Deutsches Institut für Bautechnik

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Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment

ETA-11/0336 of 4 June 2015

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	Tecfi Concrete Screw HXE
Product family to which the construction product belongs	Concrete screw of sizes 8, 10, 12 and 16 for use in concrete
Manufacturer	Tecfi SpA Strada Statale Appia, Km. 193 81050 PASTORANO (CE) ITALIEN
Manufacturing plant	tecfi plant
This European Technical Assessment contains	14 pages including 3 annexes
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	Guideline for European technical approval of "Metal anchors for use in concrete", ETAG 001 Part 3: "Undercut anchors", April 2013, used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011.

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Specific Part

1 Technical description of the product

The tecfi concrete screw HXE is made of galvanised steel of sizes 8, 10, 12 or 16 mm. The anchor may be provided with different head configurations according to Annex A2. The anchor is screwed into a predrilled cylindrical drill hole. The special thread of the anchor cuts an internal thread into the member while setting. The anchorage is characterised by mechanical interlock in the special thread.

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

2 Specification of the intended use in accordance with the applicable EAD

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 the assumption of 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.

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
Product performance for static and quasi static action and for seismic categories C1 and C2	See Annex C1
Displacements under tension and shear load	See Annex C4

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorages satisfy requirements for Class A1
Product performance for resistance to fire	See Annex C2 and C3

3.3 Hygiene, health and the environment (BWR 3)

Regarding dangerous substances there may be requirements (e.g. transposed European legislation and national laws, regulations and administrative provisions) applicable to the products falling within the scope of this European Technical Assessment. In order to meet the provisions of Regulation (EU) No 305/2011, these requirements need also to be complied with, when and where they apply.

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3.4 Safety and accessibility in use (BWR 4)

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

3.5 Protection against noise (BWR 5)

Not relevant.

3.6 Energy economy and heat retention (BWR 6)

Not relevant.

3.7 Sustainable use of natural resources (BWR 7)

For the sustainable use of natural resources no performance was determined for this product.

3.8 General aspects

The verification of durability is part of testing the essential characteristics. Durability is only ensured if the specifications of intended use according to Annex B are taken into account.

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

According to Decision 96/582/EC of the Commission of 24 June 1996 (Official Journal of the European Communities L 254 of 08.10.1996, p. 62–65) the system of assessment and verification of constancy of performance (see Annex V and Article 65 Paragraph 2 to Regulation (EU) No 305/2011) given in the following table apply.

Product	Intended use	Level or class	System
Metal anchors for use in concrete (heavy-duty type)	For fixing and/or supporting concrete structural elements or heavy units such as cladding and suspended ceilings	—	1

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 4 June 2015 by Deutsches Institut für Bautechnik

Uwe Bender
Head of Department

beglaubigt:
Lange

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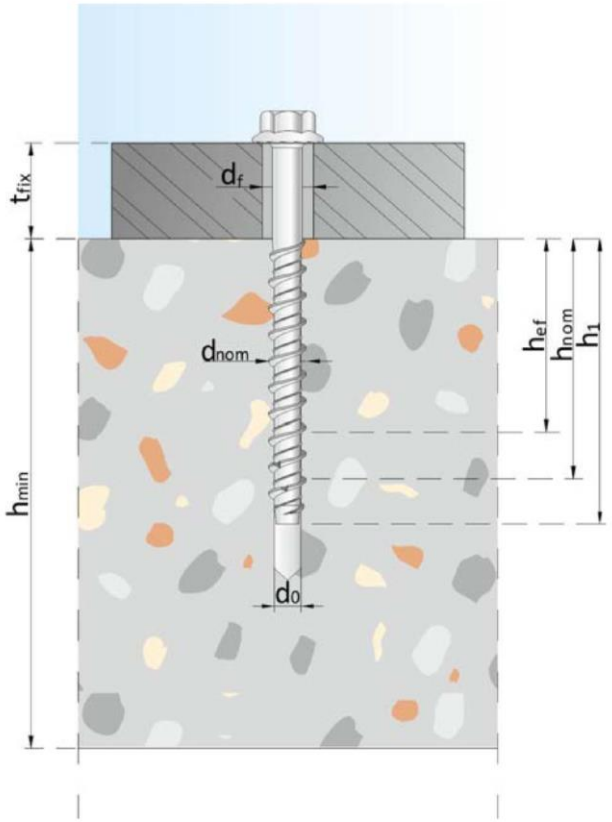
Installed conditions



Installation details

d_{nom}	Outside diameter of the anchor
d_{cut}	Maximum cutting diameter of the drill bit
t_{fix}	Thickness of the fixtures
d_0	Diameter of the drill hole
d_f	Diameter of the clearance hole in the fixture
h_{min}	Minimum thickness of the concrete member
h_{nom}	Overall anchor embedment depth
h_{ef}	Anchorage depth

Tecfi Concrete Screw HXE	**Annex A1**
Product description Installed condition	

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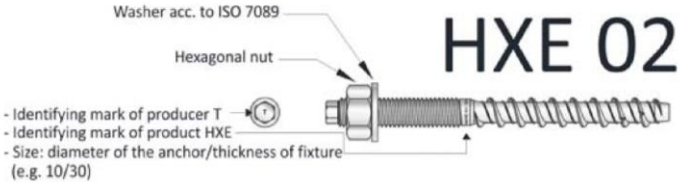
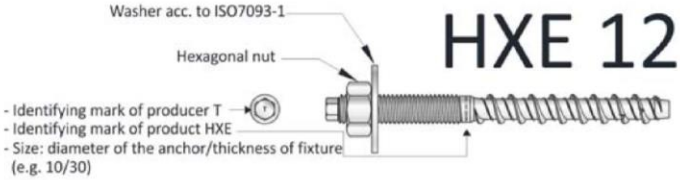
HXE 01

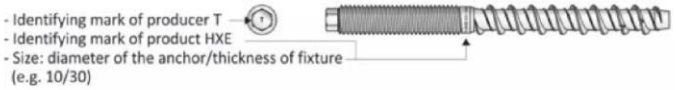
HXE 02



HXE 12



HXE 85



HXE 03

ITEM	Description	f_y [Mpa]	f_u [Mpa]	Finishing
HXE01	Hexagonal flanged washer head screw	640	750	Materials galvanised ≥ 5µm according to ISO 4042
HXE85	Dual thread screw with hexagonal shank			
HXE02	Dual thread screw with hexagonal shank, nut and washer according to ISO 7089			
HXE12	Dual thread screw with hexagonal shank, nut and washer according to ISO 7093			
HXE03	Flat countersunk head with ribs screw			

Tecfi Concrete Screw HXE

Product description
Anchor types and components

Annex A2

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Specifications of intended use

Anchorages subject to:
- Static and quasi-static loads: All anchor types, all sizes
- Seismic action for Performance Category C1 and C2: HXE01 Ø16 only
- Fire exposure: up to 120 minutes: All anchor types, all sizes

Base materials:
- Reinforced or unreinforced normal weight concrete according to EN 206:2013.
- Strength classes C20/25 to C50/60 according to EN 206:2013.
- Cracked or uncracked concrete: All anchor types, all sizes

Use conditions (Environmental conditions):
- Anchorages subject to dry internal conditions

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 and under fire exposure are designed in accordance with:
  - ETAG 001, Annex C, design method A, Edition August 2010 and EOTA Technical Report TR020;
  - CEN TS CEN/TS 1992-4-1:2009;
  - In case of requirements for resistance to fire exposure it must be ensured that local spalling of the concrete cover does not occur.
- Anchorages under seismic actions (cracked concrete) are designed in accordance with:
  - EOTA Technical Report TR 045, Edition February 2013
  - Fastening shall be positioned outside of critical regions (e.g. plastic hinges) of the concrete structure.
  - Fastenings in stand-off installation or with a grout layer are not allowed.

Installation:
- Hole drilling by rotary plus hammer mode only
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- 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 hole is filled with high strength mortar and if under shear or oblique tension load it is not the direction of the load application.
- After installation further turning of the anchor is not possible. The head of the anchor is supported on the fixture and is not damaged.

Tecfi Concrete Screw HXE	**Annex B1**
Intended use Specifications	

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Table B1: HXE 01, installation details

Denomination		HXE Ø8/6[1)]	HXE Ø10/8[2)]	HXE Ø12/10[3)]	HXE Ø16/14[4)]
Nominal drill hole diameter	d_o = [mm]	6	8	10	14
Cutting diameter of drill bit	$d_{cut} \leq$ [mm]	6.40	8.45	10.45	14.50
Effective anchorage depth	h_{ef} = [mm]	48	56	64	85
Depth of drill hole	h_1 = [mm]	75	85	100	140
Diameter of clearance in the fixture	d_f = [mm]	9	12	14	18
Overall anchor embedment depth in the concrete	h_{nom}=[mm]	60	70	80	110
Minimum thickness of concrete member	h_{min} = [mm]	100	110	130	170
Outside diameter of anchor	d_{nom} = [mm]	8	10	12	16
Wrench size HXE 01	SW = [mm]	10	13	15	21
Minimum thickness of fixture	t_{fix}=[mm]	≥5	≥5	≥5	≥5
Minimum length of the anchor HXE 01	L=[mm]	≥65	≥75	≥85	≥115
Minimum edge distance	c_{min} = [mm]	45	50	60	80
Minimum spacing	s_{min} = [mm]	45	50	60	80

Table B2: HXE 02 and HXE 12, installation details

Denomination		HXE Ø8/6[1)]	HXE Ø10/8[2)]	HXE Ø12/10[3)]
Nominal drill hole diameter	d_o = [mm]	6	8	10
Cutting diameter of drill bit	$d_{cut} \leq$ [mm]	6.40	8.45	10.45
Effective anchorage depth	h_{ef} = [mm]	48	56	64
Depth of drill hole	h_1 = [mm]	75	90	100
Diameter of clearance in the fixture	d_f = [mm]	9	12	14
Overall anchor embedment depth in the concrete	h_{nom}=[mm]	60	70	80
Minimum thickness of concrete member	h_{min} = [mm]	100	110	130
Outside diameter of anchor	d_{nom} = [mm]	8	10	12
Wrench size HXE 02 and HXE 12	SW = [mm]	13	17	19
Maximum tightening torque of the nut	T = [Nm]	20	50	80
Hexagonal shank size HXE 02 and HXE 12	AF = [mm]	5	7	8
Minimum thickness of fixture	t_{fix}=[mm]	≥5	≥5	≥5
Minimum length of the anchor HXE 02 and HXE 12	L=[mm]	≥85	≥100	≥113
Minimum edge distance	c_{min} = [mm]	45	50	60
Minimum spacing	s_{min} = [mm]	45	50	60

Table B3: HXE 03, installation details

Denomination		HXE Ø8/6[1)]	HXE Ø10/8[2)]	HXE Ø12/10[3)]
Nominal drill hole diameter	d_o = [mm]	6	8	10
Cutting diameter of drill bit	$d_{cut} \leq$ [mm]	6.40	8.45	10.45
Effective anchorage depth	h_{ef} = [mm]	48	56	64
Depth of drill hole	h_1 = [mm]	75	90	100
Diameter of clearance in the fixture	d_f = [mm]	9	12	14
Overall anchor embedment depth in the concrete	h_{nom}=[mm]	60	70	80
Minimum thickness of concrete member	h_{min} = [mm]	100	110	130
Outside diameter of anchor	d_{nom} = [mm]	8	10	12
Six lobe recess HXE 03	T	T30	T40	T50
Minimum thickness of fixture	t_{fix}=[mm]	≥5	≥5	≥5
Minimum length of the anchor HXE 03	L=[mm]	≥65	≥75	≥85
Minimum edge distance	c_{min} = [mm]	45	50	60
Minimum spacing	s_{min} = [mm]	45	50	60

[1)] Setting requires an impact wrench with maximum 20 Nm torque
[2)] Setting requires an impact wrench with maximum 50 Nm torque
[3)] Setting requires an impact wrench with maximum 80 Nm torque
[4)] Setting requires an impact wrench with maximum 160 Nm torque

Tecfi Concrete Screw HXE

Intended use
Installation parameters

Annex B2

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Drill bit

HXE anchor size	Drill bit item code
Ø 8	EO 01 06 210
Ø 10	EO 01 08 210
Ø 12	EO 01 10 210
Ø 16	EO 01 14 210

Blowing pump

Item code: DW 01 00 001

Tecfi Concrete Screw HXE	**Annex B3**
Intended use Cleaning and setting tools	

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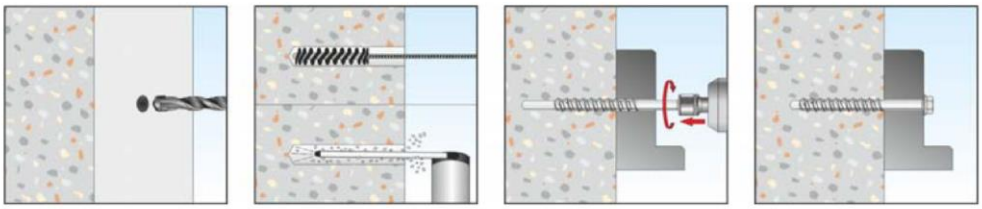
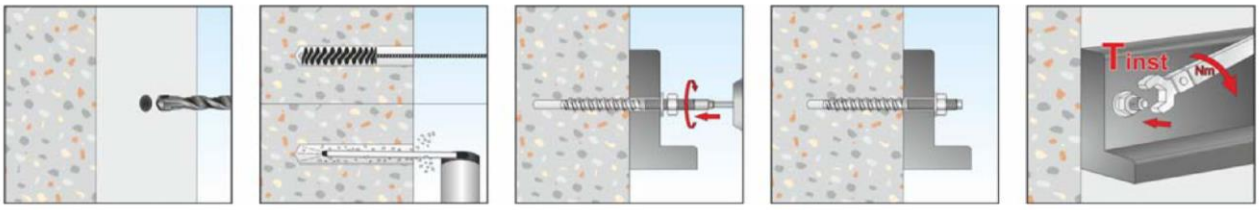
Installation instructions HXE01



Step 1	Drill a hole into the concrete in rotary plus hammer mode. The hole must be 2 [mm] less than the outside diameter of the anchor
Step 2	Remove the dust into the hole using a brush and a blowing pump
Step 3	Place the fixture
Step 4	Install the anchor using an impact screwdriver

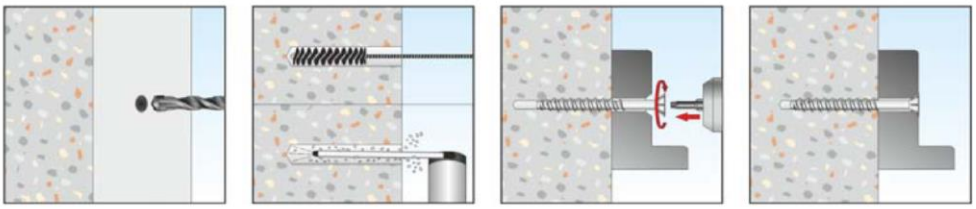
Installation instructions HXE02 and HXE12



Step 1	Drill a hole into the concrete in rotary plus hammer mode. The hole must have a diameter 2 [mm] less than the outside diameter of the anchor
Step 2	Remove the dust into the hole using a brush and a blowing pump
Step 3 [1)]	Place the fixture
Step 4	Install the anchor using an impact screwdriver
Step 5	Tight the nut applying the required torque moment

[1)] Through fixing is allowed (place the fixture before placing the anchor)

Installation instructions HXE03



Step 1	Drill a hole into the concrete in rotary plus hammer mode. The hole must be 2 [mm] less than the outside diameter of the anchor
Step 2	Remove the dust into the hole using a brush and a blowing pump
Step 3	Place the fixture
Step 4	Install the anchor using an impact screwdriver

Tecfi Concrete Screw HXE	
Intended use Installation instructions	**Annex B4**

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Table C1: Performances for design method A (tension)

Type of anchor / Size			HXE Ø8/6	HXE Ø10/8	HXE Ø12/10	HXE Ø16/14
Steel failure						
Characteristic Resistance for static, quasi-static and seismic action in Performance category C1 and C2	$N_{Rk,s}$ = $N_{rk,s,seis}$	[kN]	20	35	50	95
Partial safety factor	γ_{Ms}	-	1,5			
Pull-out failure						
Effective embedment depth	h_{ef}	[mm]	48	56	64	85
Characteristic Resistance in uncracked concrete C20/25	$N_{Rk,p}$	[kN]	16	20	25	40
Characteristic Resistance in cracked concrete C20/25			4	7,5	9	16
Characteristic resistance in seismic performance category C1			NPD	NPD	NPD	16
Characteristic resistance in seismic performance category C2			NPD	NPD	NPD	7,2
Increasing factors for $N_{Rk,p}$ for cracked and uncracked concrete	Ψ_c	C30/37	1,22			
		C40/50	1,41			
		C50/60	1,55			
Installation safety factor	$\gamma_2 = \gamma_{inst}$	-	1,4	1,2	1,4	1,4
Concrete cone failure and splitting failure						
Effective embedment depth	h_{ef}	[mm]	48	56	64	85
Spacing	$s_{cr,N}$	[mm]	3 x h_{ef}			
Edge distance	$c_{cr,N}$	[mm]	1,5 x h_{ef}			
Spacing (splitting)	$s_{cr,sp}$	[mm]	160	175	195	255
Edge distance (splitting)	$c_{cr,sp}$	[mm]	80	85	95	130
Factor for uncracked concrete	k_{ucr}	-	10,1			
Factor for cracked concrete	k_{cr}	-	7,2			

Table C2: Performances for design method A (shear)

Type of anchor / Size			HXE Ø8/6	HXE Ø10/8	HXE Ø12/10	HXE Ø16/14
Steel failure without level arm						
Characteristic Resistance	$V_{Rk,s}$	[kN]	9,4	20,1	32,4	56,9
Characteristic Resistance in performance category C1		[kN]	NPD	NPD	NPD	39,8
Characteristic Resistance in performance category C2		[kN]	NPD	NPD	NPD	39,8
Partial safety factor	γ_{Ms}	-	1,5			
Steel failure with level arm						
Characteristic bending moment	$M^0_{Rk,s}$	[Nm]	19	44	83	216
Partial safety factor	γ_{Ms}	-	1,5			
Concrete pryout failure						
Effective embedment depth	h_{ef}	[mm]	48	56	64	85
Factor for pry-out failure	$k = k_3$	-	1	1	2	2
Concrete edge failure						
Effective anchorage length	h_{ef}	[mm]	48	56	64	85
Effective diameter of the anchor	d	[mm]	6	8	10	14

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Tecfi Concrete Screw HXE

Performances
Characteristic resistance to tension loads under static and quasi-static actions and seismic performance category C1 and C2

Annex C1

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Table C3: Performances under fire exposure in concrete C20/25 to C50/60 (tension)

Type of anchor / Size			HXE Ø8/6	HXE Ø10/8	HXE Ø12/10	HXE Ø16/14
Duration of fire resistance = 30min						
Steel Failure						
Characteristic Resistance	$N_{Rk,s,fi,30}$	[kN]	0,28	0,73	1,51	2,85
Pull-out failure						
Characteristic Resistance in concrete C20/25 to C50/60	$N_{Rk,p,fi,30}$	[kN]	1,00	1,87	2,25	4,0
Concrete cone failure						
Characteristic Resistance in concrete C20/25 to C50/60	$N_{Rk,c,fi,30}$	[kN]	2,87	4,23	5,90	12,0
Duration of fire resistance = 60min						
Steel Failure						
Characteristic Resistance	$N_{Rk,s,fi,60}$	[kN]	0,25	0,64	1,13	2,14
Pull-out failure						
Characteristic Resistance in concrete C20/25 to C50/60	$N_{Rk,p,fi,60}$	[kN]	1,00	1,87	2,25	4,0
Concrete cone failure						
Characteristic Resistance in concrete C20/25 to C50/60	$N_{Rk,c,fi,60}$	[kN]	2,87	4,22	5,90	12,0
Duration of fire resistance = 90min						
Steel Failure						
Characteristic Resistance	$N_{Rk,s,fi,90}$	[kN]	0,19	0,49	0,98	1,85
Pull-out failure						
Characteristic Resistance in concrete C20/25 to C50/60	$N_{Rk,p,fi,90}$	[kN]	1,00	1,87	2,25	4,0
Concrete cone failure						
Characteristic Resistance in concrete C20/25 to C50/60	$N_{Rk,c,fi,90}$	[kN]	2,87	4,22	5,90	12,0
Duration of fire resistance =120min						
Steel Failure						
Characteristic Resistance	$N_{Rk,s,fi,120}$	[kN]	0,14	0,39	0,75	1,43
Pull-out failure						
Characteristic Resistance in concrete C20/25 to C50/60	$N_{Rk,p,fi,120}$	[kN]	0,8	1,5	1,8	3,20
Concrete cone failure						
Characteristic Resistance in concrete C20/25 to C50/60	$N_{Rk,c,fi,120}$	[kN]	2,30	3,38	4,72	9,59
Spacing	$s_{cr,N}$	[mm]	**4 x h_{ef}**			
	s_{min}		45	50	60	80
Edge distance	$c_{cr,N}$		**2 x h_{ef}**			
	c_{min}		c_{min} = 2 x h_{ef}; If fire attack comes from more than one side, the edge distance of the anchor has to be ≥ 300 mm or ≥ 2 x h_{ef}			

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Tecfi Concrete Screw HXE

Performances
For fire exposure to tension loads

Annex C2

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Table C4: Performances under fire exposure in concrete C20/25 to C50/60 (shear)

Type of anchor / Size			HXE Ø8/6	HXE Ø10/8	HXE Ø12/10	HXE Ø16/14
Duration of fire resistance = 30min						
Characteristic resistance	$V_{Rk,s,fi,30}$	[kN]	0,28	0,73	1,51	2,85
Characteristic bending resistance	$M_{Rk,s,fi,30}$	[Nm]	0,24	0,87	2,22	5,76
Duration of fire resistance = 60min						
Characteristic resistance	$V_{Rk,s,fi,60}$	[kN]	0,25	0,64	1,13	2,14
Characteristic bending resistance	$M_{Rk,s,fi,60}$	[Nm]	0,22	0,75	1,66	4,32
Duration of fire resistance = 90min						
Characteristic resistance	$V_{Rk,s,fi,90}$	[kN]	0,19	0,49	0,98	1,85
Characteristic bending resistance	$M_{Rk,s,fi,90}$	[Nm]	0,17	0,58	1,44	3,74
Duration of fire resistance = 120min						
Characteristic resistance	$V_{Rk,s,fi,120}$	[kN]	0,14	0,39	0,75	1,43
Characteristic bending resistance	$M_{Rk,s,fi,120}$	[Nm]	0,12	0,46	1,11	2,88
Concrete pryout failure						
The characteristic resistance $V_{rk,cp,fi,Ri}$ in concrete C20/25 to C50/60 is determined by: $\mathbf{V_{Rk,c,fi(90)} = k \times N_{Rk,c,fi(90)}}$ (≤ R90) and $\mathbf{V_{Rk,c,fi(120)} = k \times N_{Rk,c,fi(120)}}$ (up to R120)						
Factor k	$k = k_3$	-	1	1	2	2
Concrete edge failure						
The characteristic resistance $V_{rk,cp,fi,Ri}$ in concrete C20/25 to C50/60 is determined by $\mathbf{V^0_{Rk,c,fi(90)} = 0,25 \times V^0_{Rk,c}}$ (R30, R60, R90) and $\mathbf{V^0_{Rk,c,fi(120)} = 0,20 \times V^0_{Rk,c}}$ (R120) with $V^0_{Rk,c}$ as an initial value of the characteristic resistance of a single anchor in cracked concrete C20/25						

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Tecfi Concrete Screw HXE	**Annex C3**
Performances For fire exposure to shear loads	

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Table C5 : Displacements

Type of anchor / Size			HXE Ø8/6	HXE Ø10/8	HXE Ø12/10	HXE Ø16/14
Service tension load in uncracked concrete C20/25	N_{ucr}	[kN]	7,62	8,89	11,90	13,61
Displacements	$\delta_{N0,ucr}$	[mm]	0,76	0,74	0,63	0,74
	$\delta_{N\infty,ucr}$	[mm]	0,29	0,34	0,23	0,41
Service tension load in cracked concrete C20/25	N_{cr}	[kN]	1,90	4,17	4,29	5,44
Displacements	$\delta_{N0,cr}$	[mm]	0,27	0,39	0,45	0,79
	$\delta_{N\infty,cr}$	[mm]	0,53	0,77	0,97	1,05
Service shear load in cracked and uncracked concrete C20/25	V	[kN]	4,50	9,60	15,40	27,10
Displacements	δ_{V0}	[mm]	0,94	1,47	1,87	3,00
	$\delta_{V\infty}$	[mm]	1,41	2,20	2,81	4,50
Seismic performance category C2						
Damage limit state – tension load	$\delta_{V0,DLS}$	[mm]	NPD	NPD	NPD	0,56
Ultimate limit state – tension load	$\delta_{V\infty,ULS}$	[mm]	NPD	NPD	NPD	2,23
Damage limit state – shear load	$\delta_{V0,DLS}$	[mm]	NPD	NPD	NPD	5,54
Ultimate limit state – shear load	$\delta_{V\infty,ULS}$	[mm]	NPD	NPD	NPD	8,78

Tecfi Concrete Screw HXE

Performances
Displacements

Annex C4

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