{Rk,s}$	[kN]	15	23	34	63	98	141
Partial safety factor	γ_{Ms}	[-]	1,25					
Steel failure with standard threaded rod grade 10.9								
Characteristic resistance	$V_{Rk,s}$	[kN]	18	29	42	78	122	176
Partial safety factor	γ_{Ms}	[-]	1,50					
Steel failure with standard threaded rod grade 12.9								
Characteristic resistance	$V_{Rk,s}$	[kN]	22	35	51	94	147	212
Partial safety factor	γ_{Ms}	[-]	1,50					

Table 14: Shear loads for steel failure without lever arm

Size			M8	M10	M12	M16	M20	M24
Steel failure with standard stainless steel threaded rod A4-70								
Characteristic resistance	$V_{Rk,s}$	[kN]	13	20	29	55	86	124
Partial safety factor	γ_{Ms}	[-]	1,56					
Steel failure with standard stainless steel threaded rod A4-80								
Characteristic resistance	$V_{Rk,s}$	[kN]	15	23	34	63	98	141
Partial safety factor	γ_{Ms}	[-]	1,33					
Steel failure with high corrosion stainless steel grade 70								
Characteristic resistance	$V_{Rk,s}$	[kN]	13	20	29	55	86	124
Partial safety factor	γ_{Ms}	[-]	1,56					

Table 15: Shear loads for steel failure with lever arm

Size			M8	M10	M12	M16	M20	M24
Steel failure with standard threaded rod grade 4.8								
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	15	30	52	133	260	449
Partial safety factor	γ_{Ms}	[-]	1,25					
Steel failure with standard threaded rod grade 5.8								
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	19	37	65	166	324	561
Partial safety factor	γ_{Ms}	[-]	1,25					
Steel failure with standard threaded rod grade 8.8								
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898
Partial safety factor	γ_{Ms}	[-]	1,25					
Steel failure with standard threaded rod grade 10.9								
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	37	75	131	333	649	1123
Partial safety factor	γ_{Ms}	[-]	1,50					
Steel failure with standard threaded rod grade 12.9								
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	45	90	157	400	779	1347
Partial safety factor	γ_{Ms}	[-]	1,50					

Table 16: Shear loads for steel failure with lever arm

Size			M8	M10	M12	M16	M20	M24
Steel failure with standard stainless steel threaded rod A4-70								
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	786
Partial safety factor	γ_{Ms}	[-]	1,56					
Steel failure with standard stainless steel threaded rod A4-80								
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	30	60	105	266	519	898
Partial safety factor	γ_{Ms}	[-]	1,33					
Steel failure with high corrosion resistant steel grade 70								
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	26	52	92	233	454	786
Partial safety factor	γ_{Ms}	[-]	1,56					

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Table 17: Concrete pry out failure and concrete edge failure

Size			M8	M10	M12	M16	M20	M24
Pry out failure								
Factor	k	[-]	2	2	2	2	2	2
Partial safety factor	γ_{Mp}	[-]	1,50					
Concrete edge failure								
Effective length of anchor under shear loading	lf	[mm]	60	70	80	100	120	145
			80	90	110	140	180	220
			95	120	145	190	240	290
Diameter of anchor	d_{nom}	[mm]	8	10	12	16	20	24
Partial safety factor	γ_{Mc}	[-]	1,50					

Table 18: Displacement under tension loads

Size			M8	M10	M12	M16	M20	M24
Characteristic displacement in non-cracked concrete C20/25 to C50/60 under tension loads								
Admissible service load*	F	[kN]	9,6	10,8	14,3	23,8	29,6	42,4
Displacement	δ_{N0}	[mm]	0,30	0,30	0,35	0,35	0,35	0,40
	$\delta_{N\infty}$	[mm]	0,85	0,85	0,85	0,85	0,85	0,85

* These values are suitable for each temperature range and categories specified in the clause 1.2

Table 19: Displacement under shear loads

Size			M8	M10	M12	M16	M20	M24
Characteristic displacement in non-cracked concrete C20/25 to C50/60 under shear loads								
Admissible service load*	F	[kN]	3,7	5,8	8,4	15,7	24,5	35,3
Displacement	δ_{V0}	[mm]	2,0	2,0	2,0	2,0	2,0	2,0
	$\delta_{V\infty}$	[mm]	3,0	3,0	3,0	3,0	3,0	3,0

* These values are suitable for each temperature range and categories specified in the clause 1.2