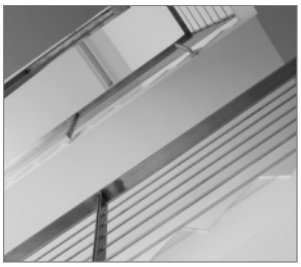
R-SPL SafetyPlus - Loose Bolt

High performance mechanical anchor - loose bolt option



Approvals and Reports

- ETA-11/0126

Product information

Features and benefits

- Design of SafetyPlus allows for easy through fixing
- Integral controlled collapse and anti-rotation feature ensures fixture is firmly secured
- Unique zig-zag feature provides balanced expansion, ensuring secure setting and maximised load-bearing capacity
- Case-hardened nut with optimum taper angle for enhanced expansion

Applications

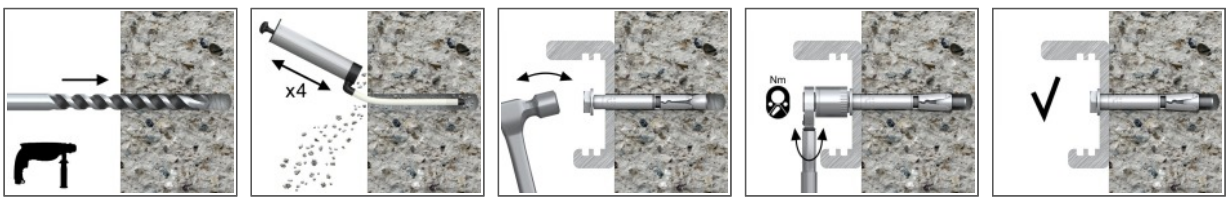
- Structural steel
- Masonry support
- Cladding restraints
- Road Signs
- Heavy machinery
- Racking systems
- Industrial doors
- Safety barriers

Base materials

Approved for use in:

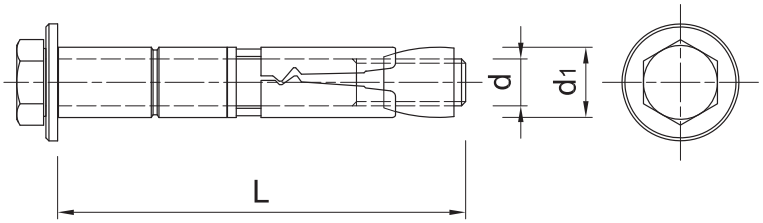
- Non-cracked concrete C20/25-C50/60
- Reinforced concrete
- Concrete

Installation guide



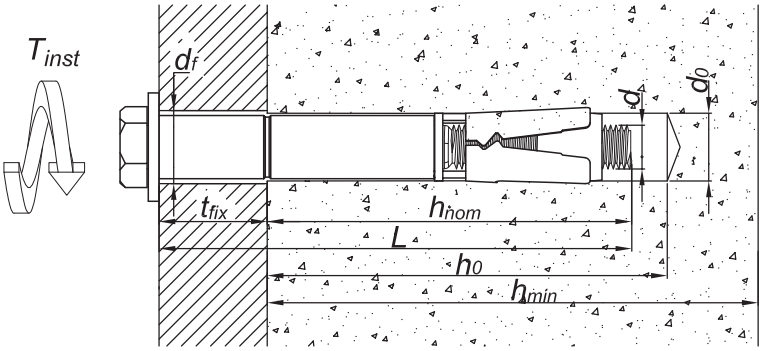
1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blowpump or equivalent method)
3. Insert anchor through fixture into hole and tap until required installation depth is achieved
4. Tighten to the recommended torque

Product information



Size	Product Code	Anchor			Fixture	
		Thread size	External diameter	Length	Max. thickness	Hole diameter
		d	d_{nom}	L	t_{fix}	d_f
		[mm]	[mm]	[mm]	[mm]	[mm]
M8	R-SPL-08090/15	8	12	90	15	14
	R-SPL-08110/40	8	12	110	40	14
M10	R-SPL-10105/20	10	15	105	20	17
	R-SPL-10120/40	10	15	120	40	17
	R-SPL-10140/60	10	15	140	60	17
M12	R-SPL-12120/25	12	18	120	25	20
	R-SPL-12150/50	12	18	150	25	20
M16	R-SPL-16145/25	16	24	145	25	26
	R-SPL-16170/50	16	24	170	50	26
M20	R-SPL-20175/30	20	28	175	30	30

Installation data



Size			M8	M10	M12	M16	M20
Thread diameter	d	[mm]	8	10	12	16	20
Hole diameter in substrate	d_0	[mm]	12	15	18	24	28
Min. hole depth in substrate	h_0	[mm]	85	95	105	130	160
Installation torque	T_{inst}	[Nm]	25	50	80	180	275
Wrench size	Sw	[mm]	13	17	19	24	30
Installation depth	h_{nom}	[mm]	70	80	90	110	130
Min. substrate thickness	h_{min}	[mm]	100	105	120	150	188
Min. spacing	s_{min}	[mm]	60	70	80	100	125
Min. edge distance	c_{min}	[mm]	90	105	120	150	186

Mechanical properties

Size			M8	M10	M12	M16	M20
Nominal ultimate tensile strength - tension	f_{uk}	[N/mm²]	800	800	800	800	800
Nominal yield strength - tension	f_{yk}	[N/mm²]	640	640	640	640	640
Cross sectional area - tension	A_s	[mm²]	36.6	58	84.3	157	245
Elastic section modulus	W_{el}	[mm³]	50.3	98.2	169.7	402.1	785.4
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	45.04	87.97	152.01	365.97	728.54
Design bending resistance	M	[Nm]	36.03	70.38	121.61	292.78	592.83

Basic performance data

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

Size		M8	M10	M12	M16	M20
Effective embedment depth h_{ef}	[mm]	60.00	70.00	80.00	100.00	125.00
MEAN ULTIMATE LOAD						
TENSION LOAD $N_{Ru,m}$	[kN]	15.70	19.70	28.20	60.10	66.80
SHEAR LOAD $V_{Ru,m}$	[kN]	25.08	35.04	57.61	98.15	88.42
CHARACTERISTIC LOAD						
TENSION LOAD N_{Rk}	[kN]	9.00	12.00	16.00	35.00	40.00
SHEAR LOAD V_{Rk}	[kN]	18.00	24.00	32.00	70.00	73.68
DESIGN LOAD						
TENSION LOAD N_{Rd}	[kN]	4.29	5.71	7.62	16.67	19.05
SHEAR LOAD V_{Rd}	[kN]	8.57	11.43	15.24	33.33	38.10
RECOMMENDED LOAD						
TENSION LOAD N_{rec}	[kN]	3.06	4.08	5.44	11.90	13.61
SHEAR LOAD V_{rec}	[kN]	6.12	8.16	10.89	23.81	27.21

Design performance data

Data based on ETA-11/0126 Option 7

Size			M8	M10	M12	M16	M20
Effective embedment depth	h_{ef}	[mm]	60.00	70.00	80.00	100.00	125.00
TENSION LOAD							
STEEL FAILURE							
Characteristic resistance	$N_{Rk,s}$	[kN]	29.30	46.40	57.40	125.60	196.00
Design resistance γ_{Ms}= 1.5	$V_{Rd,s}$	[kN]	19.53	30.93	38.27	83.73	130.67
PULL-OUT FAILURE; NON-CRACKED CONCRETE C20/25							
Characteristic resistance	$N_{Rk,p}$	[kN]	9.00	12.00	16.00	35.00	40.00
Design resistance γ_{Mp}= 2.1	$N_{Rd,p}$	[kN]	4.29	5.71	7.62	16.67	19.05
Spacing	$s_{cr,N}$	[mm]	180.00	210.00	240.00	300.00	375.00
Edge distance	$c_{cr,N}$	-	90.00	105.00	120.00	150.00	188.00
SHEAR LOAD							
CONCRETE EDGE FAILURE; NON-CRACKED CONCRETE C20/25							
Edge distance	c_1	[mm]	90.00	105.00	120.00	150.00	186.00
Characteristic resistance for c_1	$V_{Rk,c}$	[kN]	16.50	21.48	26.96	39.32	55.68
Design resistance γ_{Mc}= 2.1	$V_{Rd,c}$	[kN]	7.86	10.23	12.84	18.72	26.51
CONCRETE PRY-OUT FAILURE; NON-CRACKED CONCRETE C20/25							
	k	-	2.00	2.00	2.00	2.00	2.00
Characteristic resistance	$V_{Rk,cp}$	[kN]	18.00	24.00	32.00	70.00	80.00
Design resistance γ_{Mc}= 2.1	$V_{Rd,cp}$	[kN]	8.57	11.43	15.24	33.33	38.10
STEEL FAILURE							
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	19.20	30.00	43.20	77.60	73.68
Design resistance γ_{Ms}= 1.25	$V_{Rd,s}$	[kN]	15.36	24.00	34.56	62.08	58.94

Design performance data

Reduction / increasing resistance factors for edge distance and spacing

Edge distance (tension)

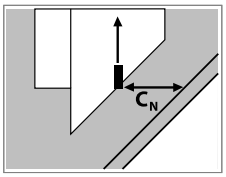
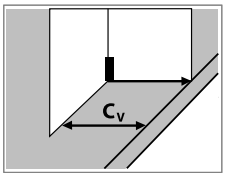


Table only valid for one edge $<C_{cr,N}$ and $S \geq S_{cr,N}$ For other cases use the Rawlplug Anchor Calculator

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	M8		M10		M12		M16		M20	
[mm]	$h \geq 1.84h_{min}$	h_{min}	$h \geq 1.84h_{min}$	h_{min}	$h \geq 1.84h_{min}$	h_{min}	$h \geq 1.84h_{min}$	h_{min}	$h \geq 1.84h_{min}$	h_{min}
90	1,00	1,00								
105			1,00	1,00						
120					1,00	1,00				
150							1,00	1,00		
190									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

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

C_V	M8		M10		M12		M16		M20	
[mm]	$h \geq 1.5c_V$	h_{min}	$h \geq 1.5c_V$	h_{min}	$h \geq 1.5c_V$	h_{min}	$h \geq 1.5c_V$	h_{min}	$h \geq 1.5c_V$	h_{min}
90	1,00	0,86								
95	1,08	0,90								
100		0,94								
105		0,98	1,00	0,82						
115		1,06	1,12	0,88						
120				0,91	1,00	0,82				
135				1,01	1,17	0,90				
150				1,10		0,98	1,00	0,82		
180						1,15	1,27	0,95		
190							1,36	0,99	1,00	0,83
200							1,46	1,03	1,00	0,87
230							1,79	1,16	1,32	0,97
245								1,22	1,43	1,02
300								1,45		1,21
360								1,70		1,41
370								1,74		

Design performance data

Spacing

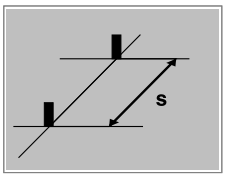


Table only valid for one spacing $<s_{cr,N}$ and $c \geq c_{cr,N}$ For other cases use the Rawlplug Anchor Calculator

Reduction factors for spacing $<S_{cr,N}$ applicable to N_{Rd} / V_{Rd} or N_{rec} / V_{rec} for non-cracked concrete from 'Basic Performance' table

C_N	M8		M10		M12		M16		M20	
[mm]	$h \geq 1.84h_{min}$	h_{min}	$h \geq 1.84h_{min}$	h_{min}	$h \geq 1.84h_{min}$	h_{min}	$h \geq 1.84h_{min}$	h_{min}	$h \geq 1.84h_{min}$	h_{min}
60	0,67	0,67								
70	0,69	0,69	0,67	0,67						
80	0,72	0,72	0,69	0,69	0,67	0,67				
90	0,75	0,75	0,71	0,71	0,69	0,69				
100	0,78	0,78	0,74	0,74	0,71	0,71	0,67	0,67		
120	0,83	0,83	0,79	0,79	0,75	0,75	0,7	0,7		
125	0,85	0,85	0,8	0,8	0,76	0,76	0,71	0,71	0,67	0,67
150	0,92	0,92	0,86	0,86	0,81	0,81	0,75	0,75	0,7	0,7
160	0,94	0,94	0,88	0,88	0,83	0,83	0,77	0,77	0,71	0,71
180	1,0	1,0	0,93	0,93	0,88	0,88	0,8	0,8	0,74	0,74
200			0,98	0,98	0,92	0,92	0,83	0,83	0,77	0,77
210			1,0	1,0	0,94	0,94	0,85	0,85	0,78	0,78
220					0,96	0,96	0,87	0,87	0,79	0,79
240					1,0	1,0	0,9	0,9	0,82	0,82
250							0,92	0,92	0,83	0,83
300							1,0	1,0	0,9	0,9
375									1,0	1,0

Product commercial data

Size	Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Codes
		Thread size [mm]	Length [mm]	Box	Outer	Pallet	Box	Outer	Pallet	
M8	R-SPL-08090/15[1)]	8	90	50	50	8000	3.8	3.8	638.0	5010445500107
	R-SPL-08110/40[1)]	8	110	50	50	8000	4.6	4.6	770.8	5010445500152
M10	R-SPL-10105/20[1)]	10	105	50	50	8000	6.6	6.6	1089.2	5010445500206
	R-SPL-10120/40[1)]	10	120	50	50	6000	7.9	7.9	976.2	5010445500251
	R-SPL-10140/60[1)]	10	140	50	50	4000	9.0	9.0	752.0	5010445500305
M12	R-SPL-12120/25[1)]	12	120	25	25	4000	5.8	5.8	956.4	5010445500350
	R-SPL-12150/50[1)]	12	150	25	25	3000	7.0	7.0	870.6	5010445500404
M16	R-SPL-16145/25[1)]	16	145	10	10	1600	4.8	4.8	801.4	5010445500503
	R-SPL-16170/50[1)]	16	170	10	10	1200	5.6	5.6	700.3	5010445500558
M20	R-SPL-20175/30[1)]	20	175	10	10	1200	8.4	8.4	1033.4	5010445500657

[1)] ETA-11/0126