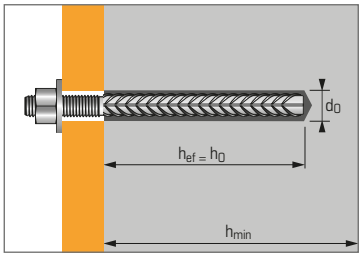
Epoxy resin - High performance for starter bar fastenings

ETA Option 1- 10/0309



APPLICATION

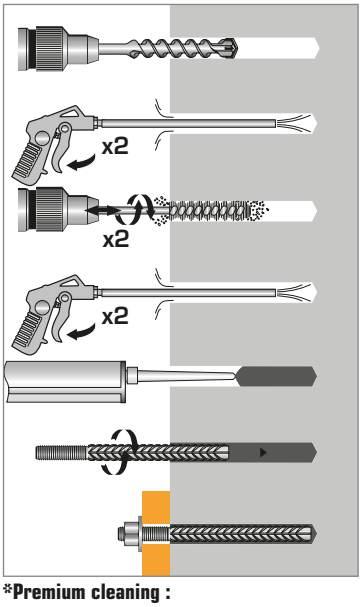
- Starter bar fastenings in non-reinforced concrete

Technical data

Anchor size	Min. anchor depth (mm) h_{ef}	Min. thick. of base material (mm) h_{min}	Drilling depth (mm) h_0	Drilling diameter (mm) d_0
Ø8	80	110	80	10
Ø10	90	120	90	12
Ø12	110	140	110	15
Ø14	125	170	125	18
Ø16	125	170	125	18
Ø20	170	220	170	25
Ø25	210	270	210	30
Ø30	300	380	300	40

EPCON C8 Epoxy resin, dual component cartridge 450 ml — Code : 055887

INSTALLATION*



***Premium cleaning :**
- 2 blowing with compressed air
- 2 brushing with brushed fitted on a drilling machine
- 2 blowing with compressed air

Mechanical characteristics

Nominal steel bar diameter		Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32	Ø40
Sections (cm^2)		0,503	0,785	1,13	1,54	2,01	3,14	4,91	8,04	12,57
Min. resistance to failure (kN)	Fe E400	21,13	32,97	47,46	64,68	84,42	131,88	206,22	337,68	527,94
	Fe E500	25,90	40,43	58,20	79,31	103,52	161,71	252,87	414,06	647,36
Ultimate limit load N_{Rd} (kN)	Fe E500	21,85	34,15	49,17	66,93	87,42	136,59	213,43	349,56	546,36

The mechanical characteristics of the high adhesion rebars are defined in the NFA 35-016 and NFA 35-017 standards.

Setting time

Temperature	Max. time for installation (min)	Waiting time for 45 % load (h)	Curing time (h)
40°C	5	3	6
30°C	8	5	8
20°C	14	6	12
10°C	20	12	23
5°C	26	15	26

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	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
h_{ef}	**80**	**90**	**110**	**125**	**125**	**170**	**210**	**230**
$N_{Ru,m}$	33,4	46,9	68,8	91,3	104,3	177,3	273,8	407,2
N_{Rk}	25,1	35,3	51,8	68,7	78,5	133,5	206,2	304,6

SHEAR

Anchor size	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
$V_{Ru,m}$	18,4	28,8	41,4	56,5	73,7	115,1	180,0	294,8
V_{Rk}	16,6	25,9	37,3	50,8	66,3	103,6	162,0	265,3

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	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
h_{ef}	**80**	**90**	**110**	**125**	**125**	**170**	**210**	**230**
N_{Rd}	14,0	19,6	28,8	38,2	43,6	74,2	114,5	169,2

$\gamma_{Mc} = 1,8$

SHEAR

Anchor size	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
V_{Rd}	11,1	17,3	24,9	33,9	44,2	39,1	108,0	176,9

$\gamma_{Ms} = 1,5$

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

$$N_{rec} = \frac{N_{Rk}\,*}{\gamma_M \,.\, \gamma_F}$$

*Derived from test results

$$V_{rec} = \frac{V_{Rk}\,*}{\gamma_M \,.\, \gamma_F}$$

TENSILE

Anchor size	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
h_{ef}	**80**	**90**	**110**	**125**	**125**	**170**	**210**	**230**
N_{rec}	-	14,0	20,6	27,3	31,2	53,0	81,8	120,9

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

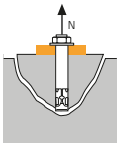
SHEAR

Anchor size	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
V_{rec}	7,9	12,3	17,8	24,2	31,6	49,3	77,2	126,3

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

SPIT CC Method (values issued from ETA)

TENSILE in kN

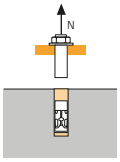


Concrete cone resistance for béton sec

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

$N^{0}_{Rd,c}$								Design cone resistance
Anchor size	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
h_{ef}	**80**	**90**	**110**	**125**	**125**	**170**	**210**	**230**
$N^{0}_{Rd,c}$	14,0	19,6	28,8	38,2	43,6	74,2	114,5	169,2

γ_{Mc} = 1,8

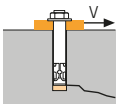


Resistance to la rupture des rebars Fe E500

$N_{Rd,s}$								Steel design tensile resistance
Anchor size	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
h_{ef}	**80**	**90**	**110**	**125**	**125**	**170**	**210**	**230**
$N_{Rd,s}$	21,0	32,7	47,1	64,2	83,8	130,8	204,6	335,0

γ_{Ms} Fe E500 = 1,4

SHEAR in kN

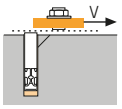


Concrete edge resistance

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

$V^{0}_{Rd,c}$								Design concrete edge resistance at minimum edge distance (C_{min})
Anchor size	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
h_{ef}	**80**	**90**	**110**	**125**	**125**	**170**	**210**	**230**
C_{min}	40	50	60	70	80	100	125	160
S_{min}	40	50	60	70	80	100	125	160
$V^{0}_{Rd,c}$	2,5	3,8	5,5	7,0	8,5	12,7	18,4	26,9

γ_{Mc} = 1,5



Steel resistance

$V_{Rd,s}$								Steel design shear resistance
Anchor size	Ø8	Ø10	Ø12	Ø14	Ø16	Ø20	Ø25	Ø32
h_{ef}	**80**	**90**	**110**	**125**	**125**	**170**	**210**	**230**
$V_{Rd,s}$	11,1	17,3	24,9	33,9	44,2	69,1	108,0	176,9

γ_{Ms} Fe E500 = 1,5

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

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

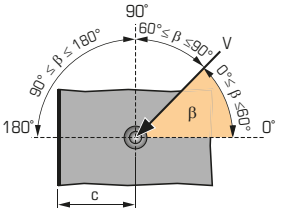
$$\beta_N + \beta_V \leq 1,2$$

f_b INFLUENCE OF CONCRETE

Concrete class	f_b
C20/25	1,00
C30/40	1,14
C40/60	1,26
C50/60	1,34

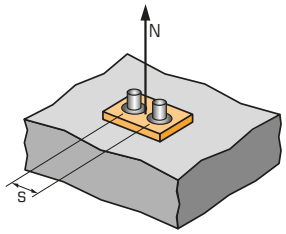
$f_{\beta,V}$ INFLUENCE OF SHEAR LOADING DIRECTION

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 (values issued from ETA)

Ψ_s INFLUENCE OF SPACING FOR CONCRETE CONE RESISTANCE IN TENSILE LOAD



$$\Psi_s = 0{,}5 + \frac{s}{4.h_{ef}}$$

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

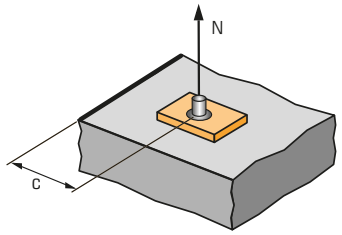
$s_{cr,N} = 2.h_{ef}$

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

SPACING S	Reduction factor Ψ_s Cracked & non-cracked concrete			
Anchor size	Ø8	Ø10	Ø12	Ø14
40	0,63			
50	0,66			
60	0,69	0,67		
70	0,72	0,69	0,66	
85	0,77	0,74	0,69	0,67
105	0,83	0,79	0,74	0,71
140	0,94	0,89	0,82	0,78
160	1,00	0,94	0,86	0,82
180		1,00	0,91	0,86
220			1,00	0,94
250				1,00

SPACING S	Reduction factor Ψ_s Cracked & non-cracked concrete			
Anchor size	Ø16	Ø20	Ø25	Ø32
80	0,66			
100	0,70	0,65		
125	0,75	0,68		
160	0,82	0,74	0,69	
200	0,90	0,79	0,74	0,72
250	1,00	0,87	0,80	0,77
320		0,97	0,88	0,85
340		1,00	0,90	0,87
380			0,95	0,91
420			1,00	0,96
460				1,00

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



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

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

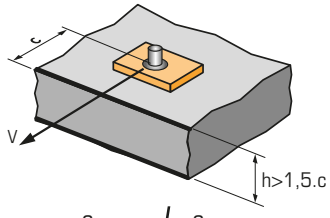
$c_{cr,N} = h_{ef}$

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

EDGE C	Reduction factor $\Psi_{c,N}$ Cracked & non-cracked concrete			
Anchor size	Ø8	Ø10	Ø12	Ø14
40	0,63			
50	0,72	0,67		
60	0,81	0,75	0,67	
70	0,90	0,83	0,73	0,68
80	1,00	0,91	0,80	0,73
90		1,00	0,86	0,79
110			1,00	0,91
125				1,00

EDGE C	Reduction factor $\Psi_{c,N}$ Cracked & non-cracked concrete			
Anchor size	Ø16	Ø20	Ø25	Ø32
80	0,73			
100	0,85	0,70		
125	1,00	0,80	0,70	
160		0,95	0,82	0,77
170		1,00	0,86	0,81
210			1,00	0,93
230				1,00

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

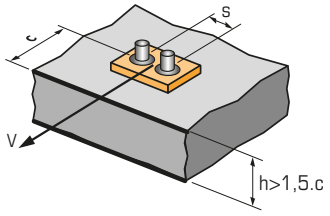


$$\Psi_{s\text{-}c,V} = \frac{c}{c_{min}} \cdot \sqrt{\frac{c}{c_{min}}}$$

For single anchor fastening

	Reduction factor $\Psi_{s\text{-}c,V}$ Cracked & 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
$\Psi_{s\text{-}c,V}$	1,00	1,31	1,66	2,02	2,41	2,83	3,26	3,72	4,19	4,69	5,20	5,72

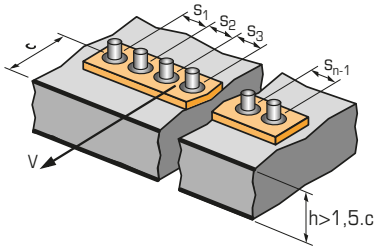
For 2 anchors fastening



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

	Reduction factor $\Psi_{s\text{-}c,V}$ Cracked & 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



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