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European Technical Assessment

ETA 20/0494 of 21/12/2020

English translation prepared by IETcc. Original version in Spanish language

General Part

Technical Assessment Body issuing the ETA designated according to Art. 29 of Regulation (EU) 305/2011:	Instituto de Ciencias de la Construcción Eduardo Torroja (IETcc)
Trade name of the construction product:	**Screw anchor THE**
Product family to which the construction product belongs:	Screw anchor of sizes 5 and 6 for use in concrete and in precast prestressed hollow core slabs for redundant non-structural systems
Manufacturer:	**Index - Técnicas Expansivas S.L.** Segador 13 26006 Logroño (La Rioja) Spain. website: www.indexfix.com
Manufacturing plant:	Index plant 2
This European Technical Assessment contains:	13 pages including 3 annexes which form an integral part of this assessment.
This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of:	European Technical Assessment EAD 330747-00-0601 “Fasteners for use in concrete for redundant non-structural systems”, ed. May 2018
This ETA replaces:	ETA 20/0494 issued 29/06/2020

This European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission according to article 25 (3) of Regulation (EU) No 305/2011.

English translation prepared by IETcc

SPECIFIC PART

1. Technical description of the product

The Index screw anchor THE is a fastener made of carbon steel of sizes 5 and 6. The fastener is installed into a predrilled cylindrical drilled hole. The special thread of the fastener cuts an internal thread into the concrete member while setting. The anchorage is characterised by mechanical interlock between fastener and concrete.

Product and installation descriptions are given in annexes A1 and A2.

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 mean to 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 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorages satisfy requirements for class A1 according to EN 13501-7
Resistance to fire	See annex C5

3.2 Safety in use (BWR 4)

Essential characteristic	Performance
Characteristic resistance under static or quasi static loading	See annex C3 and C4

4. Assessment and Verification of Constancy of Performance (hereinafter AVCP) system applied, with reference to its legal base

The applicable European legal act for the system of Assessment and Verification of Constancy of Performance (see annex V to Regulation (EU) No 305/2011) is 97/161/EC.

The system to be applied is 2+.

5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document.

The technical details necessary for the implementation of the AVCP system are laid down in the quality plan deposited at Instituto de Ciencias de la Construcción Eduardo Torroja.

Instituto de Ciencias de la Construcción Eduardo Torroja
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

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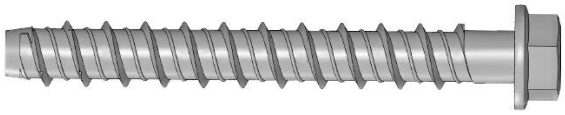
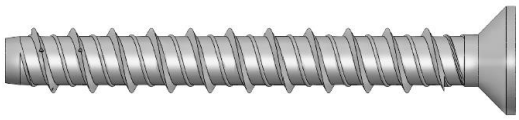
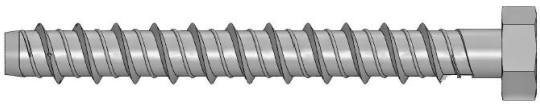
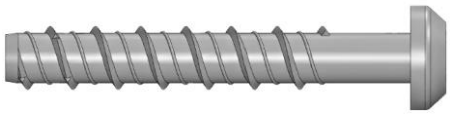
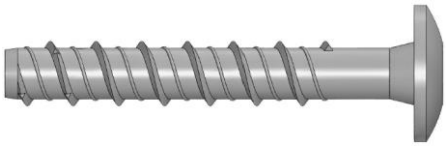
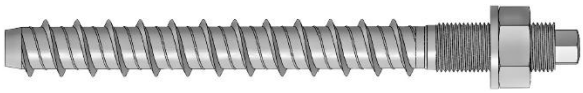
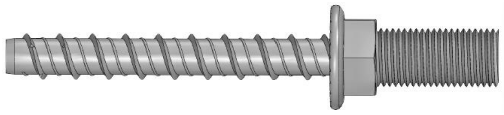
On behalf of the Instituto de Ciencias de la Construcción Eduardo Torroja
Madrid, 21th of December 2021

Firmado por CASTILLO TALAVERA ANGEL - DNI 52507605P
Fecha: 04/01/2021 13:13:11 CET

Director IETcc-CSIC

Product types

Picture	Sizes	Code	Coating
	Hexagonal head with flange	THE	Atlantis
		TFE	Zinc plated
		TNE	Zinc nickel
		TKE	Zinc flake
	Countersunk, Six lob recess	THA	Atlantis
		TFA	Zinc plated
		TNA	Zinc nickel
		TKA	Zinc flake
	Hexagonal head	THN	Atlantis
		TFN	Zinc plated
		TNN	Zinc nickel
		TKN	Zinc flake
	Pan head. Six lob recess	THT	Atlantis
		TFT	Zinc plated
		TNT	Zinc nickel
		TKT	Zinc flake
	Truss head. Six lob recess	THP	Atlantis
		TFP	Zinc plated
		TNP	Zinc nickel
		TKP	Zinc flake
	Stud head with DIN 934 class 6 nut and DIN 125 washer	TFW	Zinc plated
		TNW	Zinc nickel
		TKW	Zinc flake
	Stud head	TFS	Zinc plated
		TNS	Zinc nickel
		TKS	Zinc flake
	Male thread External thread M8; M10	TFM	Zinc plated
		TNM	Zinc nickel
		TKM	Zinc flake
	Female thread (rod hanger) Internal thread M8 / M10	TFF	Zinc plated
		TNF	Zinc nickel
		TKF	Zinc flake

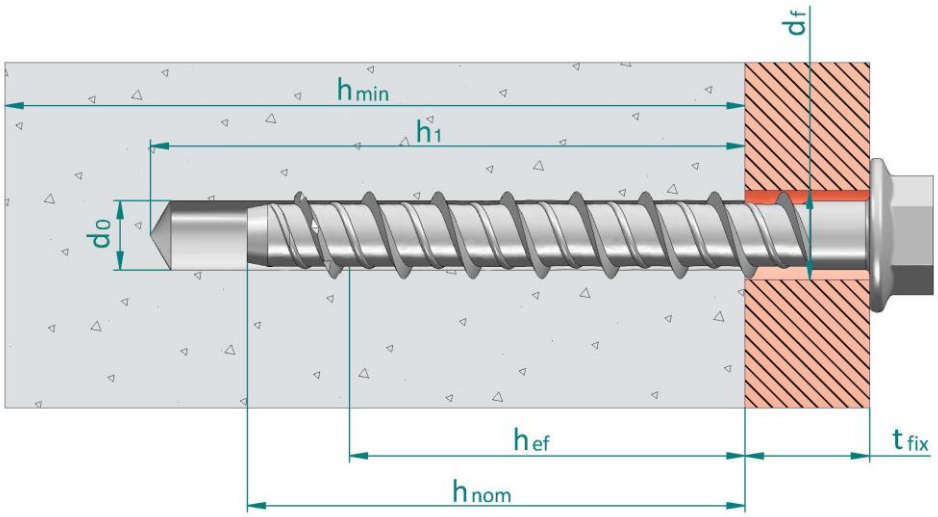
THE screw anchor

Product description

Screw types

Annex A1

Installed condition in concrete

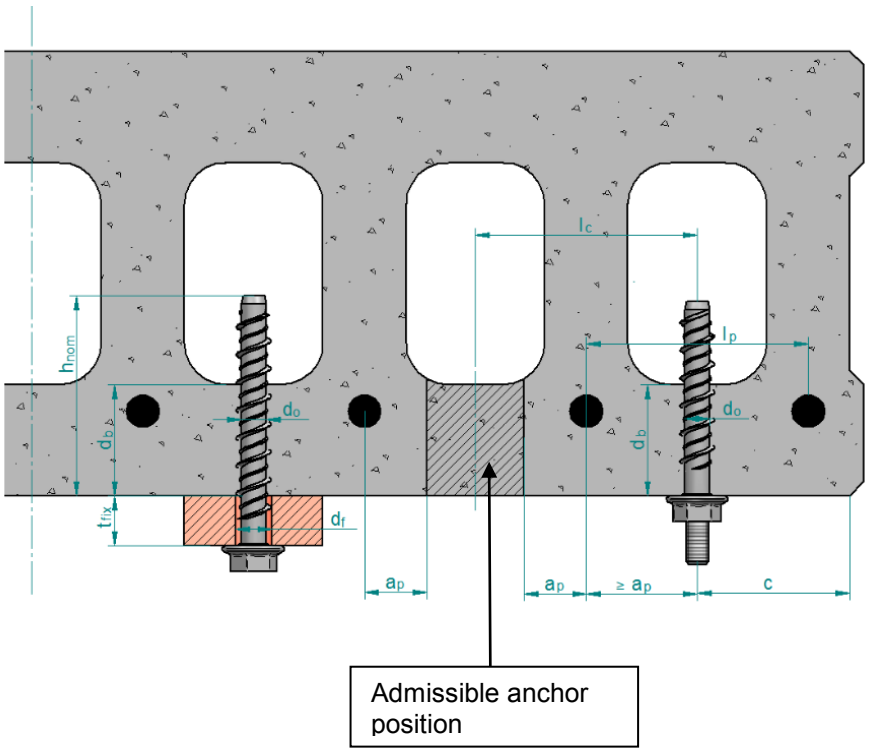


d_0: Nominal diameter of drill bit
d_f: Fixture clearance hole diameter
h_{ef}: Effective anchorage depth
h_1: Depth of drilled hole
h_{nom}: Overall fastener embedment depth in the concrete
h_{min}: Minimum thickness of concrete member
t_{fix}: Fixture thickness

Identification on head of fastener: company logo + size x length
The tip of the thread may be coloured
For heads where no space enough space is available, length mark can be replaced by the following letter codes.

Letter on head	Length [mm]
A	35 ÷50
B	51 ÷ 62
C	63 ÷75
D	76 ÷ 88
E	89 ÷ 101
F	102 ÷ 113
G	114 ÷ 126
H	127 ÷139
I	140 ÷153

Installed condition in precast prestressed hollow core concrete slabs



d_0: Nominal diameter of drill bit
d_f: Fixture clearance hole diameter
d_b: Bottom flange thickness
a_p: Distance between anchor position and prestressing steel ≥ 50 mm
l_c: Core distance ≥ 100 mm
l_p: Steel reinforcement distance ≥ 100 mm
t_{fix}: Fixture thickness
c: Edge distance

Table A1: Materials

Item	Designation	Material for screw anchor
1	Fastener body	Carbon steel, galvanized ≥ 5 µm ISO 4042 Zn5 Carbon steel, zinc nickel ≥ 8 µm ISO 4042, ZnNi8/An/T2 Carbon steel, zinc flake ≥ 6 µm ISO 10683 Carbon steel, Atlantis coating

Specifications of intended use

Anchorages subjected to:

- Static or quasi static loads for redundant non-structural systems
- Use for anchorages with requirements related to resistance of fire (not for using in prestressed hollow core slabs)
- The anchor may only be used if in the design and installation specifications for the fixture the excessive slip or failure of one anchor will not result in a significant violation of the requirements on the fixture in the serviceability and ultimate state.

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.
- Precast, prestressed hollow core concrete slabs, strength C30/37 to C50/60 according to EN 206:2013

Use conditions (environmental conditions):

- Anchorages subjected to dry internal conditions.

Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation rules and drawings are prepared taking into account of the loads to be anchored. The position of the fastener is indicated on the design drawings (e.g. position of the fastener relative to reinforcement or to supports, etc.).
- Anchorages under static or quasi-static actions are designed for design method A in accordance with EN 1992-4:2018.
- Anchorages under fire exposure are designed in accordance with EN 1992-4:2018. It must be ensured that local spalling of the concrete cover does not occur.

Installation:

- Hole drilling by rotary plus hammer mode.
- Fastener installation carried out by appropriately qualified personal 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 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 must not be possible.
- The head of the fastener must be supported on the fixture and is not damaged.

THE screw anchor	**Annex B1**
Intended use Specifications	

Table C1: Installation parameters in concrete

Installation parameters in concrete				Performances			
				5		6	
h_{nom}	Nominal embedment depth:		[mm]	35	45	35	55
h_{ef}	Effective anchorage depth:		[mm]	26.5	35.0	26.0	43.0
d_0	Nominal diameter of drill bit:		[mm]	5		6	
d_f	Clearance hole diameter ≤		[mm]	8		9	
$T_{inst,max}$	Installation torque ≤		[Nm]	5		10	
h_1	Depth of drilled hole ≥		[mm]	45	55	45	65
h_{min}	Minimum thickness of concrete member:		[mm]	80	80	80	90
L_{min}	Total length of the fastener:		[mm]	42	52	40	60
L_{max}			[mm]	100	120	150	150
t_{fix}	Thickness of fixture [1] ≤		[mm]	L-35	L-45	L-35	L-55
SW	Socket size	THE, TFE	[mm]	8		10	
		TFF, TFM	[mm]	--		13	
		TFS	[mm]	--		5	
TX	Six lob recess	THA	[--]	25		30	
		THP	[--]	30		40	
		THT	[--]	--		30	
d_k	Diameter of countersunk head:		[mm]	10.4		12.4	
s_{min}	Minimum allowable spacing:		[mm]	35		35	
c_{min}	Minimum allowable distance:		[mm]	35		35	
	Setting tool			Bosch GDS 18E, 500 W. $T_{impact,max}$ 250 Nm, or equivalent			

1) L = total fastener length

Table C2: Installation parameters in prestressed hollow core concrete slabs

Installation parameters in prestressed hollow core concrete slabs				Performances					
				5			6		
d_0	Nominal diameter of drill bit:		[mm]	5			6		
d_f	Clearance hole diameter ≤		[mm]	8			9		
$T_{inst,max}$	Installation torque ≤		[Nm]	5			10		
h_1	Depth of drilled hole ≥		[mm]	30	40	45	30	40	45
d_c	Minimum slab member thickness:		[mm]	25	30	40	25	30	40
L_{min}	Total length of the fastener:		[mm]	42			40		
L_{max}			[mm]	100			150		
SW	Socket size	THE, TFE	[mm]	8			10		
		TFF, TFM	[mm]	--			13		
		TFS	[mm]	--			5		
TX	Six lob recess	THA	[--]	25			30		
		THP	[--]	30			40		
		THT	[--]	--			30		
d_k	Diameter of countersunk head:		[mm]	10.4			12.4		
s_{min}	Minimum allowable spacing:		[mm]	35			35		
c_{min}	Minimum allowable distance:		[mm]	35			35		
	Setting tool			Bosch GDS 18E, 500 W. $T_{impact,max}$ 250 Nm, or equivalent					

1) L = total fastener length

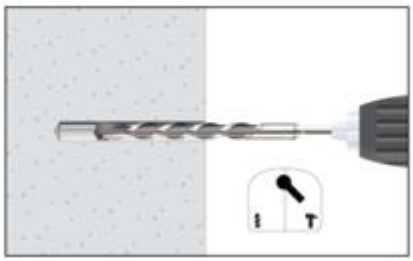
THE screw anchor

Performances

Installation parameters

Annex C1

Installation procedure

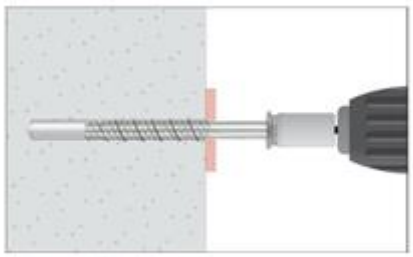


1. DRILL

Drill a hole into the base material of the correct diameter and depth using a carbide drill bit in rotary plus hammer mode.

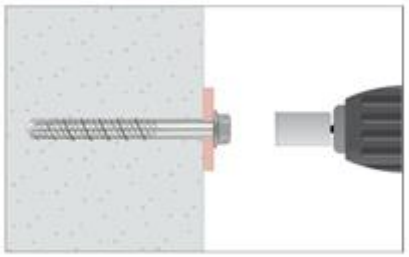
2. BLOW AND CLEAN

Remove dust and debris from hole using a hand pump, compressed air or a vacuum to remove loose particles left from drilling.



3. INSTALL

Select a powered impact wrench or a torque wrench that does not exceed the maximum torque $T_{impact,max}$ or $T_{inst,max}$ respectively. Attach an appropriate sized hex socket or six lob bit to the wrench. Mount the screw anchor head in the socket / bit.



4. APPLY TORQUE

Drive the anchor with an impact driver or a torque wrench through the fixture and into the hole until the anchor head comes in contact with the fixture. The anchor must be snug after installation. Do not spin the socket off the anchor to disengage.

THE screw anchor	**Annex C2**
Performances Installation procedure	

Table C3: Characteristic values to tension loads in concrete of design method A according to EN 1992-4

Characteristic values of resistance to tension loads according to design method A				Performances			
				5		6	
h_{nom}	Nominal embedment depth:		[mm]	35	45	35	55
Tension loads: steel failure							
$N_{Rk,s}$	Characteristic resistance:		[kN]	17.8		25.2	
γ_{Ms}	Partial safety factor [1]:		[-]	1.4		1.4	
Tension loads: pull-out failure in concrete							
$N_{Rk,p}$	Characteristic resistance in C20/25 uncracked concrete:		[kN]	[2]			
$N_{Rk,p}$	Characteristic resistance in C20/25 cracked concrete:		[kN]	[2]			
Ψ_c	Increasing factor for concrete	C30/37	[--]	1.14	1.02	1.15	1.22
		C40/45	[--]	1.26	1.04	1.27	1.41
		C50/60	[--]	1.38	1.05	1.38	1.58
Tension loads: concrete cone and splitting failure							
h_{ef}	Effective anchorage depth:		[mm]	26.5	35.0	26.0	43.0
$k_{ucr,N}$	Factor for uncracked concrete:		[-]	11.0			
$k_{cr,N}$	Factor for cracked concrete:		[-]	7.7			
$s_{cr,N}$	Concrete cone failure	Spacing:	[mm]	$3 \times h_{ef}$			
$c_{cr,N}$		Edge distance	[mm]	$1,5 \times h_{ef}$			
$s_{cr,sp}$	Spitting failure	Spacing:	[mm]	80	105	90	170
$c_{cr,sp}$		Edge distance	[mm]	40	52.5	45	85
γ_{inst}	Installation safety factor:		[--]	1.0	1.0	1.2	1.0

[1] In absence of other national regulations
[2] Pull out failure is not decisive

Table C4: Characteristic values to shear loads in concrete of design method A according to EN 1992-4

Characteristic values of resistance to shear loads according to design method A			Performances			
			5		6	
h_{nom}	Nominal embedment depth:	[mm]	35	45	35	55
Shear loads: steel failure without lever arm						
$V_{Rk,s}$	Characteristic resistance:	[kN]	8.19		12.53	
k_7	Ductility factor:	[--]	0.8			
γ_{Ms}	Partial safety factor [1]:	[--]	1.5			
Shear loads: steel failure with lever arm						
$M^0_{Rk,s}$	Characteristic bending moment:	[Nm]	11.86		21.6	
γ_{Ms}	Partial safety factor [1]:	[-]	1.5			
Shear loads: concrete pryout failure						
k_8	Pryout factor:	[mm]	1.0			
γ_{ins}	Installation safety factor:	[--]	1.0			
Shear loads: concrete edge failure						
ℓ_f	Effective length of fastener under shear loads:	[mm]	26.5	35	26.0	43.0
d_{nom}	Outside fastener diameter:	[mm]	5		6	
γ_{inst}	Installation safety factor:	[--]	1.0			

[1] In absence of other national regulations

THE screw anchor

Performances

Characteristic values for tension and shear loads in concrete

Annex C3

Table C5: Characteristic values to tension loads in precast, prestressed hollow core slabs C30/37 to C50/60 of design method A according to EN 1992-4

Characteristic values of resistance to tension loads according to design method A				Performances					
				5			6		
d_b	Minimum bottom flange thickness:		[mm]	25	30	40	25	30	40
Tension loads: steel failure									
$N_{Rk,s}$	Characteristic resistance:		[kN]	16.4			25.2		
γ_{Ms}	Partial safety factor [1]:		[-]	1.4			1.4		
Tension loads: pull-out failure in concrete									
$N_{Rk,p}$	Characteristic resistance in hollow core concrete slab::		[kN]	[2]					
Tension loads: concrete cone and splitting failure									
h_{ef}	Effective anchorage depth:		[mm]	20	22	26.5	20	22	26
$k_{ucr,N}$	Factor for uncracked concrete:		[-]	11.0					
$s_{cr,N}$	Concrete cone failure	Spacing:	[mm]	3 x h_{ef}					
$c_{cr,N}$		Edge distance	[mm]	1,5 x h_{ef}					
$s_{cr,sp}$	Spitting failure	Spacing:	[mm]	80			90		
$c_{cr,sp}$		Edge distance	[mm]	40			45		
γ_{inst}	Installation safety factor:		[--]	1.2			1.2		

[1] In absence of other national regulations
[2] Pull out failure is not decisive

Table C6: Characteristic values to shear loads in precast, prestressed hollow core slabs C30/37 to C50/60 of design method A according to EN 1992-4

Characteristic values of resistance to shear loads according to design method A			Performances					
			5			6		
d_b	Minimum bottom flange thickness:	[mm]	25	30	40	25	30	40
Shear loads: steel failure without lever arm								
$V_{Rk,s}$	Characteristic resistance:	[kN]	8.2			12.5		
γ_{Ms}	Partial safety factor [1]:	[--]	1.5			1.5		
Shear loads: steel failure with lever arm								
$M^0_{Rk,s}$	Characteristic bending moment:	[Nm]	11.9			21.6		
γ_{Ms}	Partial safety factor [1]:	[-]	1.5			1.5		
Shear loads: concrete pryout failure								
k_8	Pryout factor:	[mm]	1.0					
γ_{ins}	Installation safety factor:	[--]	1.0					
Shear loads: concrete edge failure								
ℓ_f	Effective length of fastener under shear loads:	[mm]	20	22	26.5	20	22	26
d_{nom}	Outside fastener diameter:	[mm]	5			6		
γ_{inst}	Installation safety factor:	[--]	1.0					

1) In absence of other national regulations

Table C7: Characteristic values for resistance to fire in concrete

Characteristic values for resistance to fire in concrete				Performances	
				6	
h_{nom}	Nominal embedment depth:		[mm]	35	55
Steel failure					
$N_{Rk,s,fi}$	Characteristic tension resistance:	R30	[kN]	0.26	
		R60	[kN]	0.23	
		R90	[kN]	0.18	
		R120	[kN]	0.13	
$V_{Rk,s,fi}$	Characteristic shear resistance:	R30	[kN]	0.26	
		R60	[kN]	0.23	
		R90	[kN]	0.18	
		R120	[kN]	0.13	
$M^0_{Rk,s,fi}$	Characteristic bending resistance:	R30	[kN]	0.22	
		R60	[kN]	0.20	
		R90	[kN]	0.16	
		R120	[kN]	0.11	
Pull out failure					
$N_{Rk,p,fi}$	Characteristic resistance:	R30 - R120	[kN]	2)	
Concrete cone failure 1)					
$N_{Rk,p,fi}$	Characteristic resistance:	R30 - R90	[kN]	0.59	2.09
		R120	[kN]	0.47	1.67
$s_{cr.N,fi}$	Critical spacing:	R30 - R120	[mm]	4 x h_{ef}	
$s_{min,fi}$	Minimum spacing:	R30 - R120	[mm]	35	
$c_{cr.N,fi}$	Critical edge distance:	R30 - R120	[mm]	2 x h_{ef}	
$c_{min,fi}$	Minimum edge distance:	R30 - R120	[mm]	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	
Concrete pry out failure					
k_8	Pry-out factor:	R30 - R120	[mm]	1.0	

1) As a rule, splitting failure can be neglected since cracked concrete and reinforcement is assumed.
2) Pull out failure is not decisive
In absence of other national regulations the partial safety factor for resistance under fire exposure $\gamma_{m,fi}$ = 1,0 is recommended