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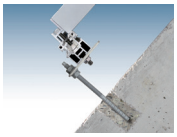
PATENTED CONCRETE SCREW ANCHORS - ETA-CE CERTIFIED

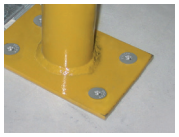
HXE 01

HXE 02

HXE 03

HXE 12





HXE 85

APPROVALS / CERTIFICATES

European Technical Assessment
(EAD) 330232-00-0601 and TR045
PART 1 and 3 and ANNEX E
OPTION 1: for cracked and
non-cracked concrete

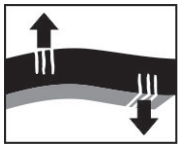
Fire resistance R30-R120
according to
Technical Report TR 020

Seismic assessment
Performance Category C1(Ø 10)
and C2-C1 (Ø 12; Ø 16) for use
under seismic action, according to
ETAG 001 - ANNEX E

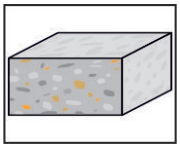
Tecfi anchor design software
Design and check
of the anchorages

European technical assessment[a] and ***Fire test report***
ETA-11/0336 / 2017-07-17
Authority: DIBt, Berlin
DoP available on www.tecfi.it/DoP

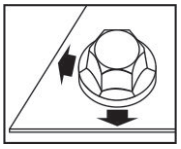
DETAILS AND ADVANTAGES



Tensile zone



For heavy duty fixings
in cracked and non-cracked
concrete of strength class
min C20/25 and max C50/60



Reduced edge distance
and spacing

- CrVI free Zinc Plated (in compliance with ROHS)
- Through fixing (in-place anchorage)
- Fixing installation independent of the torque control
- Waiting time for loading after installation is not required
- Reduced edge distance and spacing, in comparison with traditional expansion anchors
- Also suitable for lower than C20/25 concrete, or for heavy masonry or stones (all the above mentioned cases are NOT covered by ETA, so special tests are required before the installation)

[a] *Data for HXE with standard embedment depth is given in this section according ETA issue 2017-07-17*

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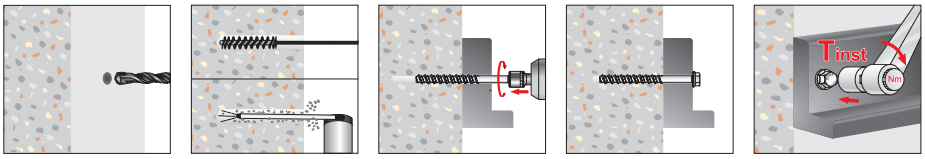
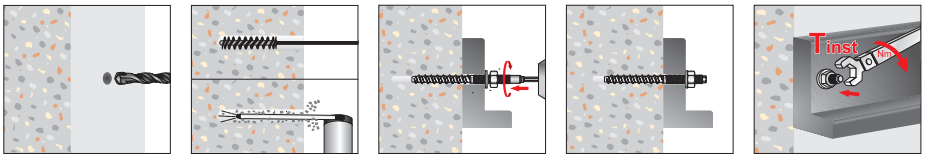
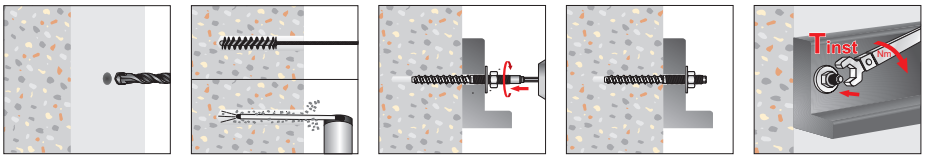
SEQUENCE OF INSTALLATION



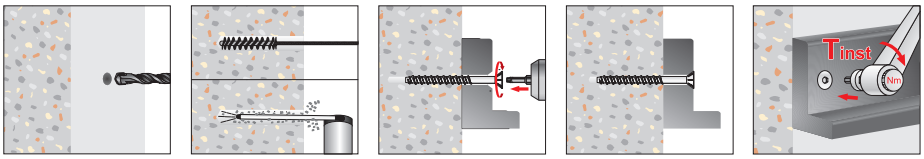
HXE 01



HXE 02 - HXE 85



HXE 12 - HXE 85



HXE 03

TECHNICAL DATA FOR HXE SCREWS

All data in this section applies to:
- Correct setting (See setting instruction)
- No edge distance and spacing influence
- Concrete as specified in the table
- Steel failure _____ (es. 52,7 Steel failure; 52,7 concrete failure)
- Minimum base material thickness
- Concrete C 20/25, $f_{ck,cube}$ = 25 N/mm²

Characteristic resistance			*Non-cracked concrete*				*Cracked concrete*			
			ø 8	***ø 10***	***ø 12***	***ø 16 (only HXE01)***	***ø 8***	***ø 10***	***ø 12***	***ø 16 (only HXE01)***
h_{nom}		[mm]	60	70	80	110	60	70	80	110
Tensile	N_{Rk}	[kN]	16	20	25	40	4	7,5	9	16
Shear	V_{Rk}	[kN]	9,4	20,1	32,4	56,9	9,4	15,1	32,4	56,42
Bending	M_{Rk}	[Nm]	19	44	83	216	19	44	83	216
Design resistance			***ø 8***	***ø 10***	***ø 12***	***ø 16 (only HXE01)***	***ø 8***	***ø 10***	***ø 12***	***ø 16 (only HXE01)***
Tensile	N_{Rd}	[kN]	7,62	11,11	11,91	19,05	1,90	4,17	4,29	7,62
Shear	V_{Rd}	[kN]	6,27	11,76	21,60	37,69	5,70	8,38	17,55	26,87
Bending	M_{Rd}	[Nm]	12,67	29,33	55,33	144	12,67	29,33	55,33	144
Recommended loads			***ø 8***	***ø 10***	***ø 12***	***ø 16 (only HXE01)***	***ø 8***	***ø 10***	***ø 12***	***ø 16 (only HXE01)***
Tensile	N_{Rec} a)	[kN]	5,44	7,94	8,51	13,61	1,36	2,98	3,06	5,44
Shear	V_{Rec} a)	[kN]	4,48	8,40	15,43	26,92	4,07	5,99	12,54	19,19
Bending	M_{Rec} a)	[Nm]	9,05	20,95	39,52	102,86	9,05	20,95	39,52	102,86

a) With overall partial safety factor for action γ = 1,4. The partial safety factors for action depend on the type of loading and shall be taken from national regulations

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BASE MATERIAL THICKNESS, ANCHOR SPACING AND EDGE DISTANCE

Anchor size			***ø 8***	***ø 10***	***ø 12***	***ø 16 (only HXE01)***
Nominal embedment depth	h_{nom}	[mm]	60	70	80	110
Minimum base material thickness non-cracked concrete	h_{min}	[mm]	100	110	130	170
Minimum spacing	s_{min}	[mm]	45	50	60	80
Minimum edge distance	c_{min}	[mm]	45	50	60	80
Critical spacing for concrete cone and splitting failure	$s_{cr,N}$	[mm]	144	168	192	255
	$s_{cr,sp}$		160	175	195	255
Critical edge distance for concrete cone and splitting failure	$c_{cr,N}$	[mm]	72	84	96	128
	$c_{cr,sp}$		80	85	95	130

SCREW LENGHT AND THICKNESS OF FIXTURE

HXE 01

Length of anchor (mm)	t_{fix} *(mm)*			
	ø 8	***ø 10***	***ø 12***	***ø 16***
80	20	10	-	-
90	-	-	10	-
100	40	30	-	-
110	-	-	30	-
120	60	50	-	-
130	-	-	50	20
140	80	70	-	-
150	-	-	70	40
160	-	90	-	-
180	-	-	-	70
190	-	-	110	-
210	-	-	130	-
250	-	-	170	-
290	-	-	210	-

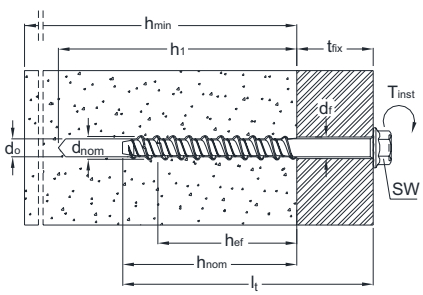
HXE 02 - HXE 12 - HXE 85

Length of anchor (mm)	t_{fix} *(mm)*		
	ø 8	***ø 10***	***ø 12***
90	10	-	-
105	-	10	-
118	-	-	10
120	40	-	-
125	-	30	-
138	-	-	30
160	80	-	-
195	-	100	-
208	-	-	100
248	-	-	140

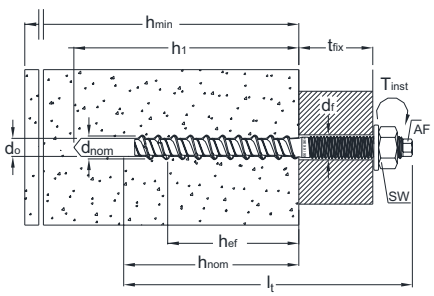
HXE 03

Length of anchor (mm)	t_{fix} *(mm)*		
	ø 8	***ø 10***	***ø 12***
70	10	-	-
80	-	10	-
100	40	30	20
120	-	-	40
140	80	-	-
160	-	90	-
180	-	-	100

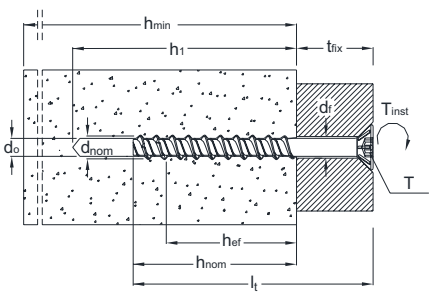
SETTING DETAILS



HXE 01



HXE 02 - HXE 12 - HXE 85



HXE 03

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Setting details			***ø 8***	***ø 10***	***ø 12***	***ø 16 (only HXE01)***
Nominal embedment depth	h_{nom}	[mm]	60	70	80	110
Nominal diameter of drill bit	d_o	[mm]	6	8	10	14
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	6,40	8,45	10,45	14,50
Depth of drill hole	$h_1 \geq$	[mm]	75	90 *(85 only HXE01)*	100	140
Diameter of countersunk head	d_h	[mm]	16	20	24	-
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	9	12	14	18
Effective anchorage depth	h_{ef}	[mm]	48	56	64	85

SIMPLIFIED DESIGN METHOD

Simplified version of the design method according ETAG 001, Annex C, Design resistance according data given in ETA-11/0336 issue 2017,07,17:

- Influence of concrete strength
- Influence of edge distance
- Influence of spacing
- Valid for a group of two anchors, (The method may also be applied for anchor groups with more than two anchors or more than one edge. The influencing factors must then be considered for each edge distance and spacing. The calculated design loads are then on the save side: They will be lower than the exact values according ETAG 001, Annex C, To avoid this, it is recommended to use TADS - TECFI anchor design software)

The design method is based on the following simplification:

- No different loads are acting on individual anchors (no eccentricity)

The values are valid for one anchor (single point fastening), multiple use applications are not part of this design method

For more complex fastening applications please use TADS - TECFI anchor design software

Design pull-out resistance $N_{Rd,p} = N^0_{Rd,p} \cdot f_B$			*Non-cracked concrete*				*Cracked concrete*			
			ø 8	***ø 10***	***ø 12***	***ø 16 (only HXE01)***	***ø 8***	***ø 10***	***ø 12***	***ø 16 (only HXE01)***
Tensile	N_{Rd}	[kN]	7,62	11,11	11,91	19,05	1,90	4,17	4,29	7,62

Influence of concrete strength **Concrete strength designation (EN 206)**	***C 20/25***	***C 25/30***	***C 30/37***	***C 35/45***	***C 40/50***	***C 45/55***	***C 50/60***
$f_B = (f_{ck,\,cube}/25N/mm^2)^{0,5}$ a)	1	1,1	1,22	1,34	1,41	1,48	1,55

a) fck,cube = concrete compressive strength, measured on cubes with 150 mm side length

Design concrete cone $N_{Rd,c} = N^0_{Rd,c} \cdot f_B \cdot f_{1,N} \cdot f_{2,N} \cdot f_{3,N} \cdot f_{re,N}$ **Design splitting resistance** * $N_{Rd,sp} = N^0_{Rd,c} \cdot f_B \cdot f_{1,sp} \cdot f_{2,sp} \cdot f_{3,sp} \cdot f_{re,N}$			*Non-cracked concrete*				*Cracked concrete*			
			ø 8	***ø 10***	***ø 12***	***ø 16 (only HXE01)***	***ø 8***	***ø 10***	***ø 12***	***ø 16 (only HXE01)***
Tensile	$N^0_{Rd,c}$	[kN]	8	11,76	12,31	18,85	5,70	8,38	8,78	13,43

INFLUENCE OF EDGE DISTANCE a)

$c/c_{cr,N}$ $c/c_{cr,sp}$	***0,55***	***0,6***	***0,65***	***0,7***	***0,75***	***0,8***	***0,85***	***0,9***	***0,95***	***1***
$f_{1,N} = 0,7 + 0,3 \cdot c/c_{cr,N} \leq 1$	-	0,88	0,90	0,91	0,93	0,94	0,96	0,97	0,99	1
$f_{1,sp} = 0,7 + 0,3 \cdot c/c_{cr,sp} \leq 1$	0,87									
$f_{2,N} = 0,5 \cdot (1 + c/c_{cr,N}) \leq 1$	-	0,8	0,83	0,85	0,88	0,90	0,93	0,95	0,98	1
$f_{2,sp} = 0,5 \cdot (1 + c/c_{cr,sp}) \leq 1$	0,78									

a) The edge distance shall not be smaller than the minimum edge distance c_{min} given in the table with the setting details, These influencing factors must be considered for every edge distance

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INFLUENCE OF ANCHOR SPACING [a)]

$s/s_{cr,N}$ $s/s_{cr,sp}$	***0,3***	***0,35***	***0,4***	***0,55***	***0,6***	***0,65***	***0,7***	***0,8***	***0,9***	***1***
$f_{3,N} = 0,5 \cdot (1 + s/s_{cr,N}) \leq 1$ $f_{3,sp} = 0,5 \cdot (1 + s/s_{cr,sp}) \leq 1$	0,79	0,81	0,82	0,87	0,88	0,90	0,91	0,94	0,97	1

a) The anchor spacing shall not be smaller than the minimum anchor spacing s_{min} given in the table with the setting details, This influencing factor must be considered for every anchor spacing

INFLUENCE OF BASE MATERIAL THICKNESS

h/h_{ef}	***2,0***	***2,2***	***2,4***	***2,6***	***2,8***	***3,0***	***3,2***	***3,4***	***3,6***	***≥ 3,68***
$f_{h,sp} = [h/(2 \cdot h_{ef})]^{2/3}$	1	1,07	1,13	1,19	1,25	1,31	1,37	1,42	1,48	1,5

INFLUENCE OF REINFORCEMENT

Mechanical properties		***ø 8***	***ø 10***	***ø 12***	***ø 16*** ***(only HXE01)***
h_{ef}	[mm]	48	56	64	85
$f_{re,N} = 0,5 + h_{ef}/200mm \leq 1$		0,74	0,78	0,82	0,93

a) This factor applies only for dense reinforcement, If in the area of anchorage there is reinforcement with a spacing ≥ 150 mm (any diameter) or with a diameter ≤ 10 mm and a spacing ≥ 100 mm, then a factor $f_{re,N} = 1$ may be applied