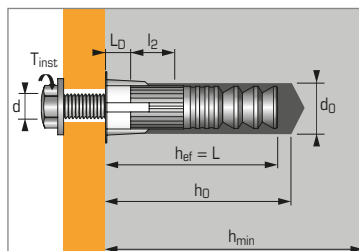


Female chemical anchoring - Heavy loads for use in non-cracked concrete



APPLICATION

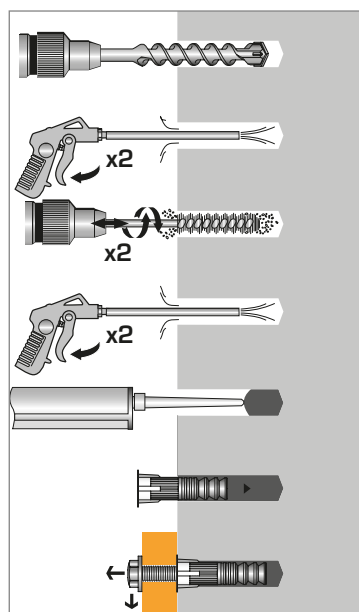
- Fixing steel framed structures
- Fixing machinery (resistant to vibration)
- Insulation fixings (public lighting, cable trays, etc.)
- Waterproof fixings (dams, etc.)
- Fixings for protective barriers, safety rails

MATERIAL

- **body :**
zinc coated steel version :
S 300 pb NFA 35561
stainless steel A4 version:
X2Cr Ni Mo 17-12-2

- **Centering cap:**
high density PE

INSTALLATION*



*Premium cleaning :

- 2 blowing with compressed air
- 2 brushing with brushed fitted on a drilling machine
- 2 blowing with compressed air

Technical data

Anchor size	Min. anchor depth (mm)	Min. thick. of base material (mm)	Thread length (mm)	Depth of threaded start (mm)	Thread diameter (mm)	Drilling depth (mm)	Drilling diameter (mm)	Total anchor length (mm)	Tighten torque (Nm)	Code	
	hef	hmin	l2	LD	d	h0	d0	L	Tinst	zinc coated st.	stainless steel A4
M8X60	60	100	20	4,5	8	65	14	60	10	062770	062860
M10X65	65	100	25	7	10	70	20	65	20	062480	062960
M12X75	75	125	30	8	12	75	24	75	30	062760	063100
M12X120	120	180	38	5	12	125	18	120	60	062500	-
M16X125	125	180	40	9,5	16	130	28	125	120	052800	051175
M20X170	170	225	50	12,5	20	175	35	170	200	062810	-

Nota : EPCON C8 XTREM or VIPER XTREM resins could be used with ATP female studs

Anchor mechanical properties

Anchor size	M8	M10	M12	M16	M20
ATP - zinc coated steel version					
f_{uk} (N/mm ²) Min. tensile strength	520	520	520	520	520
f_{yk} (N/mm ²) Yield strength	420	420	420	420	420
ATP - stainless steel A4 version					
f_{uk} (N/mm ²) Min. tensile strength	650	650	650	-	-
f_{yk} (N/mm ²) Yield strength	350	350	350	-	-

Setting time

VIPER XTREM resin

Temperature	Max. time for installation	Curing time
-10°C ▶ -5°C	90 min.	24 h
-4°C ▶ 0°C	50 min.	240 min.
1°C ▶ 5°C	25 min.	120 min.
6°C ▶ 10°C	15 min.	90 min.
11°C ▶ 20°C	7 min.	60 min.
21°C ▶ 30°C	4 min.	45 min.
31°C ▶ 40°C	2 min.	30 min.

Chemical resistance of the SPIT VIPER XTREM resin

Chemical substances	Concentration (%)	Resistance	Chemical substances	Concentration (%)	Resistance
Acetic acid	50-75	(o)	Heptane	100	(+)
Acetic acid	0-50	(+)	Hexane	100	(o)
Acetone	10	(+)	Hydrochloric acid	25	(o)
Ammonium hydroxide or Ammoniac	20	(o)	Hydrochloric acid	15	(+)
Ammonium hydroxide or Ammoniac	5	(+)	Lactic acid	0-100	(+)
Bromine water	5	(+)	Nitric acid	feb-15	(o)
Chlorine water	0-100	(+)	Phosphoric acid	80	(+)
Citric acid	0-100	(+)	Phosphoric acid, vapor and condensed		(+)
Concentrated phosphoric acid	100	(+)	Sea water	0-100	(+)
Deionized water	0-100	(+)	Sodium carbonate	10	(+)
Demineralized water		(+)	Sodium chloride	0-100	(+)
Diesel fuel	0-100	(+)	Sodium hydroxide (or Caustic soda)	25	(o)
Ethyl alcohol (Ethanol)	10	(o)	Sulfuric acid	71-75	(o)
Ethylene glycol	0-100	(+)	Sulfuric acid	0-70	(+)
Formic acid	10	(+)	Sulfuric acid	Fumes	(+)
Fuel	100	(+)	Sulfuric acid / Phosphoric acid	10:20	(+)
Heavy motor oil	100	(+)	Turpentine (oil)		(o)

Resistant (+): the samples in contact with the substances did not show any Screwable damage such as cracks, attacked surfaces, burst corners nor large swelling. **Sensitive (o):** use with care regarding exposure of the field of usage, precautions to be taken. The samples in contact with the substance slightly attacked the material.



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).

Number of sealings per cartridge

Anchor size	M8X60	M10X65	M12X75	M12X120	M16X125
Drilling diameter (mm)	10	12	14	18	25
Drilling depth (mm)	14	20	24	18	28
Number of sealings per cartridge					
VIPER XTREM 410 ml	80	30	21	24	8
VIPER XTREM 280ml	59	22	15	17	5

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	M8	M10	M12	M12	M16	M20
Screw grade 5.8 / A4-70						
h_{ef}	60	65	75	120	125	170
$N_{Ru,m}$	20,3	32,2	46,8	46,8	87,2	136,1
N_{Rk}	18,3	29	42,2	42,2	78,5	122,5
Screw grade 8.8						
h_{ef}	60	65	75	120	125	170
$N_{Ru,m}$	26,6	41,2	57,1	91,3	111,0	188,8
N_{Rk}	16,7	25,8	35,8	57,3	69,6	118,5

SHEAR

Anchor size	M8	M10	M12	M12	M16	M20
Screw grade 5.8						
$V_{Ru,m}$	11,34	18,18	26,28	26,28	48,96	76,14
V_{Rk}	9,45	15,15	21,9	21,9	40,8	63,45
Screw grade 8.8						
$V_{Ru,m}$	17,46	27,9	40,5	40,5	55,26	121,86
V_{Rk}	14,55	23,25	33,75	33,75	46,05	101,55
Screw grade A4-70						
$V_{Ru,m}$	15,27	24,47	35,38	35,38	65,91	-
V_{Rk}	12,72	20,39	29,48	29,48	54,92	-

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	M12	M16	M20
Screw grade 5.8 / A4-70						
h_{ef}	60	65	75	120	125	170
N_{Rd}	12,2	19,3	28,1	28,1	52,3	81,7
Screw grade 8.8						
h_{ef}	60	65	75	120	125	170
N_{Rd}	11,1	17,2	23,9	38,2	46,4	79,0

$\gamma_{Mc} = 1,5$

SHEAR

Anchor size	M8	M10	M12	M12	M16	M20
Screw grade 5.8						
V_{Rd}	7,6	12,1	17,5	17,5	32,6	50,8
Screw grade 8.8						
V_{Rd}	11,6	18,6	27,0	27,0	30,7	67,7
Screw grade A4-70						
V_{Rd}	8,2	13,1	18,9	18,9	35,2	-

Screw grade 5.8: $\gamma_{Ms} = 1,25$

Screw grade 8.8: $\gamma_{Ms} = 1,25$ for M8 to M12 and $\gamma_{Ms} = 1,5$ for M16 and M20

Screw grade A4-70: $\gamma_{Ms} = 1,56$

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	M8	M10	M12	M12	M16	M20
Screw grade 5.8 / A4-70						
h_{ef}	60	65	75	120	125	170
N_{rec}	8,7	13,8	20,1	20,1	37,4	58,3
Screw grade 8.8						
h_{ef}	60	65	75	120	125	170
N_{rec}	8,0	12,3	17,0	27,3	33,1	56,4

$\gamma_F = 1,4$; $\gamma_{Mc} = 1,5$

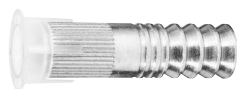
SHEAR

Anchor size	M8	M10	M12	M12	M16	M20
Screw grade 5.8						
V_{rec}	5,4	8,7	12,5	12,5	23,3	36,3
Screw grade 8.8						
V_{rec}	8,3	13,3	19,3	19,3	21,9	48,4
Screw grade A4-70						
V_{rec}	5,8	9,3	13,5	13,5	25,1	-

Screw grade 5.8: $\gamma_F = 1,4$; $\gamma_{Ms} = 1,25$

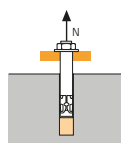
Screw grade 8.8: $\gamma_F = 1,4$; $\gamma_{Ms} = 1,25$ for M8 to M12 and $\gamma_{Ms} = 1,5$ for M16 and M20

Screw grade A4-70: $\gamma_F = 1,4$; $\gamma_{Ms} = 1,56$



SPIT CC Method

TENSILE in kN

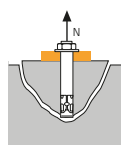


→ Pull-out resistance - Premium cleaning

$$N_{Rd,p} = N_{Rd,p}^0 \cdot f_b$$

$N_{Rd,p}^0$	Design pull-out resistance					
Anchor size	M8	M10	M12	M12	M16	M20
h_{ef}	60	65	75	120	125	170
$N_{Rd,p}^0$ (C20/25)	10,7	13,3	20,0	30,0	40,0	63,3

$$\gamma_{Mc} = 1,5$$

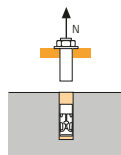


→ Concrete cone resistance - Premium cleaning

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

$N_{Rd,c}^0$	Design cone resistance					
Anchor size	M8	M10	M12	M12	M16	M20
h_{ef}	60	65	75	120	125	170
$N_{Rd,c}^0$ (C20/25)	10,7	13,3	20,0	30,0	40,0	63,3

$$\gamma_{Mc} = 1,5$$



→ Steel resistance

$N_{Rd,s}$	Steel design tensile resistance					
Anchor size	M8	M10	M12	M12	M16	M20
Screw grade 5.8						
$N_{Rd,s}$	12,0	19,3	28,0	28,0	52,0	81,2
Screw grade 8.8						
$N_{Rd,s}$	19,3	30,7	44,7	44,7	73,3	122,0
Screw grade A4-70						
$N_{Rd,s}$	12,4	19,9	29,0	29,0	54,8	-

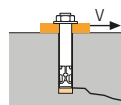
$$\text{Screw grade 5.8 and 8.8 : } \gamma_{Ms} = 1,5$$

$$\text{Screw grade A4-70 : } \gamma_{Ms} = 1,86$$

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

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

SHEAR in kN

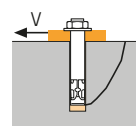


→ Concrete edge resistance

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

$V_{Rd,c}^0$	Design concrete edge resistance at minimum edge distance (C_{min})					
Anchor size	M8	M10	M12	M12	M16	M20
h_{ef}	60	65	75	120	125	170
C_{min}	40	45	55	65	65	85
S_{min}	40	45	55	65	65	85
$V_{Rd,c}^0$ (C20/25)	2,5	3,4	5,0	6,5	7,3	12,5

$$\gamma_{Mc} = 1,5$$

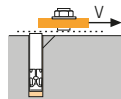


→ Pryout failure

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

$V_{Rd,cp}^0$	Design pryout resistance					
Anchor size	M8	M10	M12	M12	M16	M20
h_{ef}	60	65	75	120	125	170
$V_{Rd,cp}^0$ (C20/25)	21,3	26,7	40,0	60,0	80,0	126,7

$$\gamma_{Mc} = 1,5$$



→ Steel resistance

$V_{Rd,s}$	Steel design shear resistance					
Anchor size	M8	M10	M12	M12	M16	M20
Screw grade 5.8						
$V_{Rd,s}$	7,4	11,6	16,9	16,9	31,2	48,8
Screw grade 8.8						
$V_{Rd,s}$	11,7	18,6	27,0	27,0	36,7	60,7
Screw grade A4-70						
$V_{Rd,s}$	7,3	11,9	17,3	17,3	32,7	-

$$\text{Screw grade 5.8 : } \gamma_{Ms} = 1,25$$

$$\text{Screw grade 8.8 : } \gamma_{Ms} = 1,25 \text{ for M8 to M12 and } \gamma_{Ms} = 1,5 \text{ for M16 and M20}$$

$$\text{Screw grade A4-70 : } \gamma_{Ms} = 1,56$$

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

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

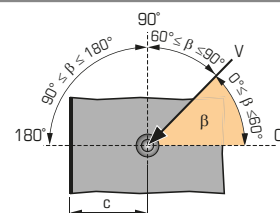
$$\beta_N + \beta_V \leq 1,2$$

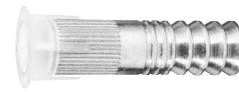
f_b INFLUENCE OF CONCRETE

Concrete class	f_b
C25/30	1,06
C30/40	1,17
C40/60	1,26
C50/60	1,34

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

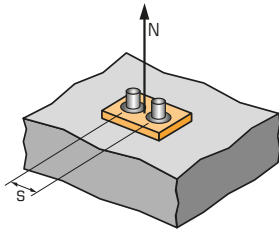
Angle β [°]	$f_{\beta,V}$
0 to 55	1
60	1,1
70	1,2
80	1,5
90 to 180	2





SPIT CC Method

Ψ_s INFLUENCE OF SPACING FOR CONCRETE CONE RESISTANCE IN TENSILE LOAD



$$\Psi_s = 0,5 + \frac{S}{4 \cdot h_{ef}}$$

$$S_{min} < S < S_{cr,N}$$

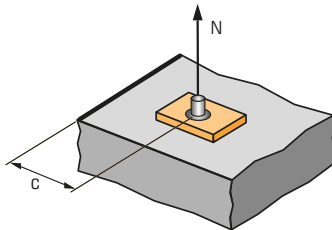
$$S_{cr,N} = 2 \cdot h_{ef}$$

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

SPACING S

Anchor size	Reduction factor Ψ_s Non-cracked concrete					
	M8	M10	M12	M12	M16	M20
40	0,67					
45	0,69	0,67				
55	0,73	0,71	0,68			
65	0,77	0,75	0,72	0,64	0,63	
85	0,85	0,83	0,78	0,65	0,67	0,60
100	0,92	0,88	0,83	0,71	0,70	0,65
120	1,00	0,96	0,90	0,75	0,74	0,68
130		1,00	0,93	0,77	0,76	0,69
150			1,00	0,81	0,80	0,72
200				0,92	0,90	0,79
250				1,00	1,00	0,87
300						0,94
340						1,00

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



$$\Psi_{c,N} = 0,27 + 0,725 \cdot \frac{C}{h_{ef}}$$

$$C_{min} < C < C_{cr,N}$$

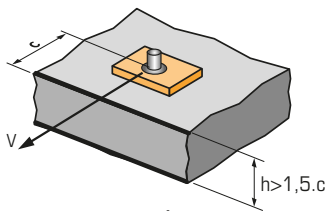
$$C_{cr,N} = h_{ef}$$

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

EDGE C

Anchor size	Reduction factor $\Psi_{c,N}$ Non-cracked concrete					
	M8	M10	M12	M12	M16	M20
40	0,75					
45	0,81	0,77				
55	0,93	0,88	0,80			
65	1,00	1,00	0,90	0,66	0,65	0,55
85			1,00	0,68	0,76	0,63
90				0,81	0,79	0,65
100				0,87	0,85	0,70
125				1,00	1,00	0,80
150						0,91
170						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

$\frac{C}{C_{min}}$	Reduction factor $\Psi_{s-c,V}$ Non-cracked concrete											
	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

$\frac{S}{C_{min}}$	$\frac{C}{C_{min}}$	Reduction factor $\Psi_{s-c,V}$ Non-cracked concrete											
		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

$$\Psi_{s-c,V} = \frac{3 \cdot C + S_1 + S_2 + S_3 + \dots + S_{n-1}}{3 \cdot n \cdot C_{min}} \cdot \sqrt{\frac{C}{C_{min}}}$$

