

DECLARATION OF PERFORMANCE

DoP 0259

for fischer Zykon-Hammerset Anchor FZEA II (Mechanical fastener for use in concrete)

EN

1. Unique identification code of the product-type: DoP 0259
2. Intended use/es: Post-installed fastening in cracked or uncracked concrete, see appendix, especially annexes B1 - B3.
3. Manufacturer: fischerwerke GmbH & Co. KG, Klaus-Fischer-Str. 1, 72178 Waldachtal, Germany
4. Authorised representative: -
5. System/s of AVCP: 1
6. European Assessment Document: ETAG 001 Part 3, April 2013, used as EAD
European Technical Assessment: ETA-06/0271; 2016-11-30
Technical Assessment Body: DIBt- Deutsches Institut für Bautechnik
Notified body/ies: 2873 TU Darmstadt
7. Declared performance/s:
Mechanical resistance and stability (BWR 1)
Characteristic resistance to tension load (static and quasi-static loading):
Resistance to steel failure: Annex C1 $E_s = 210\,000\text{ MPa}$
Resistance to pull- out failure: Annex C1
Resistance to concrete cone failure: Annex C1
Robustness: Annex C1
Minimum edge distance and spacing: Annexes B2, B3
Edge distance to prevent splitting under load: Annex C1 $N_{Rk,sp}^0 = \text{NPD}$

Characteristic resistance to shear load (static and quasi-static loading):
Resistance to steel failure (shear load): Annex C2
Resistance to pry-out failure: Annex C2
Resistance to concrete edge failure: Annex C2
Displacements under static and quasi-static loading: Annex C4
Durability: Annexes A2, B1

Characteristic resistance and displacements for seismic performance categories C1 and C2:
Resistance to steel failure: NPD
Resistance to pull-out failure: NPD
Fracture elongation: NPD
Factor annular gap: NPD
Displacements: NPD

Safety in case of fire (BWR 2)
Reaction to fire: Class (A1)

Resistance to fire:
Fire resistance to steel failure (tension load): Annex C3
Fire resistance to pull-out failure (tension load): Annex C3
Fire resistance to steel failure (shear load): Annex C3
8. Appropriate Technical Documentation and/or Specific Technical Documentation: -

The performance of the product identified above is in conformity with the set of declared performance/s. This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

Signed for and on behalf of the manufacturer by:



Dr.-Ing. Oliver Geibig, Managing Director Business Units & Engineering
Tumlingen, 2021-01-11

Jürgen Grün, Managing Director Chemistry & Quality

This DoP has been prepared in different languages. In case there is a dispute on the interpretation the English version shall always prevail.

The Appendix includes voluntary and complementary information in English language exceeding the (language-neutrally specified) legal requirements.

Specific Part

1 Technical description of the product

The fischer Zykon-Hammerset anchor FZEA II is an anchor made of galvanised or stainless or high corrosion resistant steel which is placed in an undercut hole and anchored by mechanical interlock with displacement-controlled installation.

The product description is given in Annex A.

2 Specification of the intended use in accordance with the applicable European Assessment Document

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the anchor of at least 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.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance for static and quasi static action	See Annex C 1 to C 2
Displacements	See Annex C 4

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorage satisfy requirements for Class A1
Resistance to fire	See Annex C 3

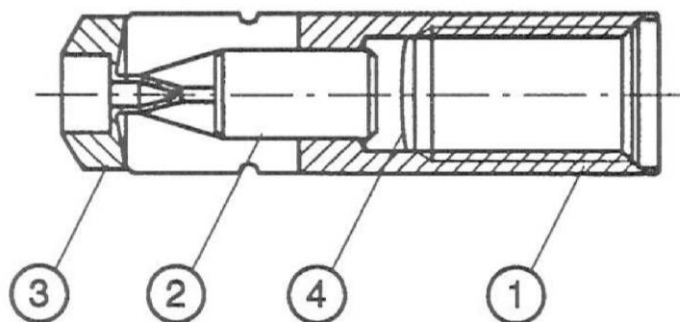
3.4 Safety in use (BWR 4)

The essential characteristics regarding Safety in use are included under the Basic Works Requirement Mechanical resistance and stability.

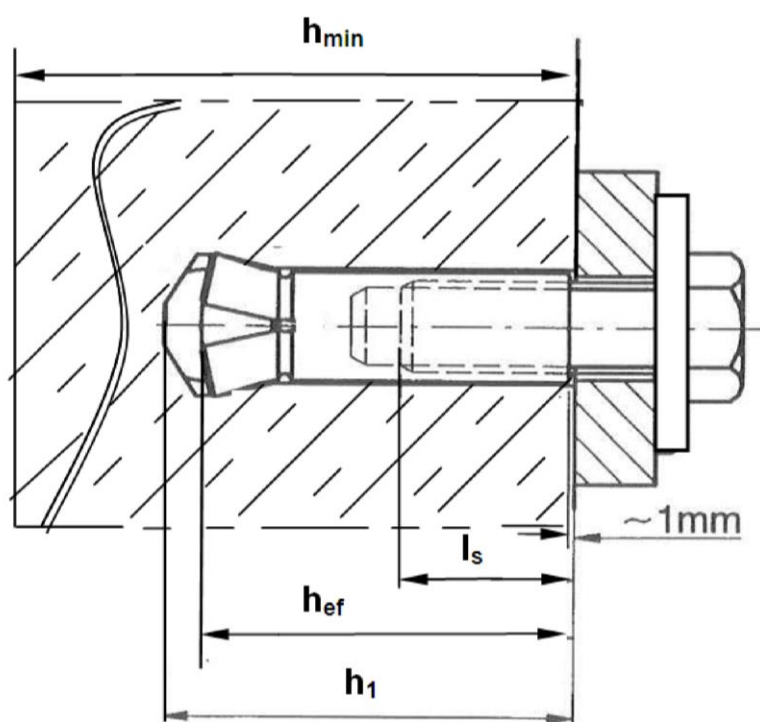
4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with guideline for European technical approval ETAG 001, April 2013 used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011 the applicable European legal act is: (96/582/EC)

The system to be applied is: 1



- ① Expansion sleeve
- ② Expansion pin
- ③ Plastic cap
- ④ Safety disk



- h_{ef} = Effective anchorage depth
- l_s = Screw-in depth
- h_1 = Drill hole depth
- h_{min} = Minimum thickness of concrete member

fischer Zykon-Hammerset anchor FZEA II

Product description
Installed condition

Annex A 1

Marking e.g.:



FZEA II 12x40

(galvanized steel)



FZEA II 12x40 A4

(stainless steel)



FZEA II 12x40 C

(high corrosion resistant steel)

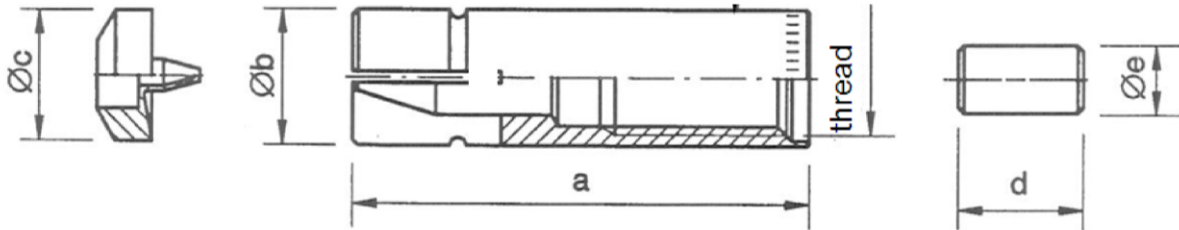


Table A1: Dimensions [mm]

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		6,5
FZEA II 14 x 40 M12	M12		14	13,5		9,5

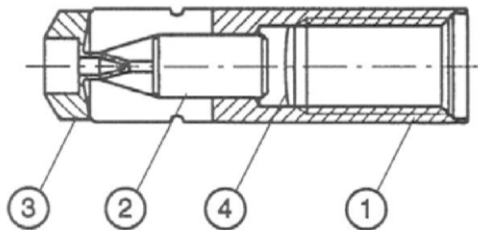


Table A2: Materials

Part	Designation	FZEA II	Material FZEA II A4	FZEA II C
1	Expansion sleeve	Steel, EN 10277:2008 EN ISO 4042:2001 $\geq 5 \mu\text{m}$	Stainless steel, EN 10088:2014	High corrosion resistant steel EN 10088:2014
2	Expansion pin	Steel, EN 10277:2008 or EN ISO 10263-1:2014 EN ISO 4042:2001 $\geq 5 \mu\text{m}$	Stainless steel, EN 10088:2014	High corrosion resistant steel EN 10088:2014
3	Plastic cap	Plastic		
4	Safety disk	Foil		
Requirements for the fastening screw / threaded rod ¹⁾		Steel, EN ISO 898-1:2013 EN ISO 4042:2001 $\geq 5 \mu\text{m}$ strength class 5.6 / 8.8	Stainless steel EN ISO 3506-1:2010 1.4401, 1.4404, 1.4578, 1.4571, 1.4439, 1.4362 strength class 50 / 70	High corrosion resistant steel EN ISO 3506-1:2010 1.4529, 1.4565 strength class 50 / 70

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 B2)

fischer Zykon-Hammerset anchor FZEA II

Product description

Anchor types and dimensions
Materials

Annex A 2

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Specifications of intended use

Anchorage subject to:

- Static and quasi-static loads
- Fire exposure in concrete

Base materials:

- Reinforced and unreinforced normal weight concrete according to EN 206-1:2000
- Strength classes C20/25 to C50/60 according to EN 206-1:2000
- Cracked or uncracked concrete

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions
(Zinc plated steel, stainless steel, high corrosion- resistant steel) FZEA II, FZEA II A4, FZEA II C
- Structures subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition, if no particular aggressive conditions exist
(stainless steel, high corrosion-resistant steel) FZEA II A4, FZEA II C
- Structures subject to external atmospheric exposure and permanently damp internal condition, if other particular aggressive conditions exist
(high corrosion-resistant steel) FZEA II C

Note: 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 deicing materials are used)

Design:

- Anchorages are designed 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 supports, etc.)
- Anchorages under static or quasi-static actions are designed in accordance with (please choose the relevant design method):
 - ETAG 001, Annex C, design method A, Edition August 2010 or
 - CEN/TS 1992-4:2009, design method A
- Fire **exposure** in cracked and uncracked concrete
 - Design according to TR 020 and ETAG 001, Annex C or CEN/TS 1992-4: 2009, Annex D

Installation:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site
- Correct installation is ensured when front face of sleeve is approximately 1 mm below the concrete surface and the control mark on the sleeve is visible as illustrated in Annex B2

fischer Zykon-Hammerset anchor FZEA II

Intended Use
Specifications

Annex B 1

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Description installation control

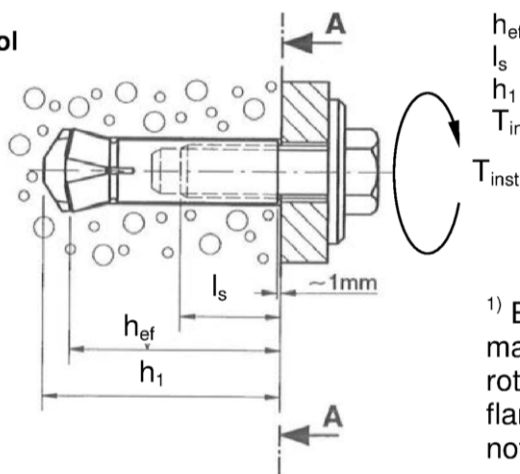
plan view A-A



unexpanded



expanded ¹⁾



h_{ef} = Effective anchorage depth

l_s = Screw-in depth

h_1 = Drill hole depth

T_{inst} = Max. installation torque

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

Table B1: Assembly tools

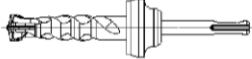


Anchor type	FZEA II 10x40 M8	FZEA II 12x40 M10	FZEA II 14x40 M12
Universal drill 	FZUB 10x40	FZUB 12x40	FZUB 14x40
Impact thorn 	FZED 10x40	FZED 12x40	FZED 14x40
Machine setting tool 	FZEM 10x40	FZEM 12x40	FZEM 14x40

Table B2: Installation and anchor parameters

Anchor type	Drill hole depth h_1 [mm]	Anchorage depth h_{ef} [mm]	Fastening screw or threaded rod			
			Max. installation torque T_{inst} [Nm]		Screw-in depth l_s [mm]	
			FZEA II	FZEA II A4 FZEA II 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

Table B3: Minimum thickness of concrete members, minimum spacing and minimum edge distance

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

fischer Zykon-Hammerset anchor FZEA II

Intended Use

Assembly tools, Installation and anchor parameters

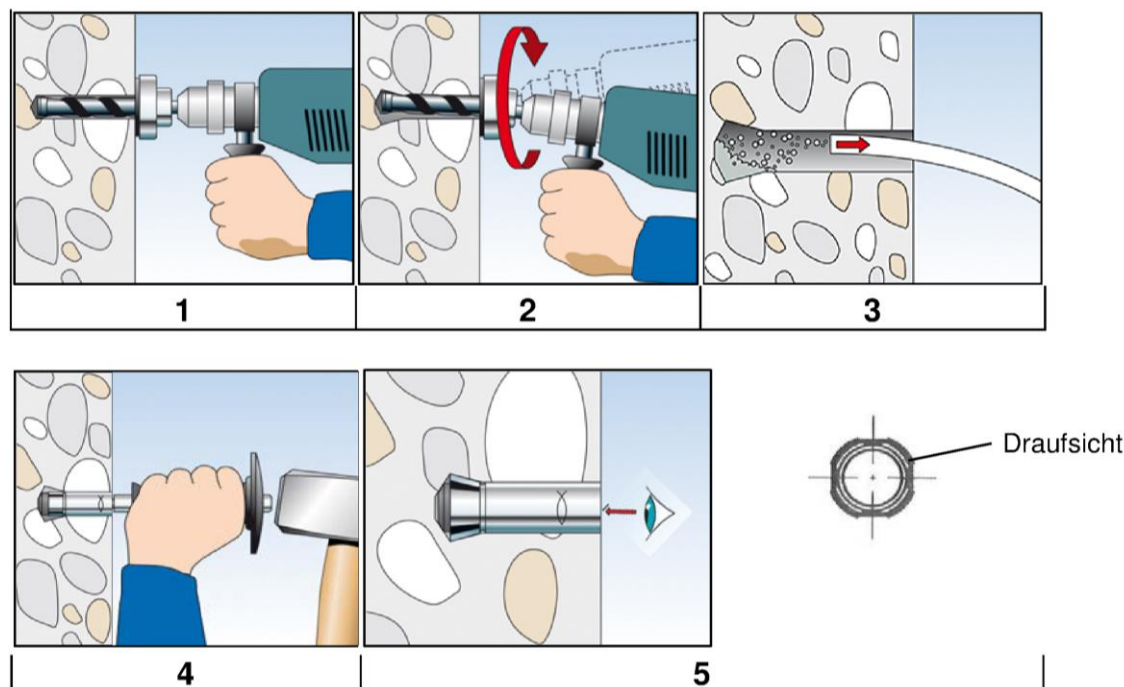
Annex B 2

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Table B4: Minimum spacings and minimum edge distances of anchors according to **TR 020 and ETAG 001, Annex C** under **fire exposure** and according to **CEN/TS 1992-4: 2009, Annex D** under **fire exposure**

Type of anchor / size			FZEA II 10x40 M8	FZEA II 12x40 M10	FZEA II 14x40 M12
Spacing	$s_{cr,N}$	[mm]	$4 \times h_{ef}$		
	s_{min}		40	45	50
Edge distance	$c_{cr,N}$		$2 \times h_{ef}$		
	c_{min}		40	45	50
	c_{min}		$c_{min} = 2 \times h_{ef}$, for fire exposure from more than one side $c_{min} \geq 300$ mm		

Installation instructions



No.	Description
1	Create a drill hole at right angles to the surface of the anchor base with a hammer drill, using the corresponding Zykon universal drill bit FZUB. The required drill depth is reached once the FZUB depth stop meets the concrete.
2	Once the FZUB depth stop meets the concrete, create the drill hole undercut by making circular swiveling movements with the hammer drill while the hammer mechanism is engaged. Press the hammer drill firmly against the anchor base: 2-3 swiveling movements are sufficient
3	Clean bore hole
4	Drive in the pin with the setting tool
5	Check of the setting notch for correct installation

fischer Zykon-Hammerset anchor FZEA II

Intended Use

Minimum spacing and edge distance
Installation instructions

Annex B 3

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Table C1: Characteristic values of **tension** resistance under static and quasi-static action
(Design method A, according to **ETAG 001, Annex C** or **CEN/TS 1992-4**)

Type of anchor			FZEA II 10x40 M8	FZEA II 12x40 M10	FZEA II 14x40 M12
Steel failure					
Characteristic resistance FZEA II	N _{Rk,s}	[kN]	9,60	17,00	19,70
Partial safety factor	γ _{Ms} ¹⁾		1,5		
Characteristic resistance FZEA II A4, FZEA II C	N _{Rk,s}	[kN]	12,20	21,60	25,00
Partial safety factor strength class	70	γ _{Ms} ¹⁾	1,5		
	50		2,86		
Pullout failure					
Characteristic resistance in cracked concrete	N _{Rk,p} [kN]	C20/25	4	7,5	9
Characteristic resistance in uncracked concrete	N _{Rk,p} [kN]	C20/25	9	9	9
Increasing factors for N _{Rk,p} for cracked and uncracked 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		
Installation safety factor	γ ₂ = γ _{inst}		1,2		
Concrete cone failure					
Effective anchorage depth	h _{ef}	[mm]	40	40	40
Factor for uncracked concrete	k _{ucr}	[-]	10,1		
Factor for cracked concrete	k _{cr}	[-]	7,2		
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
Installation safety factor	γ ₂ = γ _{inst}		1,2		

¹⁾ In absence of other national regulations

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

fischer Zykon-Hammerset anchor FZEA II

Performances

Characteristic values of tension resistance

Annex C 1

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Table C2: Characteristic values of **shear** resistance under static and quasi-static action
(Design method A, according to **ETAG 001, Annex C** or **CEN/TS 1992-4:2009**)

Type of anchor			FZEA II 10x40 M8	FZEA II 12x40 M10	FZEA II 14x40 M12
Steel failure without lever arm					
Characteristic resistance FZEA II	$V_{Rk,s}$	[kN]	8,30	13,60	19,10
Partial safety factor	8.8	$\gamma_{Ms}^{1)}$	1,25		
FZEA II strength class	5.6		1,67		
Factor for ductility	k_2	[-]	1,0		
Characteristic resistance FZEA II A4, FZEA II C	$V_{Rk,s}$	[kN]	10,00	15,00	20,60
Partial safety factor FZEA II A4, FZEA II C strength class	70 50	$\gamma_{Ms}^{1)}$	1,56		
			2,38		
Factor for ductility	k_2	[-]	1,0		
Steel failure with lever arm					
Characteristic resistance FZEA II ²⁾	$M^0_{Rk,s}$	[Nm]	15	23	31
Partial safety factor	8.8	γ_{Ms}	1,25		
FZEA II strength class	5.6		1,67		
Factor for ductility	k_2	[-]	1,0		
Characteristic resistance FZEA II A4, FZEA II C ²⁾	$M^0_{Rk,s}$	[Nm]	19	29	39
Partial safety factor FZEA II A4, FZEA II C strength class	70 50	$\gamma_{Ms}^{1)}$	1,25		
			2,38		
Factor for ductility	k_2	[-]	1,0		
Concrete pryout failure					
Factor k according to ETAG 001, Annex C or k ₃ according to CEN/TS 1992-4	k = k ₃	[-]	1,3		
Concrete edge failure					
Effective length of anchor for shear loading	l _f	[mm]	40	40	40
Effective diameter of anchor	d _{nom}	[mm]	10	12	14
Installation safety factor	$\gamma_2 = \gamma_{inst}$		1,0		

¹⁾ In absence of other national regulations

²⁾ Thread diameter of the anchor decisive

fischer Zykon-Hammerset anchor FZEA II

Performances

Characteristic values of resistance under shear loads

Annex C 2

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Table C3: Characteristic values of **tension** resistance under **fire exposure** in cracked and uncracked concrete (Design according to **TR 020** and **ETAG 001**, **Annex C** or **CEN/TS 1992-4: 2009, Annex D**)

Type of anchor	R30 Fire resistance 30 minutes			R60 Fire resistance 60 minutes		
	$N_{Rk,s,fi,30}$ [kN]	$N_{Rk,p,fi,30}$ [kN]	$N^0_{Rk,c,fi,30}$ [kN]	$N_{Rk,s,fi,60}$ [kN]	$N_{Rk,p,fi,60}$ [kN]	$N^0_{Rk,c,fi,60}$ [kN]
FZEA II 10x40 M8 (A4, C)	1,1	1,0	1,8	0,9	1,0	1,8
FZEA II 12x40 M10 (A4, C)	3,2	1,9	1,8	2,4	1,9	1,8
FZEA II 14x40 M12 (A4, C)	4,7	2,3	1,8	3,5	2,3	1,8

Type of anchor	R90 Fire resistance 90 minutes			R120 Fire resistance 120 minutes		
	$N_{Rk,s,fi,90}$ [kN]	$N_{Rk,p,fi,90}$ [kN]	$N^0_{Rk,c,fi,90}$ [kN]	$N_{Rk,s,fi,120}$ [kN]	$N_{Rk,p,fi,120}$ [kN]	$N^0_{Rk,c,fi,120}$ [kN]
FZEA II 10x40 M8 (A4, C)	0,8	1,0	1,8	0,7	0,8	1,5
FZEA II 12x40 M10 (A4, C)	1,6	1,9	1,8	1,2	1,5	1,5
FZEA II 14x40 M12 (A4, C)	2,3	2,3	1,8	1,8	1,8	1,5

Table C4: Characteristic values of **shear** resistance under **fire exposure** in cracked and uncracked concrete (Design according to **TR 020** and **ETAG 001**, **Annex C** or **CEN/TS 1992-4:2009, Annex D**)

Type of anchor	R30 Fire resistance 30 minutes			R60 Fire resistance 60 minutes		
	$V_{Rk,s,fi,30}$ [kN]	$M^0_{Rk,s,fi,30}$ [Nm]	$k = k_3$	$V_{Rk,s,fi,60}$ [kN]	$M^0_{Rk,s,fi,60}$ [Nm]	$k = k_3$
FZEA II 10x40 M8 (A4, C)	0,9	1,1	1,3	0,8	0,9	1,3
FZEA II 12x40 M10 (A4, C)	2,3	4,1	1,3	1,7	3,1	1,3
FZEA II 14x40 M12 (A4, C)	2,8	7,3	1,3	2,1	5,4	1,3

Type of anchor	R90 Fire resistance 90 minutes			R120 Fire resistance 120 minutes		
	$V_{Rk,s,fi,90}$ [kN]	$M^0_{Rk,s,fi,90}$ [Nm]	$k = k_3$	$V_{Rk,s,fi,120}$ [kN]	$M^0_{Rk,s,fi,120}$ [Nm]	$k = k_3$
FZEA II 10x40 M8 (A4, C)	0,7	0,8	1,3	0,6	0,7	1,3
FZEA II 12x40 M10 (A4, C)	1,1	2,1	1,3	0,9	1,5	1,3
FZEA II 14x40 M12 (A4, C)	1,4	3,6	1,3	1,0	2,7	1,3

Concrete pryout failure: In Equation (5.6) of ETAG 001, Annex C, 5.2.3.3 the k or k_3 -factor of Table C2 and the relevant values of $N^0_{Rk,c,fi}$ of Table C3 have to be considered.

Concrete edge failure: The characteristic resistance $V^0_{Rk,c,fi}$ in concrete C20/25 to C50/60 is determined by: $V^0_{Rk,c,fi} = 0,25 \times V^0_{Rk,c}$ (R30, R60, R90), $V^0_{Rk,c,fi} = 0,20 \times V^0_{Rk,c}$ (R120) with $V^0_{Rk,c}$ as initial value of the characteristic resistance in cracked concrete C20/25 under normal temperature according to ETAG 001, Annex C, 5.2.3.4.

fischer Zykon-Hammerset anchor FZEA II

Performances

Characteristic values of resistance under tension and shear loads under fire exposure

Annex C 3

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Table C5: Displacements of anchors due to tension load

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

Table C6: Displacements of anchors due to shear load

Type of anchor			FZEA II 10x40 M8	FZEA II 12x40 M10	FZEA II 14x40 M12
Shear load in cracked an uncracked concrete, FZEA II	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 uncracked concrete, FZEA II A4, FZEA II 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

Performances

Displacements due to tension and shear loads

Annex C 4

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