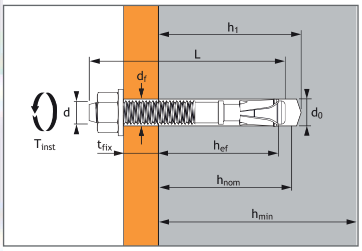
SPIT FIX3

Zinc coated steel

ETA Option 7

n° 13/0005

Torque controlled expansion anchor, made of zinc coated steel for use in non cracked concrete



Pre-assembled anchor

Technical data

SPIT FIX3	Letter marking	Minimum anchor depth: Min. anchor depth (mm) $h_{ef,min}$	Depth before expans (mm) h_{nom}	Max thick of part to be fixed (mm) t_{fix}	Drilling Depth (mm) h_1	Min thick of base material (mm) h_{min}	Maximum anchor depth: Max. anchor depth (mm) $h_{ef,max}$	Depth before expans (mm) h_{nom}	Max thick of part to be fixed (mm) t_{fix}	Drilling Depth (mm) h_1	Min thick of base material (mm) h_{min}	Ø thread (mm) d	Ø drill bit (mm) d_0	Ø clearance (mm) d_f	Total anchor length (mm) L	Max. tighten torque (Nm) T_{inst}	Code
M6x45/5*				5					-						45		050510
M6x55/15*		25,6	35	20	41	100	35	45	10	51	100	6	6	8	55	10	050520
M6x85/45*				50					40						85		050530
M6x64 percée*				-					-						64		056100
M8x55/5	-			5					-						55		057450
M8x70/20-10	C			20					10						70		057451
M8x90/40-30	E			40					30						90		057452
M8x100/50-40	F	30	38	50	50	80	40	48	40	60	80	8	8	9	110	15	057453
M8x115/65-55	G			65					55						115		057454
M8x130/80-70	H			80					70						130		057455
M8x160/110-100	J			110					100						160		057456
M10x65/5	-			5					-						65		057460
M10x75/15-5	C			15					5						75		057461
M10x85/25-15	D			25					15						85		057462
M10x95/36-26	E			36					26						95		057463
M10x110/50-40	F	40	50	50	60	100	50	60	40	70	100	10	10	12	110	30	057464
M10x125/65-55	G			65					55						125		057465
M10x140/80-70	I			80					70						140		057466
M10x160/100-90	J			100					90						160		057467
M12x80/5	-			5					-						80		057470
M12x100/25-10	F			25					10						100		057471
M12x115/40-25	G			40					25						115		057472
M12x125/50-35	H			50					35						125		057473
M12x140/65-50	I	50	62	65	75	100	65	77	50	90	130	12	12	14	140	50	057474
M12x160/85-70	J			85					70						160		057475
M12x180/105-90	L			105					90						180		057476
M12x220/145-130	O			145					130						220		057477
M12x290/215-200*	-			215					200						290		057478
M16x100/5	-			5					-						100		057480
M16x125/30-15	G			30					15						125		057481
M16x150/55-40	I			55					40						150		057482
M16x170/75-60	K	65	80	75	95	130	80	95	60	110	160	16	16	18	170	100	057483
M16x185/90-75	L			90					75						185		057484
M16x235/140-125*	-			140					125						235		057485
M16x300/200*	-			200					178						300		057486
M20x125/10	-			10					-						125		057490
M20x165/50-25	J	75	93	50	110	150	100	118	25	135	200	20	20	22	165	160	057491
M20x220/105-80	N			105					80						220		057492

* do not belongs to ETA

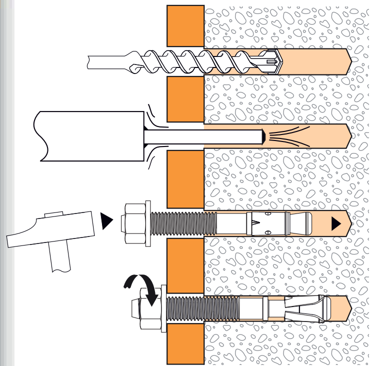
APPLICATION

- Steel and timber framework and beams
- Lift guide rails
- Industrial doors and gates
- Brickwork support angles
- Storage systems

MATERIAL

- **Bolt M8-M20:** Cold formed NFA 35-053 / Zinc electroplates (5 µm)
- **Sleeve:** Cold formed, NFA 35-231
- **Washer:** NF E25 513
- **Hexagonal nut:** Steel strength grade 6 or 8, ISO 898-2

INSTALLATION



Anchor mechanical properties

		M6	M8	M10	M12	M16	M20
Cross-section above cone							
f_{uk} (N/mm²)	Min. tensile strength	700	750	750	750	700	600
f_{yk} (N/mm²)	Yield strength	580	600	600	600	570	570
As (mm²)	Stressed cross-section	-	23,8	34,7	56,1	103,9	172
Threaded part							
f_{uk} (N/mm²)	Min. tensile strength	600	650	650	650	600	580
f_{yk} (N/mm²)	Yield strength	480	520	520	520	480	480
As (mm²)	Stressed cross-section	20,1	36,6	58	84,3	157	245
W_{el} (mm³)	Elastic section modulus	12,71	31,23	62,3	109,17	277,47	540,9
$M^0_{Rk,s}$ (Nm)	Characteristic bending moment	9	24	49	85	200	376
M (Nm)	Recommended bending moment	3,7	9,8	20,0	34,7	81,6	153,5

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The loads specified on this page allow judging the product's performances, but cannot be used for the designing.
The data given in the pages "CC method" have to be applied.

Ultimate ($N_{Ru,m}$, $V_{Ru,m}$) / characteristic loads (N_{Rk}, V_{Rk}) in kN

Mean Ultimate loads are derived from test results in admissible service conditions, and characteristic loads are statistically determined.

TENSILE

Anchor size	M6	M8	M10	M12	M16	M20
Minimum anchorage depth						
h_{ef}	*25*	*30*	*40*	*50*	*65*	*75*
$N_{Ru,m}$	6,0	10,3	15,5	23,3	39,0	40,6
N_{Rk}	4,5	7,5	12,8	17,8	26,4	32,7
Maximum anchorage depth						
h_{ef}	*35*	*40*	*50*	*65*	*80*	*100*
$N_{Ru,m}$	9,4	15,6	22,0	33,8	47,1	69,0
N_{Rk}	7,0	12,8	17,8	26,4	36,1	50,4

SHEAR

Anchor size	M6	M8	M10	M12	M16	M20
$V_{Ru,m}$	6,8	14,3	22,6	32,8	56,5	85,2
V_{Rk}	2,9	10,0	13,7	27,4	36,5	71,1

Design Loads (N_{Rd}, V_{Rd}) for one anchor without edge or spacing influence in kN

$$N_{Rd} = \frac{N_{Rk}^{*}}{\gamma_{Mc}}$$

$$V_{Rd} = \frac{V_{Rk}^{*}}{\gamma_{Ms}}$$

*Derived from test results

TENSILE

Anchor size	M6	M8	M10	M12	M16	M20
Minimum anchorage depth						
h_{ef}	*25*	*30*	*40*	*50*	*65*	*75*
N_{Rd}	2,5	5,0	8,5	11,9	17,6	21,8
Maximum anchorage depth						
h_{ef}	*35*	*40*	*50*	*65*	*80*	*100*
N_{Rd}	3,8	8,5	11,9	17,6	24,0	33,6

γ_{Mc} = 1,5

SHEAR

Anchor size	M6	M8	M10	M12	M16	M20
V_{Rd}	2,3	8,0	11,0	21,9	29,2	47,4

γ_{Ms} = 1,25 (M6-M16)

γ_{Ms} = 1,5 (M20)

Recommended loads (N_{rec}, V_{rec}) for one anchor without edge or spacing influence in kN

$$N_{Rec} = \frac{N_{Rk}^{*}}{\gamma_{M}.\gamma_{F}}$$

$$V_{Rec} = \frac{V_{Rk}^{*}}{\gamma_{M}.\gamma_{F}}$$

*Derived from test results

TENSILE

Anchor size	M6	M8	M10	M12	M16	M20
Minimum anchorage depth						
h_{ef}	*25*	*30*	*40*	*50*	*65*	*75*
N_{Rec}	1,7	3,5	6,1	8,5	12,6	15,6
Maximum anchorage depth						
h_{ef}	*35*	*40*	*50*	*65*	*80*	*100*
N_{Rec}	2,7	6,1	8,5	12,6	17,2	24,0

γ_{F}= 1,4 ; γ_{Mc} = 1,5

SHEAR

Anchor size	M6	M8	M10	M12	M16	M20
V_{Rec}	1,7	5,7	7,8	15,7	20,9	33,9

γ_{Ms} = 1,25

SPIT FIX3

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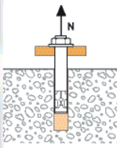
SPIT CC- Method (values issued from ETA)

TENSILE in kN

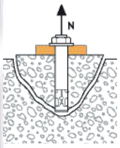


Pull-out resistance

$$N_{Rd,p} = N^{O}_{Rd,p} . f_b$$

$N^0_{Rd,p}$			Design pull-out resistance		
Anchor size	M8	M10	M12	M16	M20
Minimum anchorage depth					
h_{ef}	30	40	50	65	75
$N^0_{Rd,p}$ (C20/25)	5,0	-	-	-	-
Maximum anchorage depth					
h_{ef}	40	50	65	80	100
$N^0_{Rd,p}$ (C20/25)	-	-	-	-	-

γ_{Mc} = 1,5

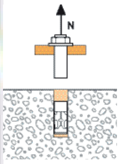


Concrete cone resistance

$$N_{Rd,c} = N^{O}_{Rd,c} . f_b . \Psi_s . \Psi_{c,N}$$

$N^0_{Rd,c}$			Design cone resistance		
Anchor size	M8	M10	M12	M16	M20
Minimum anchorage depth					
h_{ef}	30	40	50	65	75
$N^0_{Rd,c}$ (C20/25)	5,5	8,5	11,9	17,6	21,8
Maximum anchorage depth					
h_{ef}	40	50	65	80	100
$N^0_{Rd,c}$ (C20/25)	8,5	11,9	17,6	24,0	33,6

γ_{Mc} = 1,5



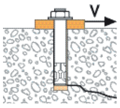
Steel resistance

$N_{Rd,s}$			Steel design tensile resistance		
Anchor size	M8	M10	M12	M16	M20
$N_{Rd,s}$	11,9	17,3	28,1	48,5	73,7

γ_{Ms} = 1,5 (M8-M16)

γ_{Ms} = 1,4 (M20)

SHEAR in kN

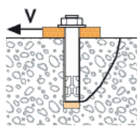


Concrete edge resistance

$$V_{Rd,c} = V^{O}_{Rd,c} . f_b . f_{\beta,V} . \Psi_{S-C,V}$$

$V^0_{Rd,c}$		Design concrete edge resistance at minimum edge distance (C_{min})			
Anchor size	M8	M10	M12	M16	M20
Minimum anchorage depth					
h_{ef}	30	40	50	65	75
C_{min}	50	65	100	100	115
S_{min}	40	50	100	100	100
$V^0_{Rd,c}$ (C20/25)	2,7	4,6	9,7	11,1	15,1
Maximum anchorage depth					
h_{ef}	40	50	65	80	100
C_{min}	55	65	70	105	120
S_{min}	45	60	70	90	100
$V^0_{Rd,c}$ (C20/25)	3,3	4,8	6,0	12,5	17,0

γ_{Mc} = 1,5

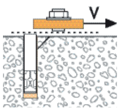


Pryout failure

$$V_{Rd,cp} = V^{0}_{Rd,cp} . f_b . \Psi_s . \Psi_{c,N}$$

$V^0_{Rd,cp}$			Design pryout resistance		
Anchor size	M8	M10	M12	M16	M20
Minimum anchorage depth					
h_{ef}	30	40	50	65	75
$V^0_{Rd,cp}$ (C20/25)	5,5	8,5	11,9	35,2	43,6
Maximum anchorage depth					
h_{ef}	40	50	65	80	100
$V^0_{Rd,cp}$ (C20/25)	8,5	11,9	35,2	48,0	67,2

γ_{Mcp} = 1,5



Steel resistance

$V_{Rd,s}$			Steel design shear resistance		
Anchor size	M8	M10	M12	M16	M20
$V_{Rd,s}$	8,0	11,0	21,9	29,2	47,4

γ_{Ms} = 1,25 (M8-M16)

γ_{Ms} = 1,5 (M20)

$$N_{Rd} = \min(N_{Rd,p} \,;\, N_{Rd,c} \,;\, N_{Rd,s})$$

$$\beta_N = N_{Sd} / N_{Rd} \leq 1$$

$$V_{Rd} = \min(V_{Rd,c} \,;\, V_{Rd,cp} \,;\, V_{Rd,s})$$

$$\beta_V = V_{Sd} / V_{Rd} \leq 1$$

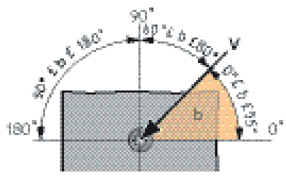
$$\beta_N + \beta_V \leq 1{,}2$$

f_B INFLUENCE OF CONCRETE

Concrete class	f_B	Concrete class	f_B
C25/30	1,1	C40/50	1,41
C30/37	1,22	C45/55	1,48
C35/45	1,34	C50/60	1,55

$f_{B,V}$ INFLUENCE OF SHEAR LOADING DIRECTION

Angle β [°]	$f_{B,V}$
0 to 55	1
60	1,1
70	1,2
80	1,5
90 to 180	2

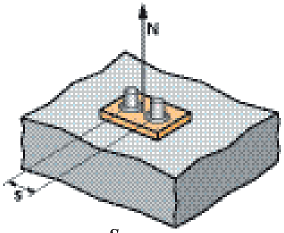


SPIT FIX3

Zinc coated steel

SPIT CC- Method (values issued from ETA)

Ψ_s INFLUENCE OF SPACING FOR CONCRETE CONE RESISTANCE IN TENSILE LOAD



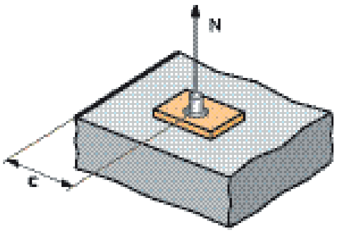
$$\Psi_S = 0,5 + \frac{s}{6.h_{ef}}$$

$S_{min} < S < S_{cr,N}$
$S_{cr,N} = 3.h_{ef}$
Ψ_S must be used for each spacing influenced the anchors group.

SPACING S	Reduction factor Ψ_s Minimum anchorage depth				
	M8	M10	M12	M16	M20
40	0,72				
50	0,78	0,71			
65	0,86	0,77			
90	1,00	0,88			
100		0,92	0,83	0,76	0,72
120		1,00	0,90	0,81	0,77
150			1,00	0,88	0,83
180				0,96	0,90
195				1,00	0,93
225					1,00

SPACING S	Reduction factor Ψ_s Maximum anchorage depth				
	M8	M10	M12	M16	M20
45	0,69				
60	0,75	0,70			
70	0,79	0,73	0,68		
90	0,88	0,80	0,73	0,69	
100	0,92	0,83	0,76	0,71	0,67
120	1,00	0,90	0,81	0,75	0,70
150		1,00	0,88	0,81	0,75
195			1,00	0,91	0,83
220				0,96	0,87
240				1,00	0,90
300					1,00

$\Psi_{c,N}$ INFLUENCE OF EDGE FOR CONCRETE CONE RESISTANCE IN TENSILE LOAD



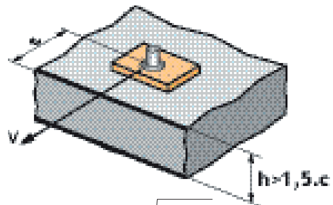
$$\Psi_{c,N} = 0,23 + 0,51.\frac{c}{h_{ef}}$$

$C_{min} < C < C_{cr,N}$
$C_{cr,N} = 1,5.h_{ef}$
$\Psi_{c,N}$ must be used for each distance influenced the anchors group.

EDGE C	Reduction factor $\Psi_{c,N}$ Minimum anchorage depth				
	M8	M10	M12	M16	M20
50	1,00				
65		1,00			
100			1,00		
100				1,00	
115					1,00

EDGE C	Reduction factor $\Psi_{c,N}$ Maximum anchorage depth				
	M8	M10	M12	M16	M20
55	0,93				
60	1,00				
65		0,89			
70		0,94	0,78		
75		1,00	0,82		
100			1,00		
105				0,90	
110				0,93	
120				1,00	0,84
130					0,89
150					1,00

$\Psi_{s-c,V}$ INFLUENCE OF SPACING AND EDGE DISTANCE FOR CONCRETE EDGE RESISTANCE IN SHEAR LOAD

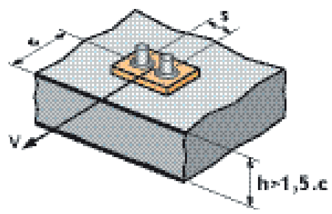


$$\Psi_{s-c,V} = \frac{c}{c_{min}}.\sqrt{\frac{c}{c_{min}}}$$

For single anchor fastening

Factor $\Psi_{s-c,V}$
Non-cracked concrete

$\frac{C}{C_{min}}$	1,0	1,2	1,4	1,6	1,8	2,0	2,2	2,4	2,6	2,8	3,0	3,2
$\Psi_{s-c,V}$	1,00	1,31	1,66	2,02	2,41	2,83	3,26	3,72	4,19	4,69	5,20	5,72

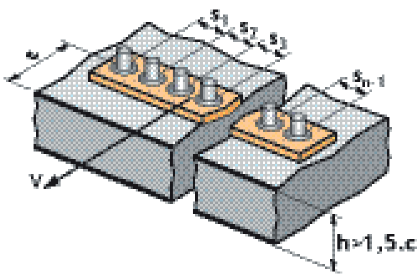


$$\Psi_{s-c,V} = \frac{3.c + s}{6.c_{min}}.\sqrt{\frac{c}{c_{min}}}$$

For 2 anchors fastening

Factor $\Psi_{s-c,V}$
Non-cracked concrete

$\frac{S}{C_{min}}$ \ $\frac{C}{C_{min}}$	1,0	1,2	1,4	1,6	1,8	2,0	2,2	2,4	2,6	2,8	3,0	3,2
1,0	0,67	0,84	1,03	1,22	1,43	1,65	1,88	2,12	2,36	2,62	2,89	3,16
1,5	0,75	0,93	1,12	1,33	1,54	1,77	2,00	2,25	2,50	2,76	3,03	3,31
2,0	0,83	1,02	1,22	1,43	1,65	1,89	2,12	2,38	2,63	2,90	3,18	3,46
2,5	0,92	1,11	1,32	1,54	1,77	2,00	2,25	2,50	2,77	3,04	3,32	3,61
3,0	1,00	1,20	1,42	1,64	1,88	2,12	2,37	2,63	2,90	3,18	3,46	3,76
3,5		1,30	1,52	1,75	1,99	2,24	2,50	2,76	3,04	3,32	3,61	3,91
4,0			1,62	1,86	2,10	2,36	2,62	2,89	3,17	3,46	3,75	4,05
4,5				1,96	2,21	2,47	2,74	3,02	3,31	3,60	3,90	4,20
5,0					2,33	2,59	2,87	3,15	3,44	3,74	4,04	4,35
5,5						2,71	2,99	3,28	3,71	4,02	4,33	4,65
6,0						2,83	3,11	3,41	3,71	4,02	4,33	4,65



For 3 anchors fastening and more

$$\Psi_{s-c,V} = \frac{3.c + s_1 + s_2 + s_3 + ... + s_{n-1}}{3.n.c_{min}}.\sqrt{\frac{c}{c_{min}}}$$