CE Declaration of Performance

EXPANDET®

Svendebuen 2-6 DK-3230
Tlf.: +45 70227979
expandet@expandet.dk

No. DEA9900190

Expandet *Throughbolt EXG II* (Zinc plated, hot-dip galvanized, stainless steel A4 and HCR)

Intended use or uses of the construction product according to ETAG 001 parts 1 and 2		
Generic type		Torque controlled expansion anchor (Bolt type)
Base material		• Reinforced or unreinforced normal weight concrete according to EN 206-1:2000-12 • Strength classes C20/25 to C50/60 according to EN 206-1:2000-12
A	Material	Galvanised or hot-dip galvanised steel
	Durability	May only be used in structures subject to dry internal conditions.
B	Material	Stainless Steel (A-4)
	Durability	A-4 may be used in structures subject to dry internal conditions and also in structures subject to external atmospheric exposure (including industrial and marine environment), or exposure in permanently damp internal conditions, if no particular aggressive conditions exist. 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 extreme chemical pollution. (e. g. in desulphurization plants or road tunnels where de-icing materials are used).
C	Material	High corrosion resistant steel (HCR)
	Durability	HCR may be used in structures subject to dry internal conditions and also in structures subject to external atmospheric exposure, in permanently damp internal conditions or in other particular aggressive conditions. 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).
Loading		static, quasi-static
Fire Reaction		A1 according to EN13501-1
ETA - 10/0180 issued by		DEUTSCHES INSTITUT FÜR BAUTECHNIK (DIBt)
On the basis of		ETAG 001
Certificate of constancy of performance 143-CPR-M559-2/11.14 issued by		Technishe Universität Darmstadt Institut für Massivbau
Under System		1

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Installation data, steel zinc plated

Anchor size			M6	M8	M10	M12	M16	M20
Nominal drill hole diameter	d_0 =	[mm]	6	8	10	12	16	20
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	6,40	8,45	10,45	12,5	16,5	20,55
Installation torque (Throughbolt EXG II electroplated)	T_{inst} =	[Nm]	8	15	30	50	100	200
Installation torque (Throughbolt EXG II hot-dip galvanised)	T_{inst} =	[Nm]	-	15	30	40	90	120
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	7	9	12	14	18	22
Standard anchorage depth								
Depth of drill hole	$h_1 \geq$	[mm]	55	65	70	90	110	130
Embedment depth	$h_{nom} \geq$	[mm]	49	56	62	82	102	121
Effective anchorage depth	$h_{ef} \geq$	[mm]	40	44	48	65	82	100
Reduced anchorage depth								
Depth of drill hole	$h_{1,red} \geq$	[mm]	45	55	65	75	95	110
Embedment depth	$h_{nom,red} \geq$	[mm]	39	47	56	67	84	99
Effective anchorage depth	$h_{ef,red} \geq$	[mm]	30	35	42	50	64	78

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Installation data, stainless steel A4/HCR

Anchor size			M6	M8	M10	M12	M16	M20
Nominal drill hole diameter	d_0 =	[mm]	6	8	10	12	16	20
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	6,40	8,45	10,45	12,5	16,5	20,55
Installation torque	T_{inst} =	[Nm]	6	15	25	50	100	160
Diameter of clearance hole in the fixture	$d_f \leq$	[mm]	7	9	12	14	18	22
Standard anchorage depth								
Depth of drill hole	$h_1 \geq$	[mm]	55	65	70	90	110	130
Embedment depth	$h_{nom} \geq$	[mm]	49	56	62	81	99	121
Effective anchorage depth	$h_{ef} \geq$	[mm]	40	44	48	65	80	100
Reduced anchorage depth								
Depth of drill hole	$h_{1,red} \geq$	[mm]	45	55	65	75	95	110
Embedment depth	$h_{nom,red} \geq$	[mm]	39	47	56	66	83	99
Effective anchorage depth	$h_{ef,red} \geq$	[mm]	30	35	42	50	64	78

Minimum spacings and edge distances, steel zinc plated

Anchor size			M6	M8	M10	M12	M16	M20
Standard anchorage depth h_{ef}								
Minimum member thickness	h_{min}	[mm]	100	100	100	130	170	200
Minimum spacing	s_{min}	[mm]	35	40	55	75	90	105
Minimum edge distance	c_{min}	[mm]	40	45	65	90	105	125
Reduced anchorage depth $h_{ef,red}$								
Minimum member thickness	h_{min}	[mm]	80	80	100	100	130	160
Minimum spacing	s_{min}	[mm]	35	40	55	100	100	140
Minimum edge distance	c_{min}	[mm]	40	45	65	100	100	140

Minimum spacings and edge distances, stainless steel A4/HCR

Anchor size			M6	M8	M10	M12	M16	M20
Standard anchorage depth h_{ef}								
Minimum member thickness	h_{min}	[mm]	100	100	100	130	160	200
Minimum spacing	s_{min}	[mm]	35	35	45	60	80	100
	for $c \geq$	[mm]	40	65	70	100	120	150
Minimum edge distance	c_{min}	[mm]	35	45	55	70	80	100
	for $s \geq$	[mm]	60	110	80	100	140	180
Reduced anchorage depth $h_{ef,red}$								
Minimum member thickness	h_{min}	[mm]	80	80	100	100	130	160
Minimum spacing	s_{min}	[mm]	35	60	55	100	110	140
Minimum edge distance	c_{min}	[mm]	40	60	65	100	110	140

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Characteristic values for **tension loads, steel zinc plated** (Design method A according to ETAG 001, Annex C or CEN/TS 1992-4)

Anchor size			**M6**	**M8**	**M10**	**M12**	**M16**	**M20**
Installation safety factor	γ_2	[-]	1,0					
Steel failure								
Characteristic resistance	$N_{Rk,s}$	[kN]	8,7	15,3	26	35	65	107
Partial safety factor	γ_{Ms}	[-]	1,5				1,6	
Pullout								
Standard anchorage depth h_{ef}								
Characteristic resistance in non-cracked concrete C20/25	$N_{Rk,p}$	[kN]	9	12	16	1)	1)	1)
Reduced anchorage depth $h_{ef,red}$								
Characteristic resistance in non-cracked concrete C20/25	$N_{Rk,p}$	[kN]	6 2)	1) 2)	1)	1)	1)	1)
Increasing factor for $N_{Rk,p}$	ψ_C	[-]	$\left(\frac{f_{ck,cube}}{25}\right)^{0,5}$					
Splitting								
Standard anchorage depth h_{ef}								
Spacing	$s_{cr,sp}$	[mm]	160	220	240	330	410	500
Edge distance	$c_{cr,sp}$	[mm]	80	110	120	165	205	250
Reduced anchorage depth $h_{ef,red}$								
Spacing	$s_{cr,sp}$	[mm]	180	210	230	240	320	400
Edge distance	$c_{cr,sp}$	[mm]	90	105	115	120	160	200
Concrete cone failure								
Standard anchorage depth h_{ef}								
Effective anchorage depth	$h_{ef} \geq$	[mm]	40	44	48	65	82	100
Spacing	$s_{cr,N}$	[mm]	3 h_{ef}					
Edge distance	$c_{cr,N}$	[mm]	1,5 h_{ef}					
Reduced anchorage depth $h_{ef,red}$								
Effective anchorage depth	$h_{ef,red} \geq$	[mm]	30 2)	35 2)	42	50	64	78
Spacing	$s_{cr,N}$	[mm]	3 $h_{ef,red}$					

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Edge distance	$c_{cr,N}$	[mm]	1,5 $h_{ef,red}$
Factor for non-cracked concrete	k_{ucr}	[-]	10,1

[1] Pullout failure is not decisive

[2] Use restricted to anchorages of indeterminate structural components

Characteristic values for **tension loads, stainless steel A4/HCR**
(Design method A according to ETAG 001, Annex C or CEN/TS 1992-4)

Anchor size			**M6**	**M8**	**M10**	**M12**	**M16**	**M20**
Installation safety factor	γ_2	[-]	1,0					
Steel failure								
Characteristic resistance	$N_{Rk,s}$	[kN]	10	18	30	44	88	134
Partial safety factor	γ_{Ms}	[-]	1,50					1,68
Pullout								
Standard anchorage depth h_{ef}								
Characteristic resistance in non-cracked concrete C20/25	$N_{Rk,p}$	[kN]	7,5	12	16	25	[1]	[1]
Reduced anchorage depth $h_{ef,red}$								
Characteristic resistance in non-cracked concrete C20/25	$N_{Rk,p}$	[kN]	6 [2]	9 [2]	12	[1]	[1]	[1]
Splitting For the proof against splitting $N^0_{Rk,c}$ has to be replaced by $N^0_{Rk,sp}$.								
Standard anchorage depth h_{ef}								
The higher one of the decisive resistances of Case 1 and Case 2 is applicable.								
Case 1								
Characteristic resistance in non-cracked concrete C20/25	$N^0_{Rk,sp}$	[kN]	6	9	12	20	30	40
Spacing	$s_{cr,sp}$	[mm]	3 h_{ef}					
Edge distance	$c_{cr,sp}$	[mm]	1,5 h_{ef}					

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Declaration of Performance

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Case 2								
Characteristic resistance in non-cracked concrete C20/25	$N^0_{Rk,sp}$	[kN]	7,5	12	16	25	1)	1)
Spacing	$s_{cr,sp}$	[mm]	160	220	240	340	410	560
Edge distance	$c_{cr,sp}$	[mm]	80	110	120	170	205	280
Reduced anchorage depth $h_{ef,red}$								
Characteristic resistance in non-cracked concrete C20/25	$N^0_{Rk,sp}$	[kN]	6 2)	9 2)	12	1)	1)	1)
Spacing	$s_{cr,sp}$	[mm]	180	210	230	300	320	400
Edge distance	$c_{cr,sp}$	[mm]	90	105	115	150	160	200
Increasing factor for $N_{RK,p}$ and $N^0_{Rk,sp}$	ψ_C	[-]	$\left(\frac{f_{ck,cube}}{25}\right)^{0,5}$					
Concrete cone failure								
Standard anchorage depth								
Effective anchorage depth	h_{ef}	[mm]	40	44	48	65	80	100
Spacing	$s_{cr,N}$	[mm]	$3\ h_{ef}$					
Edge distance	$c_{cr,N}$	[mm]	$1{,}5\ h_{ef}$					
Reduced anchorage depth								
Effective anchorage depth	$h_{ef,red}$	[mm]	30 2)	35 2)	42	50	64	78
Spacing	$s_{cr,N}$	[mm]	$3\ h_{ef}$					
Edge distance	$c_{cr,N}$	[mm]	$1{,}5\ h_{ef}$					
Factor for non-cracked concrete	k_{ucr}	[-]	10,1					

1) Pullout failure is not decisive.

2) Use restricted to anchorages of indeterminate structural components.

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Characteristic values for **shear loads, steel zinc plated** (Design method A according to ETAG 001, Annex C or CEN/TS 1992-4)

Anchor size			**M6**	**M8**	**M10**	**M12**	**M16**	**M20**
Installation safety factor	γ_2	[-]	1,0					
Steel failure without lever arm								
Characteristic shear resistance	$V_{Rk.s}$	[kN]	5	11	17	25	44	69
Factor for ductility	k_2	[-]	1,0					
Steel failure with lever arm								
Characteristic resistance	$M^0_{Rk.s}$	[Nm]	9	23	45	78	186	363
Partial safety factor for $V_{Rk,s}$ and $M^0_{Rk,s}$	γ_{Ms}	[-]	1,25				1,33	
Concrete pryout failure								
k-factor for standard anchorage depth h_{ef}	$k_{(3)}$	[-]	1,0	1,0	1,0	2,0	2,0	2,0
k-factor for reduced anchorage depth $h_{ef,red}$	$k_{(3)}$	[-]	1,0 [1)]	1,0 [1)]	1,0	1,0	2,0	2,0
Concrete edge failure								
Effective length of anchor in shear loading for h_{ef}	l_f	[mm]	40	44	48	65	82	100
Effective length of anchor in shear loading for $h_{ef,red}$	$l_{f,red}$	[mm]	30 [1)]	35 [1)]	42	50	64	78
Outside diameter of anchor	d_{nom}	[mm]	6	8	10	12	16	20

[1)] Use restricted to anchorages of indeterminate structural components

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Characteristic values for **shear loads, stainless steel A4/HCR** (Design method A according to ETAG 001, Annex C or CEN/TS 1992-4)

Anchor Size			**M6**	**M8**	**M10**	**M12**	**M16**	**M20**
Installation safety factor	γ_2	[-]	1,0					
Steel failure without lever arm								
Characteristic shear resistance	$V_{Rk,s}$	[kN]	7	12	19	27	50	86
Factor for ductility	k_2	[-]	1,0					
Steel failure with lever arm								
Characteristic bending moment	$M^0_{Rk,s}$	[Nm]	10	24	49	85	199	454
Partial safety factor for $V_{Rk,s}$ and $M^0_{Rk,s}$	γ_{Ms}	[-]	1,25					1,4
Concrete pryout failure								
k-factor for standard anchorage depth h_{ef}	$k_{(3)}$	[-]	1,0	1,0	1,0	2,0	2,0	2,0
k-factor for reduced anchorage depth $h_{ef,red}$	$k_{(3)}$	[-]	1,0 [1)]	1,0 [1)]	1,0	1,0	2,0	2,0
Concrete edge failure								
Effective length of anchor in shear loading with h_{ef}	l_f	[mm]	40	44	48	65	80	100
Effective length of anchor in shear loading with $h_{ef,red}$	$l_{f,red}$	[mm]	30 [1)]	35 [1)]	42	50	64	78
Outside diameter of anchor	d_{nom}	[mm]	6	8	10	12	16	20

[1)] Use restricted to anchorages of indeterminate structural components

Displacements under **tension loads, steel zinc plated**

Anchor size			**M6**	**M8**	**M10**	**M12**	**M16**	**M20**
Standard anchorage depth								
Tension load	N	[kN]	4,3	5,8	7,6	11,9	16,7	23,8
Displacement	δ_{N0}	[mm]	0,4	0,5				
	$\delta_{N\infty}$	[mm]	0,7	2,3				
Reduced anchorage depth								
Tension load	N	[kN]	2,9	5,0	6,5	8,5	12,3	16,6
Displacement	δ_{N0}	[mm]	0,3	0,4				
	$\delta_{N\infty}$	[mm]	0,6	1,8				

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Displacements under **tension loads, stainless steel A4/HCR**

Anchor size			**M6**	**M8**	**M10**	**M12**	**M16**	**M20**
Standard anchorage depth								
Tension load	N	[kN]	3,6	5,7	7,6	11,9	17,2	24,0
Displacement	δ_{N0}	[mm]	0,7	0,9	0,5	0,6	0,9	2,1
	$\delta_{N\infty}$	[mm]			1,8			4,2
Reduced anchorage depth								
Tension load	N	[kN]	2,9	4,3	5,7	8,5	12,3	16,6
Displacement	δ_{N0}	[mm]	0,4	0,7	0,4	0,4	0,6	1,5
	$\delta_{N\infty}$	[mm]			1,3			2,9

Displacements under **shear loads, steel zinc plated**

Anchor size			**M6**	**M8**	**M10**	**M12**	**M16**	**M20**
Shear load	V	[kN]	2,9	6,3	9,7	14,3	23,6	37,0
Displacement	δ_{V0}	[mm]	1,2	1,5	1,6	2,6	3,1	4,4
	$\delta_{V\infty}$	[mm]	2,4	2,2	2,4	3,9	4,6	6,6

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Displacements under **shear loads, stainless steel A4/HCR**

Anchor Size			**M6**	**M8**	**M10**	**M12**	**M16**	**M20**
Shear load	V	[kN]	4,0	6,9	10,9	15,4	28,6	43,7
Displacement	δ_{V0}	[mm]	1,1	2,0	1,2	2,0	2,2	2,1
	$\delta_{V\infty}$	[mm]	1,7	3,0	1,8	3,0	3,3	3,2

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, 18/01/2015

Peter van der Wel, Managing Director