Vinyl ester styrene-free mortar anchor, for use in non-cracked concrete

MO-VSF

Assessed ETA Option 7 (non-cracked concrete).

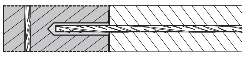
PRODUCT INFORMATION

DESCRIPTION
Vinyl ester styrene-free, chemical anchor.

OFFICIAL DOCUMENTATION
- ETA 24/0724 option 7, de M8 a M24 or non-cracked concrete.
- ETA 24/0726 or post-installed rebar installation.
- ETA 24/725 for installation in masonry.
- Certificate 1020-CPD-090-063589 for use in concrete.
- Certificate EVCP 1020-CPR-090-063593 for post-installed rebars.
- Certificate EVCP 1020-CPR-090-063591 for installation in masonry.
- Declaration features DoP MO-VSF.

VALID FOR

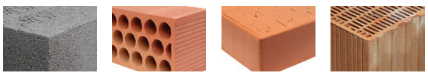
Stud


Post-installed rebar

DIMENSIONS
Stud M8 - M24
Post-installed rebars Ø8 - Ø16

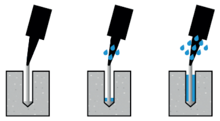
RANGE OF CACULATION LOADS
From 7,8 to 48,3 kN (non-cracked).

BASE MATERIAL
Concrete quality C20/25 to C50/60 non-cracked.


Concrete | Hollow brick | Solid brick | Thermal clay

ASSESSMENTS
- ETA 24/0724 Option 7: non-cracked concrete.
- ETA 24/0726 Post-installed rebars.
- ETA 24/0725 Masonry.

STRUCTURAL FIXINGS IN UNCRACKED CONCRETE – ETA 24/0724 | REBAR CONNECTIONS – ETA 24/0726 | FIXINGS IN MASONRY – ETA 24/0725 | ÉMISSIONS DANS L'AIR INTÉRIEUR A+ | LEED TESTED

DRILL HOLE CONDITION

Dry | Wet | Flooded

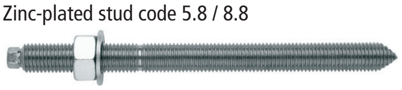
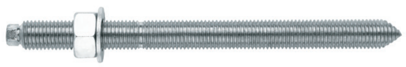
CHARACTERISTICS AND BENEFITS
- Easy installation.
- For use in non-cracked concrete,
- Used for high loads.
- Temperature range -40°C to +80°C (maximum long-term temperature +50°C).
- Variety of lengths and diameters: M8-M24-assessed studs, flexible assembly.
- For static or quasi-static loads.
- Version in zinc plated steel, stainless steel A4.
- Available in INDEXcal.

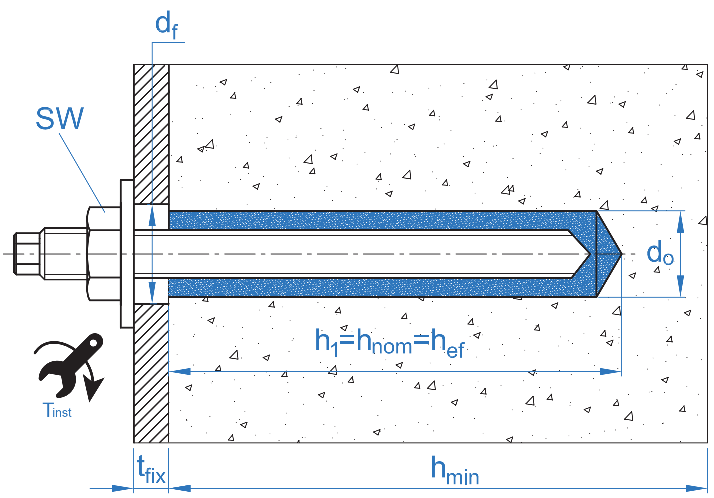
MATERIALS
Standard stud:
Carbon steel 5.8, 8.8.

Stainless standard stud:
Stainless steel A2-70 and A4-70.

APPLICATIONS
- For indoor and outdoor use.
- Structural applications.
- Safety barriers.
- Fixing of road fences.
- Fixing of posters, machinery, boilers, signs, billboards, etc.

CONCRETE INSTALLATION PARAMETERS

METRIC			M8	M10	M12	M16	M20	M24
d_0	nominal diameter	[mm]	10	12	14	18	22	26
d_f	diameter in anchor plate ≤	[mm]	9	12	14	18	22	26
T_{inst}	tightening torque ≤	[Nm]	10	20	40	80	150	200
Circular cleaning brush			Ø14		Ø20		Ø29	
$h_{ef,min}$ = 8d								
h_1	depth of the drill hole	[mm]	64	80	96	128	160	192
$s_{cr,N}$	critical distance between anchors	[mm]	192	240	288	384	480	576
$c_{cr,N}$	critical distance from the edge	[mm]	96	120	144	192	240	288
c_{min}	minimum distance from the edge	[mm]	35	40	50	65	80	96
s_{min}	minimum distance between anchors	[mm]	35	40	50	65	80	96
h_{min}	minimum concrete thickness	[mm]	100	110	126	158	204	244
Standard stud								
h_1	depth of the drill hole	[mm]	80	90	110	128	170	210
$s_{cr,N}$	critical distance between anchors	[mm]	240	270	330	384	510	630
$c_{cr,N}$	critical distance from the edge	[mm]	120	135	165	192	255	315
c_{min}	minimum distance from the edge	[mm]	43	45	56	65	85	105
s_{min}	minimum distance between anchors	[mm]	43	45	56	65	85	105
h_{min}	minimum concrete thickness	[mm]	110	120	140	158	214	262
$h_{ef,max}$ = 12d								
h_1	depth of the drill hole	[mm]	96	120	144	192	240	288
$s_{cr,N}$	critical distance between anchors	[mm]	288	360	432	576	720	864
$c_{cr,N}$	critical distance from the edge	[mm]	144	180	216	288	360	432
c_{min}	minimum distance from the edge	[mm]	50	60	70	95	120	145
s_{min}	minimum distance between anchors	[mm]	50	60	70	95	120	145
h_{min}	minimum concrete thickness	[mm]	126	150	174	222	284	340
Zinc-plated stud code 5.8 / 8.8 			EQAC08110 EQ8808110	EQAC10130 EQ8810130	EQAC12160 EQ8812160	EQAC16190 EQ8816190	EQAC20260 EQ8820260	EQAC24300 EQ8824300
Stainless steel stud code A2 / A4 			EQA208110 EQA408110	EQA210130 EQA410130	EQA212160 EQA412160	EQA216190 EQA416190	EQA220260 EQA420260	EQA224300 EQA424300

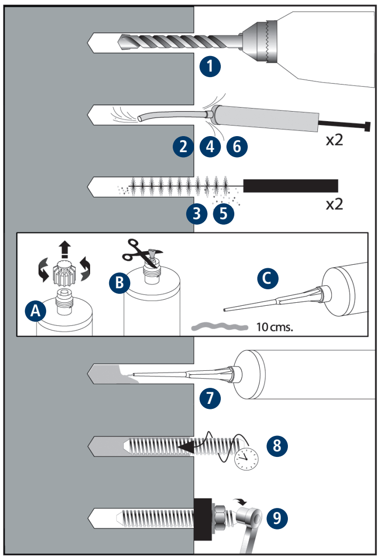


INSTALLATION ACCESSORIES

CODE	PRODUCT	MATERIAL
MOPISSI	APPLICATION GUNS	Gun for 300 ml cartridges
MOPISTO		Guns for 410 ml cartridges, professional use
MOPISNEU		Pneumatic gun for 410 ml coaxial cartridges, professional use
EQ-AC **EQ-8.8** **EQ-A2** **EQ-A4**	STUD	Studs threaded steel, class 5.8 ISO 898-1 Studs threaded steel, class 8.8 ISO 898-1 Studs stainless steel A2-70 Studs stainless steel A4-70
MORCEPKIT	CLEANING BRUSHES	Kit with 3 cleaning brushes measuring ø14, ø20 and ø29 mm
MOBOMBA	CLEANING PUMP	Pump for cleaning leftover dust and fragments in the drill hole
MORCANU	MIXING TUBE	Plastic. Static labyrinth mixture

INSTALLATION PROCEDURE

CONCRETE



MINIMUM CURING TIME

TYPE	Cartridge temperature [°C]	Handling time [min]	Base material temperature [°C]	Curing time [min]
MO-VSF	min +5	18	min +5	145
	+5 a +10	10	+5 a +10	145
	+10 a +20	6	+10 a +20	85
	+20 a +25	5	+20 a +25	50
	+25 a +30	4	+25 a +30	40
	+30	4	+30	35

Resistance in concrete C20/25 for an insulated anchor, without effects of distance from the edge or spacing between anchors, with a standard stud EQ-AC, EQ-8.8, EQ-A2 or EQ-A4

Characteristic tensile strength N_{Rk}								
Metric			M8	M10	M12	M16	M20	M24
N_{Rk}	Non-cracked concrete	[kN]	14,0	19,7	26,9	41,8	64,0	87,0
Calculated tensile strength N_{Rd}								
Metric			M8	M10	M12	M16	M20	M24
N_{Rd}	Non-cracked concrete	[kN]	7,8	11,0	14,9	23,2	35,6	48,3
Maximum recommended tensile load N_{rec}								
Metric			M8	M10	M12	M16	M20	M24
N_{rec}	Non-cracked concrete	[kN]	5,5	7,8	10,7	16,6	25,4	34,5
Characteristic resistance to shear stress V_{Rk}								
Metric			M8	M10	M12	M16	M20	M24
V_{Rk}	Zinc-plated stud	[kN]	*9,0*	*15,0*	*21,0*	*39,0*	*61,0*	*88,0*
	Stainless steel stud	[kN]	*13,0*	*20,0*	*30,0*	*55,0*	*86,0*	*124,0*
Calculated resistance to shearing V_{Rd}								
Metric			M8	M10	M12	M16	M20	M24
V_{Rd}	Zinc-plated stud	[kN]	*7,2*	*12,0*	*16,8*	*31,2*	*48,8*	*70,4*
	Stainless steel stud	[kN]	*8,3*	*12,8*	*19,2*	*35,3*	*55,1*	*79,5*
Maximum recommended load to shear stress V_{rec}								
Metric			M8	M10	M12	M16	M20	M24
V_{rec}	Zinc-plated stud	[kN]	*5,1*	*8,6*	*12,0*	*22,3*	*34,9*	*50,3*
	Stainless steel stud	[kN]	*6,0*	*9,2*	*13,7*	*25,2*	*39,4*	*56,8*
Effective depth of studs EQ-AC / EQ-A2 / EQ-A4								
Metric			M8	M10	M12	M16	M20	M24
Effective depth		[mm]	80	90	110	128	170	210

The values underlined and in italics indicate steel failure

Simplified calculation method. European Technical Assessment ETA 24/0724

Simplified version of the calculation method according to Eurocode 2 EN 1992-4. Resistance is calculated according to the data shown in assessment ETA 24/0724.

- Influence of concrete resistance.
- Influence of the distance from the edge of the concrete.
- Influence of the spacing between anchors.
- Influence of rebars.
- Influence of the base material thickness.
- Influence of the load application angle.
- Influence of the effective depth.
- Valid for a group of two anchors.
- Valid for dry or wet drill holes.

The calculation method is based on the following simplification:
No different loads act on individual anchors, without eccentricity.

INDEXcal
For a more precise calculation and taking into account more constructive arrangements we recommend the use of our INDEXcal calculation program. It can be downloaded free from our website **www.indexfix.com**

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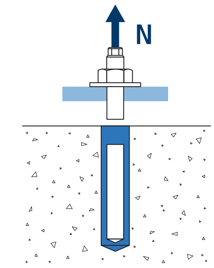
TENSILE LOADS

- Calculated steel resistance: $N_{Rd,s}$
- Calculated extraction resistance: $N_{Rd,p} = N^{o}_{Rd,p} \cdot \Psi_{c} \cdot \Psi_{hef,p}$
- Calculated concrete cone resistance: $N_{Rd,c} = N^{o}_{Rd,c} \cdot \Psi_{b} \cdot \Psi_{s,N} \cdot \Psi_{c,N} \cdot \Psi_{re,N} \cdot \Psi_{hef,N}$
- Calculated concrete cracking resistance: $N_{Rd,sp} = N^{o}_{Rd,c} \cdot \Psi_{b} \cdot \Psi_{s,sp} \cdot \Psi_{c,sp} \cdot \Psi_{re,N} \cdot \Psi_{h,sp} \cdot \Psi_{hef,N}$

Calculated steel resistance

$N_{Rd,s}$

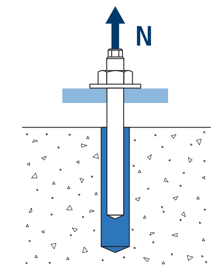
Metric			M8	M10	M12	M16	M20	M24
$N^{o}_{Rd,s}$	Steel class 5.8	[kN]	12,0	19,3	28,0	52,7	82,0	118,0
	Steel class 8.8	[kN]	19,3	30,7	44,7	84,0	130,7	188,0
	Steel class 10.9	[kN]	27,8	43,6	63,2	118,0	184,2	265,4
	Stainless steel Class A2-70, A4-70	[kN]	13,9	21,9	31,6	58,8	92,0	132,1



Calculated extraction resistance

$N_{Rd,p} = N^{o}_{Rd,p} \cdot \Psi_{c} \cdot \Psi_{hef,p}$

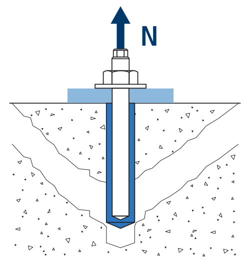
Metric			M8	M10	M12	M16	M20	M24
$N^{o}_{Rd,p}$	Non-cracked concrete	[kN]	7,8	11,0	15,0	23,2	35,6	48,4



Calculated concrete cone resistance

$N_{Rd,c} = N^{o}_{Rd,c} \cdot \Psi_{b} \cdot \Psi_{s,N} \cdot \Psi_{c,N} \cdot \Psi_{re,N} \cdot \Psi_{hef,N}$

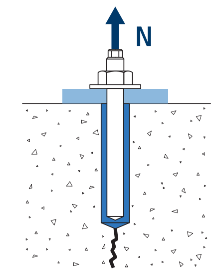
Metric			M8	M10	M12	M16	M20	M24
$N^{o}_{Rd,c}$	Non-cracked concrete	[kN]	19,6	23,3	31,5	39,6	60,6	83,2



Calculated concrete cracking resistance

$N_{Rd,sp} = N^{o}_{Rd,c} \cdot \Psi_{b} \cdot \Psi_{s,sp} \cdot \Psi_{c,sp} \cdot \Psi_{re,N} \cdot \Psi_{h,sp} \cdot \Psi_{hef,N}$

Metric			M8	M10	M12	M16	M20	M24
$N^{o}_{Rd,sp}$	Non-cracked concrete	[kN]	19,6	23,3	31,5	39,6	60,6	83,2



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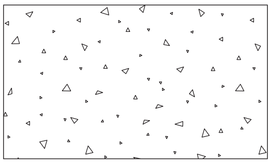
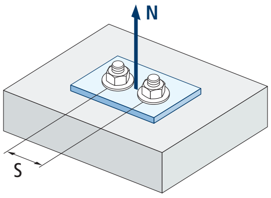
Influence coefficients



Influence of concrete resistance for extraction Ψ_c					
	Concrete type	C20/25	C30/37	C40/50	C50/60
Ψ_c	Non-cracked concrete	1,00	1,10	1,18	1,25

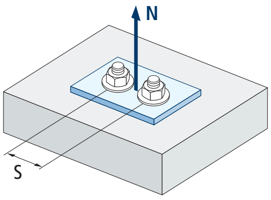
$$\Psi_b = \sqrt{\frac{f_{ck,cube}}{25}} \geq 1$$

Influence of concrete resistance for concrete cone and concrete cracking Ψ_b					
	Concrete type	C20/25	C30/37	C40/50	C50/60
Ψ_b		1,00	1,22	1,41	1,55



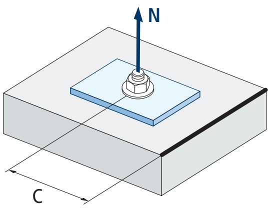
Influence of spacing between anchors (concrete cone) $\Psi_{s,N}$										
$s/s_{cr,N}$	0,1	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1,0
$\Psi_{s,N}$	0,55	0,60	0,65	0,70	0,75	0,80	0,85	0,90	0,95	1,00

$$\Psi_{s,N} = 0,5\left(1+\frac{s}{s_{cr,N}}\right) \leq 1$$



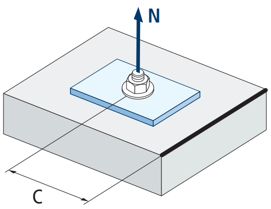
Influence of spacing between anchors (cracking) $\Psi_{s,N}$										
$s/s_{cr,sp}$	0,1	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1,0
$\Psi_{s,sp}$	0,55	0,60	0,65	0,70	0,75	0,80	0,85	0,90	0,95	1,00

$$\Psi_{s,sp} = 0,5\left(1+\frac{s}{s_{cr,sp}}\right) \leq 1$$



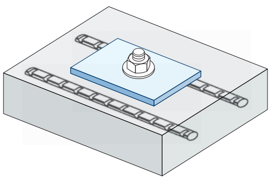
Influence of the distance from the edge of the concrete (concrete cone) $\Psi_{c,N}$												
$c/C_{cr,N}$	0,1	0,2	0,3	0,5	0,6	0,8	0,9	1,1	1,2	1,4	1,5	1,6
$\Psi_{c,N}$	0,40	0,46	0,51	0,45	0,49	0,55	0,61	0,67	0,75	0,83	0,91	1,00

$$\Psi_{c,N} = 0,35 + \frac{0,5 \cdot c}{C_{cr,N}} + \frac{0,15 \cdot c^2}{C_{cr,N}^{\;2}} \leq 1$$



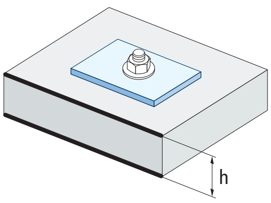
Influence of the distance from the edge of the concrete (cracking) $\Psi_{c,sp}$												
$c/C_{cr,sp}$	0,1	0,2	0,3	0,5	0,6	0,8	0,9	1,1	1,2	1,4	1,5	1,6
$\Psi_{c,sp}$	0,40	0,46	0,51	0,45	0,49	0,55	0,61	0,67	0,75	0,83	0,91	1,00

$$\Psi_{c,sp} = 0,35 + \frac{0,5 \cdot c}{C_{cr,sp}} + \frac{0,15 \cdot c^2}{C_{cr,sp}^{\;2}} \leq 1$$



Influence of the rebars $\Psi_{re,N}$					
h_{ef} (mm)	64	70	80	90	100
$\Psi_{re,N}$	0,82	0,85	0,90	0,95	1,00

$$\Psi_{re,N} = 0,5 + \frac{h_{ef}}{200} \leq 1$$



Influence of the base material thickness $\Psi_{h,sp}$											
$\Psi_{h,sp}$	h/h_{ef}	2,00	2,20	2,40	2,60	2,80	3,00	3,20	3,40	3,60	3,68
	fh	1,00	1,07	1,13	1,19	1,25	1,31	1,37	1,42	1,48	1,50

$$\Psi_{h,sp} = \left(\frac{h}{2 \cdot h_{ef}}\right)^{2/3} \leq 1,5$$

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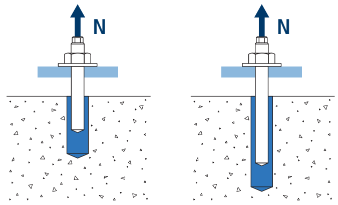
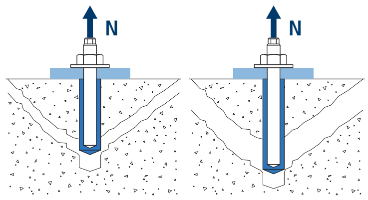
Influence of the effective depth for the extraction combination $\Psi_{hef,p}$						
Metric h_{ef}	M8	M10	M12	M16	M20	M24
64	0,80					
80	1,00	0,89				
90	1,13	1,00	0,82		Value not permitted	
96	1,20	1,07	0,87			
110		1,22	1,00			
120		1,33	1,09			
128			1,16	1,00		
144			1,31	1,13		
160				1,25	0,94	
170				1,33	1,00	
192				1,50	1,13	0,91
210		Value not permitted			1,24	1,00
240					1,41	1,14
288						1,37



$$\Psi_{hef,p} = \frac{h_{ef}}{h_{stand}}$$

Influence of the effective depth for the concrete cone $\Psi_{hef,N}$						
Metric h_{ef}	M8	M10	M12	M16	M20	M24
64	0,72					
80	1,00	0,84				
90	1,19	1,00			Value not permitted	
96	1,31	1,10	0,82			
110	1,61	1,35	1,00			
120	1,84	1,54	1,14	0,91		
128	2,02	1,70	1,26	1,00	0,65	
144		2,02	1,50	1,19	0,78	
160		2,37	1,75	1,40	0,91	0,67
170		2,60	1,92	1,53	1,00	0,73
192			2,31	1,84	1,20	0,87
210			2,64	2,10	1,37	1,00
240	Value not permitted		3,22	2,57	1,68	1,22
288				3,38	2,21	1,61



$$\Psi_{hef,N} = \left(\frac{h_{ef}}{h_{stand}}\right)^{1,5}$$

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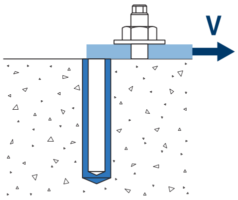
SHEARING LOADS

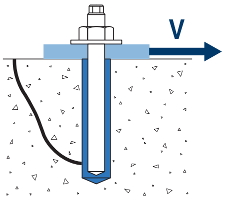
- Calculated steel resistance without lever arm: $V_{Rd,s}$
- Calculated spalling resistance: $V_{Rd,cp} = k \cdot N^o_{Rd,c}$
- Calculated concrete edge resistance: $V_{Rd,c} = V^o_{Rd,c} \cdot \Psi_b \cdot \Psi_{se,V} \cdot \Psi_{c,V} \cdot \Psi_{re,V} \cdot \Psi_{\alpha,V} \cdot \Psi_{h,V}$



Calculated steel resistance to shearing

$V_{Rd,s}$

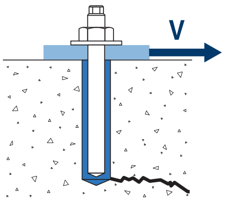
	Metric		M8	M10	M12	M16	M20	M24
$V^o_{Rd,s}$	Steel class 5.8	[kN]	7,2	12	16,8	31,2	48,8	70,4
	Steel class 8.8	[kN]	12	18,4	27,2	50,4	78,4	112,8
	Steel class 10.9	[kN]	12	19,3	28	52,7	82	118
	Stainless steel Class A2-70, A4-70	[kN]	8,3	12,8	19,2	35,3	55,1	79,5



Calculated spalling resistance

$V_{Rd,cp} = k \cdot N^o_{Rd,c}$

Metric	M8	M10	M12	M16	M20	M24
k	2					

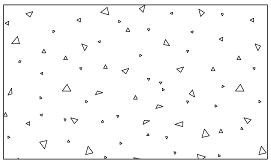


Calculated concrete edge resistance

$V_{Rd,c} = V^o_{Rd,c} \cdot \Psi_b \cdot \Psi_{se,V} \cdot \Psi_{c,V} \cdot \Psi_{re,V} \cdot \Psi_{\alpha,V} \cdot \Psi_{h,V}$

	Metric		M8	M10	M12	M16	M20	M24
$V^o_{Rd,c}$	Non-cracked concrete	[kN]	5,7	8,6	11,8	19,0	28,3	36,4

Influence coefficients



$$\Psi_b = \sqrt{\frac{f_{ck,cube}}{25}} \geq 1$$

Influence of concrete resistance for concrete cone and concrete cracking Ψ_b

Concrete type	C20/25	C30/37	C40/50	C50/60
Ψ_b	1,00	1,22	1,41	1,55

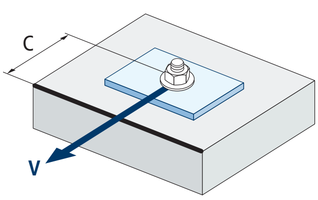
Influence of the distance from the edge and spacing between anchors $\Psi_{se,V}$

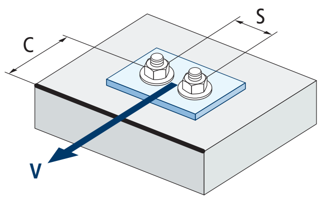
For one anchor

c/h_{ef}	0,50	0,75	1,00	1,25	1,50	1,75	2,00	2,25	2,50	2,75	3,00	3,25	3,50	3,75	4,00	4,50	5,00
Insulated	0,35	0,65	1,00	1,40	1,84	2,32	2,83	3,38	3,95	4,56	5,20	5,86	6,55	7,26	8,00	9,55	11,18

For two anchors

	c/h_{ef}	0,50	0,75	1,00	1,25	1,50	1,75	2,00	2,25	2,50	2,75	3,00	3,25	3,50	3,75	4,00	4,50	5,00
s/c	1,0	0,24	0,43	0,67	0,93	1,22	1,54	1,89	2,25	2,64	3,04	3,46	3,91	4,37	4,84	5,33	6,36	7,45
	1,5	0,27	0,49	0,75	1,05	1,38	1,74	2,12	2,53	2,96	3,42	3,90	4,39	4,91	5,45	6,00	7,16	8,39
	2,0	0,29	0,54	0,83	1,16	1,53	1,93	2,36	2,81	3,29	3,80	4,33	4,88	5,46	6,05	6,67	7,95	9,32
	2,5	0,32	0,60	0,92	1,28	1,68	2,12	2,59	3,09	3,62	4,18	4,76	5,37	6,00	6,66	7,33	8,75	10,25
	≥ 3,0	0,35	0,65	1,00	1,40	1,84	2,32	2,83	3,38	3,95	4,56	5,20	5,86	6,55	7,26	8,00	9,55	11,18





$$\Psi_{se,V} = \left(\frac{c}{h_{ef}}\right)^{1,5}$$

$$\Psi_{se,V} = \left(\frac{c}{h_{ef}}\right)^{1,5} \cdot \left(1 + \frac{s}{3 \cdot c}\right) \cdot 0,5 \leq \left(\frac{c}{h_{ef}}\right)^{1,5}$$

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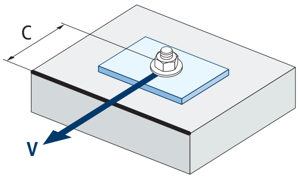
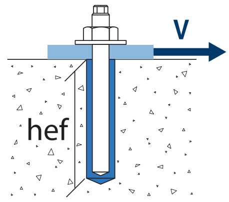
Influence of the distance from the edge of the concrete $\Psi_{c,V}$								
c/d	4	5	7	10	15	20	25	30
$\Psi_{c,V}$	0,76	0,72	0,68	0,63	0,58	0,55	0,53	0,51

$$\Psi_{c,V} = \left(\frac{d}{c}\right)^{0,20}$$

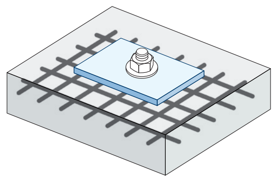


Influence of the effective depth $\Psi_{hef,V}$					
h_{ef}/d	8	9	10	11	12
$\Psi_{hef,V}$	1,65	2,04	2,47	2,93	3,42

$$\Psi_{hef,V} = 0,04 \cdot \left(\frac{h_{ef}}{d}\right)^{1,79}$$

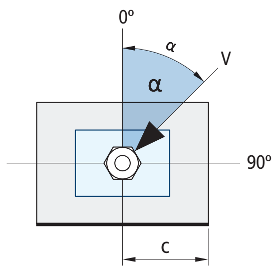


Influence of the rebars $\Psi_{re,v}$				
		Without perimeter rebar	Perimeter rebar ≥Ø12mm	Perimeter rebar with abutments at≤100mm
$\Psi_{re,v}$	Non-cracked concrete	1	1	1



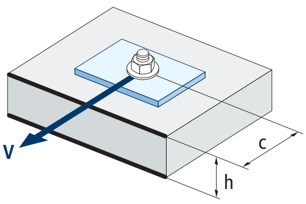
Influence of the load application angle $\Psi_{\alpha,v}$										
Angle, α(º)	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°
$\Psi_{\alpha,v}$	1,00	1,01	1,05	1,13	1,24	1,40	1,64	1,97	2,32	2,50

$$\Psi_{\alpha,V} = \sqrt{\frac{1}{(\cos\alpha_V)^2 + \left(\frac{\sin\alpha_V}{2,5}\right)^2}} \geq 1$$



Influence of the base material thickness $\Psi_{h,v}$										
h/c	0,15	0,30	0,45	0,60	0,75	0,90	1,05	1,20	1,35	≥1,5
$\Psi_{h,v}$	0,32	0,45	0,55	0,63	0,71	0,77	0,84	0,89	0,95	1,00

$$\Psi_{h,V} = \left(\frac{h}{1,5 \cdot c}\right)^{0,5} \geq 1,0$$



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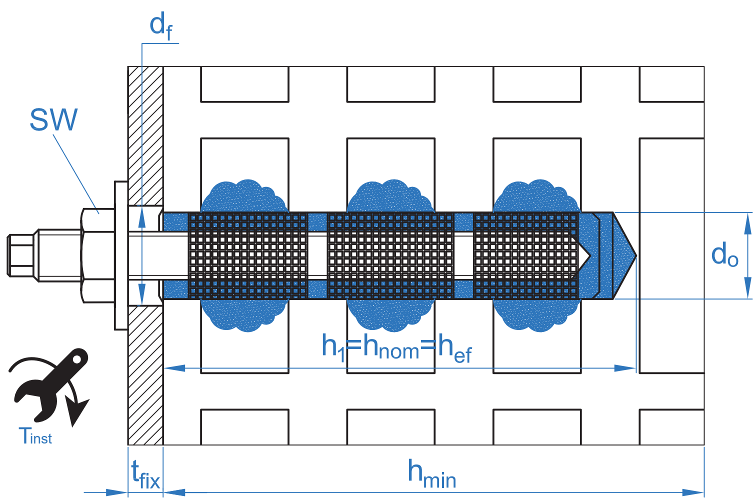
FIXING IN BRICKS

MO-VSF											
BASE MATERIAL			Brick number 1				Brick number 2			Brick number 3	
ANCHOR TYPE			Installation without sleeve				Installation with sleeve			Installation with sleeve	
DIMENSION			M6	M8	M10	M12	M8	M10	M12	M6	M8
l_s	Plastic sleeve length	[mm]	-	-	-	-	85	85	85	80	80
d_0	Nominal diameter	[mm]	-	-	-	-	16	16	16	12	12
v	Mortar volume per sleeve	[ml]	-	-	-	-	-	-	-	-	-
d_0	Drill bit diameter	[mm]	8	10	12	14	16	16	16	12	12
h_1	Drill hole depth ≥	[mm]	80	90	90	90	90	90	90	85	85
h_{ef}	Stud depth ≥	[mm]	80	90	90	90	85	85	85	80	80
h_{nom}	Sleeve installation depth	[mm]	-	-	-	-	85	85	85	80	80
d_f	Diameter in metal sheet ≤	[mm]	7	9	12	14	9	12	14	9	9
T_{ins}	Tightening torque ≤	[Nm]	2	2	2	2	2	2	2	2	2
d_b	Circular brush	[mm]	9	14	14	14	20	20	20	14	14
	Sleeve code		-	-	-	-	MOTN15085	MOTN15085	MOTN20080	MOTN12080	MOTN12080

		M6			M8			M10/M12		
Minimum distances and from the edge		$c_{cr} = c_{min}$	$s_{cr II} = s_{min II}$	$s_{cr\perp} = s_{min\perp}$	$c_{cr} = c_{min}$	$s_{cr II} = s_{min II}$	$s_{cr\perp} = s_{min\perp}$	$c_{cr} = c_{min}$	$s_{cr II} = s_{min II}$	$s_{cr\perp} = s_{min\perp}$
Brick number 1	[mm]	120	240	240	135	270	270	135	270	270
Brick number 2	[mm]	-	-	-	100	373	238	100	373	238
Brick number 3	[mm]	100	245	110	100	245	110	-	-	-



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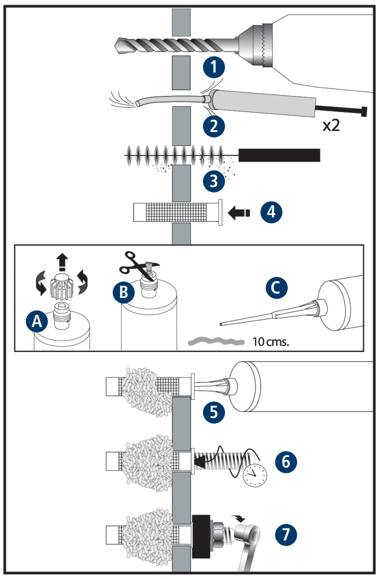
INSTALLATION ACCESSORIES		
CODE	PRODUCT	MATERIAL
MOPISSI	APPLICATION GUNS	Gun for 300 ml cartridges
MOPISTO		Guns for 410 ml cartridges, professional use
MOPISNEU		Pneumatic gun for 410 ml coaxial cartridges, professional use
MO-ES	STUD	Threaded stud
MORCEPKIT	CLEANING BRUSHES	Kit with 3 cleaning brushes measuring ø14, ø20 and ø29 mm
MOBOMBA	CLEANING PUMP	Pump for cleaning leftover dust and fragments in the drill hole
MORCANU	MIXING TUBE	Plastic. Static labyrinth mixture
MO-TN	NYLON SLEEVE	Plastic white or grey
MO-TM	METAL SLEEVE	Metal sleeve ø12, ø16 and ø22 mm

INSTALLATION PROCEDURE

BRICK



MINIMUM CURING TIME

TYPE	Cartridge temperature [°C]	Handling time [min]	Base material temperature [°C]	Curing time [min]
MO-VSF	min +5	18	min +5	145
	+5 a +10	10	+5 a +10	145
	+10 a +20	6	+10 a +20	85
	+20 a +25	5	+20 a +25	50
	+25 a +30	4	+25 a +30	40
	+30	4	+30	35

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Characteristic resistances (F_{Rk})									
Anchor type		Threaded studs. Tensile and shear force [kN]							
Use conditions		d/d, w/d				w/w			
Base material	Sleeve	M6	M8	M10	M12	M6	M8	M10	M12
Brick number 1	-	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5
Brick number 2	Ø16 x 85	-	1,5	1,5	1,5	-	1,5	1,5	1,5
Brick number 3	Ø12 x 80	1,2	1,2	-	-	0,9	0,9	-	-

Calculated resistances (F_{Rd})									
Anchor type		Threaded studs. Tensile and shear force [kN]							
Use conditions		d/d, w/d				w/w			
Base material	Sleeve	M6	M8	M10	M12	M6	M8	M10	M12
Brick number 1	-	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6
Brick number 2	Ø16 x 85	-	0,6	0,6	0,6	-	0,6	0,6	0,6
Brick number 3	Ø12 x 80	0,48	0,48	-	-	0,36	0,36	-	-

Recommended maximum loads (F_{recom}) (con γF= 1,4)									
Use conditions		d/d, w/d				w/w			
Base material	Sleeve	M6	M8	M10	M12	M6	M8	M10	M12
Brick number 1	-	0,43	0,43	0,43	0,43	0,43	0,43	0,43	0,43
Brick number 2	Ø16 x 85	-	0,43	0,43	0,43	-	0,43	0,43	0,43
Brick number 3	Ø12 x 80	0,34	0,34	-	-	0,26	0,26	-	-

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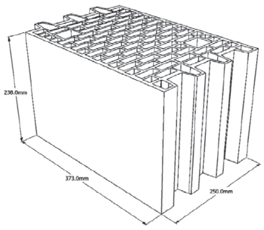
BRICK TYPES

Brick no. 1
Solid clay brick Mz 12-2,0-NF according to EN 771-1
Length / width / height: 240 mm / 116 mm / 71 mm
fb b ≥ 12 N/mm^2 / ρ ≥ 2,0 kg/dm^3



Brick no. 2
Hollow clay brick Porotherm 25 P+W KL15 according to EN 771-1
Length / width / height: 373 mm / 250 mm / 238 mm
fb b ≥ 12 N/mm^2 / ρ ≥ 0,9 kg/dm^3

Brick no. 3
Perforated clay brick 10 according to EN 771-1
Length / width / height: 245 mm / 110 mm / 100 mm
fb b ≥ 15 N/mm^2 / ρ ≥ 2,05 kg/dm^3

MO-VSF

RETROFITTED REBAR CONNECTIONS

This technical document covers post-installed rebar connections in non-carbonate concrete under the assumption that post-installed rebar connections are generally calculated according to Eurocode 2. The rebar anchor system comprises the bonding of the material and a straight, recessed reinforcement rebar with the properties specified in Eurocode 2, Annex C; classes B and C.

Dynamic, fatigue or seismic loads on post-installed rebar connections are not covered by this technical document.

Intended use

This technical document covers application in non-carbonate concrete only from C12/15 to C50/60 (EN 206) for the following applications:

- Overlapping bond with an existing rebar in a building component **(Figures 1 and 4).**
- Fixing of rebar in a slab or in a support. Support at one end of a slab calculated as simply supported as well as its rebars for retention forces **(Figure 2).**
- Fixing of rebar of construction components mainly subjected to compression **(Figure 3).**
- Fixing of rebar to cover the action line of the tensile force **(Figure 5).**

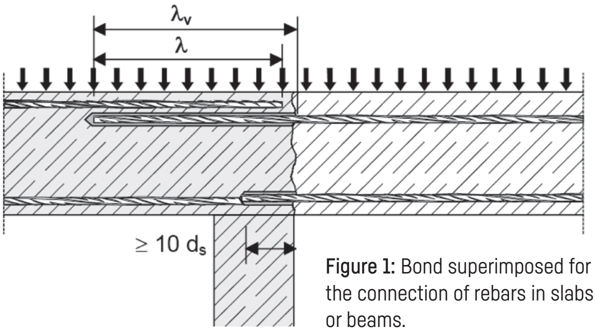


Figure 1: Bond superimposed for the connection of rebars in slabs or beams.

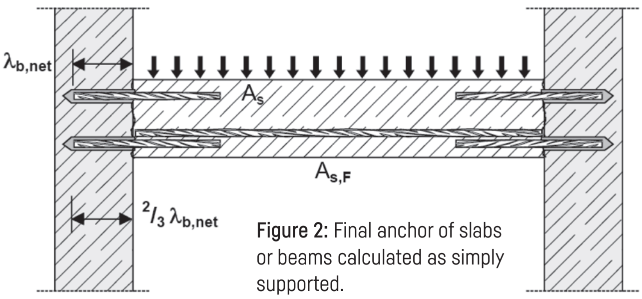


Figure 2: Final anchor of slabs or beams calculated as simply supported.

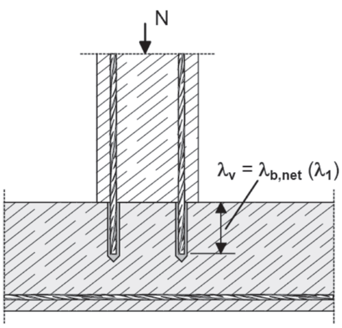


Figure 3: Rebar connections for items primarily subjected to compression. The rebars are subjected to compression.

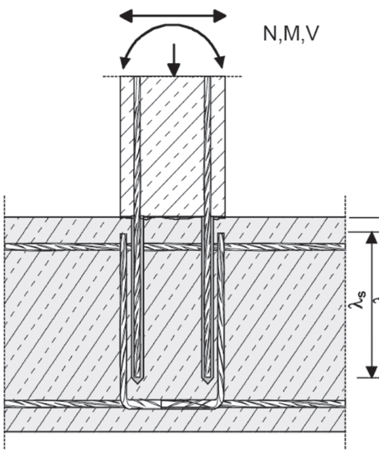


Figure 4: Bond superimposed to a foundation of a column or a wall where the rebars is subjected to tensile force.

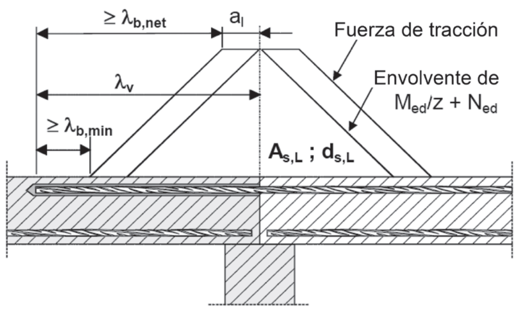


Figure 5: Reinforcement anchor to cover the action line of the tensile force.

* **Note for Figure 1 and 5:** In the figures the transversal reinforcements have not been represented, the transversal reinforcements as required by the Eurocode 2 must be present. The shear stress transferred between the anterior and posterior concrete must be calculated according to Eurocode 2.

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The tables shown below refer to Eurocode 2 Annex C, Table C.1 and C2N, rebar properties.

Properties of the start rebars			
Product form		Rebars and unwound rods	
Class		B	C
Characteristic yield stress f_{yk} or $f_{0.2k}$ (MPa)		400 to 600	
Minimum value of $k = (f_t / f_y)_k$		≥ 1.08	≥ 1.15 < 1.35
Characteristic maximum tensile deformation ε_{uk} (%)		≥ 5.0	≥ 7.5
Flexibility		Bending/folding test	
Maximum deviation from the nominal weight (individual bar or wire) (%)	Nominal size of the rebar (mm) ≤ 8 > 8	± 6.0 ± 4.5	
Bonding: Minimum relative corrugated area, $f_{R,min}$	Nominal size of the rebar (mm) 8 to 12 > 12	0.040 0.056	

Minimum / maximum lengths*				
Rebar	Minimum			Maximum
$Ød_s$ [mm]	fy,k [N/mm²]	Anchor $\ell_{b,min}$ [mm]	Overlap $\ell_{0,min}$	ℓ_{max}
8	500	114	200	400
10	500	142	200	500
12	500	171	200	600
14	500	199	210	700
16	500	227	240	800

*For concrete C20/25 (f_{bd} = 2,3 N/mm²), good bond conditions, rebar (fyk = 500 N/mm²)

Design bond resistance										
Rebar Ø	Resistance and factor	Concrete class								
d_s [mm]		C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
8	k_b*	1	1	1	0,86	0,76	0,69	0,63	0,58	0,54
	$f_{bd,PIR}$	1,6	2	2,3						
10 a 16	k_b*	1	1	1	1	0,89	0,8	0,73	0,67	0,63
	$f_{bd,PIR}$	1,6	2	2,3	2,7					

Bar Ø	Amplification factor	Concrete class
d_s [mm]		C12/15 to C50/60
8 a 16	α_{lb}	1,5

*For all drilling methods with good bond conditions

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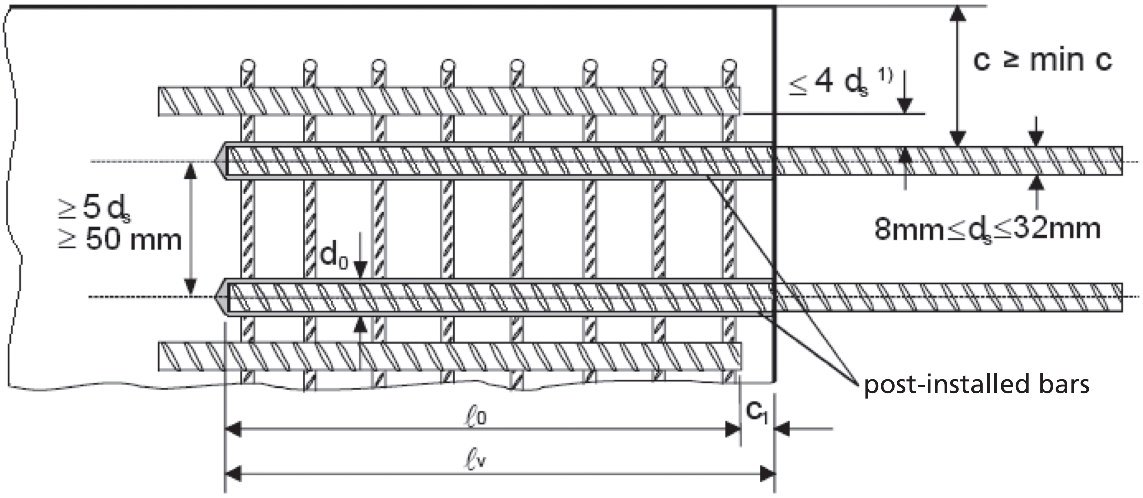
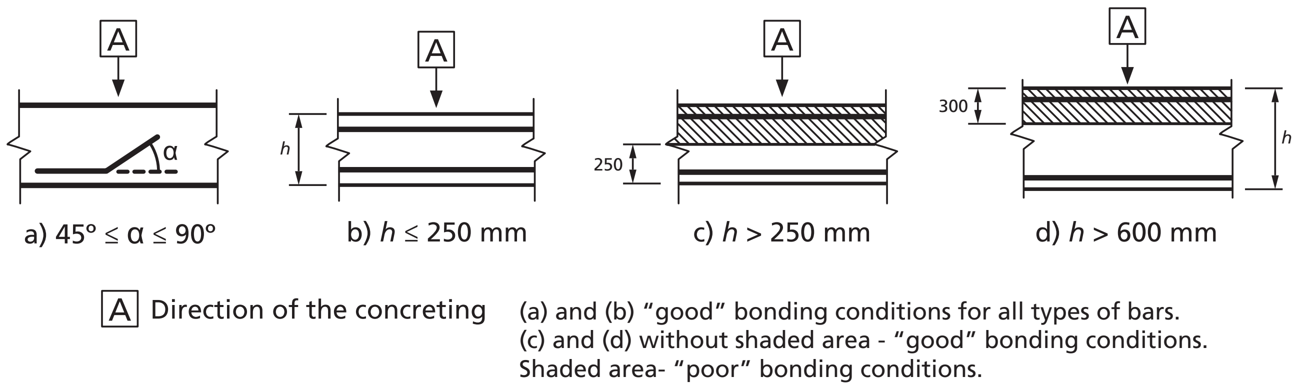
- Calculated load values according to Eurocode 2 and EOTA technical report TR 023.
- Information according to ETA 13/0780.
- Non-cracked concrete, conditions in dry or wet conditions.
- Temperature range: -40°C to +80°C (maximum long-term temperature +50°C).
- Minimum spacing conditions between bars ≥5d_s, min. 50 mm:



- Minimum concrete coating:
  - drilling with compressed air ≥ 50 + 0.06 Lb
  - drilling in percussion mode ≥ 30 + 0.08 Lb ≥ 2Φ
- Good bonding conditions:



* In case of poor bonding conditions, multiply values by 0.7.

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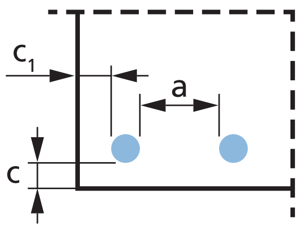
Resistance values may increase in the following situations:

- With transverse tension/compression pressure (α_2)
- In case of concrete coating (α_5)
- In case of overlapping rebars (α_6)

Values for α_2 , α_5 and α_6		
Influence factor	Reinforcement bar	
	A tension	A compression
Concrete coating	$\alpha_2 = 1 - 0.15\,(cd - Ø)/Ø$ ≥ 0.7 ≤ 1.0	$\alpha_2 = 1.0$
Transverse pressure confinement	$\alpha_5 = 1 - 0.004p$ ≥ 0.7 ≤ 1.0	$\alpha_5 = 1.0$
Overlapping length	$\alpha_6 = (p_1/25)^{0.25}$ ≥ 1.0 ≤ 1.5	

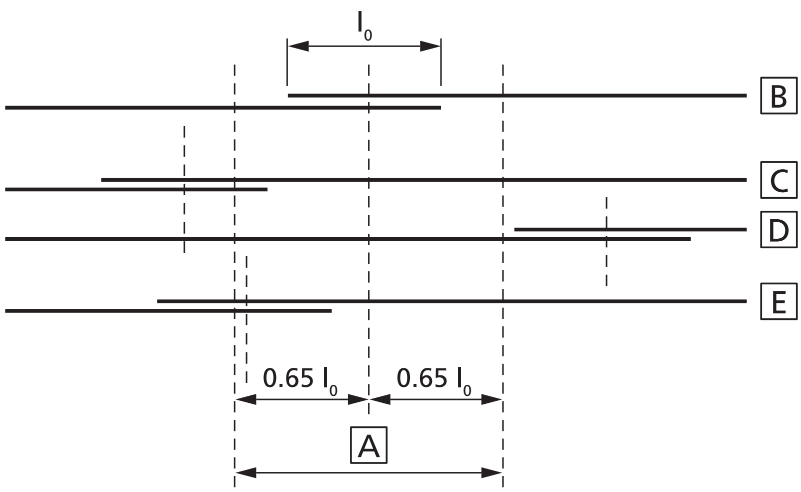
Where:

$c_d = \min(a/_2, c_1, c)$



p: transverse pressure [MPa] in the ultimate limit state l_{bd}

p_1 is the percentage of the overlapped reinforcement bar within $0.65 \cdot l_0$ from the centre of the length of the overlap considered



A Section considered B Bar I C Bar II D Bar III E Bar IV

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TABLES OF PRECALCULATED VALUES

Concrete class 20/25							
Concrete compressive strength [$f_{ck,cube}$]: 25 N/mm²							
Rebar Ø	d_s	[mm]	Ø8	Ø10	Ø12	Ø14	Ø16
Rebar Size	d_s	[mm]	8	10	12	14	16
Cross-sectional area	A_s	[mm²]	50,3	78,5	113,1	153,9	201,1
Characteristic yield strength of rebar	f_{yk}	[N/mm²]	500	500	500	500	500
Partial safety factor	$\gamma_{M,s}$	[-]	1,15	1,15	1,15	1,15	1,15
Design yield strength of rebar	f_{yd}	[N/mm²]	434,78	434,78	434,78	434,78	434,78
Design steel resistance	$N_{Rd,s}$	[kN]	21,9	34,1	49,2	66,9	87,4
Bond stress	f_{bd}	[N/mm²]	2,3	2,3	2,3	2,3	2,3
Amplification factor for minimum anchorage length	α_{lb}	[-]	1	1	1	1	1
Basic Anchorage Length - Applied	$l_{b,rqd}$	[mm]	0	0	0	0	0
Basic Anchorage Length - Yield	$l_{b,rqd,fyd}$	[mm]	378,07	472,59	567,11	661,63	756,14
Minimum anchorage Length	$l_{b,min}$	[mm]	113,42	141,78	170,13	198,49	226,84
Minimum lap length	$l_{0,min}$	[mm]	200	200	200	210	240
Max permissible embedment depth	$l_{v,max}$	[mm]	400	500	600	700	800
Drilled hole diameter	d_h	[mm]	12	14	16	18	20
Bar spacing ≥	s	[mm]	50	50	60	70	80
Edge distance (compressed air drilling) ≥	c	[mm]	$50 + 0{,}06\ L_b$				
Edge distance (hammer drilling) ≥	c	[mm]	$30 + 0{,}08\ L_b \geq 2\Phi$				
Anchorage Length, L_b [mm]			Design tensile pull-out bond resistance, N_{Rd}				
114			6,6				
142			8,2	10,3		Not allowed area	
171			9,9	12,4	14,8		
199			11,5	14,4	17,3	20,1	
200			11,6	14,5	17,3	20,2	
210			12,1	15,2	18,2	21,2	
227			13,1	16,4	19,7	23	26,2
240			13,9	17,3	20,8	24,3	27,7
300			17,3	21,7	26	30,3	34,7
350			20,2	25,3	30,3	35,4	40,5
400			**21,9**	28,9	34,7	40,5	46,2
450				32,5	39	45,5	52
500				**34,1**	43,4	50,6	57,8
550					47,7	55,6	63,6
600					**49,2**	60,7	69,4
650						65,8	75,1
700				Rebar yielding area		**66,9**	80,9
750							86,7
800							**87,4**
Length to develop steel yield, $L_{b,rqd}$ [mm]			**378**	**473**	**567**	**662**	**756**

Values shaded in blue are not allowed for overlapping joints

MO-VSF

TABLES OF PRECALCULATED VALUES

Concrete class 30/37							
Concrete compressive strength [$f_{ck,cube}$]: 37 N/mm²							
Rebar Ø	d_s	[mm]	Ø8	Ø10	Ø12	Ø14	Ø16
Rebar Size	d_s	[mm]	8	10	12	14	16
Cross-sectional area	A_s	[mm²]	50,3	78,5	113,1	153,9	201,1
Characteristic yield strength of rebar	f_{yk}	[N/mm²]	500	500	500	500	500
Partial safety factor	$\gamma_{M,s}$	[-]	1,15	1,15	1,15	1,15	1,15
Design yield strength of rebar	f_{yd}	[N/mm²]	434,78	434,78	434,78	434,78	434,78
Design steel resistance	$N_{Rd,s}$	[kN]	21,9	34,1	49,2	66,9	87,4
Bond stress	f_{bd}	[N/mm²]	2,3	3	3	3	3
Amplification factor for minimum anchorage length	α_{lb}	[-]	0,76	0,89	0,89	0,89	0,89
Basic Anchorage Length - Applied	$l_{b,rqd}$	[mm]	0	0	0	0	0
Basic Anchorage Length - Yield	$l_{b,rqd,fyd}$	[mm]	378,07	362,32	434,78	507,25	579,71
Minimum anchorage Length	$l_{b,min}$	[mm]	86,2	96,74	116,09	135,43	154,78
Minimum lap length	$l_{0,min}$	[mm]	152	178	178	186,9	213,6
Max permissible embedment depth	$l_{v,max}$	[mm]	400	500	600	700	800
Drilled hole diameter	d_h	[mm]	12	14	16	18	20
Bar spacing ≥	s	[mm]	50	50	60	70	80
Edge distance (compressed air drilling) ≥	c	[mm]	$50 + 0{,}06\ L_b$				
Edge distance (hammer drilling) ≥	c	[mm]	$30 + 0{,}08\ L_b \geq 2\Phi$				

Anchorage Length, L_b [mm]	Design tensile pull-out bond resistance, N_{Rd}				
87	5	Not allowed area			
97	5,6	9,1			
117	6,8	11	13,2		
136	7,9	12,8	15,4	17,9	
152	8,8	14,3	17,2	20,1	
155	9	14,6	17,5	20,5	23,4
178	10,3	16,8	20,1	23,5	26,8
187	10,8	17,6	21,1	24,7	28,2
214	12,4	20,2	24,2	28,2	32,3
250	14,5	23,6	28,3	33	37,7
300	17,3	28,3	33,9	39,6	45,2
350	20,2	33	39,6	46,2	52,8
400	**21,9**	**34,1**	45,2	52,8	60,3
450	Rebar yielding area	**34,1**	**49,2**	59,4	67,9
500		**34,1**	**49,2**	66	75,4
550			**49,2**	**66,9**	82,9
600			**49,2**	**66,9**	**87,4**
650				**66,9**	**87,4**
700				**66,9**	**87,4**
750					**87,4**
800					**87,4**
Length to develop steel yield, $L_{b,rqd}$ [mm]	**378**	**362**	**435**	**507**	**580**

Values shaded in blue are not allowed for overlapping joints

MO-VSF

TABLES OF PRECALCULATED VALUES

Concrete class 40/50							
Concrete compressive strength [$f_{ck,cube}$]: 50 N/mm²							
Rebar Ø	d_s	[mm]	Ø8	Ø10	Ø12	Ø14	Ø16
Rebar Size	d_s	[mm]	8	10	12	14	16
Cross-sectional area	A_s	[mm²]	50,3	78,5	113,1	153,9	201,1
Characteristic yield strength of rebar	f_{yk}	[N/mm²]	500	500	500	500	500
Partial safety factor	$\gamma_{M,s}$	[-]	1,15	1,15	1,15	1,15	1,15
Design yield strength of rebar	f_{yd}	[N/mm²]	434,78	434,78	434,78	434,78	434,78
Design steel resistance	$N_{Rd,s}$	[kN]	21,9	34,1	49,2	66,9	87,4
Bond stress	f_{bd}	[N/mm²]	2,3	3,7	3,7	3,7	3,7
Amplification factor for minimum anchorage length	α_{lb}	[-]	0,63	0,73	0,73	0,73	0,73
Basic Anchorage Length - Applied	$l_{b,rqd}$	[mm]	0	0	0	0	0
Basic Anchorage Length - Yield	$l_{b,rqd,fyd}$	[mm]	378,07	293,77	352,53	411,28	470,04
Minimum anchorage Length	$l_{b,min}$	[mm]	71,46	73	87,6	102,2	116,8
Minimum lap length	$l_{0,min}$	[mm]	126	146	146	153,3	175,2
Max permissible embedment depth	$l_{v,max}$	[mm]	400	500	600	700	800
Drilled hole diameter	d_h	[mm]	12	14	16	18	20
Bar spacing ≥	s	[mm]	50	50	60	70	80
Edge distance (compressed air drilling) ≥	c	[mm]	$50 + 0{,}06\ L_b$				
Edge distance (hammer drilling) ≥	c	[mm]	$30 + 0{,}08\ L_b \geq 2\Phi$				
Anchorage Length, L_b [mm]			Design tensile pull-out bond resistance, N_{Rd}				
72			4,2	Not allowed area			
73			4,2	8,5			
88			5,1	10,2	12,3		
103			6	12	14,4	16,8	
117			6,8	13,6	16,3	19	21,8
126			7,3	14,6	17,6	20,5	23,4
146			8,4	17	20,4	23,8	27,2
154			8,9	17,9	21,5	25,1	28,6
176			10,2	20,5	24,5	28,6	32,7
400			**21,9**	**34,1**	**49,2**	65,1	74,4
450			Rebar yielding area	**34,1**	**49,2**	**66,9**	83,7
500				**34,1**	**49,2**	**66,9**	**87,4**
550					**49,2**	**66,9**	**87,4**
600					**49,2**	**66,9**	**87,4**
650						**66,9**	**87,4**
700						**66,9**	**87,4**
750							**87,4**
800							**87,4**
Length to develop steel yield, $L_{b,rqd}$ [mm]			**378**	**294**	**353**	**411**	**470**

Values shaded in blue are not allowed for overlapping joints

MO-VSF

TABLES OF PRECALCULATED VALUES

Concrete class 50/60							
Concrete compressive strength [$f_{ck,cube}$]: 60 N/mm²							
Rebar Ø	d_s	[mm]	Ø8	Ø10	Ø12	Ø14	Ø16
Rebar Size	d_s	[mm]	8	10	12	14	16
Cross-sectional area	A_s	[mm²]	50,3	78,5	113,1	153,9	201,1
Characteristic yield strength of rebar	f_{yk}	[N/mm²]	500	500	500	500	500
Partial safety factor	$\gamma_{M,s}$	[-]	1,15	1,15	1,15	1,15	1,15
Design yield strength of rebar	f_{yd}	[N/mm²]	434,78	434,78	434,78	434,78	434,78
Design steel resistance	$N_{Rd,s}$	[kN]	21,9	34,1	49,2	66,9	87,4
Bond stress	f_{bd}	[N/mm²]	2,3	4,3	4,3	4,3	4,3
Amplification factor for minimum anchorage length	α_{lb}	[-]	0,54	0,63	0,63	0,63	0,63
Basic Anchorage Length - Applied	$l_{b,rqd}$	[mm]	0	0	0	0	0
Basic Anchorage Length - Yield	$l_{b,rqd,fyd}$	[mm]	378,07	252,78	303,34	353,89	404,45
Minimum anchorage Length	$l_{b,min}$	[mm]	61,25	63	75,6	88,2	100,8
Minimum lap length	$l_{0,min}$	[mm]	108	126	126	132,3	151,2
Max permissible embedment depth	$l_{v,max}$	[mm]	400	500	600	700	800
Drilled hole diameter	d_h	[mm]	12	14	16	18	20
Bar spacing ≥	s	[mm]	50	50	60	70	80
Edge distance (compressed air drilling) ≥	c	[mm]	$50 + 0{,}06\ L_b$				
Edge distance (hammer drilling) ≥	c	[mm]	$30 + 0{,}08\ L_b \geq 2\Phi$				
Anchorage Length, L_b [mm]			Design tensile pull-out bond resistance, N_{Rd}				
62			3,6	Not allowed area			
63			3,6	8,5			
76			4,4	10,3	12,3		
89			5,1	12	14,4	16,8	
101			5,8	13,6	16,4	19,1	21,8
108			6,2	14,6	17,5	20,4	23,3
126			7,3	17	20,4	23,8	27,2
133			7,7	18	21,6	25,2	28,7
152			8,8	20,5	24,6	28,7	32,9
400			**21,9**	**34,1**	**49,2**	**66,9**	86,5
450			Rebar yielding area	**34,1**	**49,2**	**66,9**	**87,4**
500				**34,1**	**49,2**	**66,9**	**87,4**
550					**49,2**	**66,9**	**87,4**
600					**49,2**	**66,9**	**87,4**
650						**66,9**	**87,4**
700						**66,9**	**87,4**
750							**87,4**
800							**87,4**
Length to develop steel yield, $L_{b,rqd}$ [mm]			**378**	**253**	**303**	**354**	**404**

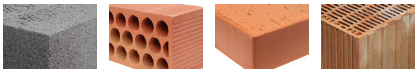
Values shaded in blue are not allowed for overlapping joints

MO-VSF

RANGE

VINYL ESTER STYRENE-FREE

CODE	DIMENSION	
NORMAL		
MOVSF300	300 ml	12
MOVSF410	410 ml	12



Concrete | Hollow brick | Solid brick | Thermal clay

Accessories for chemical anchor cartridges

MO-PIS Application guns

CODE	MODEL
MOPISTO	Manual
MOPISPR	Professional 410 ml
MOPISSI	Silicone 300 ml
MOPISNEU	Pneumatic

MO-TN Plastic sleeve

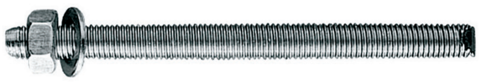
CODE	DIMENSION
MOTN12050	12 x 50
MOTN12080	12 x 80
MOTN15085	15 x 85
MOTN15130	15 x 130
MOTN20085	20 x 85

MO-AC Mixing tubes and miscellaneous

MORCEPKIT
Kit 3 brushes (ø15, ø20, ø30)

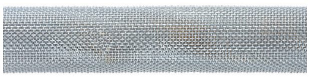
CODE	MODEL
MOBOMBA	Blower pump
MORCANU	Tube 300 - 410 ml
MORCEPKIT	Kit 3 brushes

MO-ES Threaded stud



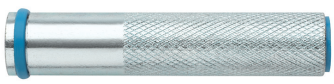
CODE	DIMENSION
MOES06070	M6 x 70
MOES08110	M8 x 110
MOES10115	M10 x 115
MOES12110	M12 x 110

MO-TM Metal sleeve



CODE	DIMENSION
MOTM12100	12 x 1000
MOTM16100	16 x 1000
MOTM22100	22 x 1000

MO-TR Threaded sleeve



CODE	DIMENSION
MOTRO08	M8/12 x 80
MOTRO10	M10/14 x 80
MOTRO12	M12/16 x 80

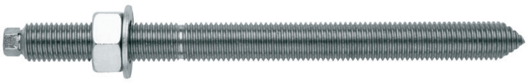
MO-VSF

Accessories for chemical anchor cartridges

Stud for chemical anchor with nut and washer

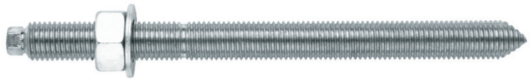
Hollow brick · Solid brick · Stone · Cellular concrete · Hollow concrete · Concrete · Reinforced concrete

EQ-AC Zinc-plated 5.8



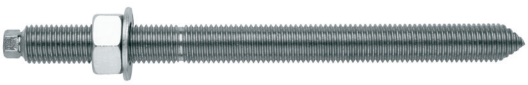
CODE	DIMENSION
EQAC08110	M8 x 110
EQAC10130	M10 x 130
EQAC10190	M10 x 190
EQAC12160	M12 x 160
EQAC12220	M12 x 220
EQAC16190	M16 x 190
EQAC16250	M16 x 250
EQAC20260	M20 x 260
EQAC20350	M20 x 350
EQAC24300	M24 x 300
EQAC24380	M24 x 380
EQAC30330	M30 x 330

EQ-A2 Stainless steel A2



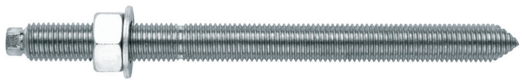
CODE	DIMENSION
EQA208110	M8 x 110
EQA210130	M10 x 130
EQA212160	M12 x 160
EQA216190	M16 x 190
EQA220260	M20 x 260
EQA224300	M24 x 300
EQA230330	M30 x 330

EQ-8.8 Zinc-plated 8.8



CODE	DIMENSION
EQ8808110	M8 x 11040
EQ8810130	M10 x 130
EQ8812160	M12 x 160
EQ8816190	M16 x 190
EQ8820260	M20 x 260
EQ8824300	M24 x 300

EQ-A4 Stainless steel A4



CODE	DIMENSION
EQA408110	M8 x 110
EQA410130	M10 x 130
EQA412160	M12 x 160
EQA416190	M16 x 190
EQA420260	M20 x 260
EQA424300	M24 x 300
EQA430330	M30 x 330

Notes