



## Declaration of Performance

No. DEA9900500

### Expandet C-Bolt

Intended use or uses of the construction product according to ETAG 001 parts 1 and 3		
Generic type	Concrete Screw	
Base material	Cracked & Un-cracked concrete C20/25 to C50/60 acc. to EN 206-1:2003	
A	Material	Galvanized carbon steel acc. EN10263
	Durability	Internal dry conditions
Loading	static, quasi-static	
Fire Reaction	A1 according to EN13501-1	
ETA-16/0403 issued by		INSTYTUT TECHNIKI BUDOWLANEJ (ITB)
On the basis of		ETAG 001, Part 1 & 3 – Used as EAD
Certificate of Constancy of Performance		INSTYTUT TECHNIKI BUDOWLANEJ (ITB)
ETA-16/0403		1488-CPR-0561/W
Under System		1

### Installation parameters

Anchor size			8			10			12			14		
Nominal drill bit diameter	$d_0$	mm	8			10			12			14		
Cutting diameter of drill bit	$d_{cut} \leq$	mm	8.45			10.45			12.5			14.5		
Depth of drill hole	$h_1 \geq$	mm	55	60	75	60	70	85	60	70	105	70	80	125
Nominal anchorage depth	$h_{nom}$	mm	45	50	65	50	60	75	50	60	95	60	70	115
Clearance hole in the fixture	$d_f \geq$	mm	12			14			16			18		
Installation torque	$T_{inst}$	N·m	30			40			50			60		

### Minimum thickness of concrete member, minimum spacing and minimum edge distance

Anchor size			8			10			12			14		
Minimum thickness of member	$h_{min}$	mm	110			110			130			150		
Minimum edge distance	$c_{min}$	mm	60			70			80			90		
Minimum spacing	$s_{min}$	mm	60			70			80			90		



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### Characteristic resistance for tension loads in cracked and non-cracked concrete C20/25 to C50/60 (design acc. to ETAG 001, Annex C, design method A)

Anchor size		8			10			12			14		
Nominal anchorage depth	$h_{nom}$ [mm]	45	50	65	50	60	75	50	60	95	60	70	115
<b>Steel failure</b>													
Characteristic resistance	$N_{Rk,s}$ [kN]	42,4			67,2			99,4			134,0		
Partial safety factor	$\gamma_{Ms}^{1)}$	1,4											
<b>Pullout failure</b>													
Characteristic resistance in non-cracked concrete C20/25	$N_{Rk,p}$ [kN]	6	6	12	6	9	16	6	9	25	9	12	35
Characteristic resistance in cracked concrete C20/25	$N_{Rk,p}$ [kN]	3	4	7,5	4	6	9	4	6	16	5	7,5	20
Increasing factors for $N_{Rk,p}$	C30/37	1,17			1,17			1,17			1,22		
	C40/50	1,32			1,32			1,32			1,41		
	C50/60	1,42			1,42			1,42			1,55		
Partial safety factor for cracked and non-cracked concrete	$\gamma_{Mp}^{1)}$	1,8											
<b>Concrete cone and splitting failure</b>													
Effective anchorage depth	$h_{ef}$ [mm]	30	34	47	33	42	54	33	42	71	40	48	86
Spacing	$s_{cr,N}$ [mm]	90	102	141	100	124	162	100	124	213	118	144	258
Edge distance	$c_{cr,N}$ [mm]	45	51	71	50	62	81	50	62	107	59	72	129
Spacing	$s_{cr,sp}$ [mm]	90	102	141	100	124	162	100	124	213	118	144	258
Edge distance	$c_{cr,sp}$ [mm]	45	51	71	50	62	81	50	62	107	59	72	129

<sup>1)</sup> in the absence of other national regulations

### Displacements under tension loads

Anchor size			8		10		12		14	
Non-cracked concrete C20/25 to C50/60	Tension load	N [kN]	5,8		8,5		12,6		15,6	
	Displacement	$\delta_{NO}$ [mm]	0,3		0,4		0,4		0,6	
		$\delta_{N\infty}$ [mm]	1,4		1,5		1,8		1,9	
Cracked concrete C20/25 to C50/60	Tension load	N [kN]	3,2		4,0		6,9		9,6	
	Displacement	$\delta_{NO}$ [mm]	0,4		0,5		0,5		0,6	
		$\delta_{N\infty}$ [mm]	2,0		2,0		2,0		2,0	



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**Characteristic resistance for shear loads in cracked and non-cracked concrete C20/25 to C50/60 (design acc. to ETAG 001, Annex C, design method A)**

Anchor size		8			10			12			14		
Nominal anchorage depth	$h_{nom}$ [mm]	45	50	65	50	60	75	50	60	95	60	70	115
<b>Steel failure without lever arm</b>													
Characteristic resistance	$V_{Rk,s}$ [kN]	17,0			26,9			39,8			53,5		
Partial safety factor	$\gamma_{Ms}^{1)}$	1,5											
<b>Steel failure with lever arm</b>													
Characteristic bending resistance	$M^0_{Rk,s}$ [Nm]	46,8			93,2			167,7			261,8		
Partial safety factor	$\gamma_{Ms}^{1)}$	1,5											
<b>Concrete pryout failure</b>													
Factor in equation (5.6) of ETAG 001 Annex C, 5.2.3.3	k	1,0						2,0					
<b>Concrete edge failure</b>													
Effective length of anchor	$l_f$ [mm]	30	34	47	33	42	54	33	42	71	40	48	86
Effective diameter of anchor	$d_{nom}$ [mm]	8			10			12			16		
Partial safety factor	$\gamma_{Mc}^{1)}$	1,5											

<sup>1)</sup> in the absence of other national regulations

### Displacements under shear loads

Anchor size			8		10		12		14	
Non-cracked and cracked concrete C20/25 to C50/60	Shear load	V [kN]	6,9		11		15		15,5	
	Displacement	$\delta_{v0}$ [mm]	1,5		1,7		2,0		2,7	
		$\delta_{v\infty}$ [mm]	2,3		2,6		3,0		4,1	



## Declaration of Performance

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### Characteristic resistance for tension loads under fire exposure in cracked and non-cracked concrete C20/25 to C50/60 (design acc. to TR020)

Anchor size			8	10	12	14
Nominal anchorage depth	$h_{nom}$ [mm]		65	75	95	115
<b>Steel failure</b>						
Characteristic resistance	R30	$N_{Rk,s,fi}$ [kN]	0,64	1,34	1,99	2,68
	R60	$N_{Rk,s,fi}$ [kN]	0,55	1,01	1,49	2,01
	R90	$N_{Rk,s,fi}$ [kN]	0,42	0,87	1,29	1,74
	R120	$N_{Rk,s,fi}$ [kN]	0,34	0,67	0,99	1,34
<b>Pullout failure</b>						
Characteristic resistance	R30	$N_{Rk,p,fi}$ [kN]	1,9	2,2	4,0	5,0
	R60	$N_{Rk,p,fi}$ [kN]	1,9	2,2	4,0	5,0
	R90	$N_{Rk,p,fi}$ [kN]	1,9	2,2	4,0	5,0
	R120	$N_{Rk,p,fi}$ [kN]	1,5	1,8	3,2	4,0
<b>Concrete cone failure</b>						
Characteristic resistance	R30	$N_{Rk,c,fi}$ [kN]	2,7	3,9	7,6	12,3
	R60	$N_{Rk,c,fi}$ [kN]	2,7	3,9	7,6	12,3
	R90	$N_{Rk,c,fi}$ [kN]	2,7	3,9	7,6	12,3
	R120	$N_{Rk,c,fi}$ [kN]	2,2	3,1	6,1	9,9
<b>Edge distance</b>						
	R30	$c_{cr,N,fi}$ [mm]	$2 \cdot h_{ef}$			
	R60	$c_{cr,N,fi}$ [mm]				
	R90	$c_{cr,N,fi}$ [mm]				
	R120	$c_{cr,N,fi}$ [mm]				
<b>Spacing</b>						
	R30	$s_{cr,N,fi}$ [mm]	$4 \cdot h_{ef}$			
	R60	$s_{cr,N,fi}$ [mm]				
	R90	$s_{cr,N,fi}$ [mm]				
	R120	$s_{cr,N,fi}$ [mm]				



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### Characteristic resistance for shear loads under fire exposure in in cracked and non-cracked concrete C20/25 to C50/60 (design acc. to TR020)

Anchor size			8	10	12	14
Nominal anchorage depth	$h_{nom}$ [mm]		65	75	95	115
<b>Steel failure without lever arm</b>						
Characteristic resistance	R30	$V_{Rk,s,fi}$ [kN]	0,64	1,34	1,99	2,68
	R60	$V_{Rk,s,fi}$ [kN]	0,55	1,01	1,49	2,01
	R90	$V_{Rk,s,fi}$ [kN]	0,42	0,87	1,29	1,74
	R120	$V_{Rk,s,fi}$ [kN]	0,34	0,67	0,99	1,34
<b>Steel failure with lever arm</b>						
Characteristic bending resistance	R30	$M^0_{Rk,s,fi}$ [Nm]	0,70	1,86	3,36	5,24
	R60	$M^0_{Rk,s,fi}$ [Nm]	0,61	1,40	2,52	3,93
	R90	$M^0_{Rk,s,fi}$ [Nm]	0,47	1,21	2,18	3,40
	R120	$M^0_{Rk,s,fi}$ [Nm]	0,37	0,93	1,68	2,62
<b>Concrete pry-out failure</b>						
	R30	k [-]	1	1	2	2
	R60	k [-]				
	R90	k [-]				
	R120	k [-]				
<b>Concrete edge failure</b>						
	R30	$V^0_{Rk,c,fi}$ [kN]	0,25 · $V^0_{Rk,c}$ *			
	R60	$V^0_{Rk,c,fi}$ [kN]				
	R90	$V^0_{Rk,c,fi}$ [kN]				
	R120	$V^0_{Rk,c,fi}$ [kN]	0,20 · $V^0_{Rk,c}$ *			
* with $V^0_{Rk,c}$ as initial value of the characteristic resistance in cracked concrete C20/25 under minimal temperature acc. to ETAG 001, Annex C						



# EXPANDET®



## Declaration of Performance

No. *DEA9900500*

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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 Expandet Screw Anchors A/S by:

Place and date of issue: Græsted, 15/09/2017

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Lars Mortensen, Head of Technical Department