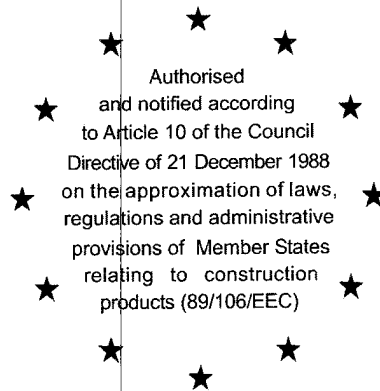


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European Technical Approval ETA-06/0271

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung
Trade name

fischer Zykon-Einschlaganker FZEA II
fischer Zykon-Hammerset anchor FZEA II

Zulassungsinhaber
Holder of approval

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

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

Hinterschnittdübel in den Größen M8, M10 und M12 zur
Verankerung im Beton
Undercut anchor of sizes M8, M10 and M12 for use in concrete

Geltungsdauer: vom
Validity: from
bis
to

5 January 2007
5 January 2012

Herstellwerk
Manufacturing plant

fischerwerke

Diese Zulassung umfasst
This Approval contains

15 Seiten einschließlich 7 Anhänge
15 pages including 7 annexes



Europäische Organisation für Technische Zulassungen
European Organisation for Technical Approvals

I LEGAL BASES AND GENERAL CONDITIONS

- 1 This European technical approval is issued by Deutsches Institut für Bautechnik in accordance with:
 - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products¹, modified by Council Directive 93/68/EEC² and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council³;
 - Gesetz über das In-Verkehr-Bringen von und den freien Warenverkehr mit Bauprodukten zur Umsetzung der Richtlinie 89/106/EWG des Rates vom 21. Dezember 1988 zur Angleichung der Rechts- und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte und anderer Rechtsakte der Europäischen Gemeinschaften (Bauproduktengesetz - BauPG) vom 28. April 1998⁴, zuletzt geändert durch Gesetz vom 06.01.2004⁵;
 - Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC⁶;
 - Guideline for European technical approval of "Metal anchors for use in concrete - Part 3: Undercut anchors", ETAG 001-03.
- 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 pursuant to information by the Commission according to 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 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 fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

1 Official Journal of the European Communities L 40, 11.02.1989, p. 12
2 Official Journal of the European Communities L 220, 30.08.1993, p. 1
3 Official Journal of the European Union L 284, 31.10.2003, p. 25
4 Bundesgesetzblatt I, p. 812
5 Bundesgesetzblatt I, p.2, 15
6 Official Journal of the European Communities L 17, 20.01.1994, p. 34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of the construction product and intended use

1.1 Definition of the product

The fischer Zykon-Hammerset anchor FZEA II is an undercut anchor made of galvanised steel (FZEA II) or stainless steel 1.4401, 1.4404 or 1.4571 (FZEA II A4) or high corrosion resistant steel 1.4529 (FZEA II C) of sizes M8, M10 and M12 which is placed in an undercut hole and anchored by mechanical interlock with displacement-controlled installation.

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 may be used for anchorages with requirements related to resistance to fire.

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 provisions made in this European technical approval are based on an assumed 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.

Galvanised steel (FZEA II):

The anchor made of galvanised steel may only be used in structures subject to dry internal conditions.

Stainless steel 1.4401, 1.4404, 1.4571 (FZEA II A4):

The anchor made of stainless steel may be used in structures 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).

High corrosion resistant steel 1.4529 (FZEA II C):

The anchor made of high corrosion resistant steel 1.4529 may be used in structures subject to dry internal conditions and also in structures subject to external atmospheric 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).

2 Characteristics of the product and methods of verification

2.1 Characteristics of the product

The anchor corresponds to the drawings and provisions given in Annexes 2 and 3. The characteristic material values, dimensions and tolerances of the anchor not given in Annexes 2 and 3 shall correspond to the respective values laid down in the technical documentation⁷ of this European technical approval.

Regarding the requirements concerning safety in case of fire it is assumed that the anchor meets the requirements of class A1 in relation to reaction to fire in accordance with the stipulations of the Commission decision 96/603/EC, amended by 2000/605/EC.

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

The characteristic values for the design of anchorages regarding resistance to fire are given in Annexes 6 and 7. They are valid for use in a system that is required to provide a specific fire resistance class.

Each anchor is marked with the identifying mark of the producer, the commercial name and the anchor size according to Annex 2. In addition, each anchor made of stainless steel 1.4401, 1.4404 or 1.4571 is marked with the letters "A4" and each anchor made of high corrosion resistant steel 1.4529 is marked with the letter "C".

The anchor shall only be 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 3 "Undercut anchors", on the basis of Option 1.

The assessment of the anchor for the intended use in relation to the requirements for resistance to fire has been made in accordance with the Technical Report TR 020 "Evaluation of anchorages in concrete concerning resistance to fire".

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 and attestation of conformity and CE marking

3.1 System of attestation of conformity

According to the decision 96/582/EG of the European Commission⁸ the system 2(i) (referred to as system 1) of attestation of conformity applies.

This system of attestation of conformity is defined as follows:

⁷ 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.

⁸ Official Journal of the European Communities L 254 of 08.10.1996.

System 1: Certification of the conformity of the product by an approved certification body on the basis of:

(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.

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

3.2 Responsibilities

3.2.1 Tasks for the manufacturer

3.2.1.1 Factory production control

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

The manufacturer may only use initial/raw/constituent materials stated in the technical documentation of this European technical approval.

The factory production control shall be in accordance with the control plan of December 2006 which is part of the technical documentation of this European technical approval. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited with Deutsches Institut für Bautechnik.⁹

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

3.2.1.2 Other tasks for the manufacturer

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

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

3.2.2 Tasks for the approved bodies

The approved body shall perform the

- initial type-testing of the product,
- initial inspection of factory and of factory production control,
- continuous surveillance, assessment and approval of factory production control,

in accordance with the provisions laid down in the control plan.

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

⁹ The control plan is a confidential part of the European technical approval and only handed over to the approved body involved in the procedure of attestation of conformity. See section 3.2.2.

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

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

3.3 CE marking

The CE marking shall be affixed on each packaging of the anchor. The letters "CE" shall be followed by the identification number of the approved certification body, where relevant, and be accompanied by the following additional information:

- the name and address of the holder of the approval (legal entity responsible for the manufacturer),
- the last two digits of the year in which the CE marking was affixed,
- the number of the EC certificate of conformity for the product,
- the number of the European technical approval,
- the number of the guideline for European technical approval,
- use category (ETAG 001-1 Option 1),
- size.

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

4.1 Manufacturing

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

4.2 Installation

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, 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).

The design of anchorages under fire exposure has to consider the conditions given in the Technical Report TR 020 "Evaluation of anchorages in concrete concerning resistance to fire". The relevant characteristic anchor values are given in Annexes 6 and 7. The design method covers anchors with a fire attack from one side only. If the fire attack is from more than one side, the design method may be taken only, if the edge distance of the anchor is $c \geq 300$ mm.

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 including drilling of the hole 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,
- Drilling the hole with the universal drill FZUB which is shown in Annex 3 until the collar of the drill reaches the concrete surface; making the undercut by circular swinging of the hammer drill with activated impact,
- 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 when the anchor does no more exceed the concrete surface,
- Anchor expansion by impact on the cone using the setting tools given in Annex 3. The anchor is properly set if the stop of the pin reaches the expansion sleeve, and the impression of the setting tool is visible as illustrated in Annex 3;
- The fastening screw or threaded rod shall comply with the requirements given in Annex 2.
- The installation torque for fixing the attachment shall comply with the values given in Annex 3.

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).

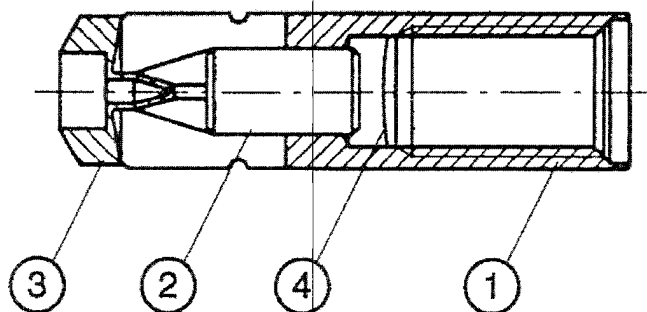
The minimum data required are:

- Special universal drill bit FZUB,
- Thread diameter,
- Minimum/Maximum screw-in depth of the fastening screw or threaded rod,
- Minimum effective anchorage depth,
- Minimum hole depth,
- Maximum installation torque,
- 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.

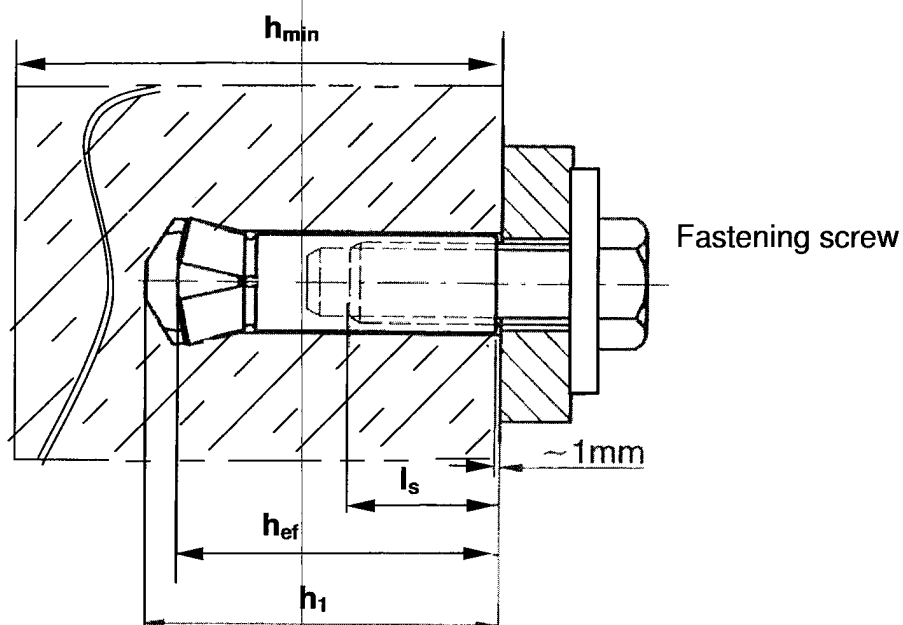
All data shall be presented in a clear and explicit form.

Dipl.-Ing. E. Jasch
President of Deutsches Institut für Bautechnik
Berlin, 5 January 2007

beglaubigt:
Lange



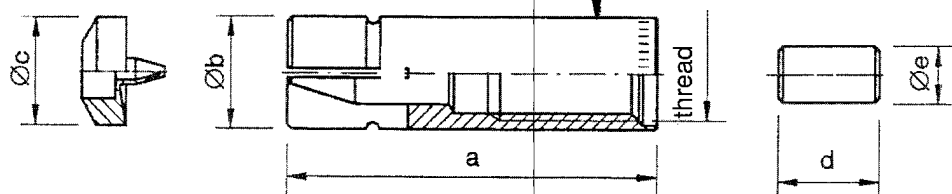
- ① Expansion sleeve
- ② Expansion pin
- ③ Distance part
- ④ Safety disk



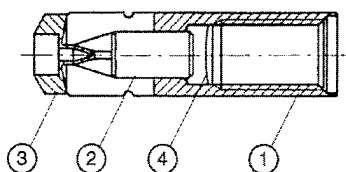
- h_{ef} : Anchorage depth
- l_s : Screw-in depth
- h_1 : Drill hole depth
- h_{min} : minimal member thickness

Marking e.g.:

-  FZEA II 12x40 (galvanised steel)
 FZEA II 12x40 A4 (stainless steel)
 FZEA II 12x40 C (high corrosion resistant steel)

**Table 1: Dimensions [mm]**

Anchor type	thread	a [mm]	Øb [mm]	Øc [mm]	d [mm]	Øe [mm]
FZEA II 10 x 40 M8	M8	39	10	9,5	11	6,5
FZEA II 12 x 40 M10	M10		12	11,5		7,0
FZEA II 14 x 40 M12	M12		14	13,5		9,5

**Table 2: Materials**

Part No.	Designation	Material		
		galvanised steel ($\geq 5 \mu\text{m}$)	stainless steel A4 1.4401, 1.4404, 1.4571	high corrosion resistant steel C 1.4529
1	Expansion sleeve	steel, EN 10277 A2G EN ISO 4042	steel, EN 10088	steel, EN 10088
2	Expansion pin	steel, EN 10277 A2G EN ISO 4042 functional coating	steel, EN 10088 functional coating	steel, EN 10088 functional coating
3	Distance part	plastic		
4	Safety disk	foil		
Requirements for the fastening screw / threaded rod ¹⁾		galvanised steel ($\geq 5 \mu\text{m}$) minimum strength class 5.6	stainless steel A4 1.4401, 1.4404, 1.4571 minimum strength class A 50	high corrosion resistant steel C 1.4529 minimum strength class A 50

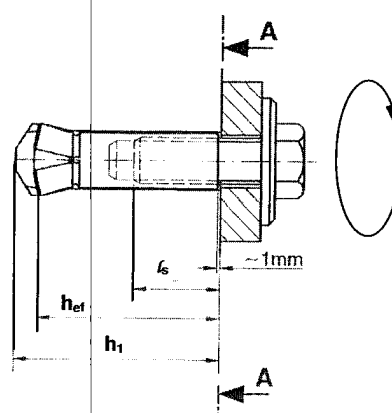
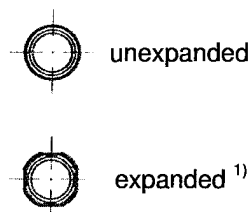
¹⁾ The length of the fastening screw shall be determined depending on the thickness of the fixture t_{fix} , admissible tolerances, existing thread length (=maximum screwing depth) and minimum screwing depth (according to Table 3)

fischer Zykon-Hammerset anchor FZEA II

Designations, Materials, Dimensions

Annex 2of European
technical approval**ETA - 06/0271**

Description installation
control plan view A-A



h_{ef} : anchorage depth
 l_s : screw-in depth
 h_1 : drill hole depth

T_{max}

¹⁾ By setting the anchor with the machine setting tool stop the rotation, otherwise a round flange is formed instead of the notch

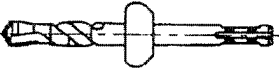
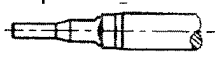
Anchor type	FZEA II 10x40M8	FZEA II 12x40M10	FZEA II 14x40M12
Installation tools			
Universal drill 	FZUB 10x40	FZUB 12x40	FZUB 14x40
Impact thorn 	FZED 10x40	FZED 12x40	FZED 14x40
Machine setting tool ¹⁾ 	FZEM 10x40	FZEM 12x40	FZEM 14x40

Table 3: Installation and anchor parameters

Anchor type	Drill hole depth $t^{2)}$ [mm]	Anchorage depth h_{ef} [mm]	Fastening screw or threaded rod			
			Installation torque T_{inst} [Nm]		Screw-in depth l_s [mm]	
			galvanised steel	stainless steel A4,C	max	min
FZEA II 10 x 40 M8	43	40	< 10	< 15	17	11
FZEA II 12 x 40 M10	43	40	< 15	< 20	19	13
FZEA II 14 x 40 M12	43	40	< 20	< 40	21	15

²⁾ Depends on the abrasion of the stopper of the universal drill, gets deeper with longer lifetime

Table 4: Minimal member thickness and minimal edge- and spacing distance

Anchor type and size		FZEA II 10x40 M8	FZEA II 12x40 M10	FZEA II 14x40 M12
Minimal member thickness	h_{min} [mm]	80	80	80
Minimal spacing distance	s_{min} [mm]	40	45	50
Minimal edge distance	c_{min} [mm]	40	45	50

fischer Zykon-Hammerset anchor FZEA II

Installation characteristics and installation tools

Annex 3

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Table 5: Design method A - Characteristic values to tension loads

FZEA II		FZEA II 10x40 M8	FZEA II 12x40 M10	FZEA II 14x40 M12
Steel failure				
Characteristic resistance galvanised steel	N _{Rk} [kN]	9,60	17,00	19,70
Characteristic resistance stainless steel A4,C	N _{Rk} [kN]	12,20	21,60	25,00
Partial safety factor	γ _{Ms} ²⁾	2,2 ³⁾ / 1,5		
Pullout failure				
Characteristic resistance in cracked concrete	N _{Rk,p} [kN] C20/25	4	7,5	9
Characteristic resistance in non-cracked concrete	N _{Rk,p} [kN] C20/25	9	9	9
Increasing factors for N _{Rk,p} for cracked and non-cracked concrete	ψ _c	C30/37	1,22	
		C40/50	1,41	
		C50/60	1,55	
Partial safety factor	γ _{Mp} ²⁾	1,8 ¹⁾		
Concrete cone failure				
Effective anchorage depth	h _{ef} [mm]	40	40	40
Minimal member thickness	h _{min} [mm]	80	80	80
Spacing	s _{cr,N} [mm]	120	120	120
Edge distance	c _{cr,N} [mm]	60	60	60
Spacing (splitting)	s _{cr,sp} [mm]	170	170	170
Edge distance (splitting)	c _{cr,sp} [mm]	85	85	85
Partial safety factor	γ _{Mp} ²⁾	1,8 ¹⁾		

¹⁾ Including partial safety factor $\gamma_2 = 1,2$

²⁾ If there are no other national requirements

³⁾ $\gamma_{Ms} = 2,2$ for screws strength class A 50, otherwise $\gamma_{Ms} = 1,5$

Table 6: Displacements of anchors due to tension load

FZEA II		FZEA II 10x40 M8	FZEA II 12x40 M10	FZEA II 14x40 M12
Tension load in cracked concrete	[kN]	1,56	2,93	3,50
Displacement	δ_{N0} [mm]	1,30		
	$\delta_{N\infty}$ [mm]	1,40		
Tension load in non-cracked concrete	[kN]	3,52		
Displacement	δ_{N0} [mm]	1,30		
	$\delta_{N\infty}$ [mm]	1,40		

fischer Zykon-Hammerset anchor FZEA II

Design method A
Characteristic values to tension loads
Displacements

Annex 4

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Table 7: Design method A - Characteristic values to shear loads

FZEA II		FZEA II 10x40 M8	FZEA II 12x40 M10	FZEA II 14x40 M12
Steel failure without lever arm				
Characteristic resistance galvanised steel	$V_{Rk,s}$ [kN]	8,30	13,60	19,10
Partial safety factor galvanised steel	$\gamma_{Ms}^{1)}$	1,6 ⁴⁾ / 1,25		
Characteristic resistance stainless steel A4, C	$V_{Rk,s}$ [kN]	10,00	15,00	20,60
Partial safety factor stainless steel A4, C	$\gamma_{Ms}^{1)}$	2,6 ⁵⁾ / 1,25		
Steel failure with lever arm				
Characteristic resistance galvanised steel ³⁾	$M_{Rk,s}^0$ [Nm]	15	23	31
Partial safety factor galvanised steel	γ_{Ms}	1,4 ⁴⁾ / 1,25		
Characteristic resistance stainless steel A4, C ³⁾	$M_{Rk,s}^0$ [Nm]	19	29	39
Partial safety factor stainless steel A4, C	γ_{Ms}	2,5 ⁵⁾ / 1,25		
Concrete pryout failure				
Factor in equation (5.6) of ETAG 001 Annex C, 5.2.3.3	k	1,3		
Partial safety factor	$\gamma_{Mc}^{1)}$	1,5 ²⁾		
Concrete edge failure				
Effective length of anchor for shear loading	ℓ_t [mm]	40	40	40
Effective diameter of anchor	d_{nom} [mm]	10	12	14
Partial safety factor	$\gamma_{Mc}^{1)}$	1,5 ²⁾		

¹⁾ If there are no other national requirements

²⁾ Including partial safety factor $\gamma_2 = 1,0$

³⁾ Thread diameter of the anchor decisive

⁴⁾ Decisive for the screw respectively thread strength class 5.6, otherwise $\gamma_{Ms} = 1,25$

⁵⁾ Decisive for the screw respectively thread strength class A50, otherwise $\gamma_{Ms} = 1,25$

Table 8: Displacements of anchors due to shear load

FZEA II		FZEA II 10x40 M8	FZEA II 12x40 M10	FZEA II 14x40 M12
Shear load in cracked an non-cracked concrete, galvanised steel	V [kN]	4,70	7,60	10,70
Displacement	δ_{V0} [mm]	1,3	1,8	2,0
	$\delta_{V\infty}$ [mm]	1,9	2,6	3,0
Shear load in cracked an non-cracked concrete, stainless steel A4, C	V [kN]	5,60	8,40	11,60
Displacement	δ_{V0} [mm]	1,8	2,0	2,0
	$\delta_{V\infty}$ [mm]	2,7	3,0	3,0

fischer Zykon-Hammerset anchor FZEA II

Design method A
Characteristic values to shear loads
Displacements

Annex 5

of European
technical approval

ETA - 06/0271

Table 9: Characteristic values to tension loads under fire exposure in cracked and non-cracked concrete C20/25 to C50/60

FZEA II gvz, A4 and C	FZEA II 10x40 M8				FZEA II 12x40 M10				FZEA II 14x40 M12					
Fire resistance duration	R... [min]	30	60	90	120	30	60	90	120	30	60	90	120	
Steel failure:														
Characteristic resistance	N _{Rk,s,fi} [kN]	1,1	0,9	0,8	0,7	3,2	2,4	1,6	1,2	4,7	3,5	2,3	1,8	
Pullout failure:														
Characteristic resistance in concrete C20/25 to C50/60	N _{Rk,p,fi} [kN]	1,0				1,9				1,5				1,8
Concrete cone failure:														
Characteristic resistance in concrete C20/25 to C50/60	N _{Rk,c,fi} [kN]	1,8				1,5				1,8				1,5
Spacing		4 x h _{ef}												
S _{min} [mm]		40				45				50				
Edge Distance		2 x h _{ef}												
C _{min} [mm]		40				45				50				
		If fire attack is from more than one side, the edge distance of the anchor has to be bigger than 300 mm.												

In absence of other national regulations the partial safety factor for resistance under fire exposure $\gamma_{M,fi} = 1,0$ is recommended.

Table 10: Characteristic values to shear loads under fire exposure in cracked and non-cracked concrete C20/25 to C50/60

FZEA II gvz, A4 and C	FZEA II 10x40 M8				FZEA II 12x40 M10				FZEA II 14x40 M12			
Fire resistance duration R... [min]	30	60	90	120	30	60	90	120	30	60	90	120
Steel failure without lever arm:												
Characteristic resistance $V_{Rk,s,fi}$ [kN]	0,9	0,8	0,7	0,6	2,3	1,7	1,1	0,9	2,8	2,1	1,4	1,0
Steel failure with lever arm:												
Characteristic resistance $M^0_{Rk,s,fi}$ [kN]	1,1	0,9	0,8	0,7	4,1	3,1	2,1	1,5	7,3	5,4	3,6	2,7
Concrete pryout failure:												
In Equation (5.6) of ETAG 001, Annex C, 5.2.2.3 the k-factor of Table 7 and the relevant values of $N^0_{Rk,c,fi}$ of Table 9 have to be considered												
Concrete edge failure:												
The initial value $V^0_{Rk,c,fi}$ of the characteristic resistance in concrete C20/25 to C50/60 under fire exposure may be determined by: $V^0_{Rk,c,fi} = 0,25 \times V^0_{Rk,c}$ (R30, R 60, R90) $V^0_{Rk,c,fi} = 0,20 \times V^0_{Rk,c}$ (R120) with $V^0_{Rk,c}$ initial value of the characteristic resistance in cracked concrete C20/25 under normal temperature.												

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Characteristic values to shear loads under fire exposure

Annex 7

of European
technical approval

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