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-17/0471 of 19 June 2017

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	BOSSONG concrete screw CLS-CE, CLS-CE X4 and CLS-CE HCR
Product family to which the construction product belongs	Concrete screw of sizes 6, 8, 10, 12 and 14 mm for use in concrete
Manufacturer	BOSSONG S.p.A. via Enrico Fermi 49/51 24050 GRASSOBBIO (BG) ITALIEN
Manufacturing plant	Bossong S.p.A. Manufacturing plant 1
This European Technical Assessment contains	16 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 Assessment Document (EAD) 330232-00-0601 and 330011-00-0601

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Specific Part

1 Technical description of the product

The BOSSONG concrete screw CLS-CE, CLS-CE X4 and CLS-CE HCR is an anchor in size 6, 8, 10, 12 and 14 mm made of galvanised steel respectively steel with zinc flake coating, made of stainless or high corrosion resistant steel. 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.

Product and 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**
Product performance for static and quasi-static action	See Annex C 1 and C 2
Product performance for seismic category C1	See Annex C 4
Displacements under tension and shear loads	See Annex C 3

3.2 Safety in case of fire (BWR 2)

Essential characteristic	**Performance**
Reaction to fire	Anchorages satisfy requirements for Class A1
Resistance to fire	See Annex C 5

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

In accordance with European Assessment Documents EAD No. 330232-00-0601 and EAD No. 330011-00-0601, the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

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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 with Deutsches Institut für Bautechnik.

Issued in Berlin on 19 June 2017 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Tempel

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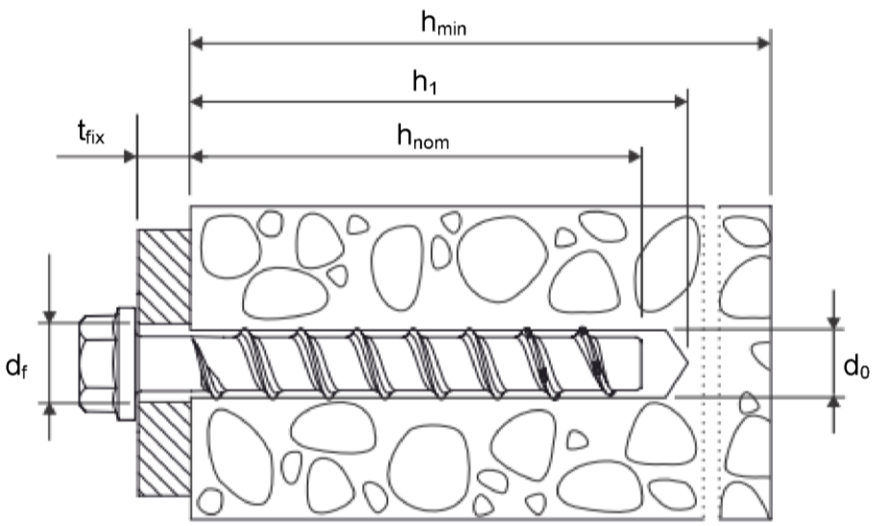
product and installed condition

BOSSONG concrete screw CLS-CE

CLS-CE
carbon steel
zinc plated / zinc-flake coating

CLS-CE X4
CLS-CE HCR
stainless steel A4 and HCR



d_0	=	nominal drill bit diameter
h_{nom}	=	nominal anchorage depth
h_1	=	depth of the drill hole
h_{min}	=	minimum thickness of member
t_{fix}	=	thickness of fixture
d_f	=	diameter of clearance hole in the fixture

BOSSONG concrete screw CLS-CE, CLS-CE X4 and CLS-CE HCR

Product description

Installed condition

Annex A 1

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Table A1: materials and variants

part	name	Material			
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	Concrete screw	CLS-CE	Steel EN 10263-4 galvanized acc. to EN ISO 4042 or zinc flake coating acc. to EN ISO 10683 (≥ 5µm)		
		CLS-CE X4	1.4401, 1.4404, 1.4571, 1.4578		
		CLS-CE HCR	1.4529		
					CLS-CE CLS-CE X4 CLS-CE HCR
		nominal characteristic steel yield strength	f_{yk}	[N/mm²]	560
		nominal characteristic steel ultimate strength	f_{uk}	[N/mm²]	700
		elongation at rupture	A_5	[%]	≤ 8


1) Anchor version with connection thread and hexagon socket drive
e.g. CLS-M10/HS CE 8x105


2) Anchor version with connection thread and hexagon drive
e.g. CLS-M10/HD CE 8x105


3) Anchor version with washer, hexagon head and TORX
e.g. CLS-H/TX CE 8x80


4) Anchor version with washer and hexagon head
e.g. CLS-H CE 8x80


5) Anchor version with hexagon head
e.g. CLS-H/NW CE 8x80


6) Anchor version with countersunk head
e.g. CLS-S CE 8x80


7) Anchor version with pan head
e.g. CLS-B CE 8x80


8) Anchor version with large pan head
e.g. CLS-BL CE 8x80


9) Anchor version with countersunk head and connection thread
e.g. CLS-M8/S CE 6x55


10) Anchor version with hexagon head and connection thread
e.g. CLS-M8/HH CE 6x55


11) Anchor version with internal thread and hexagon drive
e.g. CLS-IM8/M10 CE 6x55

BOSSONG concrete screw CLS-CE, CLS-CE X4 and CLS-CE HCR

Product descriptions

Materials and versions

Annex A 2

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Table A2: dimensions and markings

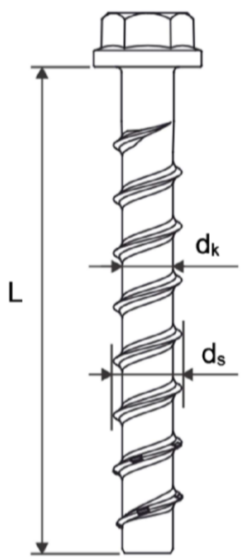
Anchor size CLS-CE		**6**		**8**			**10**		
Nominal embedment depth h_{nom} [mm]		h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
		40	55	45	55	65	55	75	85
Length of the anchor L ≤	[mm]	500							
Diameter of shaft d_k	[mm]	5,1		7,1			9,1		
Diameter of thread d_s	[mm]	7,5		10,6			12,6		

Anchor size CLS-CE		**12**			**14**		
Nominal embedment depth h_{nom} [mm]		h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
		65	85	100	75	100	115
Length of the anchor L ≤	[mm]	500					
Diameter of shaft d_k	[mm]	11,1			13,1		
Diameter of thread d_s	[mm]	14,6			16,6		

Marking:
CLS-CE
Anchor type: TSM
Anchor size: 10
Length of the anchor: 100

CLS-CE X4
Anchor type: TSM
Anchor size: 10
Length of the anchor: 100
Material: A4

CLS-CE HCR
Anchor type: TSM
Anchor size: 10
Length of the anchor: 100
Material: HCR



BOSSONG concrete screw CLS-CE, CLS-CE X4 and CLS-CE HCR

Product descriptions
Dimensions and markings

Annex A 3

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Intended use

Anchorages subject to:

- static and quasi-static loads, all sizes and all embedment depth,
- Used for anchorages with requirements related to resistance of fire, all sizes and all embedment depth,
- used for anchorages with seismic actions category C1, sizes 8-14 for maximum embedment depth h_{nom3}.

Base materials:

- reinforced and unreinforced concrete according to EN 206-1:2000,
- strength classes C20/25 to C50/60 according to EN 206-1:2000,
- cracked and uncracked concrete.

Use conditions (Environmental conditions):

- The anchor may only be used in dry internal conditions: All screw types,
- Structural subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition no particular aggressive conditions exits: screw types made of stainless steel with marking A4,
- Structural subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition if particular aggressive conditions exits: screw types made of stainless steel with marking HCR.
  Note: 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)

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,
- Anchorages under static or quasi-static actions, under seismic actions and under fire exposure are designed in accordance with FprEN 1992-4:2016 and EOTA Technical Report TR 055,
- The design of anchorages under shear load according to FprEN 1992-4:2016, Section 6.2.2 applies for all specified diameters d_f of clearance hole in the fixture in Annex B 2, Table B1.

Installation:

- Hammer drilling only.
- Fastener installation in accordance with the manufacturer's specifications using the appropriate tools carried out by appropriately qualified personnel.
- After installation further turning of the anchor is not possible. The head of the anchor is supported on the fixture and is not damaged.
- Adjustability according to Annex B 4: sizes 8-14, all anchorage depths.

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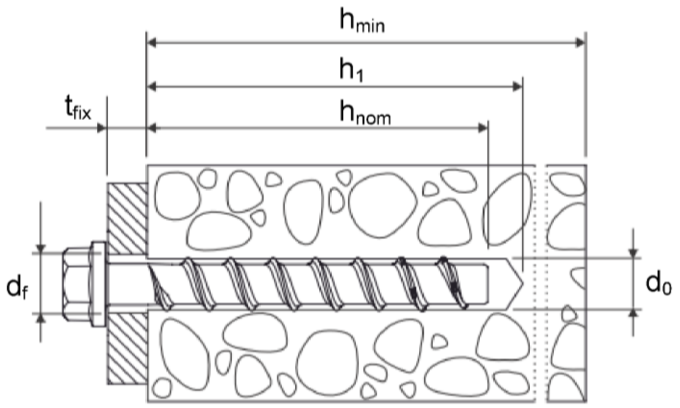
Table B1: Installation parameters

Anchor size CLS-CE			**6**		**8**			**10**		
Nominal embedment depth h_{nom} [mm]			h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
			40	**55**	**45**	**55**	**65**	**55**	**75**	**85**
Nominal drill bit diameter	d_0	[mm]	6		8			10		
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	6,40		8,45			10,45		
Depth of drill hole	$h_1 \geq$	[mm]	45	60	55	65	75	65	85	95
Diameter of clearing hole in the fix-ture	$d_f \leq$	[mm]	8		12			14		
Installation torque for version with connection thread	T_{inst}	[Nm]	10		20			40		
Recommended impact screw driver		[Nm]	Max. torque according to manufacturer's instructions							
			160		300			400		

Anchor size CLS-CE			**12**			**14**		
Nominal embedment depth h_{nom} [mm]			h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
			65	**85**	**100**	**75**	**100**	**115**
Nominal drill bit diameter	d_0	[mm]	12			14		
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	12,50			14,50		
Depth of drill hole	$h_1 \geq$	[mm]	75	95	110	85	110	125
Diameter of clearing hole in the fix-ture	$d_f \leq$	[mm]	16			18		
Installation torque for version with connection thread metrical	T_{inst}	[Nm]	60			80		
Recommended impact screw driver		[Nm]	Max. torque according to manufacturer's instructions					
			650			650		



BOSSONG concrete screw CLS-CE, CLS-CE X4 and CLS-CE HCR

Intended use

Installation parameters

Annex B 2

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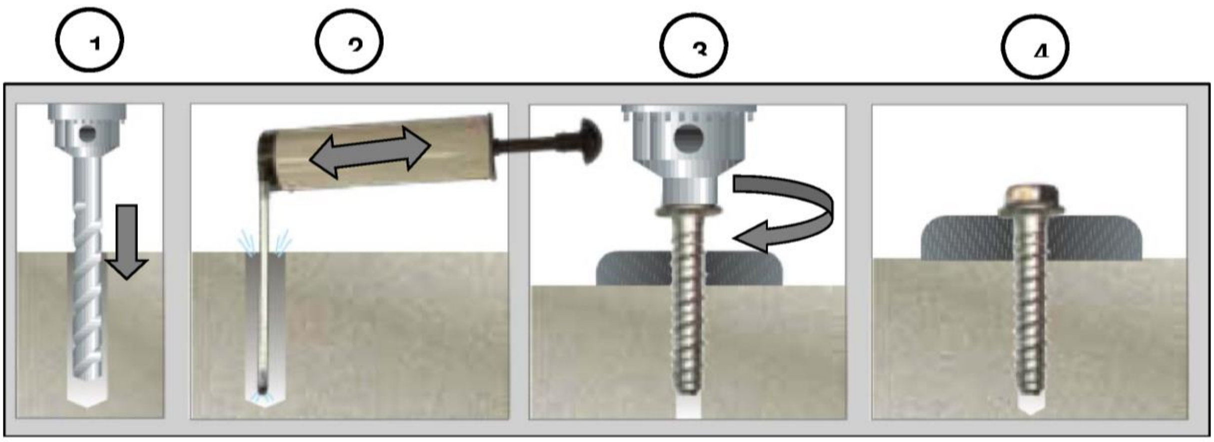
Table B2: Minimum thickness of member, minimum edge distance and minimum spacing

Anchor size CLS-CE			**6**		**8**			**10**		
Nominal embedment depth h_{nom} [mm]			h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
			40	**55**	**45**	**55**	**65**	**55**	**75**	**85**
Minimum thickness of member	h_{min}	[mm]	100		100		120	100	130	130
Minimum edge distance	c_{min}	[mm]	40		40	50		50		
Minimum spacing	s_{min}	[mm]	40		40	50		50		

Anchor size CLS-CE			**12**			**14**		
Nominal embedment depth h_{nom} [mm]			h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
			65	**85**	**100**	**75**	**100**	**115**
Minimum thickness of member	h_{min}	[mm]	120	130	150	130	150	170
Minimum edge distance	c_{min}	[mm]	50		70	50	70	
Minimum spacing	s_{min}	[mm]	50		70	50	70	

Installation instructions



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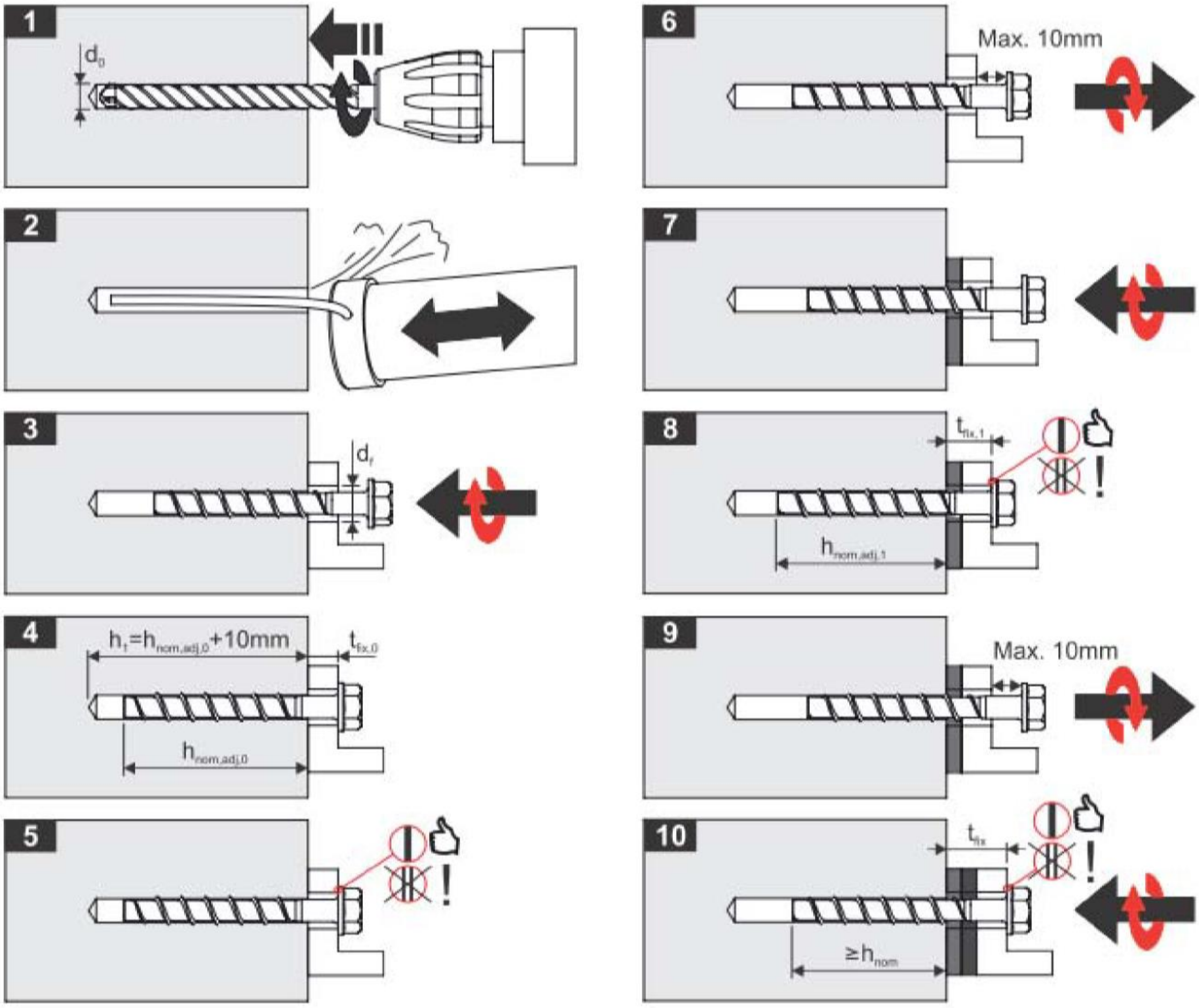
Installation instructions for adjustability



Installation instructions

The anchor may be adjusted maximum two times while the anchor may turn back at most 10 mm.
The total allowed thickness of shims added during the adjustment process is 10mm.
The final embedment depth after adjustment process must be equal or larger than h_{nom}.

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BOSSONG concrete screw CLS-CE, CLS-CE X4 and CLS-CE HCR	Annex B 4
Intended use Installation instruction for adjustability	

Table C1: Characteristic values for design method A for CLS-CE 6, 8 and 10

Anchor size CLS-CE			6		8			10		
Nominal embedment depth h_{nom} [mm]			h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
			40	55	45	55	65	55	75	85
steel failure for tension- and shear load										
characteristic load	$N_{Rk,s}$	[kN]	14,0		27,0			45,0		
	$V_{Rk,s}$	[kN]	7,0		13,5		17,0	22,5	34,0	
	k_7	[-]	0,8		0,8			0,8		
	$M^0_{Rk,s}$	[Nm]	10,9		26,0			56,0		
pull-out failure										
characteristic tension load in cracked concrete C20/25	$N_{Rk,p}$	[kN]	2,0	4,0	5,0	9,0	12,0	9,0	Pull-out failure is not decisive	
characteristic tension load in uncracked concrete C20/25	$N_{Rk,p}$	[kN]	4,0	9,0	7,5	12,0	16,0	12,0	20,0	26,0
increasing factor for $N_{Rk,p}$	ψ_C	C30/37	1,22							
		C40/50	1,41							
		C50/60	1,58							
concrete cone and splitting failure										
effective anchorage depth	h_{ef}	[mm]	31	44	35	43	52	43	60	68
factor k_1 — cracked	$k_{cr,N}$	[-]	7,7							
factor k_1 — uncracked	$k_{ucr,N}$	[-]	11,0							
concrete cone failure — spacing	$s_{cr,N}$	[mm]	3 x h_{ef}							
concrete cone failure — edge distance	$c_{cr,N}$	[mm]	1,5 x h_{ef}							
splitting failure — spacing	$s_{cr,Sp}$	[mm]	120	160	120	140	150	140	180	210
splitting failure — edge distance	$c_{cr,Sp}$	[mm]	60	80	60	70	75	70	90	105
installation safety factor	γ_{inst}	[-]	1,0							
concrete pry out failure (pry-out)										
factor	k_8	[-]	1,0						2,0	
concrete edge failure										
effective length of anchor	$l_f = h_{ef}$	[mm]	31	44	35	43	52	43	60	68
outside diameter of anchor	d_{nom}	[mm]	6		8			10		

BOSSONG concrete screw CLS-CE, CLS-CE X4 and CLS-CE HCR

Performances

Characteristic values for CLS-CE 6, 8 and 10

Annex C 1

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Table C2: Characteristic values for design method A for CLS-CE 12 and 14

Anchor size CLS-CE				12			14		
Nominal embedment depth h_{nom} [mm]				h_{nom1} 65	h_{nom2} 85	h_{nom3} 100	h_{nom1} 75	h_{nom2} 100	h_{nom3} 115
steel failure for tension- and shear load									
characteristic load		$N_{Rk,s}$	[kN]	67,0			94,0		
		$V_{Rk,s}$	[kN]	33,5	42,0		56,0		
		k_7	[-]	0,8			0,8		
		$M^0_{Rk,s}$	[Nm]	113,0			185,0		
pull-out failure									
characteristic tension load in cracked concrete C20/25		$N_{Rk,p}$	[kN]	12,0	Pull-out failure is not decisive		Pull-out failure is not decisive		
characteristic tension load in uncracked concrete C20/25		$N_{Rk,p}$	[kN]	16,0					
increasing factor for $N_{Rk,p}$		Ψ_C	C30/37	1,22					
			C40/50	1,41					
			C50/60	1,58					
concrete cone and splitting failure									
effective anchorage depth		h_{ef}	[mm]	50	67	80	58	79	92
factor k_1	cracked	$k_{cr,N}$	[-]	7,7					
	uncracked	$k_{ucr,N}$	[-]	11,0					
concrete cone failure	spacing	$s_{cr,N}$	[mm]	3 x h_{ef}					
	edge distance	$c_{cr,N}$	[mm]	1,5 x h_{ef}					
splitting failure	spacing	$s_{cr,Sp}$	[mm]	150	210	240	180	240	280
	edge distance	$c_{cr,Sp}$	[mm]	75	105	120	90	120	140
installation safety factor		γ_{inst}	[-]	1,0					
concrete pry out failure (pry-out)									
factor		k_8	[-]	1,0	2,0		1,0	2,0	
concrete edge failure									
effective length of anchor		$l_f = h_{ef}$	[mm]	50	67	80	58	79	92
outside diameter of anchor		d_{nom}	[mm]	12			14		

BOSSONG concrete screw CLS-CE, CLS-CE X4 and CLS-CE HCR

Performances

Characteristic values for CLS-CE 12 and 14

Annex C 2

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Table C3: Displacements under tension load for CLS-CE

Anchor size CLS-CE				6		8			10		
Nominal embedment depth h_{nom} [mm]				h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
				40	55	45	55	65	55	75	85
cracked concrete	tension load	N	[kN]	0,95	1,9	2,4	4,3	5,7	4,3	7,9	9,6
	displacement	δ_{N0}	[mm]	0,3	0,6	0,6	0,7	0,8	0,6	0,5	0,9
		δ_{∞}	[mm]	0,4	0,4	0,6	1,0	0,9	0,4	1,2	1,2
un-cracked concrete	tension load	N	[kN]	1,9	4,3	3,6	5,7	7,6	5,7	9,5	11,9
	displacement	δ_{N0}	[mm]	0,4	0,6	0,7	0,9	0,5	0,7	1,1	1,0
		$\delta_{N\infty}$	[mm]	0,4	0,4	0,6	1,0	0,9	0,4	1,2	1,2

Anchor size CLS-CE				12			14		
Nominal embedment depth h_{nom} [mm]				h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
				65	85	100	75	100	115
cracked concrete	tension load	N	[kN]	5,7	9,4	12,3	7,6	12,0	15,1
	displacement	δ_{N0}	[mm]	0,9	0,5	1,0	0,5	0,8	0,7
		δ_{∞}	[mm]	1,0	1,2	1,2	0,9	1,2	1,0
un-cracked concrete	tension load	N	[kN]	7,6	13,2	17,2	10,6	16,9	21,2
	displacement	δ_{N0}	[mm]	1,0	1,1	1,2	0,9	1,2	0,8
		$\delta_{N\infty}$	[mm]	1,0	1,2	1,2	0,9	1,2	1,0

Table C4 : Displacements under shear load for CLS-CE

Anchor size CLS-CE			6		8			10		
Nominal embedment depth h_{nom} [mm]			h_{nom1}	h_{nom2}	h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
			40	55	45	55	65	55	75	85
shear load	V	[kN]	3,3		8,6			16,2		
displacement	δ_{V0}	[mm]	1,55		2,7			2,7		
	$\delta_{V\infty}$	[mm]	3,10		4,1			4,3		

Anchor size CLS-CE			12			14		
Nominal embedment depth h_{nom} [mm]			h_{nom1}	h_{nom2}	h_{nom3}	h_{nom1}	h_{nom2}	h_{nom3}
			65	85	100	75	100	115
shear load	V	[kN]	20,0			30,5		
displacement	δ_{V0}	[mm]	4,0			3,1		
	$\delta_{V\infty}$	[mm]	6,0			4,7		

BOSSONG concrete screw CLS-CE, CLS-CE X4 and CLS-CE HCR

Performances

Displacements under tension and shear loads

Annex C 3

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Table C5: Characteristic values for seismic category C1

Anchor size CLS-CE			8	10	12	14
Nominal embedment depth h_{nom} [mm]			h_{nom3}			
			65	85	100	115
steel failure for tension- and shear load						
characteristic load	$N_{Rk,s,eq}$	[kN]	27,0	45,0	67,0	94,0
	$V_{Rk,s,eq}$	[kN]	8,5	15,3	21,0	22,4
pull-out failure						
characteristic tension load in cracked concrete C20/25	$N_{Rk,p,eq}$	[kN]	12,0	Pull-out failure is not decisive		
concrete cone failure						
effective anchorage depth	h_{ef}	[mm]	52	68	80	92
concrete cone failure – spacing	$s_{cr,N}$	[mm]	3 x h_{ef}			
concrete cone failure – edge distance	$c_{cr,N}$	[mm]	1,5 x h_{ef}			
installation safety factor	γ_{inst}	[-]	1,0			
concrete pry out failure (pry-out)						
factor	k_8	[-]	1,0	2,0		
concrete edge failure						
effective length of anchor	$l_f = h_{ef}$	[mm]	52	68	80	92
outside diameter of anchor	d_{nom}	[mm]	8	10	12	14

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Table C6: Characteristic values of resistance to fire exposure for CLS-CE

Anchor size CLS-CE				**6**		**8**			**10**			**12**			**14**		
Nominal embedment depth		h_{nom}		**1**	**2**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
			[mm]	40	55	45	55	65	55	75	85	65	85	100	75	100	115
steel failure for tension- and shear load ($F_{Rk,s,fi} = N_{Rk,s,fi} = V_{Rk,s,fi}$)																	
Fire resistance class																	
R30	Characteristic Resistance	$F_{Rk,s,fi30}$	[kN]	0,9		2,4			4,4			7,4			10,3		
R60		$F_{Rk,s,fi60}$	[kN]	0,8		1,7			3,3			5,8			8,2		
R90		$F_{Rk,s,fi90}$	[kN]	0,6		1,1			2,3			4,2			5,9		
R120		$F_{Rk,s,fi120}$	[kN]	0,4		0,7			1,7			3,4			4,8		
R30		$M^0_{Rks,,fi30}$	[Nm]	0,7		2,4			5,9			12,3			20,4		
R60		$M^0_{Rk,s,fi60}$	[Nm]	0,6		1,8			4,5			9,7			15,9		
R90		$M^0_{Rk,s,fi90}$	[Nm]	0,5		1,2			3,0			7,0			11,6		
R120		$M^0_{Rks,,fi120}$	[Nm]	0,3		0,9			2,3			5,7			9,4		
edge distance																	
R30 to R120		$c_{cr,fi}$	[mm]	$2 \times h_{ef}$													
spacing																	
R30 to R120		$s_{cr,fi}$	[mm]	$4 \times h_{ef}$													

The characteristic resistance to fire exposure for pull-out failure, concrete cone failure, concrete pry-out failure and concrete edge failure shall be calculated according to FprEN 1992-4. If no value for $N_{Rk,p}$ is given, in the equation D.4 and D.5 the value of $N^0_{Rk,c}$ shall be inserted instead of $N_{Rk,p}$.

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BOSSONG concrete screw CLS-CE, CLS-CE X4 and CLS-CE HCR

Performances

Characteristic values of resistance to fire exposure

Annex C 5