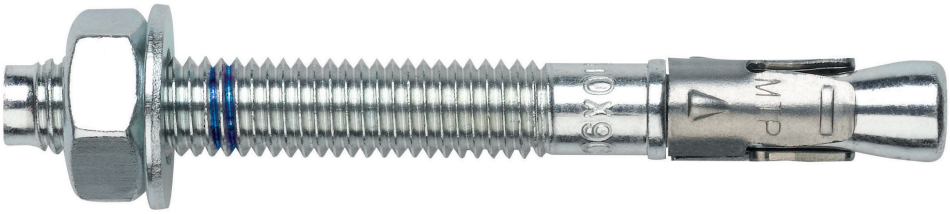
Through-bolt expansion anchor with controlled torque, for use in cracked and non cracked concrete

MTP

ETA Assessed Option 1. Zinc-plated shaft. A4 Stainless clip.



PRODUCT INFORMATION

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

OFFICIAL DOCUMENTATION
- AVCP-1219-CPR-0053.
- ETA 12/0397 option 1.
- Declaration of Performance DoP MTP.

SIZES
M8x50 to M24x235.

DESIGN LOAD RANGE
From 5,00 to 33,3 kN (non cracked).
From 2,7 to 20,0 kN (cracked).

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

Stone | Concrete | Reinforced Concrete | Cracked Concrete

ASSESSMENTS
- Option 1 (Cracked and non-cracked concrete)
- Fire Resistance R30-120
- Seismic C1 M10÷M16
- Sesimic C2 M12÷M16

12
Técnicas Expansivas S.L.
Segador 13. Logroño. Spain
ETA 12/0397
1219
Structural fixings in concrete

FIRE RESISTANCE

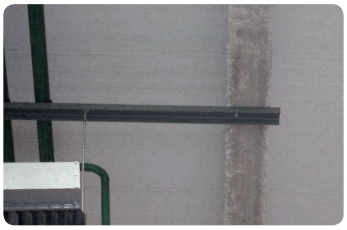
SEISMIC C2&C1

CHARACTERISTICS AND BENEFITS
- Easy installation.
- Use in cracked and non-craked 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.
- Available at INDEXcal.

MATERIALS
Shaft: Cold-formed steel, zinc-plated ≥ 5 µm.
Washer: DIN 125 or DIN 9021, zinc-plated ≥ 5 µm.
Nut: DIN 934, zinc-plated ≥ 5 µm.

Clip: A4 Stainless steel

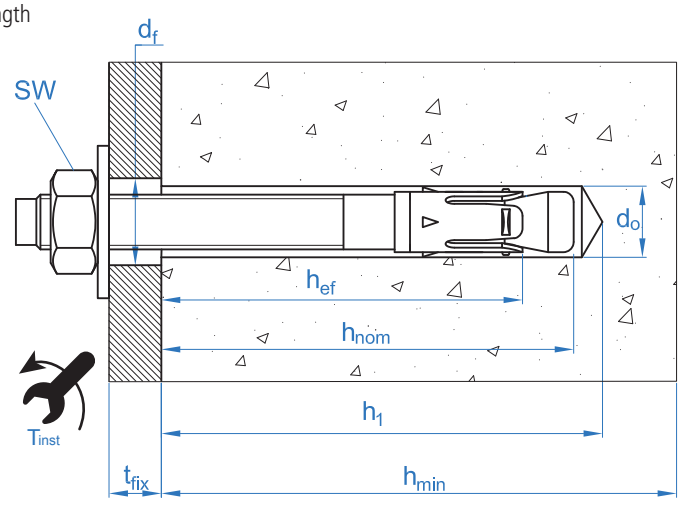
APPLICATIONS
- Anchor plates.
- Metallic structures.
- Bridges.
- Urban fitments.
- Protective fences.
- Catenaries.
- Elevators.
- Pipe supports.



MECHANICAL PROPERTIES								
			M8	M10	M12	M16	M20	M24
Cone area section								
A_s	(mm^2)	Cone area section	22,9	41,8	55,4	103,9	176,7	298,6
$f_{u,s}$	(N/mm^2)	Chracteristic tension resistance	790	750	730	700	660	600
$f_{y,s}$	(N/mm^2)	Yield strength	632	600	585	560	530	480
Threaded area section								
A_s	(mm^2)	Cone area section	36,6	58,0	84,3	157,0	245,0	353,0
$f_{u,s}$	(N/mm^2)	Chracteristic tension resistance	600	600	600	600	600	600
$f_{y,s}$	(N/mm^2)	Yield Strength	480	480	480	480	480	480

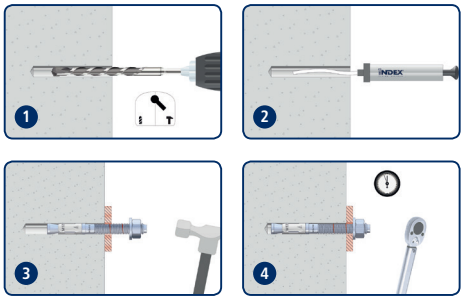
INSTALLATION DATA								
SIZE			M8	M10	M12	M16	M20	M24
Code			AP08XXX	AP10XXX	AP12XXX	AP16XXX	AP20XXX	AP24XXX
d_0	Nominal diameter of drill bit	[mm]	8	10	12	16	20	24
T_{ins}	Installation torque moment	[Nm]	20	40	60	100	200	250
$d_f \leq$	Diameter of clearance hole in the fixture	[mm]	9	12	14	18	22	26
h_1	Minimum drill hole depth	[mm]	60	75	85	105	125	155
h_{nom}	Installation depth	[mm]	55	68	80	97	114	143
h_{ef}	Effective embedment depth	[mm]	48	60	70	85	100	125
h_{min}	Minimum base material thickness	[mm]	100	120	140	170	200	250
t_{fix}	Maximum thickness of fixture	[mm]	L - 66	L - 80	L - 96	L - 117	L-138	L-170
$s_{cr,N}$	Critical spacing	[mm]	144	180	210	255	300	375
$c_{cr,N}$	Critical edge distance	[mm]	72	90	105	128	150	188
$s_{cr,sp}$	Critical distance (splitting)	[mm]	288	300	350	425	500	560
$c_{cr,sp}$	Critical edge distance (splitting)	[mm]	144	150	175	213	250	280
s_{min}	Minimum spacing	[mm]	50	60	70	85	100	125
c_{min}	Minimum edge distance	[mm]	50	60	70	85	100	125
SW	Installation wrench		13	17	19	24	30	30

*L = Total anchor length



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

INSTALLATION



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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

Size			M8	M10	M12	M16	M20	M24
N_{Rk}	Non-cracked concrete	[kN]	9,0	16,0	20,0	35,0	50,0	50,0
N_{Rk}	Cracked concrete	[kN]	5,0	9,0	12,0	25,0	30,0	30,0

SHEAR

Size			M8	M10	M12	M16	M20	M24
V_{Rk}	Non-cracked concrete	[kN]	11,0	17,4	25,3	47,1	73,1	84,7
V_{Rk}	Cracked concrete	[kN]	11,0	17,4	25,3	47,1	73,1	84,7

Design Resistance N_{Rd} and V_{Rd}

TENSION

Size			M8	M10	M12	M16	M20	M24
N_{Rd}	Non-cracked concrete	[kN]	5,0	10,6	13,3	23,3	33,3	27,7
N_{Rd}	Cracked concrete	[kN]	2,7	6,0	8,0	16,6	20,0	16,6

SHEAR

Size			M8	M10	M12	M16	M20	M24
V_{Rd}	Non-cracked concrete	[kN]	8,8	13,9	20,2	37,6	58,4	67,7
V_{Rd}	Cracked concrete	[kN]	8,8	13,9	20,2	37,6	58,4	67,7

Maximum Loads Recommended N_{rec} and V_{rec}

TENSION

Size			M8	M10	M12	M16	M20	M24
N_{rec}	Non-cracked concrete	[kN]	3,5	7,6	9,5	16,6	23,8	19,8
N_{rec}	Cracked concrete	[kN]	2,0	4,2	5,7	11,9	14,2	11,9

SHEAR

Size			M8	M10	M12	M16	M20	M24
V_{rec}	Non-cracked concrete	[kN]	6,3	9,9	14,4	26,9	41,7	48,4
V_{rec}	Cracked concrete	[kN]	6,3	9,9	14,4	26,9	41,7	48,4

Simplified calculation method

European Technical Assessment ETA 12/0397

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.

- 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

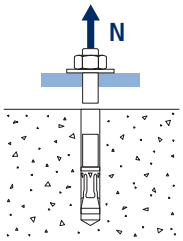
For a more accurate calculation and to take more constructive provisions into account, we recommend using our calculation program INDEXcal. It may be easily downloaded from our website **www.indexfix.com**

MTP

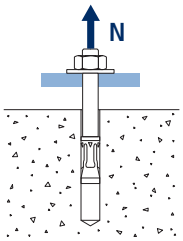
TENSION LOADS

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

Steel Design resistance							
$N_{Rd,s}$							
Size			M8	M10	M12	M16	M20	M24
N^{o}_{Rd}		[kN]	12,1	20,9	26,9	48,5	77,7	119,5

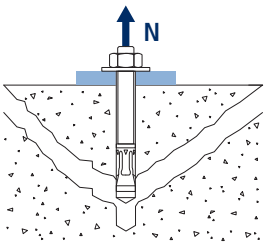


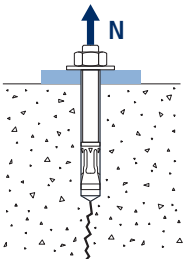
Pull-out design resistance								
$N_{Rd,p} = N^{o}_{Rd,p} \cdot \Psi_{c}$								
Size			M8	M10	M12	M16	M20	M24
$N^{o}_{Rd,p}$	Non-cracked concrete	[kN]	5,0	10,6	13,3	23,3	33,3	27,7
$N^{o}_{Rd,p}$	Cracked concrete	[kN]	2,7	6,0	8,0	16,6	20,0	16,6



Concrete cone design resistance								
$N_{Rd,c} = N^{o}_{Rd,c} \cdot \Psi_{b} \cdot \Psi_{s,N} \cdot \Psi_{c,N} \cdot \Psi_{re,N}$								
Concrete splitting design resistance*								
$N_{Rd,sp} = N^{o}_{Rd,c} \cdot \Psi_{b} \cdot \Psi_{s,sp} \cdot \Psi_{c,sp} \cdot \Psi_{re,N} \cdot \Psi_{h,sp}$								
Size			M8	M10	M12	M16	M20	M24
$N^{o}_{Rd,c}$	Non-cracked concrete	[kN]	9,3	15,6	19,6	26,3	33,6	39,1
$N^{o}_{Rd,c}$	Cracked concrete	[kN]	6,6	11,1	14,0	18,8	24,0	27,9

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

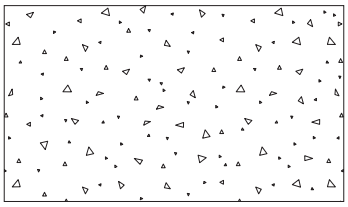




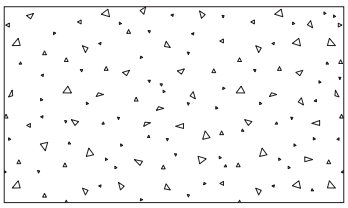
MTP

Coefficients of influence

Influence of concrete strength resistance in pul-out failure Ψ_c							
		M8	M10	M12	M16	M20	M24
Ψ_c	C 20/25	1,00	1,00	1,00	1,00	1,00	1,00
	C 30/37	1,22	1,16	1,22	1,22	1,16	1,22
	C 40/50	1,41	1,31	1,41	1,41	1,31	1,41
	C 50/60	1,55	1,41	1,55	1,55	1,41	1,55

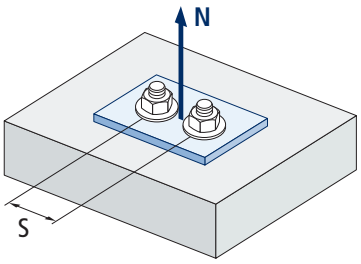


Influence of concrete strength in concret cone and splitting failure Ψ_b							
		M8	M10	M12	M16	M20	M24
Ψ_b	C 20/25	1,00					
	C 30/37	1,22					
	C 40/50	1,41					
	C 50/60	1,55					



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

MTP



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

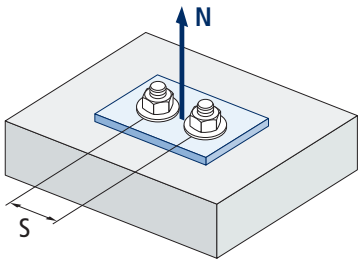
Influence of spacing (concrete cone) $\Psi_{s,N}$						
s [mm]	MTP					
	M8	M10	M12	M16	M20	M24
50	0,67					
55	0,69					
60	0,71	0,67		Invalid value		
65	0,73	0,68				
70	0,74	0,69	0,67			
80	0,78	0,50	0,50			
85	0,80	0,74	0,70	0,67		
90	0,81	0,75	0,71	0,68		
100	0,85	0,78	0,74	0,70	0,67	
105	0,86	0,79	0,75	0,71	0,68	
110	0,88	0,81	0,76	0,72	0,68	
120	0,92	0,83	0,79	0,74	0,70	
125	0,93	0,85	0,80	0,75	0,71	0,67
126	0,94	0,85	0,80	0,75	0,71	0,67
128	0,94	0,86	0,80	0,75	0,71	0,67
130	0,95	0,86	0,81	0,75	0,72	0,67
135	0,97	0,88	0,82	0,76	0,73	0,68
144	1,00	0,90	0,84	0,78	0,74	0,69
150		0,92	0,86	0,79	0,75	0,70
165		0,96	0,89	0,82	0,78	0,72
170		0,97	0,90	0,83	0,78	0,73
180		1,00	0,93	0,85	0,80	0,74
195			0,96	0,88	0,83	0,76
200			0,98	0,89	0,83	0,77
210			1,00	0,91	0,85	0,78
220				0,93	0,87	0,79
225				0,94	0,88	0,80
252				0,99	0,92	0,84
255				1,00	0,93	0,84
260					0,93	0,85
300					1,00	0,90
309		Value without reduction = 1				0,91
310						0,91
375						1,00

MTP

Influence of spacing (concrete splitting) $\Psi_{s,sp}$						
s [mm]	MTP					
	M8	M10	M12	M16	M20	M24
50	0,59					
55	0,60					
60	0,60	0,60				
65	0,61	0,61				
70	0,62	0,62	0,60			
80	0,64	0,63	0,61			
85	0,65	0,64	0,62	0,60		
90	0,66	0,65	0,63	0,61		
100	0,67	0,67	0,64	0,62	0,60	
110	0,69	0,68	0,66	0,63	0,61	
125	0,72	0,71	0,68	0,65	0,63	0,61
128	0,72	0,71	0,68	0,65	0,63	0,61
135	0,73	0,73	0,69	0,66	0,64	0,62
140	0,74	0,73	0,70	0,66	0,64	0,63
150	0,76	0,75	0,71	0,68	0,65	0,63
160	0,78	0,77	0,73	0,69	0,66	0,64
165	0,79	0,78	0,74	0,69	0,67	0,65
168	0,79	0,78	0,74	0,70	0,67	0,65
180	0,81	0,80	0,76	0,71	0,68	0,66
192	0,83	0,82	0,77	0,73	0,69	0,67
200	0,85	0,83	0,79	0,74	0,70	0,68
210	0,86	0,85	0,80	0,75	0,71	0,69
220	0,88	0,87	0,81	0,76	0,72	0,70
260	0,95	0,93	0,87	0,81	0,76	0,73
288	1,00	0,98	0,91	0,84	0,79	0,76
300		1,00	0,93	0,85	0,80	0,77
336			0,98	0,90	0,84	0,80
350			1,00	0,91	0,85	0,81
412				0,98	0,91	0,87
425				1,00	0,93	0,88
500					1,00	0,95
510						0,96
560						1,00

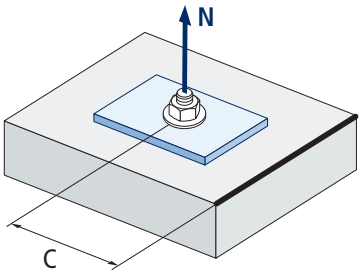
Invalid value

Value without reduction = 1



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

MTP



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

Influence of concrete edge distance (splitting) $\Psi_{c,sp}$						
c [mm]	MTP					
	M8	M10	M12	M16	M20	M24
50	0,54					
60	0,58	0,57				
65	0,61	0,59			Invalid value	
70	0,63	0,62	0,57			
75	0,65	0,64	0,59			
80	0,67	0,66	0,61			
83	0,69	0,67	0,62			
84	0,69	0,68	0,62			
85	0,70	0,68	0,63	0,57		
90	0,72	0,70	0,65	0,59		
96	0,75	0,73	0,67	0,61		
100	0,77	0,75	0,68	0,62	0,57	
105	0,79	0,77	0,70	0,63	0,59	
110	0,82	0,80	0,72	0,65	0,60	
125	0,90	0,87	0,78	0,70	0,64	0,60
128	0,91	0,89	0,80	0,70	0,65	0,61
130	0,92	0,90	0,80	0,71	0,65	0,61
135	0,95	0,92	0,82	0,73	0,66	0,63
144	1,00	0,97	0,86	0,76	0,69	0,65
150		1,00	0,89	0,78	0,70	0,66
168			0,97	0,84	0,75	0,70
175			1,00	0,86	0,77	0,72
180				0,88	0,79	0,73
206				0,97	0,86	0,80
213				1,00	0,88	0,82
250	Value without reduction = 1				1,00	0,92
255						0,93
280						1,00

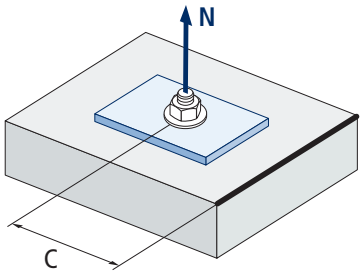
MTP

Influence of concrete edge distance (concrete cone) $\Psi_{c,N}$

c [mm]	MTP					
	M8	M10	M12	M16	M20	M24
50	0,77					
53	0,80					
60	0,87	0,75				
63	0,90	0,77				
65	0,92	0,79				
70	0,98	0,83	0,75			
72	1,00	0,85	0,76			
75		0,87	0,78			
80		0,91	0,82			
83		0,94	0,84			
85		0,96	0,85	0,75		
90		1,00	0,89	0,78		
98			0,95	0,82		
100			0,96	0,83	0,75	
105			1,00	0,86	0,77	
110				0,89	0,80	
113				0,91	0,81	
125				0,98	0,87	0,75
126				0,99	0,88	0,75
128				1,00	0,89	0,76
135					0,92	0,79
150					1,00	0,84
155						0,86
188						1,00

Invalid value

Value without reduction = 1

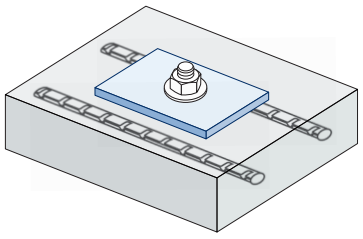


$$\Psi_{c,N} = 0{,}35 + \frac{0{,}5 \cdot c}{C_{cr,N}} + \frac{0{,}15 \cdot c^2}{C_{cr,N}^{\ 2}} \leq 1$$

Influence of reinforcements $\Psi_{re,N}$

$\Psi_{re,N}$	MTP					
	M8	M10	M12	M16	M20	M24
	0,74	0,80	0,85	0,93	1,00	1,00

*This factor only applies for a high density of reinforcements. If in the area of the anchor there are reinforcements with a distancing of ≥ 150 mm (any diameter) or with a diameter ≤ 10 mm and a distancing of ≥ 100 mm, a $f_{re,N}$ = 1 factor may be applied.

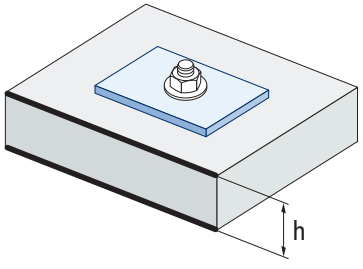


$$\Psi_{re,N} = 0{,}5 + \frac{h_{ef}}{200} \leq 1$$

Influence of base material thickness $\Psi_{h,sp}$

$\Psi_{h,sp}$	MTP										
	h/hef	2,00	2,20	2,40	2,60	2,80	3,00	3,20	3,40	3,60	≥3,68
	$\Psi_{h,sp}$	1,00	1,07	1,13	1,19	1,25	1,31	1,37	1,42	1,48	1,50

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

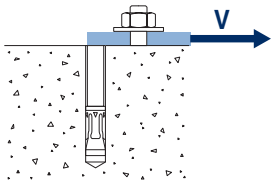


MTP

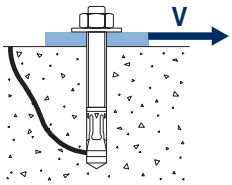
SHEAR LOADS

- 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		M8	M10	M12	M16	M20	M24
$V_{Rd,s}$	[kN]	8,8	13,9	20,2	37,6	58,8	67,7

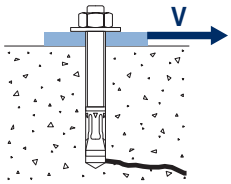


Pry-out design resistance*						
$V_{Rd,cp} = k \cdot N^{o}_{Rd,c}$						
Size	M8	M10	M12	M16	M20	M24
k	1	2	2	2	2	2



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

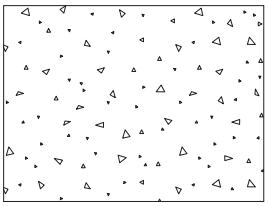
Concrete edge resistance								
$V_{Rd,c} = V^{o}_{Rd,c} \cdot \Psi_{b} \cdot \Psi_{se,V} \cdot \Psi_{c,V} \cdot \Psi_{re,V} \cdot \Psi_{\alpha,V} \cdot \Psi_{h,V}$								
Size			M8	M10	M12	M16	M20	M24
$V^{o}_{Rd,c}$	Non-cracked concrete	[kN]	6,2	8,9	11,5	15,9	20,8	30,1
	Cracked concrete	[kN]	4,4	6,3	8,2	11,3	14,7	21,4



MTP

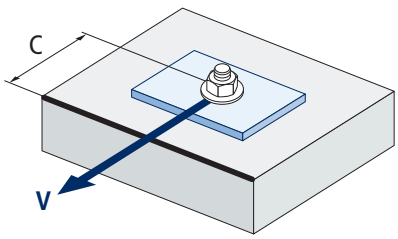
Coefficients of influence

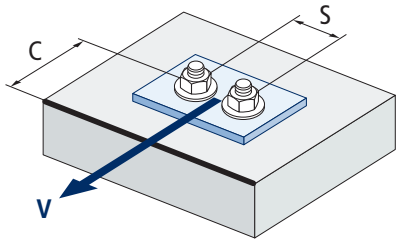
Influence of concrete strength in concrete edge failure Ψ_b							
		M8	M10	M12	M16	M20	M24
Ψ_b	C 20/25	1,00					
	C 30/37	1,22					
	C 40/50	1,41					
	C 50/60	1,55					



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

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	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
	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

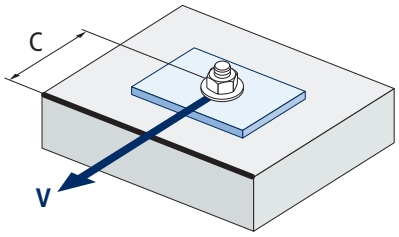




$$\Psi_{se,V} = \left(\frac{c}{h_{ef}}\right)^{1,5}$$

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

MTP

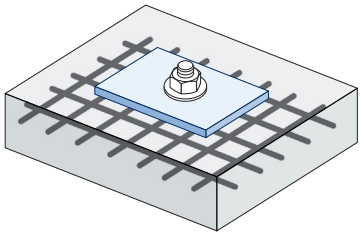


$$\Psi_{c,V} = \left(\frac{d}{c}\right)^{0,20}$$

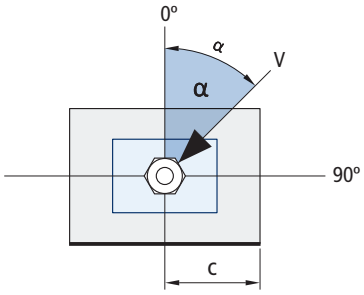
Influence of concrete edge distance $\Psi_{c,V}$						
c [mm]	MTP					
	M8	M10	M12	M16	M20	M24
40						
45						
50	0,69					
55	0,68					
60	0,67	0,70				
65	0,66	0,69	0,71			
70	0,65	0,68	0,70			
80	0,63	0,66	0,68			
85	0,62	0,65	0,68	0,72		
90	0,62	0,64	0,67	0,71		
100	0,60	0,63	0,65	0,69	0,72	
105	0,60	0,62	0,65	0,69	0,72	
110	0,59	0,62	0,64	0,68	0,71	
120	0,58	0,61	0,63	0,67	0,70	
125	0,58	0,60	0,63	0,66	0,69	0,72
130	0,57	0,60	0,62	0,66	0,69	0,71
135	0,57	0,59	0,62	0,65	0,68	0,71
140	0,56	0,59	0,61	0,65	0,68	0,70
150	0,56	0,58	0,60	0,64	0,67	0,69
160	0,55	0,57	0,60	0,63	0,66	0,68
170	0,54	0,57	0,59	0,62	0,65	0,68
175	0,54	0,56	0,59	0,62	0,65	0,67
180	0,54	0,56	0,58	0,62	0,64	0,67
190	0,53	0,55	0,58	0,61	0,64	0,66
200	0,53	0,55	0,57	0,60	0,63	0,65
210	0,52	0,54	0,56	0,60	0,62	0,65
220	0,52	0,54	0,56	0,59	0,62	0,64
230	0,51	0,53	0,55	0,59	0,61	0,64
240	0,51	0,53	0,55	0,58	0,61	0,63
250	0,50	0,53	0,54	0,58	0,60	0,63
260	0,50	0,52	0,54	0,57	0,60	0,62
270	0,49	0,52	0,54	0,57	0,59	0,62
280	0,49	0,51	0,53	0,56	0,59	0,61
290	0,49	0,51	0,53	0,56	0,59	0,61
300	0,48	0,51	0,53	0,56	0,58	0,60

Invalid value

Influence of reinforcements $\Psi_{re,V}$			
	Without perimetral reinforcements	Perimetral reinforcements ≥ Ø12 mm	Perimetral reinforcements with brackets ≤ 100 mm
Non-cracked concrete	1	1	1
Cracked concrete	1	1,2	1,4

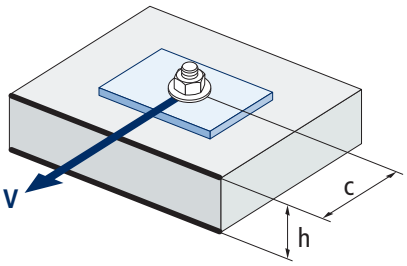


Influence of load application angle $\Psi_{\alpha,V}$										
Angle, α(°)	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°
$\Psi_{\alpha,V}$	1,00	1,01	1,05	1,13	1,24	1,40	1,64	1,97	2,32	2,50



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

Influence of base material thickness $\Psi_{h,V}$										
	MTP									
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



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

MTP

FIRE RESISTANCE

Characteristic Resistance*												
	TENSION						SHEAR					
	M8	M10	M12	M16	M20	M24	M8	M10	M12	M16	M20	M24
RF30	0,4	0,9	1,7	3,1	4,9	7,1	0,4	0,9	1,7	3,1	4,9	7,1
RF60	0,3	0,8	1,3	2,4	3,7	5,3	0,3	0,8	1,3	2,4	3,7	5,3
RF90	0,3	0,6	1,1	2,0	3,2	4,6	0,3	0,6	1,1	2,0	3,2	4,5
RF120	0,2	0,5	0,8	1,6	2,5	3,5	0,2	0,5	0,8	1,6	2,5	3,5

*The safety factor for design resistance under fire exposure is $\gamma_{M,fi}$=1 (in abscence of other national regulations). As a eresult the Characteristic Resistance is the same as Design Resistance.

Maximum Load Recommended												
	TENSION						SHEAR					
	M8	M10	M12	M16	M20	M24	M8	M10	M12	M16	M20	M24
RF30	0,3	0,6	1,2	2,2	3,5	5,1	0,3	0,6	1,2	2,2	3,5	5,1
RF60	0,2	0,6	0,9	1,7	2,6	3,8	0,2	0,6	0,9	1,7	2,6	3,8
RF90	0,2	0,4	0,8	1,4	2,3	3,3	0,2	0,4	0,8	1,4	2,3	3,2
RF120	0,1	0,4	0,6	1,1	1,8	2,5	0,1	0,4	0,6	1,1	1,8	2,5

RANGE

Code	Seismic assessment	Size	Maximum thickness of fixture	Axle letter (length)		
• AP08050	-	M8 x 50 Ø8	2	A	100	800
AP08075	-	M8 x 75 Ø8	9	C	100	600
AP08095	-	M8 x 95 Ø8	29	E	100	600
AP08115	-	M8 x 115 Ø8	49	G	100	400
AP10090	C1	M10 x 90 Ø10	10	E	100	400
AP10105	C1	M10 x 105 Ø10	25	F	50	300
AP10115	C1	M10 x 115 Ø10	35	G	50	200
AP10135	C1	M10 x 135 Ø10	55	H	50	200
AP10165	C1	M10 x 165 Ø10	85	K	50	200
AP10185	C1	M10 x 185 Ø10	105	L	50	150
• AP12080	-	M12 x 80 Ø12	4	D	50	300
AP12100	C1&C2	M12 x 100 Ø12	4	E	50	200
AP12110	C1&C2	M12 x 110 Ø12	14	F	50	200

Code	Seismic assessment	Size	Maximum thickness of fixture	Axle letter (length)		
AP12120	C1&C2	M12 x 120 Ø12	24	G	50	200
AP12130	C1&C2	M12 x 130 Ø12	34	H	50	200
AP12150	C1&C2	M12 x 150 Ø12	54	I	50	100
AP12180	C1&C2	M12 x 180 Ø12	84	L	50	150
AP12200	C1&C2	M12 x 200 Ø12	104	M	50	150
AP16145	C1&C2	M16 x 145 Ø16	28	I	25	100
AP16175	C1&C2	M16 x 175 Ø16	58	K	25	50
AP16220	C1&C2	M16 x 220 Ø16	103	O	25	50
AP16250	C1&C2	M16 x 250 Ø16	133	Q	25	50
AP20170	-	M20 x 170 Ø20	32	K	20	40
AP20200	-	M20 x 200 Ø20	62	M	20	40
AP24205	-	M24 x 205 Ø24	35	N	10	30
AP24235	-	M24 x 235 Ø24	65	P	10	20

• Non assessed sizes. Resistance values and installation data are not applicable to these references. For further information, please contact Technical Department.