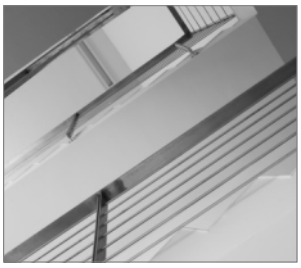
R-HPTII-A4 Stainless Steel Throughbolt

Stainless steel throughbolt anchor for cracked and non-cracked concrete



Approvals and Reports

- ETA 17/0185

Product information

Features and benefits

- Stainless steel anchor for the highest corrosion resistance
- High performance in cracked and non-cracked concrete confirmed by ETA Option 1
- Highest quality ensures maximum load capability
- For applications requiring fire resistance up to 120 minutes
- Suitable for reduced embedment to avoid contact with reinforcement
- Embedment depth markings help to ensure precise installation of the anchor
- Design of R-HPTII allows drilling and installing directly through the fixture and helps to reduce installation time

Applications

- Cladding restraints
- Barriers
- Structural steel
- Curtain walling
- Hand rails
- Heavy Plant
- Balustrading
- Passenger lifts
- Facades
- Fencing & gates manufacturing and installation
- Masonry support
- Platforms
- Public seating
- Racking systems

Base materials

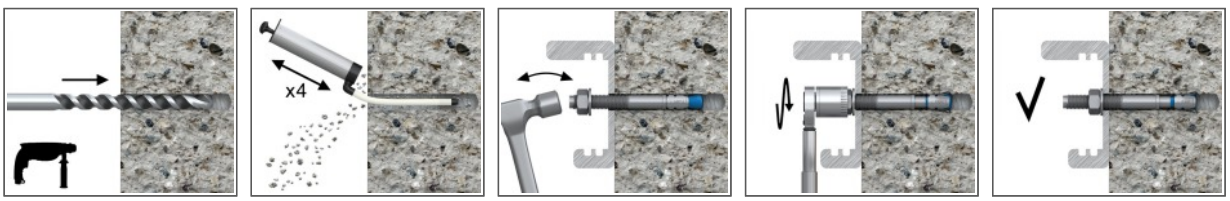
Approved for use in:

- Cracked concrete C20/25-C50/60
- Non-cracked concrete C20/25-C50/60
- Reinforced concrete
- Unreinforced concrete

Also suitable for use in:

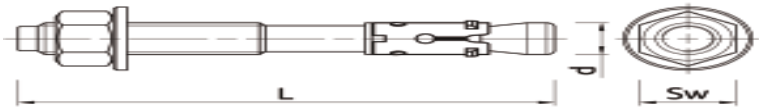
- Natural Stone

Installation guide



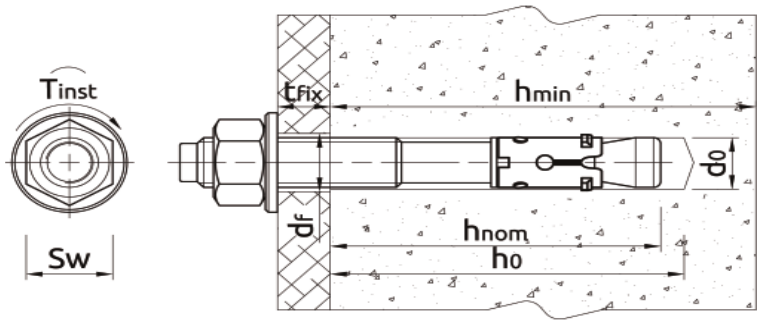
1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blowpump or equivalent method)
3. Lightly tap the throughbolt through the fixture into hole with a hammer, until fixing depth is reached
4. Tighten to the recommended torque

Product information



Size	Product Code	Anchor		Fixture		
		Diameter	Length	Max. thickness	Max. thickness t_{fix} for:	Hole diameter
		d	L	$t_{fix,r}$	$h_{nom,std}$	d_f
		[mm]	[mm]	[mm]	[mm]	[mm]
M8	R-HPTIIA4-08060/10	8	60	10	-	9
	R-HPTIIA4-08075/10	8	75	25	10	9
	R-HPTIIA4-08085/20	8	85	35	20	9
	R-HPTIIA4-08095/30	8	95	45	30	9
	R-HPTIIA4-08105/40	8	105	55	40	9
	R-HPTIIA4-08115/50	8	115	65	50	9
M10	R-HPTIIA4-10065/5	10	65	5	-	11
	R-HPTIIA4-10080/20	10	80	20	-	11
	R-HPTIIA4-10095/15	10	95	35	15	11
	R-HPTIIA4-10115/35	10	115	55	35	11
	R-HPTIIA4-10130/50	10	130	70	50	11
	R-HPTIIA4-10140/60	10	140	80	60	11
M12	R-HPTIIA4-12080/5	12	80	5	-	13
	R-HPTIIA4-12100/5	12	100	25	5	13
	R-HPTIIA4-12125/30	12	125	50	30	13
	R-HPTIIA4-12150/55	12	150	75	55	13
	R-HPTIIA4-12180/85	12	180	105	85	13
M16	R-HPTIIA4-16125/5	16	125	25	5	18
	R-HPTIIA4-16140/20	16	140	40	20	18
	R-HPTIIA4-16150/30	16	150	50	30	18
	R-HPTIIA4-16180/60	16	180	80	60	18

Installation data



Size			M8	M10	M12	M16
Thread diameter	d	[mm]	8	10	12	16
Hole diameter in substrate	d_0	[mm]	8	10	12	16
Installation torque	T_{inst}	[Nm]	15	30	50	100
Wrench size	Sw	[mm]	13	17	19	24

Installation data

Mechanical properties

Size			M8	M10	M12	M16
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	545	545	500	500
Nominal ultimate tensile strength - shear	f_{uk}	[N/mm²]	600	600	550	550
Nominal yield strength - tension	f_{yk}	[N/mm²]	436	436	400	400
Nominal yield strength - shear	f_{yk}	[N/mm²]	480	480	440	440
Cross sectional area - tension	A_s	[mm²]	38.9	61.7	89.6	165.2
Cross sectional area - shear	A_s	[mm²]	38.9	61.7	89.6	165.2
Elastic section modulus	W_{el}	[mm³]	34.3	68.3	119.6	299.5
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	22	45	72	180
Design bending resistance	M	[Nm]	18	36	57	144

Basic performance data

Performance data for single anchor without influence of edge distance and spacing

Size		M8	M10	M12	M16
NON-CRACKED CONCRETE					
Standard embedment depth h_{ef}	[mm]	47.00	59.00	68.00	85.00
Reduced embedment depth h_{ef}	[mm]	32.00	39.00	48.00	65.00
CRACKED CONCRETE					
Standard embedment depth h_{ef}	[mm]	47.00	59.00	68.00	85.00
Reduced embedment depth h_{ef}	[mm]	32.00	39.00	48.00	65.00
MEAN ULTIMATE LOAD					
TENSION LOAD $N_{Ru,m}$					
NON-CRACKED CONCRETE					
Standard embedment depth	[kN]	15.40	22.80	29.20	55.80
Reduced embedment depth	[kN]	10.40	16.00	22.10	37.90
CRACKED CONCRETE					
Standard embedment depth	[kN]	9.70	11.50	18.60	30.40
Reduced embedment depth	[kN]	5.60	9.80	13.40	22.20
SHEAR LOAD $V_{Ru,m}$					
NON-CRACKED CONCRETE					
Standard embedment depth	[kN]	14.00	22.20	29.60	54.50
Reduced embedment depth	[kN]	14.00	19.20	29.60	54.50
CRACKED CONCRETE					
Standard embedment depth	[kN]	14.00	22.20	29.60	54.50
Reduced embedment depth	[kN]	14.00	19.20	29.60	54.50
CHARACTERISTIC LOAD					
TENSION LOAD N_{Rk}					
NON-CRACKED CONCRETE					
Standard embedment depth	[kN]	9.00	16.00	25.00	39.50
Reduced embedment depth	[kN]	7.50	12.00	16.80	26.40
CRACKED CONCRETE					
Standard embedment depth	[kN]	6.00	9.00	12.00	25.00
Reduced embedment depth	[kN]	3.00	7.50	9.00	16.00
SHEAR LOAD V_{Rk}					
NON-CRACKED CONCRETE					
Standard embedment depth	[kN]	11.70	18.50	24.60	45.40
Reduced embedment depth	[kN]	11.70	14.70	24.60	45.40
CRACKED CONCRETE					
Standard embedment depth	[kN]	6.00	9.00	24.00	45.40
Reduced embedment depth	[kN]	3.00	7.50	9.00	32.00

Basic performance data

Design performance data

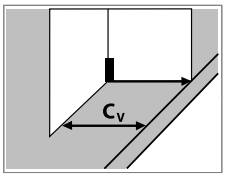
Standard embedment depth

Size			M8	M10	M12	M16
Effective embedment depth	h_{ef}	[mm]	47.00	59.00	68.00	85.00
TENSION LOAD						
STEEL FAILURE						
Characteristic resistance	$N_{Rk,s}$	[kN]	21.20	33.60	44.80	82.60
Design resistance γ_{Ms}= 1.4	$N_{Rd,s}$	[kN]	14.10	22.40	29.90	55.10
PULL-OUT FAILURE; NON-CRACKED CONCRETE C20/25						
Characteristic resistance	$N_{Rk,p}$	[kN]	9.00	16.00	25.00	-
Design resistance γ_{Mp}= 1.8	$N_{Rd,p}$	[kN]	5.00	-	-	-
Design resistance γ_{Mp}= 1.5	$N_{Rd,p}$	[kN]	-	10.70	16.70	-
PULL-OUT FAILURE; CRACKED CONCRETE C20/25						
Characteristic resistance	$N_{Rk,p}$	[kN]	6.00	9.00	12.00	25.00
Design resistance γ_{Mp}= 1.8	$N_{Rd,p}$	[kN]	3.33	-	-	-
Design resistance γ_{Mp}= 1.5	$N_{Rd,p}$	[kN]	-	6.00	8.00	16.70
CONCRETE CONE FAILURE; NON-CRACKED CONCRETE C20/25						
Characteristic resistance	$N_{Rk,c}$	-	-	-	-	39.50
Design resistance γ_{Mc}= 1.5	$N_{Rd,c}$	-	-	-	-	26.30
Increasing factors for $N_{Rd,p}$ - C30/37	Ψ_c	-	1.16	1.26	1.23	1.18
Increasing factors for $N_{Rd,p}$ - C40/50	Ψ_c	-	1.33	1.52	1.45	1.37
Increasing factors for $N_{Rd,p}$ - C50/60	Ψ_c	-	1.50	1.78	1.67	1.55
Spacing	$s_{cr,N}$	[mm]	141.00	177.00	204.00	255.00
Edge distance	$c_{cr,N}$	[mm]	71.00	89.00	102.00	128.00
SHEAR LOAD						
CONCRETE EDGE FAILURE; NON-CRACKED CONCRETE C20/25						
Edge distance	c_1	[mm]	40.00	50.00	55.00	80.00
Characteristic resistance for c_1	$V_{Rk,c}$	[kN]	5.03	7.32	8.81	15.80
Design resistance γ_{Mc}= 1.8	$V_{Rd,c}$	[kN]	2.79	-	-	-
Design resistance γ_{Mc}= 1.5	$V_{Rd,c}$	[kN]	-	4.88	5.87	10.50
CONCRETE EDGE FAILURE; CRACKED CONCRETE C20/25						
Edge distance	c_1	[mm]	40.00	45.00	55.00	70.00
Characteristic resistance for c_1	$V_{Rk,c}$	[kN]	3.56	4.52	6.24	9.41
Design resistance γ_{Mc}= 1.8	$V_{Rd,c}$	[kN]	1.98	-	-	-
Design resistance γ_{Mc}= 1.5	$V_{Rd,c}$	[kN]	-	3.01	4.16	6.27
CONCRETE PRY-OUT FAILURE; NON-CRACKED CONCRETE C20/25						
	k	-	-	-	-	-
Characteristic resistance	$V_{Rk,cp}$	[kN]	-	-	-	-
Design resistance	$V_{Rd,cp}$	[kN]	-	-	-	-
CONCRETE PRY-OUT FAILURE; CRACKED CONCRETE C20/25						
	k	-	1.00	1.00	2.00	2.00
Characteristic resistance	$V_{Rk,cp}$	[kN]	6.00	9.00	24.00	50.00
Design resistance γ_{Mc}= 1.8	$V_{Rd,cp}$	[kN]	3.33	-	-	-
Design resistance γ_{Mc}= 1.5	$V_{Rd,cp}$	[kN]	-	6.00	16.00	33.30
STEEL FAILURE						
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	11.70	18.50	24.60	45.40
Design resistance γ_{Ms}= 1.25	$V_{Rd,s}$	[kN]	9.36	14.80	19.70	36.30

Design performance data

Reduction / increasing resistance factors for edge distance and spacing

Edge distance (shear)

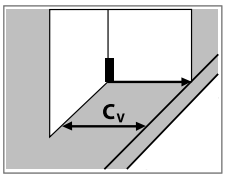


Tables only valid for one edge $>c_{min}$ and $s \geq 3c_v$ For other cases use the Rawlplug Anchor Calculator

Increasing factors for edge distance $>C_{min}$ applicable to $V_{Rd,c}$ for non-cracked concrete from Design Performance table

c_v[mm]	M8		M10		M12		M16	
	$h>1,5c_v$	h_{min}	$h>1,5c_v$	h_{min}	$h>1,5c_v$	h_{min}	$h>1,5c_v$	h_{min}
40	0,43	0,43						
45	0,50	0,50						
50	0,58	0,58	0,40	0,40				
55	0,66	0,66	0,45	0,45	0,36	0,36		
60	0,74	0,74	0,50	0,50	0,40	0,40		
70	0,91	0,89	0,62	0,62	0,49	0,49		
75	1,00	0,95	0,68	0,68	0,54	0,54		
90		1,00	0,87	0,82	0,69	0,69	0,40	0,40
100			1,00	0,90	0,79	0,76	0,46	0,46
120				1,00	1,00	0,89	0,59	0,57
140						1,00	0,72	0,65
160							0,87	0,73
180							1,00	0,81
200								0,88
250								1,00

Edge distance (shear)



Tables only valid for one edge $>c_{min}$ and $s \geq 3c_v$ For other cases use the Rawlplug Anchor Calculator

[English]: Współczynniki zwiększające dla odległości od krawędzi > cmin stosowane dla VRd i Vrec dla betonu spękanego.

c_v[mm]	M8		M10		M12		M16	
	$h>1,5c_v$	h_{min}	$h>1,5c_v$	h_{min}	$h>1,5c_v$	h_{min}	$h>1,5c_v$	h_{min}
40	0,30	0,30						
45	0,36	0,36	0,24	0,24				
50	0,41	0,41	0,28	0,28				
55	0,47	0,47	0,32	0,32	0,25	0,25		
60	0,52	0,52	0,36	0,36	0,28	0,28		
70	0,65	0,63	0,44	0,44	0,35	0,35	0,21	0,21
75	0,71	0,67	0,48	0,48	0,38	0,38	0,23	0,23
90	0,91	0,79	0,61	0,58	0,49	0,49	0,29	0,29
100	1,00	0,86	0,71	0,63	0,56	0,54	0,33	0,33
120		1,00	0,91	0,74	0,71	0,63	0,42	0,41
140			1,00	0,85	0,88	0,72	0,51	0,46
160				0,96	1,00	0,81	0,61	0,52
180				1,00		0,89	0,72	0,57
200						0,98	0,83	0,62
250						1,00	1,00	0,76
300								0,89
350								1,00

Design performance data

Edge distance (tension)

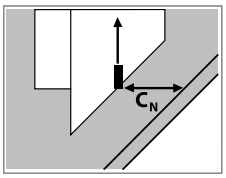


Table only valid for one edge $<C_{cr,N}$ and $S \geq S_{cr,N}$ For other cases use the Rawlplug Anchor Calculator

Reduction factors for edge distance $<C_{cr,N}$ applicable to N_{Rd} or N_{rec} for non-cracked concrete from 'Basic Performance' table

c_N[mm]	M8		M10		M12		M16	
	$h>1,84h_{min}$	h_{min}	$h>1,84h_{min}$	h_{min}	$h>1,84h_{min}$	h_{min}	$h>1,84h_{min}$	h_{min}
40	0,91	0,91						
45	0,97	0,97						
50	1,00	1,00	0,77	0,77				
55			0,82	0,82	0,63	0,63		
60			0,86	0,86	0,66	0,66		
70			0,95	0,95	0,73	0,73		
75			1,00	1,00	0,76	0,76		
90					0,86	0,86	0,72	0,72
100					0,94	0,94	0,77	0,77
120					1,00	1,00	0,88	0,88
140							0,97	0,97
160							1,00	1,00

Edge distance (tension)

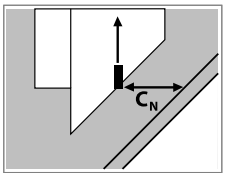


Table only valid for one edge $<C_{cr,N}$ and $S \geq S_{cr,N}$ For other cases use the Rawlplug Anchor Calculator

[English]: Współczynniki redukcyjne dla odległości od krawędzi < ccr,N stosowane dla NRd lub Nrec dla betonu spękanego.

c_N[mm]	M8		M10		M12		M16	
	$h>1,84h_{min}$	h_{min}	$h>1,84h_{min}$	h_{min}	$h>1,84h_{min}$	h_{min}	$h>1,84h_{min}$	h_{min}
40	0,97	0,97						
45	1,00	1,00	0,93	0,93				
50			0,98	0,98				
55			1,00	1,00	0,94	0,94		
60					0,98	0,98		
70					1,00	1,00	0,70	0,70
75							0,73	0,73
90							0,81	0,81
100							0,87	0,87
120							1,00	1,00

Design performance data

Spacing

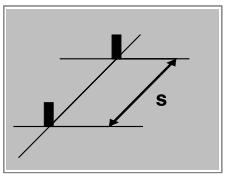


Table only valid for one spacing $<s_{cr,N}$ and $c \geq c_{cr,N}$ For other cases use the Rawlplug Anchor Calculator

[English]: Współczynniki redukcyjne dla rozstawu kotew > smin stosowane dla NRd lub Nrec dla betonu spękanego.

s_N[mm]	M8		M10		M12		M16	
	$h>1,84h_{min}$	h_{min}	$h>1,84h_{min}$	h_{min}	$h>1,84h_{min}$	h_{min}	$h>1,84h_{min}$	h_{min}
55	0,99	0,99						
60	1,00	1,00						
70			1,00	1,00				
75								
90					1,00	1,00		
100								
120								
140							0,81	0,81
160							0,85	0,85
180							0,89	0,89
200							0,93	0,93
250							1,00	1,00

Spacing

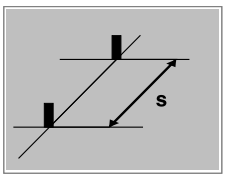


Table only valid for one spacing $<s_{cr,N}$ and $c \geq c_{cr,N}$ For other cases use the Rawlplug Anchor Calculator

[English]: Współczynniki redukcyjne dla rozstawu kotew > smin stosowane dla VRd lub Vrec dla betonu spękanego.

s_v[mm]	M8		M10		M12		M16	
	$h>1,5c_v$	h_{min}	$h>1,5c_v$	h_{min}	$h>1,5c_v$	h_{min}	$h>1,5c_v$	h_{min}
55	0,82	0,80						
60	0,84	0,82						
70	0,87	0,85	0,76	0,72				
75	0,89	0,86	0,77	0,73				
90	0,93	0,91	0,80	0,76	0,74	0,71		
100	0,96	0,94	0,83	0,79	0,76	0,73		
120	1,00	1,00	0,87	0,83	0,80	0,76		
140			0,92	0,87	0,84	0,80	0,62	0,58
160			0,96	0,92	0,87	0,84	0,64	0,61
180			1,00	0,96	0,91	0,87	0,67	0,63
200				1,00	0,95	0,91	0,69	0,65
250					1,00	1,00	0,75	0,71
300							0,81	0,76
350							0,87	0,82
400							0,93	0,87
450							0,99	0,93
500							1,00	0,99

Design performance data

Spacing

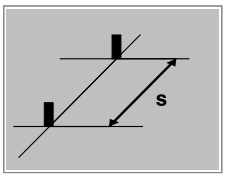


Table only valid for one spacing $<s_{cr,N}$ and $c \geq c_{cr,N}$ For other cases use the Rawlplug Anchor Calculator

[English]: Współczynniki redukcyjne dla rozstawu kotew > smin stosowane dla NRd lub Nrec dla betonu niespękanego.

s_N[mm]	M8		M10		M12		M16	
	$h>1,84h_{min}$	h_{min}	$h>1,84h_{min}$	h_{min}	$h>1,84h_{min}$	h_{min}	$h>1,84h_{min}$	h_{min}
55	0,92	0,92						
60	0,95	0,95						
70	0,99	0,99	0,79	0,79				
75	1,00	1,00	0,81	0,81				
90			0,86	0,86	0,69	0,69		
100			0,89	0,89	0,71	0,71		
120			0,95	0,95	0,76	0,76		
140			1,00	1,00	0,80	0,80	0,72	0,72
160					0,85	0,85	0,75	0,75
180					0,90	0,90	0,79	0,79
200					0,94	0,94	0,83	0,83
250					1,00	1,00	0,92	0,92
300							1,00	1,00

Spacing

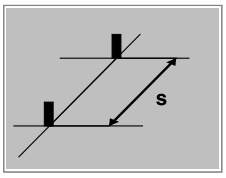


Table only valid for one spacing $<s_{cr,N}$ and $c \geq c_{cr,N}$ For other cases use the Rawlplug Anchor Calculator

[English]: Współczynniki redukcyjne dla rozstawu kotew > smin stosowane dla VRd lub Vrec dla betonu niespękanego.

s_V[mm]	M8		M10		M12		M16	
	$h>1,5c_v$	h_{min}	$h>1,5c_v$	h_{min}	$h>1,5c_v$	h_{min}	$h>1,5c_v$	h_{min}
55	1,00	1,00						
70			1,00	1,00				
90					1,00	1,00		
140							0,87	0,82
160							0,91	0,86
180							0,94	0,89
200							0,97	0,92
250							1,00	1,00

Design performance data

Resistance to tension and shear loads under fire exposure - Standard embedment depth

Size			M8	M10	M12	M16
R (for EI) = 30 min						
TENSION LOAD						
STEEL FAILURE						
Characteristic resistance	$N_{Rk,s}$	[kN]	0.70	1.50	2.50	4.70
PULL-OUT FAILURE						
Characteristic resistance	$N_{Rk,p}$	[kN]	1.50	2.30	3.00	6.30
CONCRETE CONE FAILURE						
Characteristic resistance	$N_{Rk,c}$	[kN]	2.70	4.80	6.90	12.00
SHEAR LOAD						
STEEL FAILURE						
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	0.70	1.50	2.50	4.70
Characteristic resistance with lever arm	$M_{Rk,s}$	[kN]	0.70	1.90	3.90	10.00
R (for EI) = 60 min						
TENSION LOAD						
STEEL FAILURE						
Characteristic resistance	$N_{Rk,s}$	[kN]	0.60	1.20	2.10	3.90
PULL-OUT FAILURE						
Characteristic resistance	$N_{Rk,p}$	[kN]	1.50	2.30	3.00	6.30
CONCRETE CONE FAILURE						
Characteristic resistance	$N_{Rk,c}$	[kN]	2.70	4.80	6.90	12.00
SHEAR LOAD						
STEEL FAILURE						
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	0.60	1.20	2.10	3.90
Characteristic resistance with lever arm	$M_{Rk,s}$	[kN]	0.60	1.50	3.30	8.30
R (for EI) = 90 min						
TENSION LOAD						
STEEL FAILURE						
Characteristic resistance	$N_{Rk,s}$	[kN]	0.40	0.90	1.70	3.10
PULL-OUT FAILURE						
Characteristic resistance	$N_{Rk,p}$	[kN]	1.50	2.30	3.00	6.30
CONCRETE CONE FAILURE						
Characteristic resistance	$N_{Rk,c}$	[kN]	2.70	4.80	6.90	12.00
SHEAR LOAD						
STEEL FAILURE						
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	0.40	0.90	1.70	3.10
Characteristic resistance with lever arm	$M_{Rk,s}$	[kN]	0.40	1.20	2.60	6.70
R (for EI) = 120 min						
TENSION LOAD						
STEEL FAILURE						
Characteristic resistance	$N_{Rk,s}$	[kN]	0.40	0.80	1.30	2.50
PULL-OUT FAILURE						
Characteristic resistance	$N_{Rk,p}$	[kN]	1.20	1.80	2.40	5.00
CONCRETE CONE FAILURE						
Characteristic resistance	$N_{Rk,c}$	[kN]	2.20	3.90	5.50	9.60
SHEAR LOAD						
STEEL FAILURE						
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	0.40	0.80	1.30	2.50
Characteristic resistance with lever arm	$M_{Rk,s}$	[kN]	0.40	1.00	2.10	5.30

Design performance data

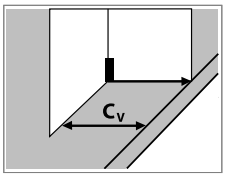
Reduced embedment depth

Size			M8	M10	M12	M16
Effective embedment depth	h_{ef}	[mm]	32.00	39.00	48.00	65.00
TENSION LOAD						
STEEL FAILURE						
Characteristic resistance	$N_{Rk,s}$	[kN]	21.20	33.60	44.80	82.60
Design resistance γ_{Ms}= 1.4	$N_{Rd,s}$	[kN]	14.10	22.40	29.90	55.10
PULL-OUT FAILURE; NON-CRACKED CONCRETE C20/25						
Characteristic resistance	$N_{Rk,p}$	[kN]	7.50	12.00	-	-
Design resistance γ_{Mp}= 1.8	$N_{Rd,p}$	[kN]	4.17	-	-	-
Design resistance γ_{Mp}= 1.5	$N_{Rd,p}$	[kN]	-	6.67	-	-
PULL-OUT FAILURE; CRACKED CONCRETE C20/25						
Characteristic resistance	$N_{Rk,p}$	[kN]	3.00	7.50	9.00	16.00
Design resistance γ_{Mp}= 1.8	$N_{Rd,p}$	[kN]	1.67	-	-	-
Design resistance γ_{Mp}= 1.5	$N_{Rd,p}$	[kN]	-	4.17	6.00	10.70
CONCRETE CONE FAILURE; NON-CRACKED CONCRETE C20/25						
Characteristic resistance	$N_{Rk,c}$	-	-	-	16.80	26.40
Design resistance γ_{Mc}= 1.5	$N_{Rd,c}$	-	-	-	11.20	17.60
Increasing factors for $N_{Rd,p}$ - C30/37	Ψ_c	-	1.07	1.07	1.16	1.18
Increasing factors for $N_{Rd,p}$ - C40/50	Ψ_c	-	1.13	1.13	1.32	1.37
Increasing factors for $N_{Rd,p}$ - C50/60	Ψ_c	-	1.20	1.20	1.49	1.55
Spacing	$s_{cr,N}$	[mm]	96.00	117.00	144.00	195.00
Edge distance	$c_{cr,N}$	[mm]	48.00	59.00	72.00	98.00
SHEAR LOAD						
CONCRETE EDGE FAILURE; NON-CRACKED CONCRETE C20/25						
Edge distance	c_1	[mm]	50.00	70.00	95.00	100.00
Characteristic resistance for c_1	$V_{Rk,c}$	[kN]	6.37	10.70	17.10	20.00
Design resistance γ_{Mc}= 1.8	$V_{Rd,c}$	[kN]	3.54	-	-	-
Design resistance γ_{Mc}= 1.5	$V_{Rd,c}$	[kN]	-	5.94	11.40	13.40
CONCRETE EDGE FAILURE; CRACKED CONCRETE C20/25						
Edge distance	c_1	[mm]	40.00	50.00	70.00	85.00
Characteristic resistance for c_1	$V_{Rk,c}$	[kN]	3.33	4.80	8.03	11.50
Design resistance γ_{Mc}= 1.8	$V_{Rd,c}$	[kN]	1.85	-	-	-
Design resistance γ_{Mc}= 1.5	$V_{Rd,c}$	[kN]	-	2.67	5.35	7.63
CONCRETE PRY-OUT FAILURE; NON-CRACKED CONCRETE C20/25						
	k	-	-	1.00	-	-
Characteristic resistance	$V_{Rk,cp}$	-	-	14.70	-	-
Design resistance γ_{Mc}= 1.5	$V_{Rd,cp}$	-	-	8.17	-	-
CONCRETE PRY-OUT FAILURE; CRACKED CONCRETE C20/25						
	k	-	1.00	1.00	1.00	2.00
Characteristic resistance	$V_{Rk,cp}$	[kN]	3.00	7.50	9.00	32.00
Design resistance γ_{Mc}= 1.8	$V_{Rd,cp}$	[kN]	1.67	-	-	-
Design resistance γ_{Mc}= 1.5	$V_{Rd,cp}$	[kN]	-	4.17	6.00	21.30
STEEL FAILURE						
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	11.70	18.50	24.60	45.40
Design resistance γ_{Ms}= 1.25	$V_{Rd,s}$	[kN]	9.36	14.80	19.70	36.30

Design performance data

Reduction / increasing resistance factors for edge distance and spacing

Edge distance (shear)

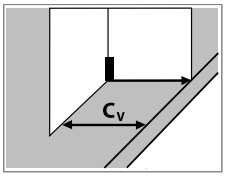


Tables only valid for one edge $>c_{min}$ and $s \geq 3c_V$ For other cases use the Rawlplug Anchor Calculator

Increasing factors for edge distance $>C_{min}$ applicable to $V_{Rd,c}$ for non-cracked concrete from Design Performance table

c_v[mm]	M8		M10		M12		M16	
	$h>1,5c_v$	h_{min}	$h>1,5c_v$	h_{min}	$h>1,5c_v$	h_{min}	$h>1,5c_v$	h_{min}
50	0,54	0,54						
55	0,62	0,62						
60	0,70	0,70						
70	0,87	0,84	0,74	0,72				
75	0,95	0,90	0,81	0,77				
90	1,00	1,00	0,90	0,90				
100			0,97	0,97	0,75	0,61	0,44	0,44
120			1,09	1,09	0,96	0,71	0,56	0,56
140			1,21	1,21	1,00	0,82	0,69	0,69
160			1,28	1,28		0,92	0,83	0,83
180						1,00	0,98	0,98
200							1,00	1,00

Edge distance (shear)



Tables only valid for one edge $>c_{min}$ and $s \geq 3c_V$ For other cases use the Rawlplug Anchor Calculator

[English]: Współczynniki zwiększające dla odległości od krawędzi > cmin stosowane dla VRd i Vrec dla betonu spękanego.

c_v[mm]	M8		M10		M12		M16	
	$h>1,5c_v$	h_{min}	$h>1,5c_v$	h_{min}	$h>1,5c_v$	h_{min}	$h>1,5c_v$	h_{min}
40	0,28	0,28						
45	0,33	0,33						
50	0,39	0,39	0,53	0,53				
55	0,44	0,44	0,61	0,61				
60	0,50	0,50	0,68	0,68				
70	0,61	0,60	0,84	0,82	0,33	0,32		
75	0,67	0,64	0,93	0,87	0,36	0,34		
90	0,87	0,75	1,03	1,02	0,46	0,39	0,27	0,27
100	1,00	0,82	1,10	1,10	0,53	0,43	0,31	0,29
120		0,97	1,24	1,24	0,68	0,51	0,40	0,34
140		1,00	1,38	1,38	0,84	0,58	0,49	0,39
160			1,52	1,52	1,00	0,65	0,59	0,43
180			1,66	1,66		0,72	0,69	0,48
200			1,80	1,80		0,79	0,80	0,53
250			2,06	2,06		0,97	1,00	0,64
300						1,00		0,75
350								0,86
400								0,97
450								1,00

Design performance data

Edge distance (tension)

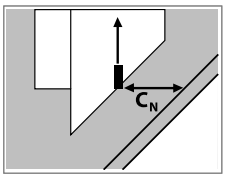


Table only valid for one edge $<C_{cr,N}$ and $S \geq S_{cr,N}$ For other cases use the Rawlplug Anchor Calculator

Reduction factors for edge distance $<C_{cr,N}$ applicable to N_{Rd} or N_{rec} for non-cracked concrete from 'Basic Performance' table

c_N[mm]	M8		M10		M12		M16	
	$h>1,84h_{min}$	h_{min}	$h>1,84h_{min}$	h_{min}	$h>1,84h_{min}$	h_{min}	$h>1,84h_{min}$	h_{min}
50	0,82	0,82						
55	0,86	0,86						
60	0,91	0,91						
70	0,99	0,99	0,78	0,78				
75	1,00	1,00	0,81	0,81				
90			0,90	0,90				
100			0,97	0,97	0,88	0,88	0,84	0,84
120			1,00	1,00	0,99	0,99	0,92	0,92
140					1,00	1,00	1,00	1,00

Edge distance (tension)

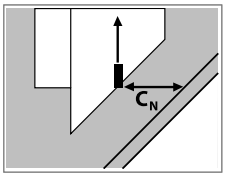


Table only valid for one edge $<C_{cr,N}$ and $S \geq S_{cr,N}$ For other cases use the Rawlplug Anchor Calculator

[English]: Współczynniki redukcyjne dla odległości od krawędzi < ccr,N stosowane dla NRd lub Nrec dla betonu spękanego.

c_N[mm]	M8		M10		M12		M16	
	$h>1,84h_{min}$	h_{min}	$h>1,84h_{min}$	h_{min}	$h>1,84h_{min}$	h_{min}	$h>1,84h_{min}$	h_{min}
40	1,00	1,00						
45								
50			0,72	0,72				
55			0,77	0,77				
60			0,82	0,82				
70			0,89	0,89	0,96	0,96		
75			0,93	0,93	1,00	1,00		
90			1,00	1,00			0,91	0,91
100							0,99	0,99
120							1,00	1,00

Design performance data

Spacing

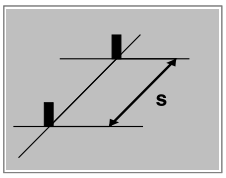


Table only valid for one spacing $<s_{cr,N}$ and $c \geq c_{cr,N}$ For other cases use the Rawlplug Anchor Calculator

[English]: Współczynniki redukcyjne dla rozstawu kotew > smin stosowane dla NRd lub Nrec dla betonu niespękanego.

s_N[mm]	M8		M10		M12		M16	
	$h>1,84h_{min}$	h_{min}	$h>1,84h_{min}$	h_{min}	$h>1,84h_{min}$	h_{min}	$h>1,84h_{min}$	h_{min}
50	0,61	0,61						
55	0,63	0,63						
60	0,65	0,65						
70	0,70	0,70	0,57	0,57				
75	0,72	0,72	0,58	0,58				
90	0,78	0,78	0,63	0,63				
100	0,82	0,82	0,66	0,66				
120	0,91	0,91	0,72	0,72	0,68	0,68		
140	0,99	0,99	0,78	0,78	0,73	0,73		
160	1,00	1,00	0,84	0,84	0,78	0,78	0,75	0,75
180			0,90	0,90	0,83	0,83	0,79	0,79
200			0,97	0,97	0,88	0,88	0,84	0,84
250			1,00	1,00	1,00	1,00	0,94	0,94
300							1,00	1,00

Spacing

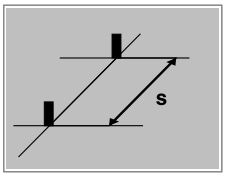


Table only valid for one spacing $<s_{cr,N}$ and $c \geq c_{cr,N}$ For other cases use the Rawlplug Anchor Calculator

[English]: Współczynniki redukcyjne dla rozstawu kotew > smin stosowane dla VRd lub Vrec dla betonu niespękanego.

s_V[mm]	M8		M10		M12		M16	
	$h>1,5c_v$	h_{min}	$h>1,5c_v$	h_{min}	$h>1,5c_v$	h_{min}	$h>1,5c_v$	h_{min}
50	0,69	0,69						
55	0,71	0,71						
60	0,73	0,73						
70	0,77	0,77	0,57	0,57				
75	0,78	0,78	0,58	0,58				
90	0,84	0,84	0,63	0,63				
100	0,87	0,87	0,66	0,66				
120	0,94	0,94	0,72	0,72	0,74	0,72		
140	1,00	1,00	0,78	0,78	0,79	0,76		
160			0,84	0,84	0,83	0,80	0,66	0,66
180			0,90	0,90	0,88	0,84	0,69	0,69
200			0,97	0,97	0,92	0,89	0,72	0,72
250			1,12	1,12	1,00	0,99	0,79	0,79
300			1,27	1,27		1,00	0,86	0,86
350			1,28	1,28			0,94	0,94
400							1,00	1,00

Design performance data

Spacing

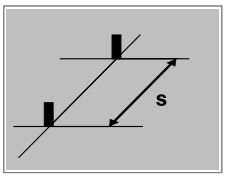
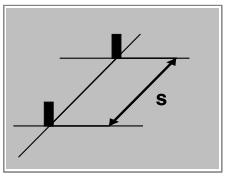


Table only valid for one spacing <$s_{cr,N}$ and c ≥ $c_{cr,N}$ For other cases use the Rawlplug Anchor Calculator

[English]: Współczynniki redukcyjne dla rozstawu kotew > smin stosowane dla NRd lub Nrec dla betonu spękanego.

s_N[mm]	M8		M10		M12		M16	
	h>1,84h_{min}	h_{min}	h>1,84h_{min}	h_{min}	h>1,84h_{min}	h_{min}	h>1,84h_{min}	h_{min}
50	1,00	1,00						
55								
60								
70			0,65	0,65				
75			0,67	0,67				
90			0,72	0,72				
100			0,75	0,75				
120			0,82	0,82	0,90	0,90		
140			0,89	0,89	0,97	0,97		
160			0,96	0,96	1,00	1,00	0,89	0,89
180			1,00	1,00			0,94	0,94
200							0,99	0,99
250							1,00	1,00

Spacing



[English]: Tabela ważna tylko dla jednego rozstawu kotew < scr,N i c ≥ ccr,N W innym wypadku skorzystać z programu obliczeniowego Rawlplug EasyFix - Anchor Calculator.

[English]: Współczynniki redukcyjne dla rozstawu kotew > smin stosowane dla VRd lub Vrec dla betonu spękanego.

s_V[mm]	M8		M10		M12		M16	
	h>1,5c_v	h_{min}	h>1,5c_v	h_{min}	h>1,5c_v	h_{min}	h>1,5c_v	h_{min}
50	0,49	0,49						
55	0,50	0,50						
60	0,52	0,52						
70	0,54	0,54	0,65	0,65				
75	0,55	0,55	0,67	0,67				
90	0,59	0,59	0,72	0,72				
100	0,62	0,62	0,75	0,75				
120	0,67	0,67	0,82	0,82	0,53	0,51		
140	0,72	0,72	0,89	0,89	0,56	0,54		
160	0,77	0,77	0,96	0,96	0,59	0,57	0,47	0,44
180	0,82	0,82	1,03	1,03	0,62	0,60	0,49	0,46
200	0,87	0,87	1,10	1,10	0,65	0,63	0,51	0,48
250	1,00	1,00	1,27	1,27	0,73	0,70	0,56	0,53
300			1,45	1,45	0,81	0,78	0,61	0,58
350			1,62	1,62	0,89	0,85	0,66	0,63
400			1,80	1,80	0,97	0,93	0,72	0,67
450			1,97	1,97	1,00	1,00	0,77	0,72
500			2,06	2,06			0,82	0,77
550							0,87	0,82
600							0,92	0,87
700							1,00	0,97

Design performance data

Resistance to tension and shear loads under fire exposure - Reduced embedment depth

Size			M8	M10	M12	M16
R (for EI) = 30 min						
TENSION LOAD						
STEEL FAILURE						
Characteristic resistance	$N_{Rk,s}$	[kN]	0.70	1.50	2.50	4.70
PULL-OUT FAILURE						
Characteristic resistance	$N_{Rk,p}$	[kN]	0.80	1.90	2.30	4.00
CONCRETE CONE FAILURE						
Characteristic resistance	$N_{Rk,c}$	[kN]	1.00	1.70	2.90	6.10
SHEAR LOAD						
STEEL FAILURE						
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	0.70	1.50	2.50	4.70
Characteristic resistance with lever arm	$M_{Rk,s}$	[kN]	0.70	1.90	3.90	10.00
R (for EI) = 60 min						
TENSION LOAD						
STEEL FAILURE						
Characteristic resistance	$N_{Rk,s}$	[kN]	0.60	1.20	2.10	3.90
PULL-OUT FAILURE						
Characteristic resistance	$N_{Rk,p}$	[kN]	0.80	1.90	2.30	4.00
CONCRETE CONE FAILURE						
Characteristic resistance	$N_{Rk,c}$	[kN]	1.00	1.70	2.90	6.10
SHEAR LOAD						
STEEL FAILURE						
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	0.60	1.20	2.10	3.90
Characteristic resistance with lever arm	$M_{Rk,s}$	[kN]	0.60	1.50	3.30	8.30
R (for EI) = 90 min						
TENSION LOAD						
STEEL FAILURE						
Characteristic resistance	$N_{Rk,s}$	[kN]	0.40	0.90	1.70	3.10
PULL-OUT FAILURE						
Characteristic resistance	$N_{Rk,p}$	[kN]	0.80	1.90	2.30	4.00
CONCRETE CONE FAILURE						
Characteristic resistance	$N_{Rk,c}$	[kN]	1.00	1.70	2.90	6.10
SHEAR LOAD						
STEEL FAILURE						
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	0.40	0.90	1.70	3.10
Characteristic resistance with lever arm	$M_{Rk,s}$	[kN]	0.40	1.20	2.60	6.70
R (for EI) = 120 min						
TENSION LOAD						
STEEL FAILURE						
Characteristic resistance	$N_{Rk,s}$	[kN]	0.40	0.80	1.30	2.50
PULL-OUT FAILURE						
Characteristic resistance	$N_{Rk,p}$	[kN]	0.60	1.50	1.80	3.20
CONCRETE CONE FAILURE						
Characteristic resistance	$N_{Rk,c}$	[kN]	0.80	1.40	2.30	4.90
SHEAR LOAD						
STEEL FAILURE						
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	0.40	0.80	1.30	2.50
Characteristic resistance with lever arm	$M_{Rk,s}$	[kN]	0.40	1.00	2.10	5.30

Product commercial data

Size	Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Codes
		Diameter [mm]	Length [mm]	Box	Outer	Pallet	Box	Outer	Pallet	
M8	R-HPTIIA4-08060/10 [1]	8	60	100	100	16000	2.6	2.6	441.0	5906675046419
	R-HPTIIA4-08075/10 [1]	8	75	100	100	16000	3.1	3.1	519.6	5906675046426
	R-HPTIIA4-08085/20 [1]	8	85	100	100	16000	3.3	3.3	563.6	5906675046433
	R-HPTIIA4-08095/30 [1]	8	95	100	100	12000	3.3	3.3	426.0	5906675046440
	R-HPTIIA4-08105/40 [1]	8	105	50	50	16000	2.2	2.2	734.0	5906675046457
	R-HPTIIA4-08115/50 [1]	8	115	100	100	16000	4.3	4.3	717.0	5906675046464
M10	R-HPTIIA4-10065/5 [1]	10	65	50	50	8000	2.4	2.4	409.0	5906675046471
	R-HPTIIA4-10080/20 [1]	10	80	50	50	8000	2.8	2.8	469.7	5906675046488
	R-HPTIIA4-10095/15 [1]	10	95	50	50	8000	3.1	3.1	529.7	5906675046495
	R-HPTIIA4-10115/35 [1]	10	115	50	50	6000	3.7	3.7	468.1	5906675046501
	R-HPTIIA4-10130/50 [1]	10	130	50	50	6000	4.0	4.0	508.3	5906675046518
	R-HPTIIA4-10140/60 [1]	10	140	50	50	8000	4.2	4.2	707.0	5906675046532
M12	R-HPTIIA4-12080/5 [1]	12	80	50	50	8000	4.1	4.1	688.7	5906675046549
	R-HPTIIA4-12100/5 [1]	12	100	50	50	8000	4.8	4.8	797.4	5906675046556
	R-HPTIIA4-12125/30 [1]	12	125	50	50	6000	5.8	5.8	721.9	5906675046563
	R-HPTIIA4-12150/55 [1]	12	150	50	50	4000	6.7	6.7	561.6	5906675046570
	R-HPTIIA4-12180/85 [1]	12	180	50	50	4000	7.8	7.8	651.3	5906675046587
M16	R-HPTIIA4-16125/5 [1]	16	125	25	25	4000	5.4	5.4	888.2	5906675046594
	R-HPTIIA4-16140/20 [1]	16	140	25	25	4000	5.8	5.8	957.4	5906675034898
	R-HPTIIA4-16150/30 [1]	16	150	25	25	4000	6.1	6.1	1006.5	5906675046600
	R-HPTIIA4-16180/60 [1]	16	180	25	25	3000	7.2	7.2	888.7	5906675046617

[1] ETA 17/0185