



Through-bolt expansion anchor with controlled torque, for use in non cracked concrete

MTA-A2

A2 Stainless shaft. A2 Stainless clip.



PRODUCT INFORMATION

DESCRIPTION

Metallic anchor, with male thread, expansion by controlled torque.

OFFICIAL DOCUMENTATION

- Not available

SIZES

M6x45 to M20x220.

DESIGN LOAD RANGE

From 6,7 to 27,8 kN.



BASE MATERIAL

Concrete class from C20/25 to C50/60 non-cracked.



Stone



Concrete

ASSESSMENTS

- Not available.

CHARACTERISTICS AND BENEFITS

- Easy installation.
- Use in non-cracked concrete.
- Use for medium-heavy duty loads.
- Pre-installation or through the drill-hole of the fixture.
- Variety of lengths and diameters: flexibility in assembly.
- For static and quasi-static loads.
- Version in A2 stainless steel (AISI 304)
- Available at INDEXcal.



MATERIALS

Shaft: A2 grad stainless steel.

Washer: A2 grad stainless steel.

Nut: A2 grad stainless steel.

Clip: A2 grad stainless steel.



APPLICATIONS

- Pipe supports.
- Urban fittings.
- Rehabilitation of facades
- Curtain walls.
- Railings.
- Balconies.





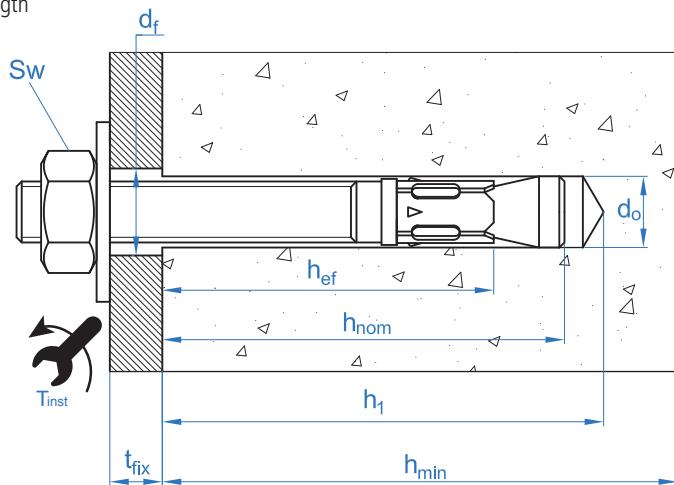
MECHANICAL PROPERTIES

			M6	M8	M10	M12	M16	M20
Cone area section								
A_s	(mm ²)	Cone area section	14,52	27,34	49,02	70,88	122,72	201,06
$f_{u,s}$	(N/mm ²)	Characteristic tension resistance	700	700	700	700	700	700
$f_{y,s}$	(N/mm ²)	Yield strength	500	500	500	500	500	500
Threaded area section								
A_s	(mm ²)	Cone area section	20,1	36,6	58,0	84,3	157,0	245,0
$f_{u,s}$	(N/mm ²)	Characteristic tension resistance	600	600	600	600	600	600
$f_{y,s}$	(N/mm ²)	Yield Strength	400	600	600	600	600	600

INSTALLATION DATA

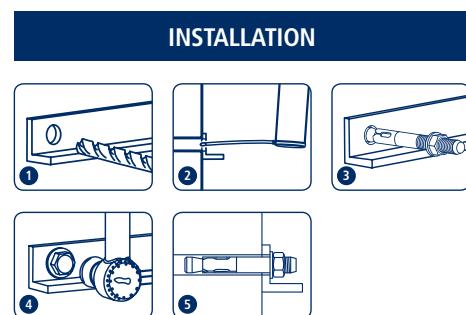
SIZE		M6	M8	M10	M12	M16	M20	
Code		MI06XXX	MI08XXX	MI10XXX	MI12XXX	MI16XXX	MI20XXX	
d_0	Nominal diameter of drill bit	[mm]	6	8	10	12	16	20
T_{ins}	Installation torque moment	[Nm]	7	20	35	60	120	240
$d_f \leq$	Diameter of clearance hole in the fixture	[mm]	7	9	12	14	18	22
h_1	Minimum drill hole depth	[mm]	55	65	75	85	110	135
h_{nom}	Installation depth	[mm]	49,5	59,5	66,5	77	103,5	125
h_{ef}	Effective embedment depth	[mm]	40	48	55	65	84	103
h_{min}	Minimum base material thickness	[mm]	100	100	110	130	168	206
t_{fix}	Maximum thickness of fixture	[mm]	L - 58	L - 70	L - 80	L - 92	L - 122	L - 147
$S_{cr,N}$	Critical spacing	[mm]	120	144	165	195	252	309
$C_{cr,N}$	Critical edge distance	[mm]	60	72	83	98	126	155
$S_{cr,sp}$	Critical distance (splitting)	[mm]	160	192	220	260	336	412
$C_{cr,sp}$	Critical edge distance (splitting)	[mm]	80	96	110	130	168	206
S_{min}	Minimum spacing	[mm]	50	65	70	85	110	135
C_{min}	Minimum edge distance	[mm]	50	65	70	85	110	135
SW	Installation wrench		10	13	17	19	24	30

*L = Total anchor length





Code	INSTALLATION PRODUCTS
	Hammer drill
BHDSXXXX	Concrete Drill bits
MOBOMBA	Blow pump
MORCEPKIT	Cleaning Brush
DOMTAXX	Installation hammering tool
	Torque wrench
	Hexagonal socket



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Resistances in C20/25 concrete for an isolated anchor, without effects of edge distance or spacing

Characteristic resistance N_{Rk} and V_{Rk}															
TENSION							SHEAR								
Size		M6	M8	M10	M12	M16	M20	Size		M6	M8	M10	M12	M16	M20
N_{Rk}	[kN]	10,1	12,0	16,0	25,0	35,0	50,0	V_{Rk}	[kN]	6,0	10,9	17,4	25,2	47,1	73,5

Design resistance N_{Rd} and V_{Rd}															
TENSION							SHEAR								
Size		M6	M8	M10	M12	M16	M20	Size		M6	M8	M10	M12	M16	M20
N_{Rd}	[kN]	6,0	8,0	8,9	13,9	19,4	27,8	V_{Rd}	[kN]	3,9	7,2	11,4	16,6	31,0	48,4

Maximum loads recommended N_{rec} and V_{rec}															
TENSION							SHEAR								
Size		M6	M8	M10	M12	M16	M20	Size		M6	M8	M10	M12	M16	M20
N_{rec}	[kN]	4,3	5,7	6,3	9,9	13,9	19,8	V_{rec}	[kN]	2,8	5,1	8,2	11,8	22,1	34,5

Simplified version of the calculation method according to ETAG 001, annex C. Resistance is calculated according to the data shown in assessment ETA 12/0397.

The calculation method is based on the following simplification:
Different loads do not act on individual anchors, without eccentricity.

Simplified calculation method

Simplified version of the calculation method according to ETAG 001, annex C. Resistance has been calculated with data obtained from tests performed by INDEX.

- Influence of concrete strength.
- Influence of edge distance.
- Influence of spacing between anchors.
- Influence of reinforcements.
- Influence of base material thickness.
- Influence of load application angle.
- Valid for a group of two anchors.

The calculation method is based on the following simplification:
Different loads do not act on individual anchors, without eccentricity.



INDEXcal

For a more accurate calculation and to take more constructive provisions into account, we recommend using our calculation program INDEXcal. It may be easily downloaded from our website www.indexfix.com

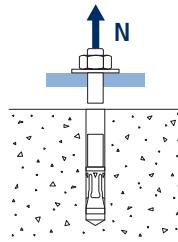


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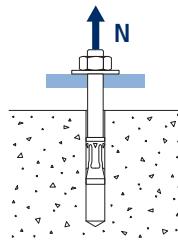
TENSION LOADS

- Steel design resistance: $N_{Rd,s}$
- Pull-out design resistance: $N_{Rd,p} = N_{Rd,p}^o \cdot \Psi_c$
- Concrete cone design resistance: $N_{Rd,c} = N_{Rd,c}^o \cdot \Psi_b \cdot \Psi_{s,N} \cdot \Psi_{c,N} \cdot \Psi_{re,N}$
- Concrete splitting design resistance: $N_{Rd,sp} = N_{Rd,c}^o \cdot \Psi_b \cdot \Psi_{s,sp} \cdot \Psi_{c,sp} \cdot \Psi_{re,N} \cdot \Psi_{h,sp}$

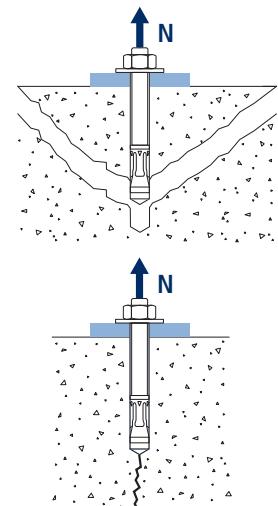
Steel Design resistance							
$N_{Rd,s}$							
Size		M6	M8	M10	M12	M16	M20
N_{Rd}^o	[kN]	6,0	11,4	20,4	29,5	51,1	83,8



Pull-out design resistance							
$N_{Rd,p} = N_{Rd,p}^o \cdot \Psi_c$							
Size		M6	M8	M10	M12	M16	M20
$N_{Rd,p}^o$	Non-cracked concrete [kN]	6,0	8,0	8,9	13,9	19,4	27,8



Concrete cone design resistance							
$N_{Rd,c} = N_{Rd,c}^o \cdot \Psi_b \cdot \Psi_{s,N} \cdot \Psi_{c,N} \cdot \Psi_{re,N}$							
Concrete splitting design resistance*							
$N_{Rd,sp} = N_{Rd,c}^o \cdot \Psi_b \cdot \Psi_{s,sp} \cdot \Psi_{c,sp} \cdot \Psi_{re,N} \cdot \Psi_{h,sp}$							
Size		M6	M8	M10	M12	M16	M20
$N_{Rd,c}^o$	Non-cracked concrete [kN]	8,5	11,2	11,4	14,7	21,6	29,3



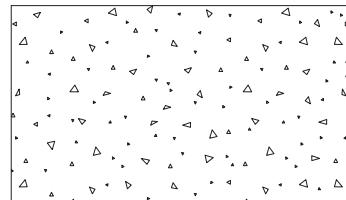
*Concrete splitting design resistance must only be considered for non-cracked concrete.



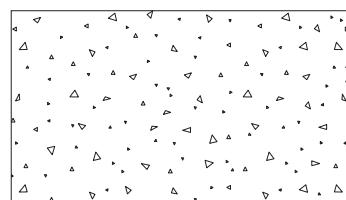
Coefficients of influence

MTA-A2

Influence of concrete strength resistance in pul-out failure Ψ_c						
	M6	M8	M10	M12	M16	M20
Ψ_c	C 20/25			1,00		
	C 30/37			1,22		
	C 40/50			1,41		
	C 50/60			1,55		



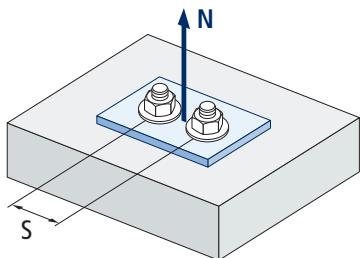
Influence of concrete strength in concret cone and splitting failure Ψ_b						
	M6	M8	M10	M12	M16	M20
Ψ_b	C 20/25			1,00		
	C 30/37			1,22		
	C 40/50			1,41		
	C 50/60			1,55		



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



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$$\Psi_{s,N} = 0,5 + \frac{S}{2 \cdot S_{cr,N}} \leq 1$$

s [mm]	Influence of spacing (concrete cone) $\Psi_{s,N}$					
	MTA-A2					
	M6	M8	M10	M12	M16	M20
50	0,71					
55	0,73					
60	0,75					
65	0,77	0,73				
70	0,79	0,74	0,71			
85	0,85	0,80	0,76	0,72		
100	0,92	0,85	0,80	0,76		
105	0,94	0,86	0,82	0,77		
110	0,96	0,88	0,83	0,78	0,72	
120	1,00	0,92	0,86	0,81	0,74	
125		0,93	0,88	0,82	0,75	
126		0,94	0,88	0,82	0,75	
128		0,94	0,89	0,83	0,75	
130		0,95	0,89	0,83	0,76	
135		0,97	0,91	0,85	0,77	0,72
144		1,00	0,94	0,87	0,79	0,73
150			0,95	0,88	0,80	0,74
165			1,00	0,92	0,83	0,77
170				0,94	0,84	0,78
180				0,96	0,86	0,79
195				1,00	0,89	0,82
200					0,90	0,82
210					0,92	0,84
220					0,94	0,86
225					0,95	0,86
252					1,00	0,91
255						0,91
260						0,92
300						0,99
309						1,00
310						
375						

Value without reduction = 1

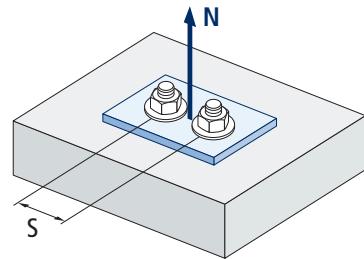
Influence of spacing (concrete splitting) $\Psi_{s,sp}$

s [mm]	MTA-A2					
	M6	M8	M10	M12	M16	M20
50	0,66					
55	0,67					
60	0,69					
65	0,70	0,67				
70	0,72	0,68	0,66			
85	0,77	0,72	0,69	0,66		
100	0,81	0,76	0,73	0,69		
110	0,84	0,79	0,75	0,71	0,66	
125	0,89	0,83	0,78	0,74	0,69	
128	0,90	0,83	0,79	0,75	0,69	
135	0,92	0,85	0,81	0,76	0,70	0,66
140	0,94	0,86	0,82	0,77	0,71	0,67
150	0,97	0,89	0,84	0,79	0,72	0,68
160	1,00	0,92	0,86	0,81	0,74	0,69
165		0,93	0,88	0,82	0,75	0,70
168		0,94	0,88	0,82	0,75	0,70
180		0,97	0,91	0,85	0,77	0,72
192		1,00	0,94	0,87	0,79	0,73
200			0,95	0,88	0,80	0,74
210			0,98	0,90	0,81	0,75
220			1,00	0,92	0,83	0,77
260				1,00	0,89	0,82
288					0,93	0,85
300					0,95	0,86
336					1,00	0,91
350						0,92
412						1,00
425						
500						
510						
560						
600						

Invalid value

Value without reduction = 1

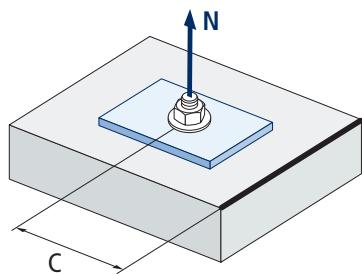
MTA-A2



$$\Psi_{s,sp} = 0,5 + \frac{S}{2 \cdot S_{cr,sp}} \leq 1$$



MTA-A2



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

s [mm]	Influence of concrete edge distance (splitting) $\Psi_{c,sp}$					
	MTA-A2					
M6	M8	M10	M12	M16	M20	
50	0,72					
60	0,81					
65	0,86	0,76				
70	0,90	0,79	0,73			
75	0,95	0,83	0,76			
80	1,00	0,87	0,79			
82,5		0,89	0,81			
84		0,90	0,82			
85		0,91	0,83	0,74		
90		0,95	0,86	0,77		
96		1,00	0,90	0,80		
100			0,93	0,82		
105			0,96	0,85		
110			1,00	0,88	0,74	
125				0,97	0,81	
128				0,99	0,82	
130				1,00	0,83	
135					0,85	0,74
144					0,89	0,77
150					0,92	0,79
168					1,00	0,86
175						0,88
206						1,00
213						
250						
255						
280						
300						

Value without reduction = 1



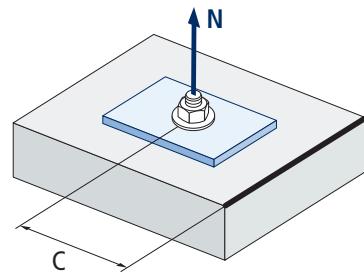
Influence of concrete edge distance (concrete cone) $\Psi_{c,N}$						
s [mm]	MTA-A2					
	M6	M8	M10	M12	M16	M20
50	0,87					
53	0,91					
60	1,00					
63						
65	0,92					
70	0,98	0,88				
72	1,00	0,90				
75		0,92				
82,5		1,00				
83		1,00				
85			0,90			
90			0,94			
98			1,00			
100						
105						
110				0,90		
113				0,92		
125				0,99		
126				1,00		
128						
135					0,90	
150					0,97	
155					1,00	
188						

Invalid value

Value without reduction = 1

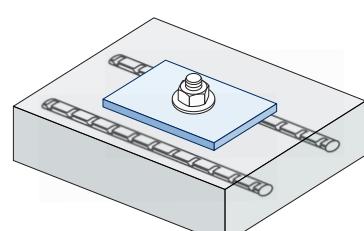
*The critical concrete edge distance matches the minimum concrete edge distance

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

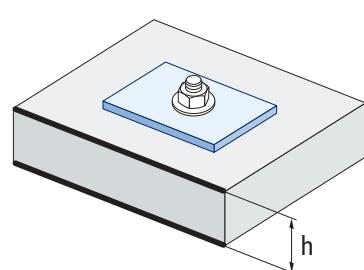
Influence of reinforcements $\Psi_{re,N}$						
$\Psi_{re,N}$	MTA-A2					
	M6	M8	M10	M12	M16	M20
0,7	0,74	0,775	0,825	0,92	1,015	



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

Influence of base material thickness $\Psi_{h,sp}$										
$\Psi_{h,sp}$	MTA-A2									
	h/hef	2,00	2,20	2,40	2,60	2,80	3,00	3,20	3,40	$\geq 3,68$
fh	1,00	1,07	1,13	1,19	1,25	1,31	1,37	1,42	1,48	1,50

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



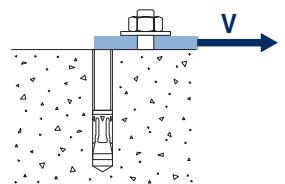


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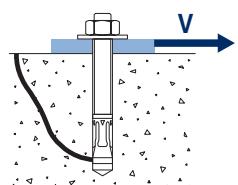
SHEAR LOADS

- Steel design resistance without lever arm: $V_{Rd,s}$
- Pry-out design resistance: $V_{Rd,cp} = k \cdot N^o_{Rd,c}$
- Concrete edge design resistance: $V_{Rd,c} = V^o_{Rd,c} \cdot \Psi_b \cdot \Psi_{se,V} \cdot \Psi_{c,V} \cdot \Psi_{re,V} \cdot \Psi_{\alpha,V} \cdot \Psi_{h,V}$

Steel design resistance							
$V_{Rd,s}$							
Size	M6	M8	M10	M12	M16	M20	
$V_{Rd,s}$	[kN]	3,9	7,2	11,4	16,6	31,0	48,4

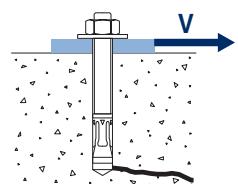


Pry-out design resistance*						
$V_{Rd,cp} = k \cdot N^o_{Rd,c}$						
Size	M6	M8	M10	M12	M16	M20
k	1	1	1	2	2	2



* $N^o_{Rd,c}$ Concrete cone design resistance for tension loads

Concrete edge resistance								
$V_{Rd,c} = V^o_{Rd,c} \cdot \Psi_b \cdot \Psi_{se,V} \cdot \Psi_{c,V} \cdot \Psi_{re,V} \cdot \Psi_{\alpha,V} \cdot \Psi_{h,V}$								
Size	M6	M8	M10	M12	M16	M20		
$V^o_{Rd,c}$	Non-cracked concrete	[kN]	4,6	6,2	7,7	10,2	15,6	21,8

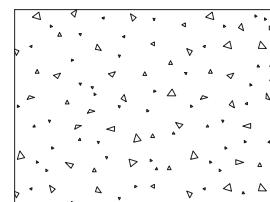




Coefficients of influence

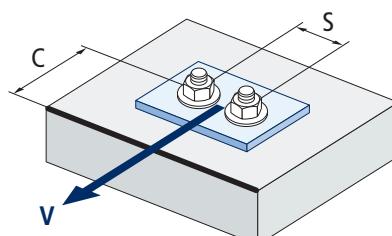
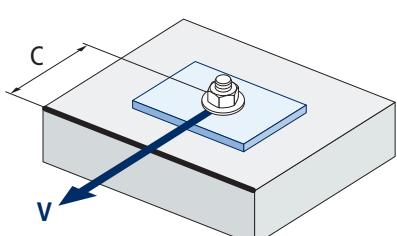
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		Influence of concrete strength in concrete edge failure Ψ_b					
		M6	M8	M10	M12	M16	M20
Ψ_b	C 20/25	1,00					
	C 30/37	1,22					
	C 40/50	1,41					
	C 50/60	1,55					



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

Influence of edge distance and spacing $\Psi_{se,V}$																		
FOR ONE ANCHOR ONLY																		
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	
Isolated	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																		
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

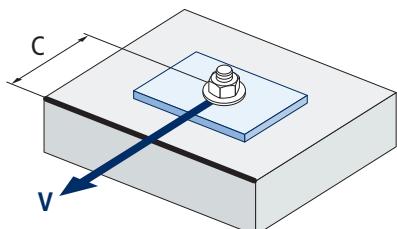


$$\Psi_{se,V} = \left(\frac{c}{h_{ef}} \right)^{1,5}$$

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



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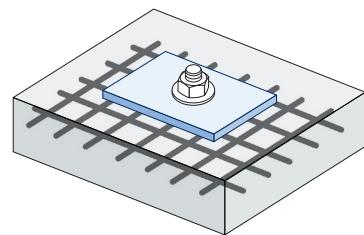


$$\Psi_{c,V} = \left(\frac{d}{c} \right)^{0,20}$$

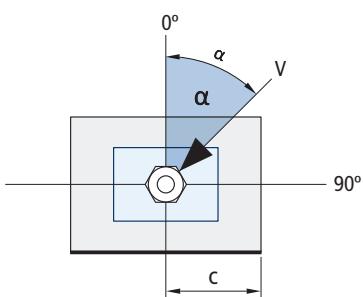
c [mm]	Influence of concrete edge distance $\Psi_{c,V}$					
	MTA-A2					
	M6	M8	M10	M12	M16	M20
40						
45						
50	0,65					
55	0,64					
60	0,63					
65	0,62	0,66				
70	0,61	0,65	0,68			
80	0,60	0,63	0,66			
85	0,59	0,62	0,65	0,68		
90	0,58	0,62	0,64	0,67		
100	0,57	0,60	0,63	0,65		
105	0,56	0,60	0,62	0,65		
110	0,56	0,59	0,62	0,64	0,68	
120	0,55	0,58	0,61	0,63	0,67	
125	0,54	0,58	0,60	0,63	0,66	
130	0,54	0,57	0,60	0,62	0,66	
135	0,54	0,57	0,59	0,62	0,65	0,68
140	0,53	0,56	0,59	0,61	0,65	0,68
150	0,53	0,56	0,58	0,60	0,64	0,67
160	0,52	0,55	0,57	0,60	0,63	0,66
170	0,51	0,54	0,57	0,59	0,62	0,65
175	0,51	0,54	0,56	0,59	0,62	0,65
180	0,51	0,54	0,56	0,58	0,62	0,64
190	0,50	0,53	0,55	0,58	0,61	0,64
200	0,50	0,53	0,55	0,57	0,60	0,63
210	0,49	0,52	0,54	0,56	0,60	0,62
220	0,49	0,52	0,54	0,56	0,59	0,62
230	0,48	0,51	0,53	0,55	0,59	0,61
240	0,48	0,51	0,53	0,55	0,58	0,61
250	0,47	0,50	0,53	0,54	0,58	0,60
260	0,47	0,50	0,52	0,54	0,57	0,60
270	0,47	0,49	0,52	0,54	0,57	0,59
280	0,46	0,49	0,51	0,53	0,56	0,59
290	0,46	0,49	0,51	0,53	0,56	0,59
300	0,46	0,48	0,51	0,53	0,56	0,58



Influence of reinforcements $\Psi_{re,v}$			
	Without perimetral reinforcements	Perimetral reinforcements $\geq \varnothing 12 \text{ mm}$	Perimetral reinforcements with brackets $\leq 100 \text{ mm}$
Non-cracked concrete	1	1	1

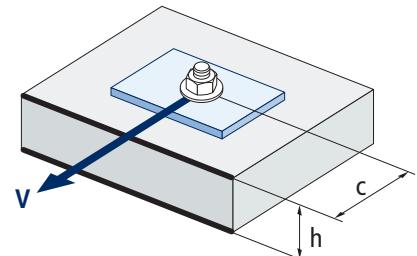


Influence of load application angle $\Psi_{\alpha,v}$										
Angle, $\alpha(^{\circ})$	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°
$\Psi_{\alpha,v}$	1,00	1,01	1,05	1,13	1,24	1,40	1,64	1,97	2,32	2,50



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

Influence of base material thickness $\Psi_{h,v}$										
MTA-A2										
h/c	0,15	0,30	0,45	0,60	0,75	0,90	1,05	1,20	1,35	$\geq 1,5$
$\Psi_{h,v}$	0,32	0,45	0,55	0,63	0,71	0,77	0,84	0,89	0,95	1,00



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



MTA-A2

GAMA

Code	Size	Maximum thickness of fixture	Axle letter (length)			Code	Size	Maximum thickness of fixture	Axle letter (length)		
MI06045	M6 x 45 Ø6	1	A	200	1.200	MI10120	M10 x 120 Ø10	40	G	50	300
MI06060	M6 x 60 Ø6	2	B	200	1.200	MI10150	M10 x 150 Ø10	70	I	50	200
MI06080	M6 x 80 Ø6	22	D	200	1.200	MI12075	M12 x 75 Ø12	5	C	50	300
MI06120	M6 x 120 Ø6	62	G	100	600	MI12090	M12 x 90 Ø12	5	D	50	200
MI06140	M6 x 140 Ø6	82	I	100	600	MI12110	M12 x 110 Ø12	18	F	50	200
MI06160	M6 x 160 Ø6	102	J	100	400	MI12140	M12 x 140 Ø12	48	I	50	200
MI08050	M8 x 50 Ø8	4	A	100	800	MI16090	M16 x 90 Ø16	4	D	25	150
MI08075	M8 x 75 Ø8	5	C	100	600	MI16145	M16 x 145 Ø16	23	I	25	100
MI08090	M8 x 90 Ø8	20	E	100	600	MI16170	M16 x 170 Ø16	48	K	25	75
MI08115	M8 x 115 Ø8	45	G	100	400	MI20120	M20 x 120 Ø20	5	G	20	40
MI10070	M10 x 70 Ø10	5	C	100	400	MI20170	M20 x 170 Ø20	23	K	20	40
MI10090	M10 x 90 Ø10	10	D	100	400	MI20220	M20 x 220 Ø20	73	O	20	40