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Rakennustuotedirektiivin (89/106/EEC) artiklan 10,
neuvoston direktiivi 21. joulukuuta 1988, mukaisesti
notifioitu tuotehyväksyntälaitos

EOTAN JÄSEN

Eurooppalainen tekninen hyväksyntä ETA-04/0058 European Technical Approval (amendment)

Kauppanimi:

Trade name

LIEBIG wedge anchor BoA - X - A4

Hyväksynnän haltija:

Holder of approval:

Liebig International Ltd.

Killorglin, Co. Kerry

Ireland

Tuotetyyppi ja sen käyttötarkoitus:

Generic type and use of construction
product:

**KIILA-ANKKURI BETONIIN TEHTÄVIÄ
KIINNITYKSIÄ VARTEN**

**TORQUE CONTROLLED EXPANSION ANCHOR MADE
OF STAINLESS STEEL OF SIZES M8, M10, M12 AND
M16 FOR USE IN CONCRETE**

Voimassaoloaika:

Validity from/to

27. 10. 2006

21. 09. 2011

Valmistuspaikka:

Manufacturing plants:

Plant 3

Tämä hyväksyntä sisältää

This European Technical Approval
contains

sivuja/liitteitä

12 sivua sisältäen 5 liitettä

pages/annexes

12 pages including 5 annexes



Eurooppalainen tekninen hyväksyntäorganisaatio
European Organisation for Technical Approvals

This European Technical Approval replaces ETA-04/0058 with validity from 07.08.2004 to 29.10.2006

I LEGAL BASES AND GENERAL CONDITIONS

1. This European Technical Approval is issued by the Technical Research Centre of Finland (VTT) 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 the Council Directive 93/68/EEC of 22 July 1993²; and Regulation (EC) No 1882/2003 of the European Parliament and of the Council⁴;
 - Laki rakennustuotteiden hyväksynnästä (230/2003) luvut 3 ja 10, Ympäristöministeriön asetus rakennustuotteiden hyväksynnästä 3 § sekä Ympäristöministeriön 14.10.1997 antama valtuutus päätös (12/352/94);
 - Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex of Commission Decision 94/23/EC³;
 - Guideline for European Technical Approval of “Metal Anchors for use in Concrete“ ETAG 001, edition 1997, Part 1 ”Anchors in general”, and Part 2 “Torque-controlled expansion anchors”.
2. The Technical Research Centre of Finland (VTT) is authorised 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 with 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 manufacturer 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 the Technical Research Centre of Finland (VTT), in particular after information by the Commission on the basis of Article 5 (1) of the 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 the Technical Research Centre of Finland (VTT). 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 English. 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 N° L 40, 11.2.1989, p. 12

² Official Journal of the European Communities N° L 220, 30.8.1993, p. 1

³ Official Journal of the European Communities N° L 17, 20.1.1994, p. 34

⁴ Official Journal of the European Union N° L 284, 31.10.2003, p 25

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of product and intended use

1.1 Definition of product

The LIEBIG wedge anchors M8, M10, M12 and M16 are anchors made of stainless steel, which is placed into a drilled hole and anchored by torque-controlled expansion.
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. The anchor is to be used only for anchorages subject to static or quasi-static loading in reinforced or unreinforced normal weight concrete of strength classes C 20/25 at minimum and C50/60 at the most according to ENV 206: 1990-03. It may be anchored in cracked and non-cracked concrete.

The anchor may be used in structures made of concrete subject to dry internal conditions and also in structures 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).

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, 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 anchor in the range of M8 to M16 corresponds to the drawings and provisions given in Annexes 1 to 4. The characteristic material values, dimensions and tolerances of the anchor not indicated in Annexes 1 to 4 shall correspond to the respective values laid down in the technical documentations⁵ of this European Technical Approval. The characteristic anchor values for the design of anchorages are given in Annexes 4 and 5.

⁵ The technical documentation of this European Technical Approval is deposited at the Technical Research Centre of Finland (VTT) and, as far as relevant for the tasks of the approved bodies involved in the attestation of conformity procedure, is handed over to the approved bodies.

Each anchor is marked by the ETA holders identifying mark, the type of anchor B_oA, the nominal diameter corresponding to the diameter of the thread and the maximum thickness of the fixture according to Annex 1 and 3.

The anchor shall only be packaged and supplied as a complete unit.

2.2 Methods of verification

The assessment of fitness of the anchor 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 “Guideline for European Technical Approval of Metal Anchors for use in Concrete“, Part 1 “Anchors in general“, and Part 2, “Torque-controlled expansion anchors” on the basis of Option 4.

3 Evaluation of Conformity and CE marking

3.1 Attestation of conformity system

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 for 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 for 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 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 prescribed test plan⁶. The incoming raw materials shall be subject to controls and tests by the manufacturer before acceptance. Check of such as nuts, washers, wire for bolts and metal band for expansion sleeves shall include control of the inspection documents presented by suppliers (comparison with nominal values) by verifying dimension and determining material properties, e.g. tensile strength, hardness, surface finish.

⁶The prescribed test plan has been deposited at the VTT Technical Research Centre of Finland and is only made available to the approved bodies involved in the conformity attestation procedure.

The manufactured components of the anchor shall be subjected to the following tests:

- Dimensions of component parts:
conical bolt (diameters, length, thread, angle of the cone);
expansion sleeve (length, thickness, catch sizes);
hexagonal nut (well running, wrench size across flats);
washer (diameters, thickness).
- Material properties: conical bolt (tensile strength, yield limit, hardness), expansion sleeve (tensile strength, yield limit), hexagonal nut (strength), washer (hardness).
- Coating of the cone.
- Visual control of correct assemblage and of completeness of the anchor.

The frequency of controls and tests conducted during production and on the assembled anchor is laid down in the prescribed test plan taking account of the automated manufacturing process of the anchor.

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 and 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 inspection body during the continuous surveillance. On request they shall be presented to the VTT Technical Research Centre of Finland.

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

3.2.2. Tasks of approved bodies

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 VTT Technical Research Centre of Finland and the approved bodies involved.

3.2.2.2. Initial inspection of factory and of factory production control

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

3.2.2.3. Continuous surveillance

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

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

The results of product certification and continuous surveillance shall be made available on demand by the certification body or inspection body, respectively, to the VTT Technical Research Centre of Finland.

In cases where the provisions of the European Technical Approval and the prescribed test 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 anchors. The symbol “CE” shall be accompanied by the following information:

- identification number of the certification body;
- name or identifying mark of the producer and manufacturing plant;
- the 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;
- use category (ETAG 001-1 Option 4);
- size.

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

4.1 Manufacturing

The anchor is manufactured in accordance with the provisions of the European Technical Approval using the automated manufacturing process as identified during the inspection of the plant by the VTT Technical Research Centre of Finland and the approved body 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 of Metal Anchors for Use in Concrete”, Annex C, Method B, for torque controlled expansion anchors 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, in cracked or non-cracked concrete, etc.).

4.2.2. Installation of anchors

The fitness for use of the anchor can only be assumed if the anchor is installed as follows:

- Anchor 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.
- Anchor installation in accordance with the manufacturer's specifications and drawings prepared for that purpose and using the appropriate tools.
- 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 characteristic loads apply.
- Check of concrete being well compacted, e.g. without significant voids.
- Clearing the hole of drilling dust.
- 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 hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted drill hole is filled with high strength mortar and if under shear or oblique tension load it is not in the direction of load application.
- Application of the torque moment given in Annex 4 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,
- thread diameter,
- maximum thickness of the fixture,
- minimum effective anchorage depth,
- minimum hole depth,
- required torque moment,
- information on the installation procedure, including cleaning of the hole, preferably by means of an illustration,
- reference to any special installation equipment needed,
- identification of the manufacturing batch.

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

On behalf of VTT technical Research Centre of Finland

Espoo 27.10.2006

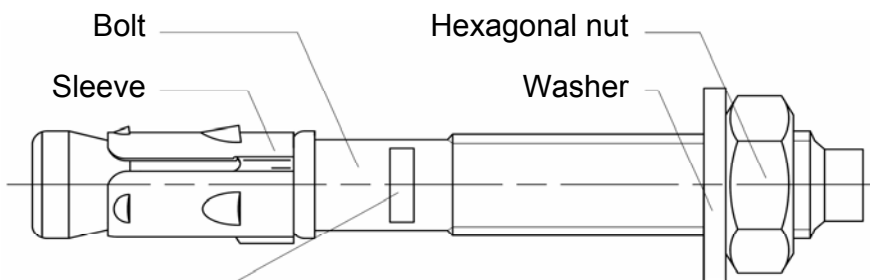



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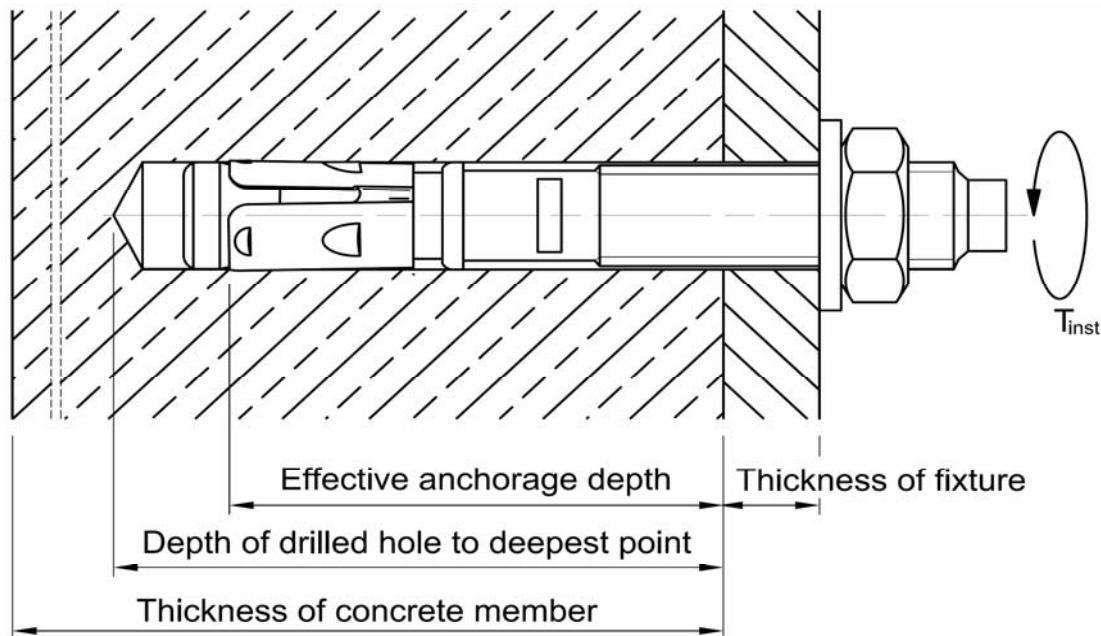
LIEBIG wedge anchor BoA - X - A4



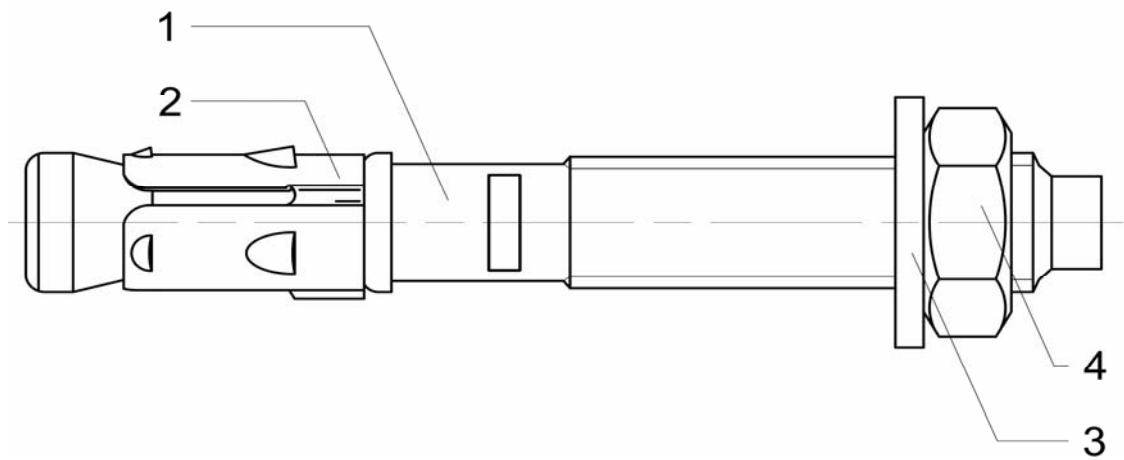
Marking: Identifying mark: 
 Anchor identity: BoA-X
 Thread size: M8 ... M16
 Max. fixture thickness: t_{fix}
 Category: A4

For example: **BoA-X 8/10 A4**

LIEBIG wedge anchor BoA - X - A4 after installation



<p>LIEBIG wedge anchor BoA - X - A4</p>	<p>Annex 1</p>
<p>Product and intended use</p>	<p>of European Technical Approval ETA - 04 / 0058</p>

LIEBIG wedge anchor BoA - X - A4**Table 1: Materials**

Part	Designation	Diameters	Material	f_{yk} [N/mm ²]	f_{uk} [N/mm ²]
1	Bolt	M8 - M16	Cold forged steel, EN 10088-3 W 1.4578	530	600
2	Sleeve ¹⁾		Stainless steel strip, EN 10088-2 W 1.4436	-	-
3	Washer		Stainless steel A4, DIN 125	-	-
4	Hexagonal Nut		Stainless steel A4, DIN 934	-	-

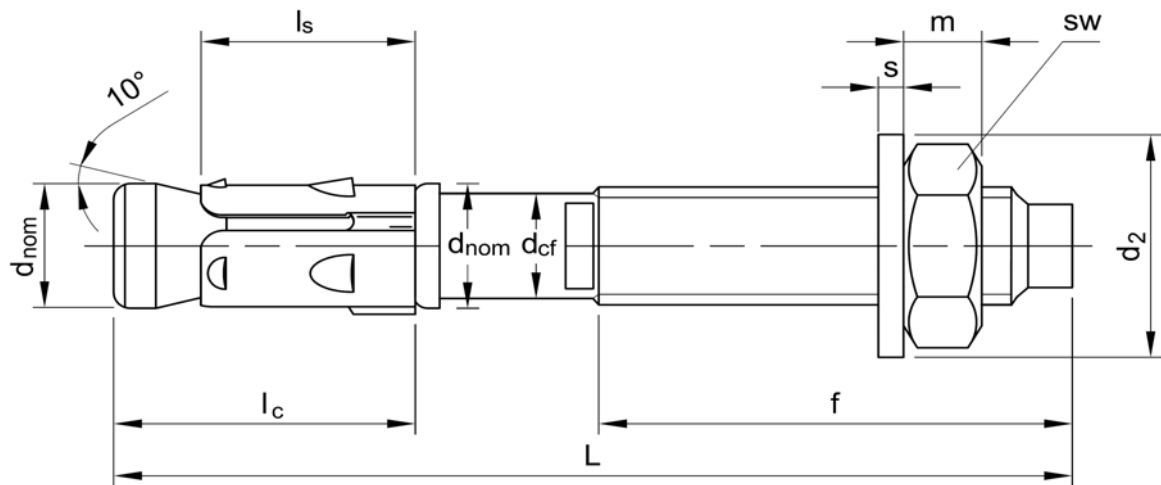
¹⁾ The sleeve is coated from inside with Teflon in appearance of paste.

LIEBIG wedge anchor BoA - X - A4

Materials

Annex 2

of European
Technical Approval
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LIEBIG wedge anchor BoA - X - A4**Table 2: Dimensions of the anchor**

Main dimensions			Stud bolt		Cone bolt		Expansion sleeve	Washer			Hexagonal nut	
Anchor type	Size	L [mm]	f [mm]	d_{cf} [mm]	d_{nom} [mm]	l_c [mm]	l_s [mm]	s [mm]	d_1 [mm]	d_2 [mm]	sw [mm]	m [mm]
BoA - X 8 / 10...215 - A4	M8	77...282	31...92	7,1	8	20,9	16,3	1,6	8,4	17,0	13,0	6,5
BoA - X 10 / 10...210 - A4	M10	82...282	34...92	8,9	10	25,7	18,3	2,0	10,5	21,0	17,0	8,0
BoA - X 12 / 5...230 - A4	M12	93...318	35...92	10,8	12	30,3	19,5	2,5	13,0	24,0	19,0	10,0
BoA - X 16 / 5...225 - A4	M16	118...338	53...92	14,6	16	38,1	26,0	3,0	17,0	30,0	24,0	13,0

LIEBIG wedge anchor BoA - X - A4

Dimensions of the anchor

Annex 3of European
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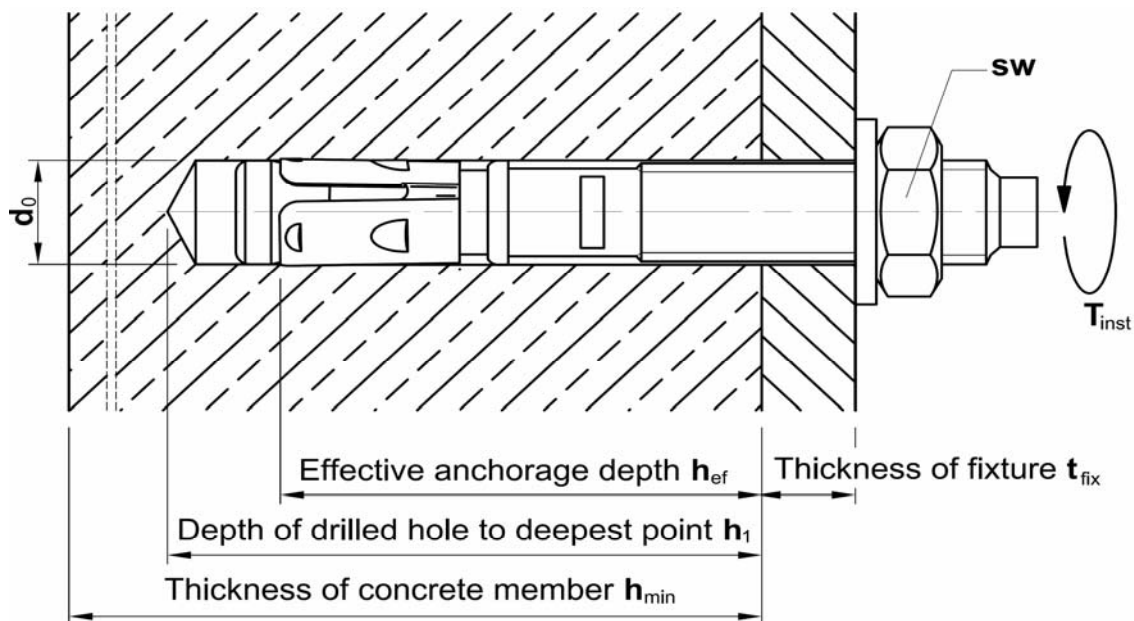


Table 3: Installation data

Liebig BoA-X - A4		Anchor type			
		BoA-X 8/10...215 A4	BoA-X 10/10...210 A4	BoA-X 12/5...230 A4	BoA-X 16/5...225 A4
Drill hole diameter	d_0 [mm]	8	10	12	16
Cutting diameter at the upper tolerance limit (maximum diameter bit)	$d_{cut,max} \leq$ [mm]	8,45	10,45	12,5	16,5
Depth of drilled hole to deepest point	$h_1 \geq$ [mm]	65	70	80	105
Effective anchorage depth	h_{ef} [mm]	50	50	60	80
Diameter of clearance hole in the fixture	$d_f \leq$ [mm]	9	12	14	18
Thickness of fixture	$t_{fix,min...max}$ [mm]	10...215	10...210	5...230	5...225
Width across flats	sw [mm]	13	17	19	24
Required torque	T_{inst} [Nm]	18	30	54	120

LIEBIG wedge anchor BoA - X - A4	Annex 4 of European Technical Approval ETA - 04 / 0058
Installation data	

Table 4 : Minimum thickness of concrete member, center spacing and edge distance

Anchor type		BoA-X 8/10...215 A4	BoA-X 10/10...210 A4	BoA-X 12 / 5...230 A4	BoA-X 16/5...225 A4
Minimum thickness of concrete member	h_{min} [mm]	100	100	120	160
Spacing	s_{cr} [mm]	250	250	300	400
Minimum spacing	s_{min} [mm]	70	120	150	185
Edge distance	c_{cr} [mm]	125	125	150	200
Minimum edge distance	c_{min} [mm]	50	55	65	95

Table 5: Characteristic values of resistance F_{Rk} and design values F_{Rd}^0 in concrete C20/25 - C50/60 and partial safety factors for material, design method B

Anchor type		BoA-X 8/10...215 A4	BoA-X 10/10...210 A4	BoA-X 12 / 5...230 A4	BoA-X 16/5...225 A4
Cracked concrete	Characteristic values F_{Rk} [kN]	5,0	7,5	12,0	16,0
	Design values F_{Rd}^0 [kN]	2,8	4,2	6,7	8,9
Non-cracked concrete	Characteristic values F_{Rk} [kN]	6,0	9,0	16,0	25,0
	Design values F_{Rd}^0 [kN]	3,3	5,0	8,9	13,9
Partial safety factors for material γ_M [-]		1,8	1,8	1,8	1,8

Table 6: Bending moments

Anchor type		BoA-X 8/10...215 A4	BoA-X 10/10...210 A4	BoA-X 12 / 5...230 A4	BoA-X 16/5...225 A4
Bending moment	Characteristic values $M_{Rk,s}^0$ [Nm]	22,5	44,8	78,6	199,8
	Design values $M_{Rd,s}^0$ [Nm]	15,0	29,9	52,4	133,2
Partial safety factors for material γ_{Ms} [-]		1,5	1,5	1,5	1,5

Table 7: Displacements at a load $F = 0,33 F_{Rk}$

Loading case	Displacement [mm]
Short - term loading	1,0
Long - term loading	1,5

LIEBIG wedge anchor BoA - X - A4Design method B :
Characteristic values of resistance, design values and displacements**Annex 5**of European
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