GRIP SA - A4

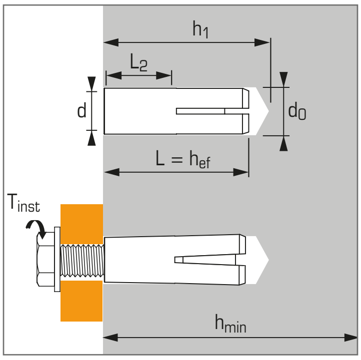
stainless steel version 1/4

Deformation-controlled expansion female anchor for use in non-cracked concrete

European Technical Assessment

ETA Option 7- 06/0268

INOX STAINLESS STEEL



Technical data

Anchor size	Min. anchor depth (mm) h_{ef}	Thread diameter (mm) d	Thread length (mm) L_2	Drilling depth (mm) h_0	Drilling diameter (mm) d_0	Min. thick. of base material (mm) h_{min}	Total anchor length (mm) L	Tighten torque (Nm) T_{inst}	Code	Setting tool reference	Setting tool code
M6X30	30	6	13	32	8	100	30	5	062240	ST-M M6x30	050214
M8X30	30	8	13	32	10	100	30	10	062250	ST-M M8x30	050215
M10X40	40	10	15	42	12	100	40	22	062260	ST-M M10x40	050216
M12X50	50	12	18	53	15	100	50	36	062270	ST-M M12x50	050217
M16X65	65	16	23	70	20	100	65	80	062280	ST-M M16x65	050218

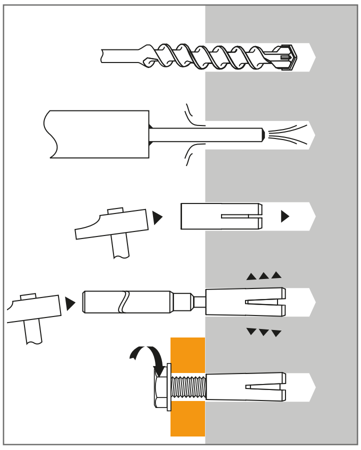
APPLICATION

- Ventilation ducts
- Suspended ceilings
- Cable tray

MATERIAL

- **Sleeve :** stainless steel X2CrNiMo17-12-2
- **Expansion cone :** stainless steel X2CrNiMo17-12-23

INSTALLATION

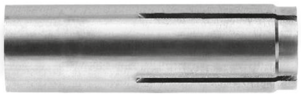


Anchor mechanical properties

Anchor size		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

GRIP SA - A4

 stainless steel version



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 (3/4 and 4/4).

Ultimate ($N_{Ru,m}$, $V_{Ru,m}$) and 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					
$h_{ef,min}$	**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

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

*Derived from test results

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

TENSILE

Anchor size	M6	M8	M10	M12	M16
Screw grade A4-70					
$h_{ef,min}$	**30**	**30**	**40**	**50**	**65**
N_{Rd}	4,4	6,2	9,2	12,6	18,0

$\gamma_{Mc} = 1,5$

SHEAR

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

$\gamma_{Ms} = 1,56$

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	M6	M8	M10	M12	M16
Screw grade A4-70					
$h_{ef,min}$	**30**	**30**	**40**	**50**	**65**
N_{rec}	2,9	4,1	6,1	9,0	12,8

$\gamma_F = 1,4$; $\gamma_{Mc} = 1,8$

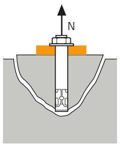
SHEAR

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

$\gamma_F = 1,4$; $\gamma_{Ms} = 1,56$

SPIT CC Method (values issued from ETA)

TENSILE in kN

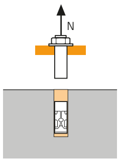


Concrete cone resistance

$$N_{Rd,c} = N^0_{Rd,c} \cdot f_b \cdot \Psi_s \cdot \Psi_{c,N}$$

$N^0_{Rd,c}$			Design cone resistance		
Anchor size	M6	M8	M10	M12	M16
h_{ef}	**30**	**30**	**40**	**50**	**65**
$N^0_{Rd,c}$ (C20/25)	5,5	5,5	8,5	11,8	17,6

$\gamma_{Mc} = 1,5$

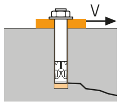


Steel resistance

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

$\gamma_{Ms} = 1,87$

SHEAR in kN

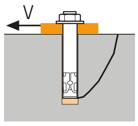


Concrete edge resistance

$$V_{Rd,c} = V^0_{Rd,c} \cdot f_b \cdot f_{\beta,V} \cdot \Psi_{S\text{-}C,V}$$

$V^0_{Rd,c}$			Design concrete edge resistance at minimum edge distance (C_{min})		
Anchor size	M6	M8	M10	M12	M16
h_{ef}	**30**	**30**	**40**	**50**	**65**
C_{min}	80	95	135	165	200
S_{min}	50	60	100	120	150
$V^0_{Rd,c}$ (C20/25)	5,5	7,6	14,4	21,8	33,5

$\gamma_{Mc} = 1,5$

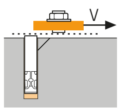


Pryout failure

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

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

$\gamma_{Mcp} = 1,5$



Steel resistance

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

$\gamma_{Ms} = 1,56$

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

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

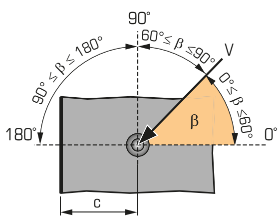
$$\beta_N + \beta_V \leq 1,2$$

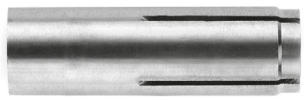
f_b INFLUENCE OF CONCRETE

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

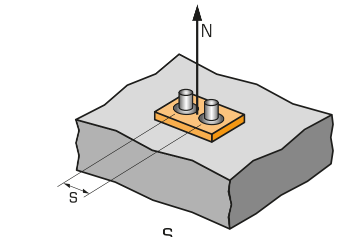
Angle β [°]	$f_{\beta,V}$
0 to 55	1
60	1,1
70	1,2
80	1,5
90 to 180	2





SPIT CC Method (values issued from ETA)

Ψ_s INFLUENCE OF SPACING FOR CONCRETE CONE RESISTANCE IN TENSILE LOAD



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

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

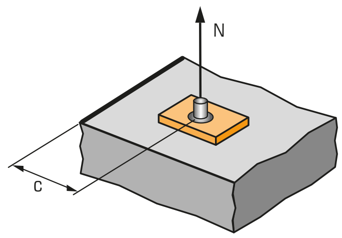
$s_{cr,N} = 3.h_{ef}$

Ψ_s must be used for each spacing influenced the anchors group

SPACING S — Reduction factor Ψ_s, Non-cracked concrete

Anchor size	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



$\Psi_c \leq 1$

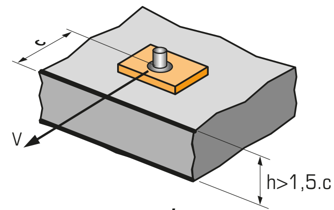
$c \geq c_{min}$

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

EDGE C — Reduction factor $\Psi_{c,N}$, Non-cracked concrete

Anchor size	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

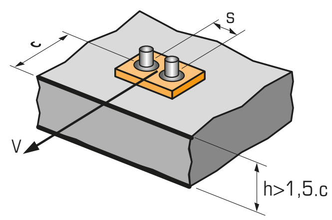


$$\Psi_{s-c,V} = \frac{c}{c_{min}} \cdot \sqrt{\frac{c}{c_{min}}}$$

For single anchor fastening

Reduction 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

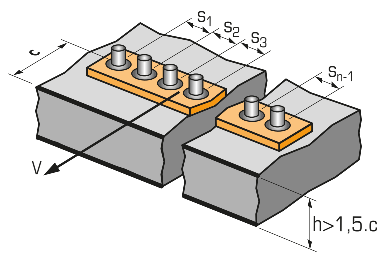


$$\Psi_{s-c,V} = \frac{3.c + s}{6.c_{min}} \cdot \sqrt{\frac{c}{c_{min}}}$$

For 2 anchors fastening

Reduction 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

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