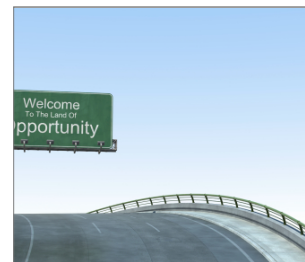
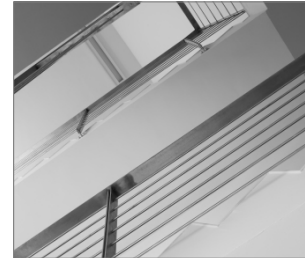


# R-SPL-II-P SafetyPlus II - Bolt Projecting

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
- ETA Option 1 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 steelwork
- Masonry support
- Cladding restraint
- Road Signs
- Heavy machinery
- Racking systems
- Industrial doors
- Safety barriers

### Base materials

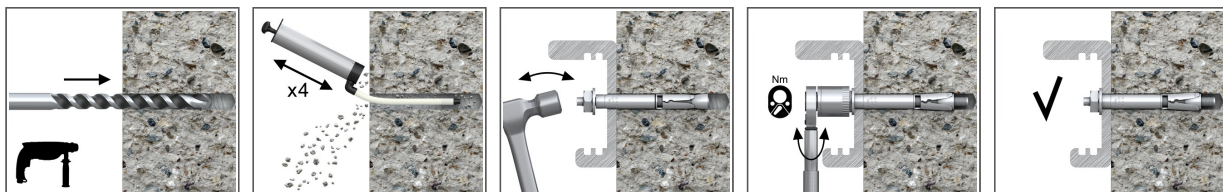
#### Approved for use in:

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

#### Also suitable for use in:

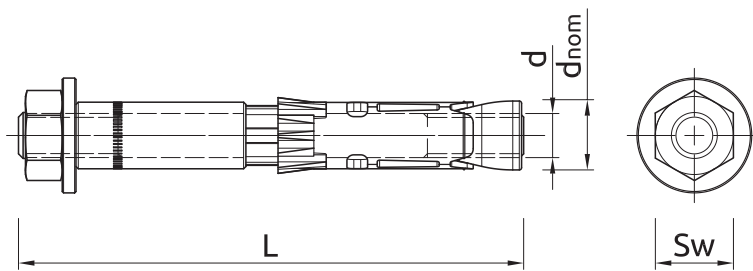
- Natural Stone (after site testing)

## Installation guide



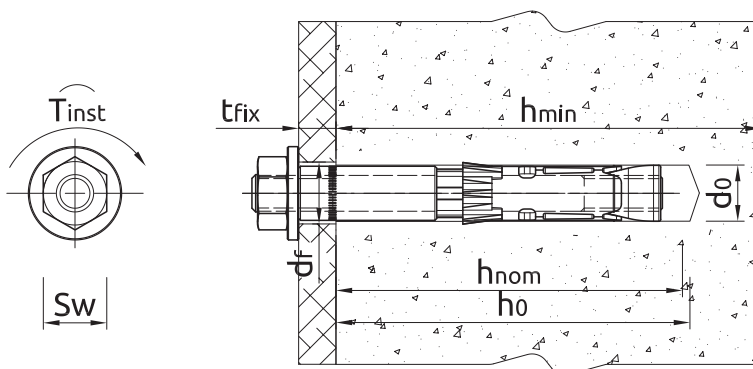
1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blowpump or equivalent method)
3. Insert anchor through fixture into hole and tap until required installation depth is achieved
4. Tighten to the recommended torque

### 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-06110/50P	6	10	110	50	12
M8	R-SPL-II-08090/20P	8	12	90	20	14
M10	R-SPL-II-10100/20P	10	15	100	20	17
M12	R-SPL-II-12125/25P	12	18	125	25	20
	R-SPL-II-12150/50P	12	18	150	50	20
M16	R-SPL-II-16125/10P	16	24	125	10	26

### Installation data



Size			M6	M8	M10	M12	M16
Thread diameter	$d$	[mm]	6	8	10	12	16
Hole diameter in substrate	$d_o$	[mm]	10	12	15	18	24
Hole diameter in fixture	$d_f$	[mm]	12	14	17	20	26
Installation torque	$T_{inst}$	[Nm]	10	20	45	80	150
Wrench size	$Sw$	[mm]	10	13	17	19	24
Min. hole depth in substrate	$h_o$	[mm]	75	85	95	115	130
Min. 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

### 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	$M^c_{Rk,s}$	[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

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>MEAN ULTIMATE LOAD</b>						
<b>TENSION LOAD <math>N_{Ru,m}</math></b>						
NON-CRACKED CONCRETE	[kN]	16.80	30.45	37.02	55.72	66.49
CRACKED CONCRETE	[kN]	11.70	15.60	20.80	32.50	46.79
<b>SHEAR LOAD <math>V_{Ru,m}</math></b>						
NON-CRACKED CONCRETE	[kN]	15.40	28.60	46.20	55.00	106.70
CRACKED CONCRETE	[kN]	15.40	21.53	46.20	55.00	93.58
<b>CHARACTERISTIC LOAD</b>						
<b>TENSION LOAD <math>N_{Rk}</math></b>						
NON-CRACKED CONCRETE	[kN]	16.00	22.29	26.98	40.61	48.46
CRACKED CONCRETE	[kN]	9.00	12.00	16.00	25.00	33.92
<b>SHEAR LOAD <math>V_{Rk}</math></b>						
NON-CRACKED CONCRETE	[kN]	14.00	22.29	42.00	50.00	96.91
CRACKED CONCRETE	[kN]	11.81	15.61	37.77	50.00	67.84
<b>DESIGN LOAD</b>						
<b>TENSION LOAD <math>N_{Rd}</math></b>						
NON-CRACKED CONCRETE	[kN]	10.67	14.86	17.99	27.07	32.30
CRACKED CONCRETE	[kN]	6.00	8.00	10.67	16.67	22.61
<b>SHEAR LOAD <math>V_{Rd}</math></b>						
NON-CRACKED CONCRETE	[kN]	11.20	14.86	33.60	40.00	64.61
CRACKED CONCRETE	[kN]	7.87	10.40	25.18	37.90	45.23

## Design performance data

(-) failure is not decisive

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	126.0
Partial safety factor	$\gamma_{Ms}$	-	1.50	1.50	1.50	1.50	1.50
<b>PULL-OUT FAILURE; NON-CRACKED CONCRETE C20/25</b>							
Characteristic resistance	$N_{Rk,p}$	[kN]	-	-	-	-	-
<b>PULL-OUT FAILURE; CRACKED CONCRETE C20/25</b>							
Characteristic resistance	$N_{Rk,p}$	[kN]	9.00	12.00	16.00	25.00	-
<b>PULL-OUT FAILURE</b>							
Installation safety factor	$\gamma_{inst}$	-	1.00	1.00	1.00	1.00	1.00
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
<b>CONCRETE CONE FAILURE</b>							
Installation safety factor	$\gamma_{inst}$	-	1.00	1.00	1.00	1.00	1.00
Factor for cracked concrete	$k_{cr,N}$	-	7.70	7.70	7.70	7.70	7.70
Factor for non-cracked concrete	$k_{ucr,N}$	-	11.00	11.00	11.00	11.00	11.00
Spacing	$s_{cr,N}$	[mm]	147.0	177.0	201.0	264.0	297.0
Edge distance	$c_{cr,N}$	[mm]	73.50	88.50	100.5	132.0	148.5
<b>CONCRETE SPLITTING FAILURE</b>							
Installation safety factor	$\gamma_{inst}$	-	1.00	1.00	1.00	1.00	1.00
Spacing	$s_{cr,sp}$	[mm]	147.0	177.0	201.0	264.0	297.0
Edge distance	$c_{cr,sp}$	[mm]	73.50	88.50	100.5	132.0	148.5
<b>SHEAR LOAD</b>							
<b>STEEL FAILURE</b>							
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	14.00	26.00	42.00	50.00	97.00
Ductility factor	$k_\gamma$	-	1.00	1.00	1.00	1.00	1.00
Characteristic resistance with lever arm	$M_{Rk,s}$	[Nm]	12.00	30.00	60.00	105.0	266.0
Partial safety factor	$\gamma_{Ms}$	-	1.25	1.25	1.25	1.25	1.25
<b>CONCRETE PRY-OUT FAILURE</b>							
Factor	$k$	-	1.00	1.00	2.00	2.00	2.00
Installation safety factor	$\gamma_{inst}$	-	1.00	1.00	1.00	1.00	1.00
<b>CONCRETE EDGE FAILURE</b>							
Effective length of anchor	$\ell_f$	[mm]	49.00	59.00	67.00	88.00	99.00
Anchor diameter	$d_{nom}$	[mm]	10.00	12.00	15.00	18.00	24.00
Installation safety factor	$\gamma_{inst}$	-	1.00	1.00	1.00	1.00	1.00

## 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>							
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]	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>SHEAR LOAD</b>							
<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	$M_{Rk,s}$	[Nm]	0.15	0.37	1.12	2.62	6.66
<b>R (for EI) = 60 min</b>							
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]	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>SHEAR LOAD</b>							
<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	$M_{Rk,s}$	[Nm]	0.14	0.34	0.97	1.96	5.00
<b>R (for EI) = 90 min</b>							
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]	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>SHEAR LOAD</b>							
<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	$M_{Rk,s}$	[Nm]	0.11	0.26	0.75	1.70	4.33
<b>R (for EI) = 120 min</b>							
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]	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>SHEAR LOAD</b>							
<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	$M_{Rk,s}$	[Nm]	0.08	0.19	0.60	1.31	3.33

## Design performance data

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	1.50	1.50	1.50	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
Installation safety factor	$\gamma_{inst}$	-	1.00	1.00	1.00	1.00	1.00
<b>SHEAR LOAD, STEEL FAILURE</b>							
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	9.80	13.00	20.00	20.00	48.50
Partial safety factor	$\gamma_{MsV,seisC1}$	-	1.25	1.25	1.25	1.25	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	1.50	1.50	1.50	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	-	-	-	-
Installation safety factor	$\gamma_{inst}$	-	-	1.00	1.00	1.00	1.00
<b>SHEAR LOAD, STEEL FAILURE</b>							
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	-	10.20	17.00	17.00	43.00
Partial safety factor	$\gamma_{MsV,seisC2}$	-	1.25	1.25	1.25	1.25	1.25

## Product commercial data

Product Code	Anchor		Quantity [pcs]			Weight [kg]			Bar Codes
	Thread size [mm]	Length [mm]	Box	Outer	Pallet	Box	Outer	Pallet	
R-SPL-II-06110/50P <sub>1)</sub>	6	110	50	300	7200	3.0	17.7	454.8	5010445007354
R-SPL-II-08090/20P <sub>1)</sub>	8	90	25	200	4800	1.73	13.8	362.2	5010445007361
R-SPL-II-10100/20P <sub>1)</sub>	10	100	20	160	3840	2.6	20.6	525.4	5010445007378
R-SPL-II-12125/25P <sub>1)</sub>	12	125	20	20	3840	4.5	4.5	899.6	5010445007385
R-SPL-II-12150/50P <sub>1)</sub>	12	150	20	20	2200	4.5	4.5	527.2	5906675375489
R-SPL-II-16125/10P <sub>1)</sub>	16	125	10	60	1440	4.3	25.9	652.1	5010445007392

1) ETA-14/0345