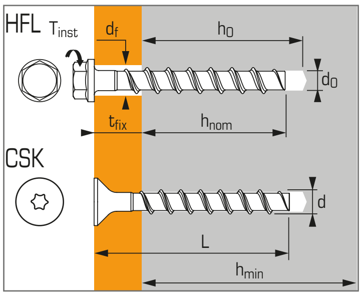
TAPCON XTREM

Concrete screw anchor for use in cracked and non-cracked concrete

European Technical Assessment
ETA Option 1- 16/0276

INOX STAINLESS STEEL

XTREM



APPLICATION

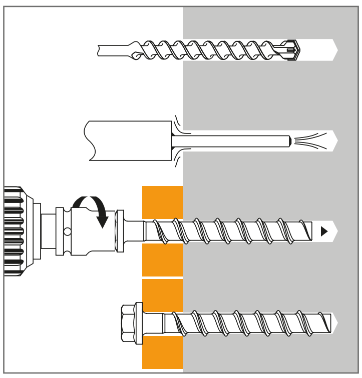
- Channel, cable tray
- Brackets
- E-Clips, cowhorn
- TRH clip, rod hanging
- Trunking
- Push-pull bars
- Formwork / shuttering

MATERIAL

Zinc coated steel version:
Min. tensile strength: 700 N/mm²
- **HFL version:**
Zinc flake coating 5 µm, EN ISO 10683
- **CSK version:**
Min. zinc coated steel 5 µm

Stainless steel version:
Min. tensile strength: 700 N/mm²
- **HFL&CSK versions:**
Stainless steel A4

INSTALLATION



Technical data

Versions	Anchor size	Minimum embedment depth				Maximum embedment depth				Thread Ø	Drilling Ø	Total anchor length	Tighten torque	Code
		Embed. depth min.	Max. thick. of part to be fixed	Drilling depth	Min. thick. of base material	Embed. depth max.	Max. thick. of part to be fixed	Drilling depth	Min. thick. of base material					
		(mm) h_{nom}	(mm) t_{fix}	(mm) h_0	(mm) h_{min}	(mm) h_{nom}	(mm) t_{fix}	(mm) h_0	(mm) h_{min}	(mm) d	(mm) d_0	(mm) L	(Nm) T_{inst}	
Zinc coated versions														
HFL	8X50/5		5			-	-	-	-			50		058733
	8X60/15		15			-	-	-	-			60		058734
	8X70/25-5		25			65	5	75	120			70		058735
	8X80/35-15	45	35	55	100	65	15	75	120	10,6	8	80	20	058736
	8X100/55-35		55			65	35	75	120			100		058737
	8X120/75-55		75			65	55	75	120			120		058738
	8X140/95-75		95			65	75	75	120			140		058739
	10X60/5		5			-	-	-	-			60		058740
	10X70/15		15			-	-	-	-			70		058741
	10X90/35-5		35			85	5	95	130			90		058742
	10X100/45-15	55	45	65	100	85	15	95	130	12,6	10	100	40	058743
	10X120/65-35		65			85	35	95	130			120		058744
	10X140/85-55		85			85	55	95	130			140		058745
	10X160/105-75		105			85	75	95	130			160		058746
	12X80/15	65	15	75	120	-	-	-	-	14,6	12	80	60	058747
	12X110/45-10		45			100	10	110	150			110		058748
	14X80/5		5			-	-	-	-			80		058766
	14X110/35	75	35	85	130	-	-	-	-	16,6	14	110	80	058767
	14X130/55-15		55			115	15	125	170			130		058768
	14X150/75-35		75			115	35	125	170			150		058769
CSK	8X80/35-15	45	35	55	100	65	15	75	120	10,6	8	80	20	058778
Stainless steel A4 versions														
HFL	8X70/25-5	45	25	55	100	65	5	75	120	10,6	8	70	20	058809
	8X80/35-15		35				15					80		058810
	10X90/35-5		35				5					90		058811
	10X100/45-15	55	45	65	100	85	15	95	130	12,6	10	100	40	058812
	10X120/65-35		65				35					120		058813
CSK	8X80/35-15	45	35	55	100	65	15	75	120	10,6	8	80	20	058814
	10X90/35-5	55	35	65	100	85	5	95	130	12,6	10	90	40	058815

Anchor mechanical properties

Anchor size Zinc coated & A4		Ø8	Ø10	Ø12	Ø14
As (mm²)	Stressed cross-section	39,6	65,0	97,7	134,0
$\mathbf{W_{el}}$ (mm³)	Elastic section modulus	35,1	74,0	134,0	220,0
$\mathbf{M^0_{rk,s}}$ (Nm)	Characteristic bending moment	26,0	56,0	113,0	185,0
M (Nm)	Recommended bending moment	13,0	28,0	56,5	92,5

TAPCON XTREM

 zinc coated & 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 (3/5 to 5/5).

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 Zinc coated & A4	Ø8	Ø10	Ø12	Ø14
Non-cracked concrete (C20/25)				
$h_{nom,min}$	**45**	**55**	**65**	**75**
N_{Rk}	7,5	12,0	16,0	22,3
$h_{nom,max}$	**65**	**85**	**100**	**115**
N_{Rk}	16,0	25,0	36,1	44,6
Cracked concrete (C20/25)				
$h_{nom,min}$	**45**	**55**	**65**	**75**
N_{Rk}	5,0	9,0	12,0	15,9
$h_{nom,max}$	**65**	**85**	**100**	**115**
N_{Rk}	12,0	20,2	25,8	31,8

SHEAR

Anchor size Zinc coated & A4	Ø8	Ø10	Ø12	Ø14
Cracked & non-cracked concrete (C20/25)				
V_{Rk}	17,0	34,0	40,0	56,0

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 Zinc coated & A4	Ø8	Ø10	Ø12	Ø14
Non-cracked concrete (C20/25)				
$h_{nom,min}$	**45**	**55**	**65**	**75**
N_{Rd}	5,0	8,0	10,7	14,9
$h_{nom,max}$	**65**	**85**	**100**	**115**
N_{Rd}	10,7	16,7	24,1	29,7
Cracked concrete (C20/25)				
$h_{nom,min}$	**45**	**55**	**65**	**75**
N_{Rd}	3,3	6,0	8,0	10,6
$h_{nom,max}$	**65**	**85**	**100**	**115**
N_{Rd}	8,0	13,5	17,2	21,2

$\gamma_{Mc} = 1,5$

SHEAR

Anchor size Zinc coated & A4	Ø8	Ø10	Ø12	Ø14
Cracked & non-cracked concrete (C20/25)				
V_{Rd}	11,3	22,7	26,7	37,3

$\gamma_{Ms} = 1,5$

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 Zinc coated & A4	Ø8	Ø10	Ø12	Ø14
Non-cracked concrete (C20/25)				
$h_{nom,min}$	**45**	**55**	**65**	**75**
N_{Rec}	3,6	5,7	7,6	10,6
$h_{nom,max}$	**65**	**85**	**100**	**115**
N_{Rec}	7,6	11,9	17,2	21,2
Cracked concrete (C20/25)				
$h_{nom,min}$	**45**	**55**	**65**	**75**
N_{Rec}	2,4	4,3	5,7	7,6
$h_{nom,max}$	**65**	**85**	**100**	**115**
N_{Rec}	5,7	9,6	12,3	15,1

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

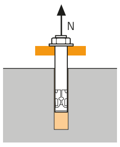
SHEAR

Anchor size Zinc coated & A4	Ø8	Ø10	Ø12	Ø14
Cracked & non-cracked concrete (C20/25)				
V_{rec}	8,1	16,2	19,0	26,7

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

SPIT CC Method

TENSILE in kN



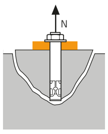
Pull-out resistance

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

$N^0_{Rd,p}$ — Design pull-out resistance

Anchor size Zinc coated & A4	Ø8	Ø10	Ø12	Ø14
Non-cracked concrete (C20/25)				
$h_{nom,min}$	**45**	**55**	**65**	**75**
$N^0_{Rd,p}$	5,0	8,0	10,7	-
$h_{nom,max}$	**65**	**85**	**100**	**115**
$N^0_{Rd,p}$	10,7	16,7	-	-
Cracked concrete (C20/25)				
$h_{nom,min}$	**45**	**55**	**65**	**75**
$N^0_{Rd,p}$	3,3	6,0	8,0	-
$h_{nom,max}$	**65**	**85**	**100**	**115**
$N^0_{Rd,p}$	8,0	-	-	-

$\gamma_{Mc} = 1,5$



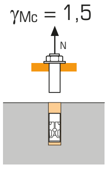
Concrete cone resistance

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

$N^0_{Rd,c}$ — Design cone resistance

Anchor size Zinc coated & A4	Ø8	Ø10	Ø12	Ø14
Non-cracked concrete (C20/25)				
$h_{nom,min}$	**45**	**55**	**65**	**75**
$N^0_{Rd,c}$	7,0	9,5	11,9	14,9
$h_{nom,max}$	**65**	**85**	**100**	**115**
$N^0_{Rd,c}$	12,6	18,9	24,1	29,7
Cracked concrete (C20/25)				
$h_{nom,min}$	**45**	**55**	**65**	**75**
$N^0_{Rd,c}$	5,0	6,8	8,5	10,6
$h_{nom,max}$	**65**	**85**	**100**	**115**
$N^0_{Rd,c}$	9,0	13,5	17,2	21,2

$\gamma_{Mc} = 1,5$



Steel resistance

$N_{Rd,s}$ — Steel design tensile resistance

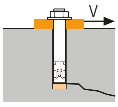
Anchor size Zinc coated & A4	Ø8	Ø10	Ø12	Ø14
$N_{Rd,s}$	19,3	32,1	47,9	67,1

$\gamma_{Ms} = 1,4$

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

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

SHEAR in kN



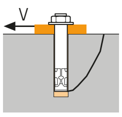
Concrete edge resistance

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

$V^0_{Rd,c}$ — Design concrete edge resistance at minimum edge distance (C_{min})

Anchor size Zinc coated & A4	Ø8	Ø10	Ø12	Ø14
$h_{nom,min}$	**45**	**55**	**65**	**75**
C_{min}	40	50	50	50
S_{min}	40	50	50	50
$V^0_{Rd,c,non-cracked}$	3,2	4,6	4,9	5,1
$V^0_{Rd,c,cracked}$	2,3	3,3	3,4	3,6
$h_{nom,max}$	**65**	**85**	**100**	**115**
C_{min}	50	50	70	70
S_{min}	50	50	70	70
$V^0_{Rd,c,non-cracked}$	4,6	5,0	8,3	8,8
$V^0_{Rd,c,cracked}$	3,3	3,6	5,9	6,2

$\gamma_{Mc} = 1,5$



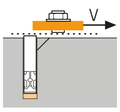
Pryout failure

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

$V^0_{Rd,cp}$ — Design pryout resistance

Anchor size Zinc coated & A4	Ø8	Ø10	Ø12	Ø14
Non-cracked concrete (C20/25)				
$h_{nom,min}$	**45**	**55**	**65**	**75**
$V^0_{Rd,cp}$	7,0	9,5	11,9	14,9
$h_{nom,max}$	**65**	**85**	**100**	**115**
$V^0_{Rd,cp}$	12,6	37,8	48,2	59,4
Cracked concrete (C20/25)				
$h_{nom,min}$	**45**	**55**	**65**	**75**
$V^0_{Rd,cp}$	5,0	6,8	8,5	10,6
$h_{nom,max}$	**65**	**85**	**100**	**115**
$V^0_{Rd,cp}$	9,0	26,9	34,3	42,4

$\gamma_{Mc} = 1,5$



Steel resistance

$V_{Rd,s}$ — Steel design shear resistance

Anchor size Zinc coated & A4	Ø8	Ø10	Ø12	Ø14
$V_{Rd,s}$	11,3	22,7	26,7	37,3

$\gamma_{Ms} = 1,5$

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

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

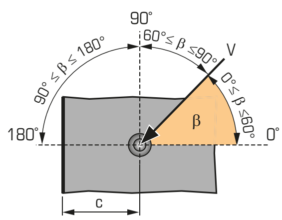
$$\beta_N + \beta_V \leq 1,2$$

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

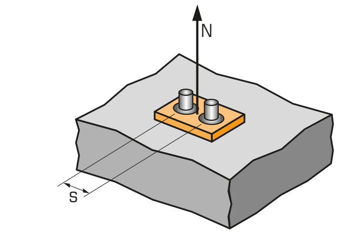
$f_{\beta,V}$ INFLUENCE OF SHEAR LOADING DIRECTION

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

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.

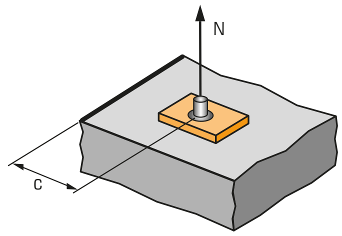
SPACING S — Reduction factor Ψ_s — Minimum anchor depth

Anchor size	Ø8	Ø10	Ø12	Ø14
40	0,69			
50	0,74	0,69	0,67	0,64
70	0,83	0,77	0,73	0,70
95	0,95	0,87	0,82	0,77
105	1,00	0,91	0,85	0,80
115		0,95	0,88	0,83
130		1,00	0,93	0,87
150			1,00	0,93
175				1,00

SPACING S — Reduction factor Ψ_s — Maximum anchor depth

Anchor size	Ø8	Ø10	Ø12	Ø14
50	0,66	0,62		
70	0,72	0,67	0,65	0,63
100	0,82	0,75	0,71	0,68
130	0,92	0,82	0,77	0,74
155	1,00	0,88	0,82	0,78
200		1,00	0,92	0,86
240			1,00	0,93
275				1,00

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



$$\Psi_{c,N} = 0,27 + 0,48.\frac{c}{h_{ef}}$$

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

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

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

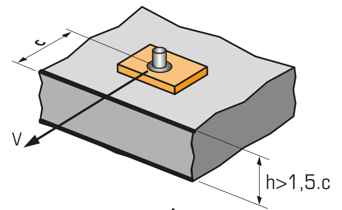
EDGE C — Reduction factor $\Psi_{c,N}$ — Minimum anchor depth

Anchor size	Ø8	Ø10	Ø12	Ø14
50	0,96	0,83	0,75	0,68
55	1,00	0,88	0,80	0,73
60		0,94	0,85	0,77
65		1,00	0,89	0,81
75			1,00	0,89
90				1,00

EDGE C — Reduction factor $\Psi_{c,N}$ — Maximum anchor depth

Anchor size	Ø8	Ø10	Ø12	Ø14
50	0,73	0,62		
65	0,87	0,73		
70	0,92	0,76	0,69	0,64
80	1,00	0,83	0,75	0,69
100		1,00	0,87	0,79
120			1,00	0,90
140				1,00

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

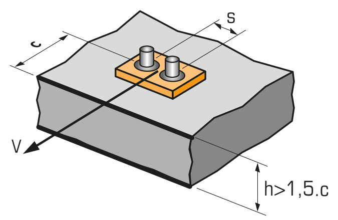


$$\Psi_{s-c,V} = \frac{c}{c_{min}}.\sqrt{\frac{c}{c_{min}}}$$

For single anchor fastening

Reduction factor $\Psi_{s-c,V}$ — Cracked & non-cracked concrete

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

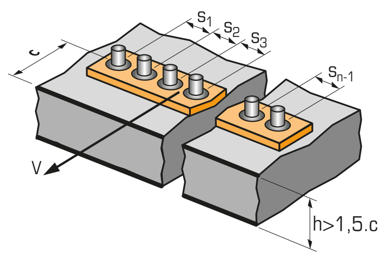


$$\Psi_{s-c,V} = \frac{3.c + s}{6.c_{min}}.\sqrt{\frac{c}{c_{min}}}$$

For 2 anchors fastening

Reduction factor $\Psi_{s-c,V}$ — Cracked & non-cracked concrete

s/c_{min} \ 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



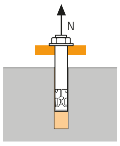
For 3 anchors fastening and more

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

Mechanical anchors

SPIT CC Method (values issued from ETA - Seismic category C1)

TENSILE in kN



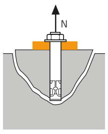
Pull-out resistance

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

$N^0_{Rd,p,C1}$ — Design pull-out resistance

Anchor size Zinc coated & A4	Ø8	Ø10	Ø12	Ø14
Category C1 - Single anchor				
h_{nom}	**65**	**85**	**100**	**115**
$N^0_{Rd,p,C1}$	8,0	-	-	-
Category C1 - Group of anchors [(1)]				
h_{nom}	**65**	**85**	**100**	**115**
$N^0_{Rd,p,C1}$	6,8	-	-	-

(1) when more than one anchor of the group is submitted to tensile load
$\gamma_{Mc} = 1{,}5$



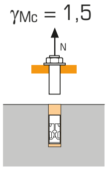
Concrete cone resistance

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

$N^0_{Rd,c,C1}$ — Design cone resistance

Anchor size Zinc coated & A4	Ø8	Ø10	Ø12	Ø14
Category C1 - Single anchor				
h_{nom}	**65**	**85**	**100**	**115**
$N^0_{Rd,c,C1}$	7,6	11,4	14,6	18,0
Category C1 - Group of anchors [(1)]				
h_{nom}	**65**	**85**	**100**	**115**
$N^0_{Rd,c,C1}$	6,7	10,1	12,9	15,9

$\gamma_{Mc} = 1{,}5$
(1) when more than one anchor of the group is submitted to tensile load
$\gamma_{Mc} = 1{,}5$



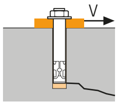
Steel resistance

$N_{Rd,s,C1}$ — Steel design tensile resistance

Anchor size Zinc coated & A4	Ø8	Ø10	Ø12	Ø14
$N_{Rd,s,C1}$	19,3	32,1	47,9	67,1

(1) when more than one anchor of the group is submitted to tensile load
$\gamma_{Ms} = 1{,}4$

SHEAR in kN



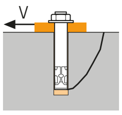
Concrete edge resistance

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

$V^0_{Rd,c,C1}$ — Design concrete edge resistance at minimum edge distance (C_{min})

Anchor size Zinc coated & A4	Ø8	Ø10	Ø12	Ø14
Category C1 - Single anchor				
h_{nom}	**65**	**85**	**100**	**115**
C_{min}	50	50	70	70
S_{min}	50	50	70	70
$V^0_{Rd,c,C1}$	2,3	3,2	3,3	3,3
Category C1 - Group of anchors [(1)]				
h_{nom}	**65**	**85**	**100**	**115**
C_{min}	50	50	70	70
S_{min}	50	50	70	70
$V^0_{Rd,c,C1}$	1,9	2,7	2,8	2,8

(1) when more than one anchor of the group is submitted to shear load
$\gamma_{Mc} = 1{,}5$



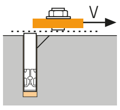
Pryout failure

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

$V^0_{Rd,cp,C1}$ — Design pryout resistance

Anchor size Zinc coated & A4	Ø8	Ø10	Ø12	Ø14
Category C1 - Single anchor				
h_{nom}	**65**	**85**	**100**	**115**
$V^0_{Rd,cp,C1}$	15,3	22,9	29,2	36,0
Category C1 - Group of anchors [(1)]				
h_{nom}	**65**	**85**	**100**	**115**
$V^0_{Rd,cp,C1}$	13,5	20,2	25,8	31,8

$\gamma_{Mc} = 1{,}5$
(1) when more than one anchor of the group is submitted to shear load
$\gamma_{Mc} = 1{,}5$



Steel resistance [(2)]

$V_{Rd,s,C1}$ — Steel design shear resistance

Anchor size Zinc coated & A4	Ø8	Ø10	Ø12	Ø14
Category C1 - Single anchor				
$V_{Rd,s,C1}$	5,7	10,2	14,0	14,9
Category C1 - Group of anchors [(1)]				
$V_{Rd,s,C1}$	4,8	8,7	11,9	12,7

(1) when more than one anchor of the group is submitted to shear load
(2) In case of no hole clearance between anchor and fixture
$\gamma_{Ms} = 1{,}5$

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

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

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

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