

SPIT FIX Z

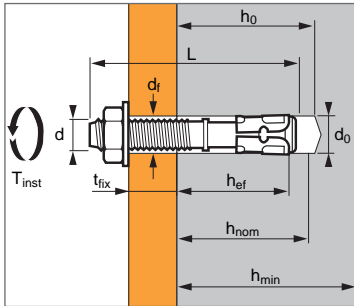
Zinc coated steel



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ETA Option 1
n° 99/0002



Pre-assembled anchor

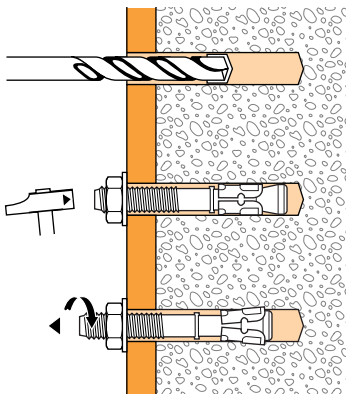
APPLICATION

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

MATERIAL

- **Bolt M8-M16:** Cold formed steel, DIN 1654 part 2 or 4 / Zinc electroplated Zn5C/Fe (5 µm), NFA 91102
- **Sleeve:** Cold-rolled stainless steel, 1.4404, finish 2B, EN 10088
- **Washer:** Steel, NFE 25514
- **Hexagonal nut:** Strength grade 8, EN 20898-2 / Zinc electroplated (5 µm), NFE 25009

INSTALLATION



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

Technical data

SPIT FIX Z	Anchor depth (mm)	Depth before expans (mm)	Max thick of part to be fixed (mm)	Min thick of base material (mm)	Ø thread (mm)	Drilling depth (mm)	Ø drill bit (mm)	Ø clearance (mm)	Total anchor length (mm)	Max. tighten torque (Nm)	Code
	h_{ef}	h_{nom}	t_{fix}	h_{min}	d	h_0	d_0	d_f	L	T_{inst}	
8x70/9			9						70		056330
8x90/29	46	55	29	100	8	65	8	9	90	20	056340
8x110/49			49						110		056350
10x85/9			9						85		056370
10x95/20	58	68	20	120	10	80	10	12	96	35	056380
10x140/64			64						140		056390
12x100/8			8						100		056600
12x115/23			23						115		056610
12x140/48	68	80	48	140	12	95	12	14	140	50	056620
12x180/88			88						180		056630
12x220/128			128						220		056640
16x135/22			22						135	100	056670
16x170/57	82	97	57	160	16	115	16	18	170		056680
16x210/97			97						210		056690

Anchor mechanical properties

	M8	M10	M12	M16
Cross-section above cone				
f_{uk} (N/mm ²) Min. tensile strength	750	650	650	540
f_{yk} (N/mm ²) Yield strength	793	640	620	530
A_s (mm ²) Stressed cross-section	23,8	40,7	56,7	103,9
Threaded part				
f_{uk} (N/mm ²) Min. tensile strength	750	650	650	540
f_{yk} (N/mm ²) Yield strength	680	520	520	430
A_s (mm ²) Stressed cross-section	36,6	58	84,3	157
W_{el} (mm ³) Elastic section modulus	31,23	62,3	109,17	277,47
$M^{0Rk,s}$ (Nm) Characteristic bending moment	28	49	85	180
M (Nm) Recommended bending moment	11,4	20,0	34,7	73,5

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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	M8	M10	M12	M16
Non cracked concrete (C20/25)				
h_{ef}	46	58	68	82
$N_{Ru,m}$	14,7	21,5	27,0	48,5
N_{Rk}	9,8	11,6	16,7	40,3
Cracked concrete (C20/25)				
h_{ef}	46	58	68	82
$N_{Ru,m}$	12,5	18,4	25,8	36,5
N_{Rk}	8,8	12,5	19,6	27,6

SHEAR

Anchor size	M8	M10	M12	M16
Non cracked concrete (C20/25)				
$V_{Ru,m}$	17,4	25,7	40,9	58,0
V_{Rk}	11,6	23,2	31,4	50,1
Cracked concrete (C20/25)				
$V_{Ru,m}$	14,6	22,6	37,3	50,2
V_{Rk}	11,6	18,3	31,3	42,3

Mechanical anchors

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

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

*Derived from test results

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

TENSILE

Anchor size	M8	M10	M12	M16
Non cracked concrete (C20/25)				
h_{ef}	46	58	68	82
N_{Rd}	4,7	5,5	8,0	19,2
Cracked concrete (C20/25)				
h_{ef}	46	58	68	82
N_{Rd}	4,2	6,0	9,3	13,1

$\gamma_{Mc} = 2,1$

SHEAR

Anchor size	M8	M10	M12	M16
Non cracked concrete (C20/25)				
V_{Rd}	7,7	18,6	25,1	40,1
Cracked concrete (C20/25)				
V_{Rd}	7,7	14,6	25,0	33,8

$\gamma_{Ms} = 1,5$ for M8 and $\gamma_{Ms} = 1,25$ for M10 to M16

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

$$N_{Rec} = \frac{N_{Rk}^*}{\gamma_M \cdot \gamma_F}$$

*Derived from test results

$$V_{Rec} = \frac{V_{Rk}^*}{\gamma_M \cdot \gamma_F}$$

TENSILE

Anchor size	M8	M10	M12	M16
Non cracked concrete (C20/25)				
h_{ef}	46	58	68	82
N_{Rec}	3,3	3,9	5,7	13,7
Cracked concrete (C20/25)				
h_{ef}	46	58	68	82
N_{Rec}	3,0	4,3	6,7	9,4

$\gamma_F = 1,4$; $\gamma_{Mc} = 2,1$

SHEAR

Anchor size	M8	M10	M12	M16
Non cracked concrete (C20/25)				
V_{Rec}	5,5	13,3	17,9	28,6
Cracked concrete (C20/25)				
V_{Rec}	5,5	10,5	17,9	24,2

$\gamma_{Ms} = 1,5$ for M8 and $\gamma_{Ms} = 1,25$ for M10 to M16

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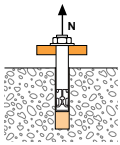
Zinc coated steel



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SPIT CC- Method (values issued from ETA)

TENSILE

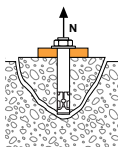


→ Pull-out resistance

$$N_{Rd,p} = N_{Rd,p}^O \cdot f_b$$

$N_{Rd,p}^O$ Anchor size	Design pull-out resistance			
	M8	M10	M12	M16
Non cracked concrete				
h_{ef}	46	58	68	82
$N_{Rd,p}^O$ (C20/25)	4,3	7,6	9,5	16,7
Cracked concrete				
h_{ef}	46	58	68	82
$N_{Rd,p}^O$ (C20/25)	2,4	4,3	5,7	9,5

$\gamma_{Mc} = 2,1$

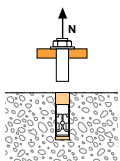


→ Concrete cone resistance

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

$N_{Rd,c}^O$ Anchor size	M8	M10	M12	M16
Non cracked concrete				
h_{ef}	46	58	68	82
$N_{Rd,c}^O$ (C20/25)	7,5	10,6	13,5	17,8
Cracked concrete				
h_{ef}	46	58	68	82
$N_{Rd,c}^O$ (C20/25)	5,3	7,6	9,6	12,7

$\gamma_{Mc} = 2,1$



→ Steel resistance

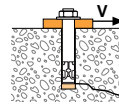
$N_{Rd,s}$ Anchor size	M8	M10	M12	M16
$N_{Rd,s}$	12,9	18,6	26,4	40,0

$\gamma_{Ms} = 1,4$

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

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

SHEAR

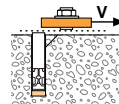


→ Concrete edge resistance

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

$V_{Rd,c}^O$ Anchor size	M8	M10	M12	M16
Non cracked concrete				
h_{ef}	46	58	68	82
c_{min}	50	60	75	80
s_{min}	75	100	170	175
$V_{Rd,c}^O$ (C20/25)	3,0	4,4	6,7	8,3
Cracked concrete				
h_{ef}	46	58	68	82
c_{min}	50	60	75	80
s_{min}	75	100	170	175
$V_{Rd,c}^O$ (C20/25)	2,1	3,1	4,8	6,0

$\gamma_{Mc} = 1,5$



→ Steel resistance

$V_{Rd,s}$ Anchor size	M8	M10	M12	M16
Non cracked concrete				
$V_{Rd,s}$	9,3	15,2	21,6	33,6
Cracked concrete				
$V_{Rd,s}$	7,3	13,6	18,4	28,0

$\gamma_{Ms} = 1,25$

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

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

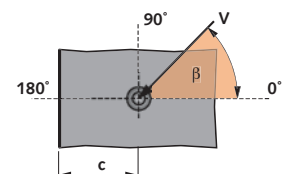
$$\beta_N^{1,5} + \beta_V^{1,5} \leq 1$$

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

$f_{\beta,V}$ INFLUENCE OF SHEAR LOADING DIRECTION

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



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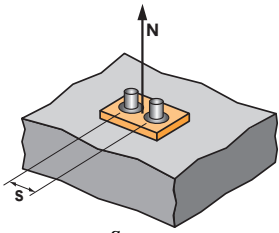
Zinc coated steel



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SPIT CC- Method (values issued from ETA)

Ψ_s INFLUENCE OF SPACING FOR CONCRETE CONE RESISTANCE IN TENSILE LOAD



$$\Psi_s = 0,5 + \frac{s}{6 \cdot h_{ef}}$$

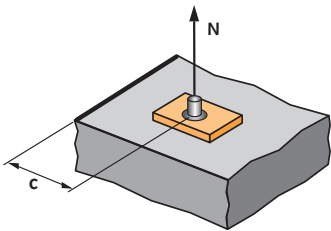
$$s_{min} < s < s_{cr,N}$$

$$s_{cr,N} = 3 \cdot h_{ef}$$

Ψ_s must be used for each spacing influenced the anchors group.

SPACING S	Reduction factor Ψ_s Cracked and non-cracked concrete			
	M8	M10	M12	M16
50	0,68			
60	0,72	0,67		
70	0,75	0,70	0,67	
80	0,79	0,73	0,70	0,66
110	0,90	0,82	0,77	0,72
140	1,00	0,90	0,84	0,78
175		1,00	0,93	0,86
205			1,00	0,92
245				1,00

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



$$\Psi_{c,N} = 0,26 + 0,48 \cdot \frac{c}{h_{ef}}$$

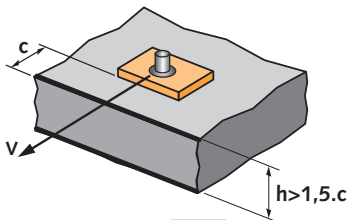
$$c_{min} < c < c_{cr,N}$$

$$c_{cr,N} = 1,5 \cdot h_{ef}$$

$\Psi_{c,N}$ must be used for each distance influenced the anchors group.

EDGE C	Reduction factor $\Psi_{c,N}$ Cracked and non-cracked concrete			
	M8	M10	M12	M16
50	0,79			
60	0,90	0,77		
70	1,00	0,85		
75		0,90	0,80	
80		0,94	0,84	0,74
90		1,00	0,91	0,80
105			1,00	0,89
125				1,00

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



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

For single anchor fastening

Factor $\Psi_{s-c,V}$
Cracked and 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

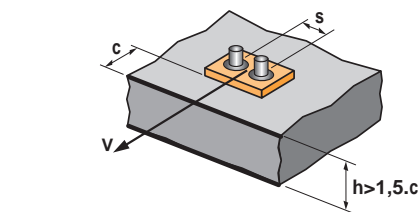
For 2 anchors fastening

Factor $\Psi_{s-c,V}$
Cracked and non-cracked concrete

$\frac{s}{c_{min}}$	Factor $\Psi_{s-c,V}$ Cracked and 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
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

For other case of fastenings

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



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

