

Deutsches Institut für Bautechnik

Anstalt des öffentlichen Rechts

10829 Berlin, Kolonnenstraße 30 L
Tel.: +49(0)30-78730-0
Fax: +49(0)30-78730-320
e-Mail: dibt@dibt.de



DIBt

Mitglied der EOTA

European Technical Approval

ETA-05/0069

English translation prepared by DIBt – Original version in German language

Handelsbezeichnung
Trade name

fischer Ankerbolzen FAZ II
fischer Anchor Bolt FAZ II

Zulassungsinhaber
Holder of approval

fischerwerke
Artur Fischer GmbH & Co. KG
Weinhalde 14-18
72178 Waldachtal

Zulassungsgegenstand
und Verwendungszweck

Kraftkontrolliert spreizender Dübel aus galvanisch
verzinktem Stahl in den Größen M8, M10, M12 und M16
zur Verankerung im Beton

*Generic type and use
of construction product*

*Torque controlled expansion anchor made of galvanized steel of sizes
M 8, M 10, M 12 and M 16 for use in concrete*

Geltungsdauer vom
Validity from
bis
to

14. April 2005

14. April 2010

Herstellwerk
Manufacturing plant

fischer, Herstellwerk 1,
Deutschland

fischer, Herstellwerk 2,
Deutschland

Diese europäische
technische Zulassung umfasst
*This European Technical Approval
contains*

12 Seiten einschließlich 5 Anhänge
12 pages including 5 annexes



70174.05

European Organisation for Technical Approvals

Europäische Organisation für Technische Zulassungen

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, amended by the Council Directive 93/68/EEC of 22 July 1993²;
 - *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 1998*³;
 - Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex of Commission Decision 94/23/EC⁴;
 - 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 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.
- 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 Deutsches Institut für Bautechnik, 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 the Deutsches Institut für Bautechnik. 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 N° L 40, 11.02.1989, p. 12

2 Official Journal of the European Communities N° L 220, 30.08.1993, p. 1

3 *Bundesgesetzblatt I*, p. 812, zuletzt geändert durch Gesetz ('last amended by law on') vom 15.12.2001, *Bundesgesetzblatt I*, p. 3762

4 Official Journal of the European Communities N° 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

The fischer Anchor Bolt FAZ II in the range of M8, M10, M12 and M16 is an anchor made of galvanised steel which is placed into a drilled hole and anchored by torque-controlled expansion.

An illustration of the product and intended use is given in Annex 1.

1.2 Intended use

The anchor is 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 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 C20/25 at minimum and C50/60 at most according to EN 206:2000-12.

The anchor may be used in cracked and non-cracked concrete.

The anchor may only be used in structures subject to dry internal conditions.

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 corresponds to the drawings and provisions given in Annex 2. The characteristic material values, dimensions and tolerances of the anchor not given in Annex 2 shall correspond to the respective values laid down in the technical documentation⁵ of this European Technical Approval.

The characteristic values for the design of anchorages are given in Annexes 4 and 5.

Each anchor is marked with the identifying mark of the producer, the anchor type, the anchor size and the maximum thickness of fixture according to Annex 2. The Anchors with the smallest thickness of fixture have additional a colour marking or a slot on anchor head corresponding to Annex 2.

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 1.

⁵ The technical documentation of this European Technical Approval is deposited at the Deutsches Institut für Bautechnik 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.

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

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

- Dimensions of component parts:
 - cone bolt (diameter, length, angle of the cone, thread);
 - expansion sleeve (length, thickness);
 - hexagon nut (well running, wrench size across flats);
 - washer (diameter, thickness),
- Material properties:
 - cone bolt (tensile strength, yield limit, hardness);
 - expansion sleeve (tensile strength, yield limit);
 - hexagon nut (proof load);
 - washer (hardness),
- Thickness of zinc coating,
- Functional coating according to Annex 2,
- Visual control of correct assembling 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 control 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, raw 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 involved in the continuous surveillance. On request they shall be presented to the Deutsches Institut für Bautechnik.

Details of the extent, nature and frequency of testing and controls to be performed within the factory production control shall correspond to the control plan⁶ 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 Deutsches Institut für Bautechnik 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 control plan, the factory, in particular the staff and equipment, and the factory production control are suitable to ensure a continuous and orderly manufacturing of the anchor with the specifications mentioned in 2.1 as well as in the Annexes to the European Technical Approval.

3.2.2.3 Continuous surveillance

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.

Continuous surveillance and assessment of factory production control have to be performed according to the control 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 Deutsches Institut für Bautechnik.

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 anchors. The symbol "CE" shall be followed by the identification number of the certification body and shall be accompanied by the additional information:

- name or identifying mark of 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 1),
- anchor size.

⁶ The control plan is deposited at the Deutsches Institut für Bautechnik and is handed over only to the approved bodies involved in the conformity attestation procedure.

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 in the inspection of the plant by the Deutsches Institut für Bautechnik and the approved body and laid down in the technical documentation.

4.2 Installation

4.2.1 Design of anchorages

The fitness of the anchor 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 A, for torque controlled expansion anchors under the responsibility of an engineer experienced in anchorages and concrete work.

Verifiable calculation notes and drawings are 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 supports).

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 of 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 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,
- Edge distances and spacings not less than 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,
- Cleaning of the hole of drilling dust,
- Anchor installation such that the effective anchorage depth is complied with. This compliance is ensured, if the exist thickness of fixture is not greater than the maximum thickness of fixture marked on the anchor,
- Application of the torque moment given in Annex 3 using a calibrated torque wrench.

4.2.3 Responsibility of the manufacturer

The manufacturer is responsible to ensure that the information on the specific conditions according to 1 and 2 including Annexes referred to and 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:

- Diameter of drill bit,
- Thread diameter,
- Maximum thickness of the fixture,
- Minimum effective anchorage depth,
- Minimum hole depth,
- 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.

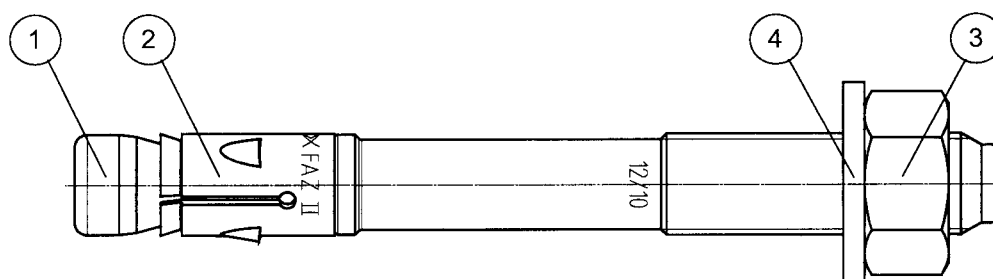
All data shall be presented in a clear and explicit form.

Dipl.-Ing. Jasch

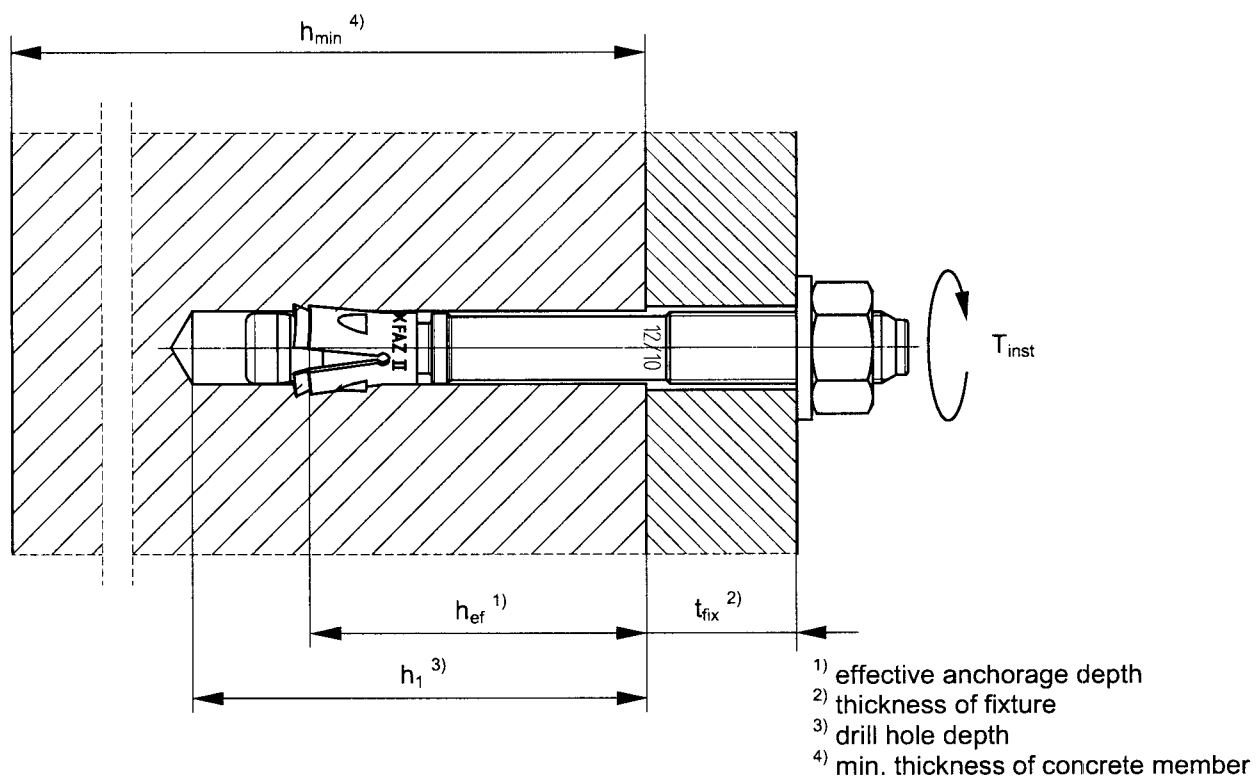
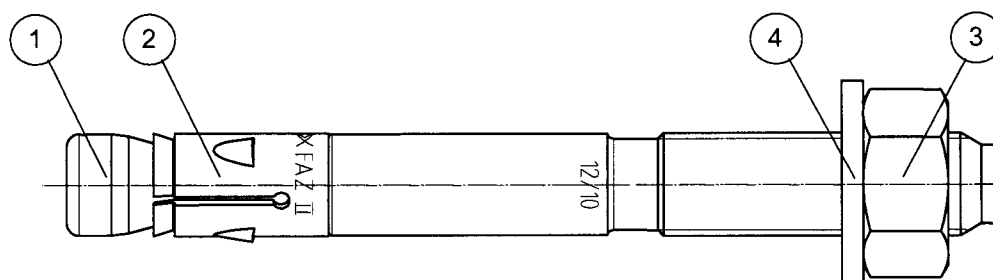
Beglaubigt:

Lange

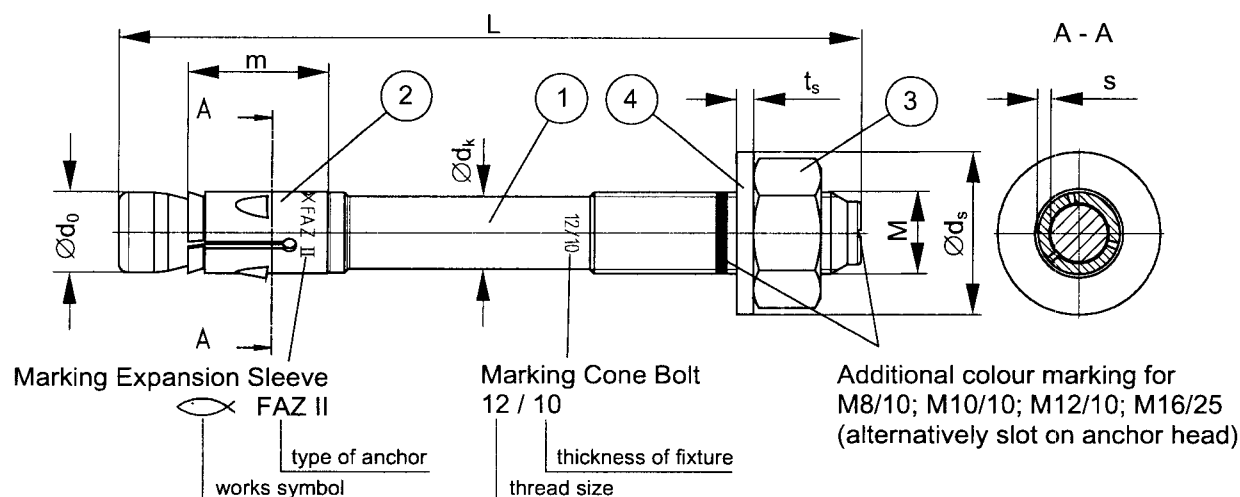
Cone bolt manufactured by cold - forming:



Cone bolt manufactured by metal - cutting:



- ① Cone bolt (cold – formed or metal - cut)
- ② Expansion sleeve
- ③ Hexagon nut
- ④ Washer

**Table 1: Anchor dimensions [mm]**

Part	Designation		FAZ II M8	FAZ II M10	FAZ II M12	FAZ II M16
1	Cone bolt	M	M8	M10	M12	M16
		$\varnothing d_0 =$	7,8	9,8	11,8	15,7
		$\varnothing d_k =$	7,1	8,9	10,7	14,5
2	Expansion sleeve	m =	17,8	20,0	20,6	27,5
		s =	1,3	1,4	1,6	2,4
3	Hexagon nut	SW	13	17	19	24
4	Washer	$t_s \geq$	1,4	1,8	2,3	2,7
		$\varnothing d_s \geq$	15	19	23	29
	$t_{fix}^{1)}$	min $\geq$	0	0	0	0
		max $\leq$	200	250	300	400
	Length of anchor	L_{min}	67	85	100	125
		L_{max}	267	335	400	525

¹⁾ t_{fix} = thickness of fixture

Table 2: Materials

Part	Designation	Material	Treatment
1	Cone bolt	Cold form steel or free cutting steel	Zinc plated $\geq 5 \mu\text{m}$ according to EN ISO 4042, + functional coating
2	Expansion sleeve	Cold strip, EN 10139	Zinc plated $\geq 5 \mu\text{m}$ according to EN ISO 4042
3	Hexagon nut	Steel, property class 8, EN 20 898 - 2	Zinc plated $\geq 5 \mu\text{m}$ according to EN ISO 4042, + functional coating ¹⁾
4	Washer	Cold strip, EN 10139	

¹⁾ Functional coating on hexagon nuts M8 and M10 and on washers for M12 and M16.

fischer Anchor bolt FAZ II

Anchor dimensions and materials

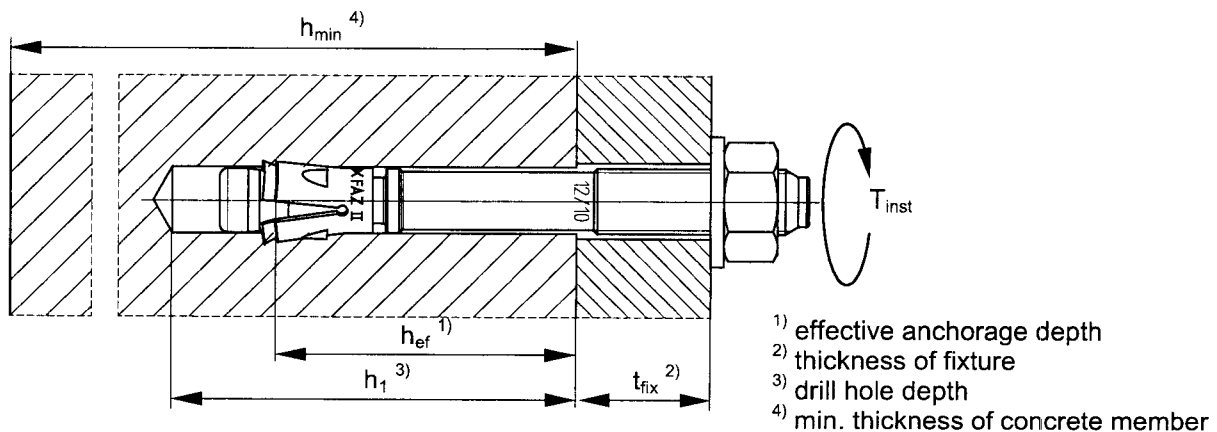
Annex 2

of European
Technical Approval

ETA - 05/0069

Table 3: Installation parameters

Type of anchor / size		FAZ II M8	FAZ II M10	FAZ II M12	FAZ II M16
Nominal drill hole diameter	$d_0 = [\text{mm}]$	8	10	12	16
Cutting diameter of drill bit	$d_{\text{cut}} \leq [\text{mm}]$	8,45	10,45	12,5	16,5
Depth of drill hole in concrete	$h_1 \geq [\text{mm}]$	55	75	90	110
Diameter of clearance hole in the fixture	$d_f \leq [\text{mm}]$	9	12	14	18
Required torque moment	$T_{\text{inst}} = [\text{Nm}]$	20	45	60	110

**Table 4:** Minimum thickness of concrete members, minimum spacing and minimum edge distances of anchors

Type of anchor / size		FAZ II M8	FAZ II M10	FAZ II M12	FAZ II M16	
Applications with concrete members of thickness $\geq 2 \times h_{ef}$	Minimum thickness of concrete member	$h_{min, 1}$ [mm]	100	120	140	170
	Non – cracked concrete					
	Minimum spacing	s_{min} [mm]	40	40	50	60
		for $c \geq$ [mm]	50	60	70	95
	Minimum edge distance	c_{min} [mm]	40	45	55	65
		for $s \geq$ [mm]	100	80	110	150
	Cracked concrete					
	Minimum spacing	s_{min} [mm]	35	40	45	60
		for $c \geq$ [mm]	50	55	70	95
	Minimum edge distance	c_{min} [mm]	40	45	55	65
for $s \geq$ [mm]		70	80	110	150	
Applications with concrete members of thickness $< 2 \times h_{ef}$	Minimum thickness of concrete member	$h_{min, 2}$ [mm]	80	100	120	140
	Cracked and non - cracked concrete					
	Minimum spacing	s_{min} [mm]	35	40	50	80
		for $c \geq$ [mm]	70	100	90	130
	Minimum edge distance	c_{min} [mm]	40	60	60	65
		for $s \geq$ [mm]	100	90	120	180

Intermediate values for s_{min} and c_{min} inside of the same thickness of concrete member by linear interpolation.

fischer Anchor bolt FAZ II

Parameters of installation

Annex 3of European
Technical Approval**ETA - 05/0069**

Table 5: Design method A - characteristic values for tension loads

			FAZ II M 8	FAZ II M 10	FAZ II M 12	FAZ II M 16
Steel failure						
Characteristic resistance	$N_{Rk,s}$	[kN]	16,0	27,0	41,5	66,0
Partial safety factor	γ_{Ms}	¹⁾	1,5	1,5	1,5	1,5
Pullout failure						
Characteristic resistance in cracked concrete	$N_{Rk,p}$	[kN] C20/25	5	9	16	- ²⁾
Characteristic resistance in non - cracked concrete	$N_{Rk,p}$	[kN] C20/25	9	16	25	
Increasing factors for $N_{Rk,p}$ for cracked and non - cracked concrete	ψ_c	C25/30	1,10			
		C30/37	1,22			
		C35/45	1,34			
		C40/50	1,41			
		C45/55	1,48			
		C50/60	1,55			
Partial safety factor	γ_{Mp}	¹⁾	1,5 ²⁾			
Concrete cone and splitting failure for applications with concrete members of thickness $\geq 2 \times h_{ef}$						
Effective anchorage depth	h_{ef}	[mm]	45	60	70	85
Min. thickness of concrete member	$h_{min, 1}$	[mm]	100	120	140	170
Spacing	$s_{cr,N} = s_{cr,sp}$	[mm]	140	180	210	260
Edge distance	$c_{cr,N} = c_{cr,sp}$	[mm]	70	90	105	130
Partial safety factor	γ_{Mc}	¹⁾	1,5 ³⁾			
Concrete cone and splitting failure for applications with concrete members of thickness $< 2 \times h_{ef}$						
Effective anchorage depth	h_{ef}	[mm]	45	60	70	85
Min. thickness of concrete member	$h_{min, 2}$	[mm]	80	100	120	140
Spacing	$s_{cr,N}$	[mm]	140	180	210	260
Edge distance	$c_{cr,N}$	[mm]	70	90	105	130
Spacing (splitting failure) ⁴⁾	$s_{cr,sp}$	[mm]	180	240	280	340
Edge distance (splitting failure) ⁴⁾	$c_{cr,sp}$	[mm]	90	120	140	170
Partial safety factor	γ_{Mc}	¹⁾	1,5 ³⁾			

¹⁾ In absence of other national regulations.²⁾ Pullout failure not relevant.³⁾ The partial safety factor $\gamma_2 = 1,0$ is included.⁴⁾ Intermediate values for $s_{cr,sp}$ and $c_{cr,sp}$ between concrete thickness $h_{min, 2}$ and $h_{min, 1}$ by linear interpolation.**Table 6:** Displacements due to tension loads

			FAZ II M 8	FAZ II M 10	FAZ II M 12	FAZ II M 16
Tension load in cracked concrete	N	[kN]	2,3	4,2	7,5	13,2
Displacement	δ_{N0}	[mm]	0,5	0,5	0,7	1,0
	$\delta_{N\infty}$	[mm]	1,2			
Tension load in non - cracked concrete	N	[kN]	4,2	7,5	11,7	18,7
Displacement	δ_{N0}	[mm]	0,3	0,3	0,5	0,7
	$\delta_{N\infty}$	[mm]	1,2			

fischer Anchor bolt FAZ II

Design method A,
characteristic values for tension loads, displacements**Annex 4**of European
Technical Approval**ETA - 05/0069**

Table 7: Design method A - characteristic values for shear loads

			FAZ II M 8	FAZ II M 10	FAZ II M 12	FAZ II M 16
Steel failure without lever arm						
Characteristic resistance	$V_{Rk,s}$	[kN]	17,5	28,0	41,0	71,5
Partial safety factor	γ_{Ms}	¹⁾	1,25			
Steel failure with lever arm						
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	26	58	92	233
Partial safety factor	γ_{Ms}	¹⁾	1,25			
Concrete pryout failure						
Factor in equation (5.6) of ETAG Annex C, 5.2.3.3	k		2,0	2,2	2,4	2,8
Partial safety factor	γ_{Mc}	¹⁾	1,5 ²⁾			
Concrete edge failure						
Effective length of anchor in shear loading	l_f	[mm]	45	60	70	85
Effective diameter of anchor	d_{nom}	[mm]	8	10	12	16
Partial safety factor	γ_{Mc}	¹⁾	1,5 ²⁾			

¹⁾ In absence of other national regulations²⁾ The partial safety factor $\gamma_2 = 1,0$ is included.**Table 8:** Displacements due to shear loads

			FAZ II M 8	FAZ II M 10	FAZ II M 12	FAZ II M 16
Shear load in cracked and non - cracked concrete	V	[kN]	9,9	15,7	23,1	40,3
Displacement	δ_{V0}	[mm]	1,7	2,1	2,3	2,7
	$\delta_{V\infty}$	[mm]	2,5	3,1	3,4	4,0

fischer Anchor bolt FAZ II

Design method A,
characteristic values for shear loads, displacements**Annex 5**of European
Technical Approval**ETA - 05/0069**