m2 and m2-C Throughbolt

Torque-controlled expansion anchor for use in non-cracked concrete with GreenTec alloy layer based on zinc-nickel foundation

Option 7

1 SPECIFICATIONS OF INTENDED USE

Anchorages subject to:
-Static and quasi-static loading

Base materials:
-Non-cracked concrete strength classes C20/25 to C50/60 according to EN 206-1:2000

Approvals:
-European Technical Approval option 7 for non-cracked concrete
-Corrosion test acc. to DIN EN ISO 9227 NSS
(GreenTec coating; 1000 Hours salt spray test)

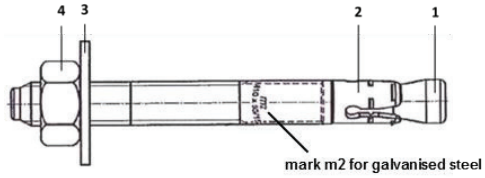
Reaction to fire:
-Anchorages satisfy requirements for Class A1

Resistance to fire:
-No performance assessed

Installation:
-Hole drilling by hammer drilling only
-Cleaning the holes
-The fastener may only be set once
-For further information see ETA-05/0070 Annex B 1 and B3

1.1 DESIGNATION OF ANCHOR PARTS AND MATERIALS

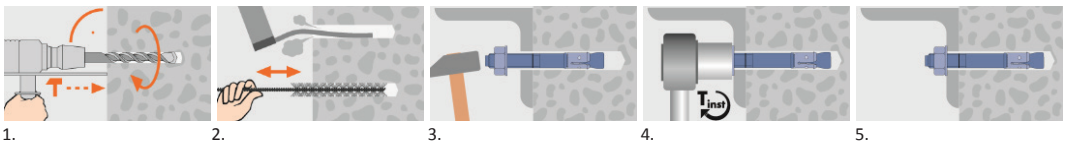
Part	Designation		Material	Steel, Tensile strength	Protection
1	Bolt	L ≤ 185	cold forged steel EN 10263-2:2001	800 N/mm2 in the neck, 760 in the thead	electroplated ≥ 5 µm
		L > 185	free-cutting steel EN 10087:1998	800 N/mm2	electroplated ≥ 5 µm
2	Expansion sleeve	L ≤ 185	cold rolled steel strip EN 10139:1997	500 - 700 N/mm2	electroplated ≥ 5 µm
		L > 185	cold rolled stainless steel strip EN 10088-2:2014	500 - 700 N/mm2	no coating
3	Washer		cold rolled steel strip EN 10139:1997	600 [N/mm2]	electroplated ≥ 5 µm
4	Hexagonal nut		steel, property class 8, DIN 934:1987-10	800 [N/mm2]	electroplated ≥ 5 µm



1.2 INSTALATION INSTRUCTIONS

1. Drilling the hole
2. Cleaning the hole
3. Fixing plug and building material
4. Tightening with the torque wrench and predetermined value of T_{inst}
5. Tightened fixation

Graphic installation instruction for m2



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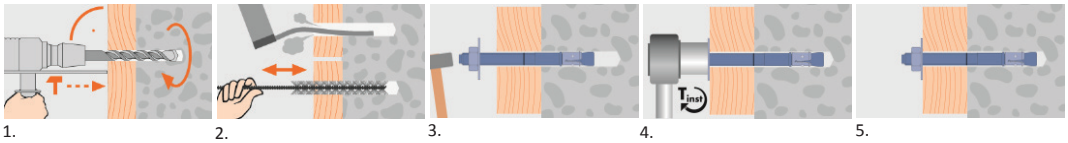
Graphic installation instruction for m2-C



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2 PRODUCT INFORMATION

m2 Throughbolt with washer DIN 125A
with GreenTec corrosion resistance

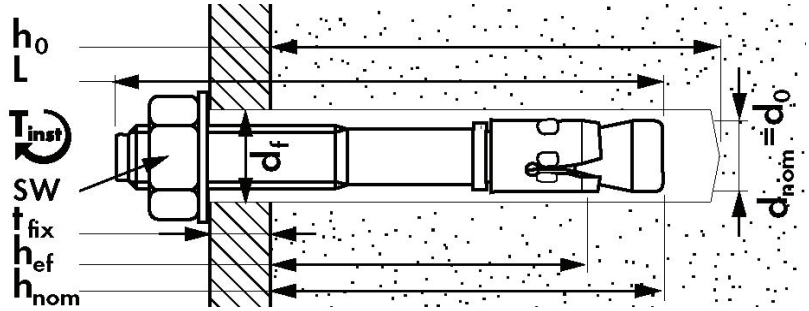
Article code	Dimensions [mm]	Length [mm] L	Length of screw in building material [mm] h_{nom}	Usable length [mm] t_{fix}	Effective anchorage depth [mm] h_{ef}
3200606	M6 x 65 / 10	65	46.9	10	40
3200608	M6 x 80 / 25	80	46.9	25	40
3200808	M8 x 80 / 10	80	58.5	10	50
3200885	M8 x 85 / 15	85	58.5	15	50
3200809	M8 x 95 / 25	95	58.5	25	50
3200811	M8 x 115 / 45	115	58.5	45	50
3200816	M8 x 165 / 95	165	58.5	95	50
3201006	M10 x 60 / 5	60	43.8	5	33
3201009	M10 x 95 / 15	95	68.8	15	58
3201011	M10 x 110 / 30	110	68.8	30	58
3201012	M10 x 125 / 45	125	68.8	45	58
3201014	M10 x 140 / 60	140	68.8	60	58
3201016	M10 x 160 / 80	160	68.8	80	58
3201018	M10 x 180 / 100	180	68.8	100	58
3201211	M12 x 110 / 15	110	79.6	15	68
3201212	M12 x 125 / 30	125	79.6	30	68
3201214	M12 x 145 / 50	145	79.6	50	68
3201216	M12 x 165 / 70	165	79.6	70	68
3201218	M12 x 185 / 90	185	79.6	90	68
3201613	M16 x 130 / 15	130	96.4	15	80
3201614	M16 x 145 / 30	145	96.4	30	80
3201616	M16 x 160 / 45	160	96.4	45	80
3201618	M16 x 180 / 65	180	96.4	65	80
[1)]1452013	M20 x 130 / 10	130	94	10	76
[1)]1452016	M20 x 160 / 30	160	118	30	100

[1)] No GreenTec corrosion protection

m2-C Throughbolt with big washer DIN 9021
zinc plated > 5µm

Article code	Dimensions [mm]	Length [mm] L	Length of screw in building material [mm] h_{nom}	Usable length [mm] t_{fix}	Effective anchorage depth [mm] h_{ef}
3210808	M8 x 80 / 10	80	58.5	10	50
3210816	M8 x 165 / 95	165	58.5	95	50
3211009	M10 x 95 / 15	95	68.8	15	58
3211011	M10 x 110 / 30	110	68.8	30	58
3211012	M10 x 125 / 45	125	68.8	45	58
3211016	M10 x 160 / 80	160	68.8	80	58
3211018	M10 x 180 / 100	180	68.8	100	58
3211211	M12 x 110 / 15	110	79.6	15	68
3211212	M12 x 125 / 30	125	79.6	30	68
3211216	M12 x 165 / 70	165	79.6	70	68
3211218	M12 x 185 / 90	185	79.6	90	68
1471220	M12 x 200 / 105	200	79.6	105	68
1471222	M12 x 220 / 125	220	79.6	125	68
1471224	M12 x 240 / 145	240	79.6	145	68
1471226	M12 x 260 / 165	260	79.6	165	68
1471228	M12 x 280 / 185	280	79.6	185	68
1471230	M12 x 300 / 205	300	79.6	205	68
1471233	M12 x 330 / 235	330	79.6	235	68
1471236	M12 x 360 / 265	360	79.6	265	68
1471622	M16 x 220 / 105	220	96.4	105	80
1471624	M16 x 240 / 125	240	96.4	125	80
1471626	M16 x 260 / 145	260	96.4	145	80
1471628	M16 x 280 / 165	280	96.4	165	80
1471630	M16 x 300 / 185	300	96.4	185	80
1471633	M16 x 330 / 215	330	96.4	215	80
1471644	M16 x 440 / 325	440	96.4	325	80

3 INSTALATION DATA m2 and m2-C



FASTENER SIZE m2 and m2-C			M6	M8	M10x60	M10	M12		M16		M20
Fastener length	L	[mm]					≤ 185	> 185	≤ 185	> 185	
Anchor/Thread diameter	d	[mm]	6	8	10		12		16		20
Diameter of clearence hole in fixture	d_f	[mm]	7	9	12		14		18		22
Spanner	SW	[mm]	10	13	17		19		24		30
INSTALLATION PARAMETERS											
Drill hole diameter in substrate	d_0	[mm]	6	8	10		12		16		20
Max. cutting diameter (max. drill diameter)	$d_{cut,max}$	[mm]	6.4	8.45	10.45		12.5		16.5		20.55
Dept of drill hole in substrate	h_1	[mm]	60	70	50	80	90		110		130
Effective anchorage depth	h_{ef}	[mm]	40	50	33	58	68		80		100
Installation torque	T_{inst}	[Nm]	5	15	30		50		100		200
Minimum thickness of concrete memeber	h_{min}	[mm]	100	100	120	120	140		160		200
Minimum edge distane	c_{min}	[mm]	40	45*	50*	50*	80*	150	130	240	300
Corresponding spacing	s ≥	[mm]	80	45*	50*	50*	75*	210	190	240	350
Minimum spacing	s_{min}	[mm]	40	45	50	50	75	110	100	120	200
Corresponding edge distance	c ≥	[mm]	70	45	50	50	80	200	190	320	400

* Not decisive in ETA-05/0070

3.1 BASIC PERFORMANCE DATA

Basic performance data for m2 and m2-C in non-cracked concrete C20/25 without influence of edge distance, spacing and splitting failure due to dimensions of concrete member

FASTENER SIZE m2 and m2-C			M6	M8	M10x60	M10	M12		M16		M20
Fastener length	L	[mm]					≤ 185	> 185	≤ 185	> 185	
Effective anchorage depth	h_{ef}	[mm]	40	50	33	58	68		80		100
CHARACTERISTIC RESISTANCE											
Tension load	N_{Rk}	[kN]	7.50	12.00	9.57[2)]	16.00	24.00	24.00	30.00	30.00	50.00
Shear load	V_{Rk}	[kN]	4.50[1)]	11.00[1)]	9.57[3)]	18.00[1)]	24.00[1)]	28.00[1)]	33.00[1)]	33.00[1)]	51.00[1)]
Bending moment, steel failure	$M^0_{Rk,s}$	[Nm]	12.0	27.0	56.8	56.8	91.6	104.7	249.0	249.0	486.2
DESIGN RESISTANCE											
Tension load	N_{Rd}	[kN]	5.00	8.00	6.40[2)]	10.67	16.00	13.33	16.67	16.67	27.78
Shear load	V_{Rd}	[kN]	3.00[1)]	8.53[1)]	6.38[3)]	14.17[1)]	19.20[1)]	21.05[1)]	22.00[1)]	22.00[1)]	34.00[1)]
Bending moment, steel failure	$M^0_{Rd,s}$	[Nm]	8.0	20.9	44.7	44.7	73.3	78.7	166.0	166.0	324.1
RECOMMENDED RESISTANCE											
Tension load, partial safety factor 1,4	N_{rec}	[kN]	3.57	5.71	4.56[2)]	7.62	11.43	9.52	11.91	11.91	19.84
Shear load, partial safety factor 1,4	V_{rec}	[kN]	2.14[1)]	6.09[1)]	4.56[3)]	10.12[1)]	13.71[1)]	15.04[1)]	15.71[1)]	15.71[1)]	24.29[1)]
Bending moment, steel fail. (safety fac. 1,4)	$M^0_{rec,s}$	[Nm]	5.7	15.0	31.9	31.9	52.3	56.2	118.6	118.6	231.5

[1)] Steel failure

[2)] Concrete cone failure

[3)] Pry-out failure

4 INCREASING DESIGN RESISTANCE FOR CONCRETE STRENGTH CLASSES

Increasing resistance to tension and shear load for concrete strength classes

FASTENER SIZE m2 and m2-C			M6	M8	M10x60	M10	M12		M16		M20
Fastener length	L	[mm]					≤ 185	> 185	≤ 185	> 185	
INCREASING DESIGN RESISTANCE FOR CONCRETE STRENGTH CLASSES											
Tension load, N_{Rd}	C20/25	[kN]	5.00	8.00	6.40	10.67	16.00	13.33	16.67	16.67	27.78
	C25/30		5.38	8.61	6.99	11.48	17.21	14.34	17.93	17.93	29.88
	C30/37		5.85	9.36	7.76	12.48	18.72	15.60	19.50	19.50	32.50
	C35/45		6.33	10.12	8.56	13.50	20.25	16.87	21.10	21.10	35.15
	C40/50		6.60	10.56	9.03	14.08	21.12	17.60	22.00	22.00	36.67
	C45/55		6.86	10.97	9.47	14.63	21.94	18.28	22.86	22.86	38.10
	C50/60		7.10	11.36	9.89	15.15	22.72	18.93	23.67	23.67	39.45
Shear load, V_{Rd}	C20/25	[kN]	3.00	8.53	6.40	14.17	19.20	21.05	22.00	22.00	34.00
	C25/30				6.99						
	C30/37				7.76						
	C35/45				8.56						
	C40/50				9.03						
	C45/55				9.47						
	C50/60				9.89						

Increasing resistance for pull-out failure based on ETA-05/0070

For minimum spacing, minimum edge distance and thickness of concrete member the above described loads have to be reduced.

5 REDUCE DESIGN RESISTANCE TO TENSION LOADS FOR LIMITED EDGE AND SPACING DISTANCE

REQUIRED PROOFS FOR DESIGN TENSION RESISTANCE FOLLOWING ETAG 001 Annex C:

1. $N_{Rd} = \min(N_{Rd,s}; N_{Rd,p}; N_{Rd,c}; N_{Rd,sp})$
2. Reduction design resistance to tension loads is only valid for one limited edge distance or one limited spacing
3. It may be assumed that splitting failure will not occur, if the edge distance in all directions is c ≥ 1.2 $c_{cr,sp}$ and the member depth is h ≥ 2 h_{ef} (see ETA ETA-05/0070 and ETAG 001 Annex C)

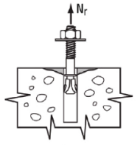
5.1 Steel failure $N_{Rd,s}$

Design resistance of one anchor in case of steel failure.

$N_{Rd,s} = N_{Rk,s} / \gamma_{Ms}$

FASTENER SIZE m2 and m2-C			M6	M8	M10x60	M10	M12		M16		M20
Fastener length	L	[mm]					≤ 185	> 185	≤ 185	> 185	
STEEL FAILURE											
Tension load γ_{Ms} = 1,4	$N_{Rd,s}$	[kN]	7.14	13.57	23.57	23.57	30.71	30.71	55.00	55.00	88.57

5.2 Pull-out failure $N_{Rd,p}$



Design resistance in case of failure of one anchor by pull-out.

$N_{Rd,p} = N_{Rk,p} / \gamma_{Mp}$

FASTENER SIZE m2 and m2-C			M6	M8	M10x60	M10	M12		M16		M20
Fastener length	L	[mm]					≤ 185	> 185	≤ 185	> 185	
PULL-OUT FAILURE, NON-CRACKED CONCRETE C20/25											
Tension load γ_{Mp} = 1,5	$N_{Rd,p}$	[kN]	5.00	8.00	n.d.[1)]	10.67	16.00	16.00*	20.00*	20.00*	33.33*

*Partial safety factor γ_{Mp} = 1.8

1)Pull-out failure not decisive in ETA-05/0070

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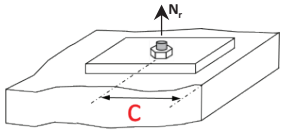
5.3 Concrete cone failure and splitting failure in case of one limited edge



5.3.1 Design tension resistance of one anchor in case of concrete cone failure ($N_{Rd,c}$) with one limited edge

Reduction factor $\Psi edge = (Ac,N/A^0c,N) \cdot \Psi s,N$ for concrete cone failure is only valid for one limited edge and without influence of spacing

$N_{Rd,c} = N^0_{Rd,c} \cdot \Psi edge$; $N^0_{Rd,c} = N^0_{Rk,c} / \gamma_{Mc}$

FASTENER SIZE m2 and m2-C			M6	M8	M10x60	M10	M12		M16		M20
Fastener length	L	[mm]					≤ 185	> 185	≤ 185	> 185	
Minimum thickness of concrete memeber	h_{min}	[mm]	100	100	120	120	140		160		200
CONCRETE CONE FAILURE IN CASE OF ONE LIMITED EDGE, NON-CRACKED CONCRETE C20/25											
Tension load $\gamma_{Mc} = 1,5$	$N^0_{Rd,c}$	[kN]	8.52	11.90	6.38	14.87	18.88	15.73*	20.07*	20.07*	28.06*
			x	x	x	x	x	x	x	x	x
			Ψ_{edge}	Ψ_{edge}	Ψ_{edge}	Ψ_{edge}	Ψ_{edge}	Ψ_{edge}	Ψ_{edge}	Ψ_{edge}	Ψ_{edge}
Edge distance [mm]	40		0.75								
	45		0.81	0.70							
	50		0.87	0.75	1.00	0.69					
	60		1.00	0.85	1.00	0.76					
	70		1.00	0.95	1.00	0.85					
	80		1.00	1.00	1.00	0.93	0.83				
	90		1.00	1.00	1.00	1.00	0.91				
	100		1.00	1.00	1.00	1.00	0.98				
	110		1.00	1.00	1.00	1.00	1.00				
	120		1.00	1.00	1.00	1.00	1.00				
	130		1.00	1.00	1.00	1.00	1.00		1.00		
	140		1.00	1.00	1.00	1.00	1.00		1.00		
	150		1.00	1.00	1.00	1.00	1.00	1.00	1.00		
	200		1.00	1.00	1.00	1.00	1.00	1.00	1.00		
	240		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
	300		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

*Partial safety factor $\gamma_{Mc} = 1.8$

5.3.2 Design tension resistance of one anchor in case of splitting failure ($N_{Rd,sp}$) with one limited edge

Reduction factor $\Psi edge = (Ac,N/A^0c,N) \cdot \Psi sp,N$ for splitting failure is only valid for one limited edge and without influence of spacing

$N_{Rd,sp} = N^0_{Rd,sp} \cdot \Psi edge$; $N^0_{Rd,sp} = N^0_{Rk,sp} / \gamma_{Msp}$

FASTENER SIZE m2 and m2-C			M6	M8	M10x60	M10	M12		M16		M20
Fastener length	L	[mm]					≤ 185	> 185	≤ 185	> 185	
Minimum thickness of concrete memeber	h_{min}	[mm]	100	100	120	120	140		160		200
SPLITTING FAILURE IN CASE OF ONE LIMITED EDGE, NON-CRACKED CONCRETE C20/25											
Tension load $\gamma_{Msp} = 1,5$	$N^0_{Rd,sp}$	[kN]	8.52	11.90	6.38	14.87	18.88	15.73*	20.07*	20.07*	28.06*
			x	x	x	x	x	x	x	x	x
			Ψ_{edge}	Ψ_{edge}	Ψ_{edge}	Ψ_{edge}	Ψ_{edge}	Ψ_{edge}	Ψ_{edge}	Ψ_{edge}	Ψ_{edge}
Edge distance [mm]	40		0.57								
	45		0.61	0.55							
	50		0.64	0.57	0.71	0.54					
	60		0.70	0.62	0.79	0.58					
	70		0.77	0.68	0.88	0.63					
	80		0.85	0.73	0.98	0.67	0.62				
	90		0.92	0.79	1.00	0.72	0.66				
	100		1.00	0.85	1.00	0.77	0.70				
	110		1.00	0.91	1.00	0.82	0.74				
	120		1.00	0.97	1.00	0.87	0.78				
	130		1.00	1.00	1.00	0.92	0.82		0.74		
	140		1.00	1.00	1.00	0.97	0.86		0.77		
	150		1.00	1.00	1.00	1.00	0.91	0.91	0.81		
	200		1.00	1.00	1.00	1.00	1.00	1.00	1.00		
	240		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
	300		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Factor $\Psi h,sp$ for splitting failure can be considered if $h > h_{min}$

$NRd,sp = N^0Rd,sp \cdot \Psi edge \cdot \Psi h,sp$

$\Psi h,sp = (\frac{h}{hmin})^{2/3} \leq 1.5$

h = actual thickness of the member
hmin = minimum thickness of concrete member

*Partial safety factor $\gamma_{Msp} = 1.8$

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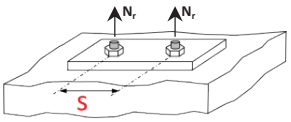
5.4 Concrete cone failure and splitting failure in case of limited spacing



5.4.1 Design tension resistance of one anchor in case of concrete cone failure ($N_{Rd,c}$) with one limited spacing

Reduction factor Ψspacing = (Ac,N/A^{0}c,N) for concrete cone failure is only valid for one limited spacing and without influence of edge

$N_{Rd,c} = N^0_{Rd,c} \cdot \Psi spacing$; $N^0_{Rd,c} = N^0_{Rk,c} / \gamma_{Mc}$

FASTENER SIZE m2 and m2-C			M6	M8	M10x60	M10	M12		M16		M20
Fastener length	L	[mm]					≤ 185	> 185	≤ 185	> 185	
Minimum thickness of concrete memeber	h_{min}	[mm]	100	100	120	120	140		160		200
CONCRETE CONE FAILURE IN CASE OF LIMITED SPACING BETWEEN ANCHORS, NON-CRACKED CONCRETE C20/25											
Tension load γ_{Mc} = 1,5	$N^0_{Rd,c}$	[kN]	8.52	11.90	6.38	14.87	18.88	15.73*	20.07*	20.07*	28.06*
			x	x	x	x	x	x	x	x	x
			Ψspacing	Ψspacing	Ψspacing	Ψspacing	Ψspacing	Ψspacing	Ψspacing	Ψspacing	Ψspacing
Spacing between anchors [mm]	40		0.67								
	45		0.69	0.65							
	50		0.71	0.67	0.75	0.64					
	60		0.75	0.70	0.80	0.67					
	75		0.81	0.75	0.88	0.71	0.68				
	80		0.83	0.77	0.90	0.73	0.70				
	90		0.88	0.80	0.95	0.76	0.72				
	100		0.92	0.83	1.00	0.79	0.74		0.71		
	110		0.96	0.87	1.00	0.81	0.77	0.77	0.73		
	120		1.00	0.90	1.00	0.84	0.79	0.79	0.75		
	130		1.00	0.93	1.00	0.87	0.82	0.82	0.77		
	140		1.00	0.97	1.00	0.90	0.84	0.84	0.79		
	150		1.00	1.00	1.00	0.93	0.87	0.87	0.81		
	200		1.00	1.00	1.00	1.00	0.99	0.99	0.92		
	240		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
	300		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
	350		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	400		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	500		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

*Partial safety factor γMc = 1.8

5.4.2 Design tension resistance of one anchor in case of splitting failure ($N_{Rd,sp}$) with one limited spacing

Reduction factor Ψspacing = (Ac,N/A^{0}c,N) for splitting failure is only valid for one limited spacing and without influence of edge

$N_{Rd,sp} = N^0_{Rd,sp} \cdot \Psi spacing$; $N^0_{Rd,sp} = N^0_{Rk,sp} / \gamma_{Msp}$

FASTENER SIZE m2 and m2-C			M6	M8	M10x60	M10	M12		M16		M20
Fastener length	L	[mm]					≤ 185	> 185	≤ 185	> 185	
Minimum thickness of concrete memeber	h_{min}	[mm]	100	100	120	120	140		160		200
SPLITTING FAILURE IN CASE OF LIMITED SPACING BETWEEN ANCHORS, NON-CRACKED CONCRETE C20/25											
Tension load γ_{Msp} = 1,5	$N^0_{Rd,sp}$	[kN]	8.52	11.90	6.38	14.87	18.88	15.73*	20.07*	20.07*	28.06*
			x	x	x	x	x	x	x	x	x
			Ψspacing	Ψspacing	Ψspacing	Ψspacing	Ψspacing	Ψspacing	Ψspacing	Ψspacing	Ψspacing
Spacing between anchors [mm]	40		1.00								
	45		1.00	0.59							
	50		1.00	0.60	1.00	1.00					
	60		1.00	0.62	1.00	1.00					
	75		1.00	0.65	1.00	1.00	1.00				
	80		1.00	0.66	1.00	1.00	1.00				
	90		1.00	0.68	1.00	1.00	1.00				
	100		1.00	0.70	1.00	1.00	1.00		0.63		
	110		1.00	0.72	1.00	1.00	1.00	1.00	0.64		
	120		1.00	0.74	1.00	1.00	1.00	1.00	0.65		
	130		1.00	0.76	1.00	1.00	1.00	1.00	0.66		
	140		1.00	0.78	1.00	1.00	1.00	1.00	0.68		
	150		1.00	0.80	1.00	1.00	1.00	1.00	0.69		
	200		1.00	0.90	1.00	1.00	1.00	1.00	0.75		
	240		1.00	0.98	1.00	1.00	1.00	1.00	0.80	0.80	
	300		1.00	1.00	1.00	1.00	1.00	1.00	0.88	0.88	
	350		1.00	1.00	1.00	1.00	1.00	1.00	0.94	0.94	0.85
	400		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90
	500		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Factor Ψh,sp for splitting failure can be considered if h > h_{min}

$N_{Rd,sp} = N^0_{Rd,sp} \cdot \Psi spacing \cdot \Psi_{h,sp}$

$\Psi_{h,sp} = \left(\frac{h}{hmin}\right)^{2/3} \leq 1.5$

h = actual thickness of the member
hmin = minimum thickness of concrete member

*Partial safety factor γMsp = 1.8

6 IMPORTANT NOTICE

Values given above are valid under the assumptions of sufficient cleaning of the drill hole and anchoring in non-cracked concrete. For the design the complete assessment ETA-05-0070 from 11 April 2017 has to be considered. In recommended resistance the partial safety factor for material as regulated in the ETA, as well as a partial safety factor for load action γ_L = 1.4 are considered. For combination of tensile loads, shear loads, bending moments as well as reduced edge distances or spacing's (anchor groups) see ETA or Mungo design software. The data must be checked by the user under the responsibility of an engineer experienced in anchorage and concrete work. This is to ensure there are no errors and all data is complete and accurate and complies with all rules and regulations for the actual conditions and application. Anchor design is performed according to the ETAG 001, Annex C in combination with assessment ETA-05-0070 from 11 April 2017.