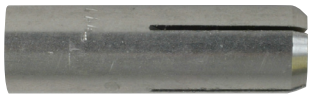
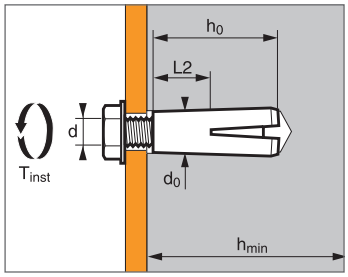


European Technical Approval

ETA Option 7
n° 06/0268



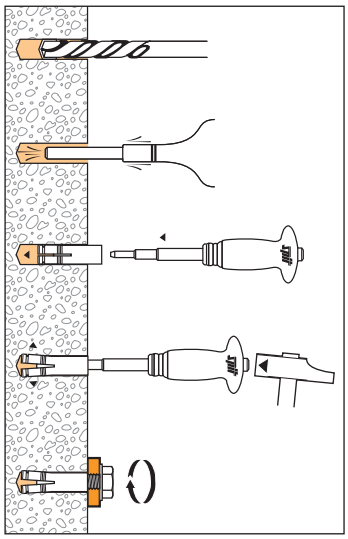
Applications

- Ventilation ducts
- Suspended ceilings
- Cable tray

Material

- **Anchor sleeve:** M6 to M16 Stainless steel X2CrNiMo17-12-2
- **Tapered expansion plug:** M6 to M16: Stainless steel X2CrNiMo17-12-2

Installation



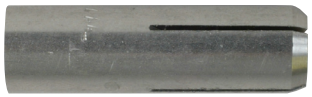
Deformation-controlled expansion female anchor

Technical data

SPIT GRIP	Anchor depth (mm)	Ø thread (mm)	Thread length (mm)	Drilling depth (mm)	Ø thread (mm)	Min thick of base material (mm)	Total anchor length (mm)	Max. tighten torque (Nm)	Eurocode GRIP SA	Expander tool	
	h_{ef}	d	L_2	h_1	d_0	h_{min}	L	T_{inst}			
GRIP SA-A4 M6	30	6	13	32	8	100	30	5	062140	SM6	062090
GRIP SA-A4 M8	30	8	13	32	10	100	30	10	062150	SM8	062100
GRIP SA-A4 M10	40	10	15	42	12	100	40	22	062160	SM10	062110
GRIP SA-A4 M12	50	12	18	53	15	100	50	36	062170	SM12	062120
GRIP SA-A4 M16	65	16	23	70	20	100	65	80	062180	SM16	062130

Anchor mechanical properties

		M6	M8	M10	M12	M16
f_{uk} (N/mm²)	Min. tensile strength	610	610	610	610	610
f_{yk} (N/mm²)	Yield strength	360	360	360	360	360
As (mm²)	Stressed cross-section	26,34	36,22	47,15	80	138,74



The loads specified on this page are derived from internal test results. For results derived from CC Methodology, please see overleaf. 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
Screw grade A4-70					
h_{ef}	30	30	40	50	65
$N_{Ru,m}$	8,75	12,3	17,8	25,4	37,3
N_{Rk}	6,6	9,3	13,8	19,05	28,05

SHEAR

Anchor size	M6	M8	M10	M12	M16
Screw grade A4-70					
$V_{Ru,m}$	8,4	12	15,6	31	50,4
V_{Rk}	7,0	10	13	26	42

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
Screw grade A4-70					
h_{ef}	30	30	40	50	65
N_{Rd}	3,7	5,2	7,7	10,6	15,6

γ_{Mc} = 1,8

SHEAR

Anchor size	M6	M8	M10	M12	M16
Screw grade A4-70					
V_{Rd}	4,5	6,4	8,3	16,6	26,9

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

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

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

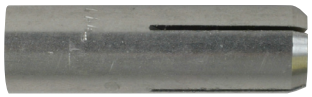
*Derived from test results

TENSILE

Anchor size	M6	M8	M10	M12	M16
Screw grade A4-70					
h_{ef}	30	30	40	50	65
N_{Rec}	2,6	3,7	5,5	7,6	11,1

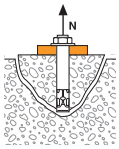
SHEAR

Anchor size	M6	M8	M10	M12	M16
Screw grade A4-70					
V_{Rec}	3,2	4,5	5,9	11,8	19,2



SPIT CC - Method (values issued from ETA)

TENSILE in kN

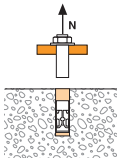


Concrete cone resistance

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

$N^0_{Rd,c}$ Anchor size	Design cone resistance M6	M8	M10	M12	M16
h_{ef}	*30*	*30*	*40*	*50*	*65*
$N^0_{Rd,c}$	4,6	4,6	8,5	11,8	17,6

γ_{Mc} = 1,8 for M6 to M8 and γ_{Mc} = 1,5 for M10 to M16

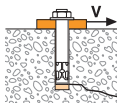


Steel resistance

$N_{Rd,s}$ Anchor size	Design steel tensile resistance M6	M8	M10	M12	M16
Screw grade A4-70					
$N_{Rd,s}$	7,5	12,3	15,5	27,8	44,9

γ_{Ms} = 1,87

SHEAR in kN

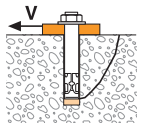


Concrete edge resistance

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

$V^0_{Rd,c}$ Anchor size	Design concrete edge resistance at minimum edge distance (C_{min}) M6	M8	M10	M12	M16
Non cracked concrete					
h_{ef}	*30*	*30*	*40*	*50*	*65*
C_{min}	80	95	135	165	200
S_{min}	50	60	100	120	150
$V^0_{Rd,c}$	5,5	7,6	14,4	21,8	33,5

γ_{Mc} = 1,5

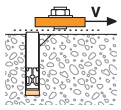


Pryout failure

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

$V^0_{Rd,cp}$ Anchor size	Design pryout resistance M6	M8	M10	M12	M16
Non cracked concrete					
h_{ef}	*30*	*30*	*40*	*50*	*65*
$V^0_{Rd,cp}$ (C20/25)	5,5	9,3	14,4	20,2	35,2

γ_{Mcp} = 1,5



Steel resistance

$V_{Rd,s}$ Anchor size	Design steel shear resistance M6	M8	M10	M12	M16
Non cracked concrete					
$V_{Rd,s}$	4,5	6,4	8,3	16,6	26,9

γ_{Ms} = 1,56

$$N_{Rd} = \min(N_{Rd,p} ; N_{Rd,c} ; N_{Rd,s})$$
$$\beta_N = N_{Sd} / N_{Rd} \leq 1$$

$$V_{Rd} = \min(V_{Rd,c} ; V_{Rd,cp} ; V_{Rd,s})$$
$$\beta_V = V_{Sd} / V_{Rd} \leq 1$$

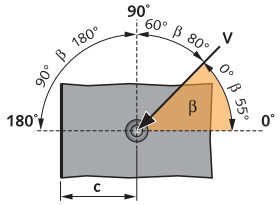
$$\beta_N + \beta_V \leq 1.2$$

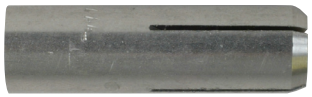
f_B Influence of Concrete

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

$f_{\beta,V}$ Influence of Shear Loading Direction

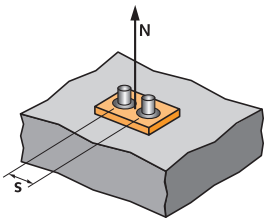
Angle β [°]	$f_{\beta,V}$
0 to 55	1
60	1.1
70	1.2
80	1.5
90 to 180	2





SPIT CC - Method (values issued from ETA)

Ψ_s Influence of spacing for concrete cone resistance in tensile load

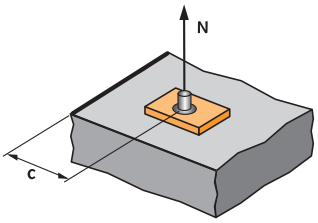


$$\Psi_S = 0{,}5 + \frac{s}{6.h_{ef}}$$

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 Non-cracked concrete				
	M6	**M8**	**M10**	**M12**	**M16**
h_{ef}	*30*	*30*	*40*	*50*	*65*
60	0,83				
70	0,89	0,89			
80	0,94	0,94			
100	1,00	1,00	0,90		
110			0,96		
120			1,00	0,92	
130				0,93	
160				1,00	0,88
180					0,96
195					1,00

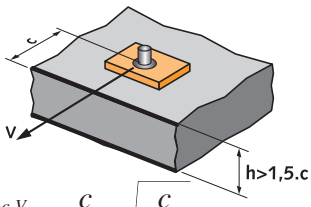
$\Psi_{c,N}$ Influence of edge for concrete cone resistance in tensile load



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 $\Psi_{c,N}$ Non-cracked concrete				
	M6	**M8**	**M10**	**M12**	**M16**
h_{ef}	*30*	*30*	*40*	*50*	*65*
80	1,00				
95		1,00			
135			1,00		
165				1,00	
200					1,00

$\Psi_{s-c,V}$ Influence of spacing and edge distance for concrete edge resistance in shear load

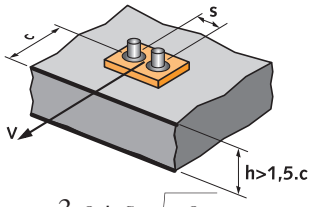


$$\Psi_{s-c,V} = \frac{c}{c_{min}} \cdot \sqrt{\frac{c}{c_{min}}}$$

For single anchor fastening

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

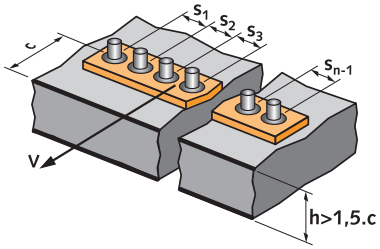


$$\Psi_{s-c,V} = \frac{3.c + s}{6.c_{min}} \cdot \sqrt{\frac{c}{c_{min}}}$$

For 2 anchors

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 or more

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