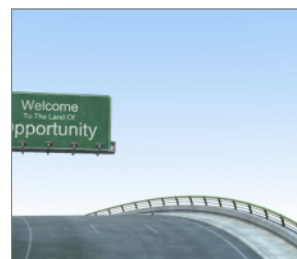


# R-SPL-II-L SafetyPlus Loose Bolt

High performance mechanical anchor - loose bolt option



## Approvals and Reports

- ETA-14/0345



## Product information

### Features and benefits

- Mechanical anchor for highest tension and shear loads
- Seismic category C2 for Structural applications. Seismic category C1 for non-structural use in areas with low seismic risk.
- For usage with required fire resistance
- Option 1 ETA for Cracked and Non-Cracked Concrete.
- Antirotation brush to prevent rotation during installation.
- Anchor's construction allows easy through-installation (drilling and installation through fixed material)
- Three types of tips (nut, flat or tapered bolt) allow simple fitment for installed element
- 8.8 grade steel material of anchor provides high durability

### Applications

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

### Base materials

#### Approved for use in:

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

#### Also suitable for use in:

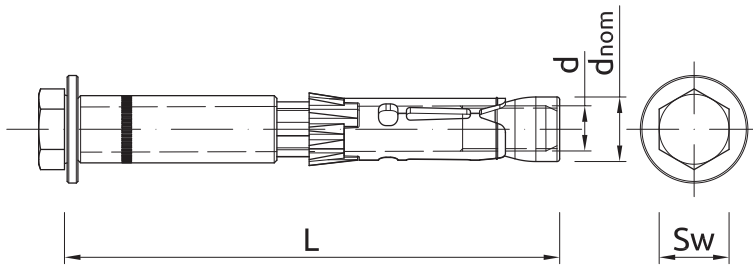
- Natural Stone (after site testing)

## Installation guide



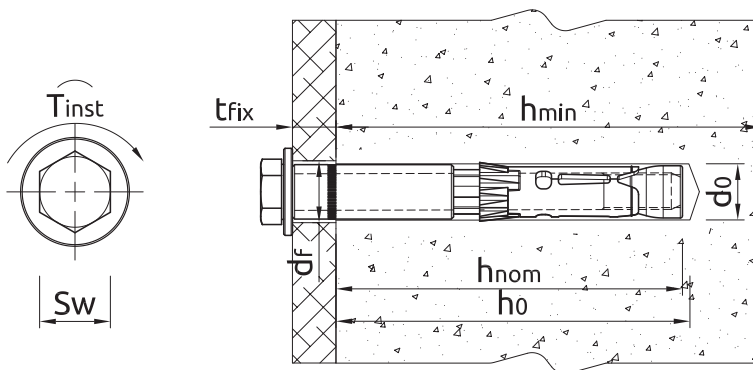
1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blowpump or equivalent method)
3. Insert anchor through fixture into hole and tap until required installation depth is achieved
4. Tighten to the recommended torque

Product information



Size	Product Code	Anchor			Fixture	
		Thread size	External diameter	Length	Max. thickness	Hole diameter
		$d$ [mm]	$d_{nom}$ [mm]	$L$ [mm]	$t_{fix}$ [mm]	$d_f$ [mm]
M6	R-SPL-II-06080/20L	6	10	80	20	12
	R-SPL-II-06110/50L	6	10	110	50	12
M8	R-SPL-II-08080/10L	8	12	80	10	14
	R-SPL-II-08090/20L	8	12	90	20	14
M10	R-SPL-II-10090/10L	10	15	90	10	17
	R-SPL-II-10100/20L	10	15	100	20	17
	R-SPL-II-10130/50L	10	15	130	50	17
M12	R-SPL-II-10180/100L	10	15	180	100	17
	R-SPL-II-12110/10L	12	18	110	10	20
	R-SPL-II-12125/25L	12	18	125	25	20
	R-SPL-II-12150/50L	12	18	150	50	20
M16	R-SPL-II-12200/100L	12	18	200	100	20
	R-SPL-II-16125/10L	16	24	125	10	26
	R-SPL-II-16140/25L	16	24	140	25	26
	R-SPL-II-16165/50L	16	24	165	50	26
	R-SPL-II-16215/100L	16	24	215	100	26

Installation data



Size			M6	M8	M10	M12	M16
Thread diameter	$d$	[mm]	6	8	10	12	16
Hole diameter in substrate	$d_0$	[mm]	10	12	15	18	24
Installation torque	$T_{inst}$	[Nm]	10	20	45	80	150
Min. hole depth in substrate	$h_0$	[mm]	75	85	95	115	130
Installation depth	$h_{nom}$	[mm]	60	70	80	100	115
Min. substrate thickness	$h_{min}$	[mm]	100	120	140	180	200
Min. spacing	$s_{min}$	[mm]	50	60	70	80	100
Min. edge distance	$c_{min}$	[mm]	50	60	70	80	100
Wrench size	$Sw$	[mm]	10	13	17	19	24

## Mechanical properties

Size			M6	M8	M10	M12	M16
Nominal ultimate tensile strength - tension	$f_{uk}$	[N/mm <sup>2</sup> ]	800	800	800	800	830
Nominal yield strength - tension	$f_{yk}$	[N/mm <sup>2</sup> ]	640	640	640	640	660
Cross sectional area - tension	$A_s$	[mm <sup>2</sup> ]	20.1	36.6	58	84.3	157
Elastic section modulus	$W_{el}$	[mm <sup>3</sup> ]	21.2	50.3	98.2	169.7	402.1
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	12	30	60	105	266
Design bending resistance	M	[Nm]	9.6	24	48	84	214

## Basic performance data

Performance data for single anchor without influence of edge distance and spacing - ETAG 001

Size			M6	M8	M10	M12	M16
<b>NON-CRACKED CONCRETE</b>							
Effective embedment depth $h_{ef}$	[mm]		49.00	59.00	67.00	88.00	99.00
<b>CRACKED CONCRETE</b>							
Effective embedment depth $h_{ef}$	[mm]		49.00	59.00	67.00	88.00	99.00
<b>CHARACTERISTIC LOAD</b>							
<b>TENSION LOAD <math>N_{Rk}</math></b>							
NON-CRACKED CONCRETE	[kN]		16.00	22.90	27.70	41.70	49.70
CRACKED CONCRETE	[kN]		9.00	12.00	16.00	25.00	35.50
<b>SHEAR LOAD <math>V_{Rk}</math></b>							
NON-CRACKED CONCRETE	[kN]		14.00	22.90	42.00	50.00	97.00
CRACKED CONCRETE	[kN]		12.30	16.30	39.50	50.00	70.90
<b>DESIGN LOAD</b>							
<b>TENSION LOAD <math>N_{Rd}</math></b>							
NON-CRACKED CONCRETE	[kN]		10.70	15.30	18.50	27.80	33.20
CRACKED CONCRETE	[kN]		6.00	8.00	10.70	16.70	23.60
<b>SHEAR LOAD <math>V_{Rd}</math></b>							
NON-CRACKED CONCRETE	[kN]		11.20	15.30	33.60	40.00	66.30
CRACKED CONCRETE	[kN]		8.23	10.88	26.30	39.60	47.30
<b>RECOMMENDED LOAD</b>							
<b>TENSION LOAD <math>N_{rec}</math></b>							
NON-CRACKED CONCRETE	[kN]		7.62	10.90	13.20	19.90	23.70
CRACKED CONCRETE	[kN]		4.29	5.71	7.62	11.90	16.90
<b>SHEAR LOAD <math>V_{rec}</math></b>							
NON-CRACKED CONCRETE	[kN]		8.00	10.90	24.00	28.60	47.40
CRACKED CONCRETE	[kN]		5.88	7.77	18.80	28.30	33.80

## Design performance data

Size			M6	M8	M10	M12	M16
Effective embedment depth	$h_{ef}$	[mm]	49.00	59.00	67.00	88.00	99.00
<b>TENSION LOAD</b>							
<b>STEEL FAILURE</b>							
Characteristic resistance	$N_{Rk,s}$	[kN]	16.00	29.00	46.00	67.00	126.00
Design resistance $V_{Mc} = 1.5$	$N_{Rd,s}$	[kN]	10.70	19.30	30.70	44.70	84.00
<b>COMBINED PULL-OUT AND CONCRETE CONE FAILURE; NON-CRACKED CONCRETE C20/25</b>							
Characteristic resistance	$N_{Rk,p}$	[kN]	17.30	22.90	27.70	41.70	49.70
Design resistance $V_{Mc} = V_{Mp} = 1.5$	$N_{Rd,p}$	[kN]	11.60	15.30	18.50	27.80	33.20
<b>COMBINED PULL-OUT AND CONCRETE CONE FAILURE; CRACKED CONCRETE C20/25</b>							
Characteristic resistance	$N_{Rk,p}$	[kN]	9.00	12.00	16.00	25.00	35.50
Design resistance $V_{Mc} = V_{Mp} = 1.5$	$N_{Rd,p}$	[kN]	6.00	8.00	10.70	16.70	23.60
Increasing factors for $N_{Rd,p}$ - C30/37	$\Psi_c$	-	1.22	1.22	1.22	1.22	1.22
Increasing factors for $N_{Rd,p}$ - C40/50	$\Psi_c$	-	1.41	1.41	1.41	1.41	1.41
Increasing factors for $N_{Rd,p}$ - C50/60	$\Psi_c$	-	1.55	1.55	1.55	1.55	1.55
Spacing	$s_{cr,N}$	[mm]	147.00	177.00	201.00	264.00	297.00
Edge distance	$c_{cr}$	[mm]	74.00	89.00	101.00	132.00	149.00
<b>SHEAR LOAD</b>							
<b>CONCRETE EDGE FAILURE; NON-CRACKED CONCRETE C20/25</b>							
Edge distance	$c_1$	[mm]	50.00	60.00	70.00	80.00	100.00
Characteristic resistance for $c_1$	$V_{Rk,c}$	[kN]	7.07	9.59	12.50	16.20	23.30
Design resistance $V_{Mc} = 1.5$	$V_{Rd,c}$	[kN]	4.71	6.39	8.32	10.80	15.50
<b>CONCRETE EDGE FAILURE; CRACKED CONCRETE C20/25</b>							
Edge distance	$c_1$	[mm]	50.00	60.00	70.00	80.00	100.00
Characteristic resistance for $c_1$	$V_{Rk,c}$	[kN]	5.00	6.79	8.84	11.50	16.50
Design resistance $V_{Mc} = 1.5$	$V_{Rd,c}$	[kN]	3.33	4.53	5.89	7.65	11.00
<b>CONCRETE PRY-OUT FAILURE; NON-CRACKED CONCRETE C20/25</b>							
Factor	k	-	1.00	1.00	2.00	2.00	2.00
Characteristic resistance	$V_{Rk,cp}$	[kN]	17.30	22.90	55.40	83.40	99.50
Design resistance $V_{Mc} = 1.5$	$V_{Rd,cp}$	[kN]	11.60	15.30	36.90	55.60	66.30
<b>CONCRETE PRY-OUT FAILURE; CRACKED CONCRETE C20/25</b>							
Factor	k	-	1.00	1.00	2.00	2.00	2.00
Characteristic resistance	$V_{Rk,cp}$	[kN]	12.30	16.30	39.50	59.40	70.90
Design resistance $V_{Mc} = 1.5$	$V_{Rd,cp}$	[kN]	8.23	10.90	26.30	39.60	47.30
<b>STEEL FAILURE</b>							
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	14.00	26.00	42.00	50.00	97.00
Design resistance $V_{Mc} = 1.25$	$V_{Rd,s}$	[kN]	11.20	20.80	33.60	40.00	77.60

## Design performance data

Characteristic Resistance under fire exposure in concrete C20/25 to C50/60

Size			M6	M8	M10	M12	M16
<b>R (for EI) = 30 min</b>							
<b>TENSION LOAD</b>							
<b>STEEL FAILURE</b>							
Characteristic resistance	$N_{Rk,s}$	[kN]	0.20	0.37	0.87	1.69	3.14
<b>PULL-OUT FAILURE</b>							
Characteristic resistance	$N_{Rk,p}$	[kN]	2.25	3.00	4.00	6.25	8.88
<b>CONCRETE CONE FAILURE</b>							
Characteristic resistance	$N_{Rk,c}$	[kN]	3.03	4.81	6.61	13.08	17.55
<b>SHEAR LOAD</b>							
<b>CONCRETE PRY-OUT FAILURE</b>							
Factor	k	-	1.00	1.00	2.00	2.00	2.00
Characteristic resistance	$V_{Rk,cp}$	[kN]	2.25	3.00	8.00	12.50	17.76
<b>STEEL FAILURE</b>							
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	0.20	0.37	0.87	1.69	3.14
Characteristic resistance with lever arm	$M_{Rk,s}$	[kN]	0.15	0.37	1.12	2.62	6.66
<b>R (for EI) = 60 min</b>							
<b>TENSION LOAD</b>							
<b>STEEL FAILURE</b>							
Characteristic resistance	$N_{Rk,s}$	[kN]	0.18	0.33	0.75	1.26	2.36
<b>PULL-OUT FAILURE</b>							
Characteristic resistance	$N_{Rk,p}$	[kN]	2.25	3.00	4.00	6.25	8.88
<b>CONCRETE CONE FAILURE</b>							
Characteristic resistance	$N_{Rk,c}$	[kN]	3.03	4.81	6.61	13.08	17.55
<b>SHEAR LOAD</b>							
<b>CONCRETE PRY-OUT FAILURE</b>							
Factor	k	-	1.00	1.00	2.00	2.00	2.00
Characteristic resistance	$V_{Rk,cp}$	[kN]	2.25	3.00	8.00	12.50	17.76
<b>STEEL FAILURE</b>							
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	0.18	0.33	0.75	1.26	2.36
Characteristic resistance with lever arm	$M_{Rk,s}$	[kN]	0.14	0.34	0.97	1.96	5.00
<b>R (for EI) = 90 min</b>							
<b>TENSION LOAD</b>							
<b>STEEL FAILURE</b>							
Characteristic resistance	$N_{Rk,s}$	[kN]	0.14	0.26	0.58	1.10	2.04
<b>PULL-OUT FAILURE</b>							
Characteristic resistance	$N_{Rk,p}$	[kN]	2.25	3.00	4.00	6.25	8.88
<b>CONCRETE CONE FAILURE</b>							
Characteristic resistance	$N_{Rk,c}$	[kN]	3.03	4.81	6.61	13.08	17.55
<b>SHEAR LOAD</b>							
<b>CONCRETE PRY-OUT FAILURE</b>							
Factor	k	-	1.00	1.00	2.00	2.00	2.00
Characteristic resistance	$V_{Rk,cp}$	[kN]	2.25	3.00	8.00	12.50	17.76
<b>STEEL FAILURE</b>							
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	0.14	0.26	0.58	1.10	2.06
Characteristic resistance with lever arm	$M_{Rk,s}$	[kN]	0.11	0.26	0.75	1.70	4.33

## Design performance data

Size			M6	M8	M10	M12	M16
<b>R (For EI) = 120 min</b>							
<b>TENSION LOAD</b>							
<b>STEEL FAILURE</b>							
Characteristic resistance	$N_{Rk,s}$	[kN]	0.10	0.18	0.46	0.84	1.57
<b>PULL-OUT FAILURE</b>							
Characteristic resistance	$N_{Rk,p}$	[kN]	1.80	2.40	3.20	5.00	7.10
<b>CONCRETE CONE FAILURE</b>							
Characteristic resistance	$N_{Rk,c}$	[kN]	2.42	3.85	5.29	10.46	14.04
<b>SHEAR LOAD</b>							
<b>CONCRETE PRY-OUT FAILURE</b>							
Factor	k	-	1.00	1.00	2.00	2.00	2.00
Characteristic resistance	$V_{Rk,cp}$	[kN]	1.80	2.40	6.40	10.00	14.20
<b>STEEL FAILURE</b>							
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	0.10	0.18	0.46	0.84	1.57
Characteristic resistance with lever arm	$M_{Rk,s}$	[kN]	0.08	0.19	0.60	1.31	3.33

Allowable values for resistance in case of Seismic performance category C1

Size			M6	M8	M10	M12	M16
Effective embedment depth	$h_{ef}$	[mm]	49.00	59.00	67.00	88.00	99.00
<b>TENSION LOAD, STEEL FAILURE</b>							
Characteristic resistance	$N_{Rk,s}$	[kN]	16.00	29.00	46.00	67.00	126.00
Partial safety factor	$\gamma_{MsN,seisC1}$	-	1.50				
<b>TENSION LOAD, PULL-OUT FAILURE</b>							
Characteristic resistance	$N_{Rk,p}$	[kN]	6.80	12.00	16.00	25.00	35.50
Partial safety factor	$\gamma_{Mp,seisC1}$	-	1.50				
<b>SHEAR LOAD, STEEL FAILURE</b>							
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	9.80	13.00	20.00		48.50
Partial safety factor	$\gamma_{MsV,seisC1}$	-	1.25				

Allowable values for resistance in case of Seismic performance category C2

Size			M6	M8	M10	M12	M16
Effective embedment depth	$h_{ef}$	[mm]	49.00	59.00	67.00	88.00	99.00
<b>TENSION LOAD, STEEL FAILURE</b>							
Characteristic resistance	$N_{Rk,s}$	[kN]	-	29.00	46.00	67.00	126.00
Partial safety factor	$\gamma_{MsN,seisC2}$	-	1.50				
<b>TENSION LOAD, PULL-OUT FAILURE</b>							
Characteristic resistance	$N_{Rk,p}$	[kN]	-	3.90	7.80	15.20	28.80
Partial safety factor	$\gamma_{Mp,seisC2}$	-	1.50				
<b>SHEAR LOAD, STEEL FAILURE</b>							
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	-	10.20	17.00		43.00
Partial safety factor	$\gamma_{MsV,seisC2}$	-	1.25				

**Product commercial data**

Size	Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Codes
		Thread size [mm]	Length [mm]	Box	Outer	Pallet	Box	Outer	Pallet	
M6	R-SPL-II-06080/20L <sup>1)</sup>	6	80	50	400	9600	2.2	17.2	442.8	5010445007217
	R-SPL-II-06110/50L <sup>1)</sup>	6	110	50	300	7200	2.9	17.4	447.6	5010445007224
M8	R-SPL-II-08080/10L <sup>1)</sup>	8	80	25	250	6000	1.62	16.2	418.4	5010445007231
	R-SPL-II-08090/20L <sup>1)</sup>	8	90	25	250	6000	1.80	18.0	462.0	5010445007248
	R-SPL-II-08120/50L <sup>1)</sup>	8	120	25	150	3600	2.4	14.4	375.6	5010445007255
M10	R-SPL-II-10090/10L <sup>1)</sup>	10	90	20	160	3840	2.3	18.7	479.3	5010445007262
	R-SPL-II-10100/20L <sup>1)</sup>	10	100	20	200	4800	2.6	25.6	644.4	5010445007279
	R-SPL-II-10130/50L <sup>1)</sup>	10	130	20	120	2880	3.4	20.2	513.8	5010445007286
	R-SPL-II-10180100L <sup>1)</sup>	10	180	20	80	500	3.8	15.2	125.0	5906675375441
M12	R-SPL-II-12110/10L <sup>1)</sup>	12	110	20	80	1920	4.2	17.0	437.0	5010445007293
	R-SPL-II-12125/25L <sup>1)</sup>	12	125	20	20	3840	4.8	4.8	959.1	5010445007309
	R-SPL-II-12150/50L <sup>1)</sup>	12	150	20	60	1440	5.6	16.8	433.2	5010445007316
	R-SPL-II-12200100L <sup>1)</sup>	12	200	20	20	2100	4.8	4.8	534.0	5906675375458
M16	R-SPL-II-16125/10L <sup>1)</sup>	16	125	10	60	1440	4.4	26.2	659.3	5010445007323
	R-SPL-II-16140/25L <sup>1)</sup>	16	140	10	40	960	4.8	19.4	494.4	5010445007330
	R-SPL-II-16165/50L <sup>1)</sup>	16	165	10	10	890	5.7	5.7	535.5	5906675375465
	R-SPL-II-16215100L <sup>1)</sup>	16	215	10	10	700	7.1	7.1	528.4	5906675375472

1) ETA-14/0345