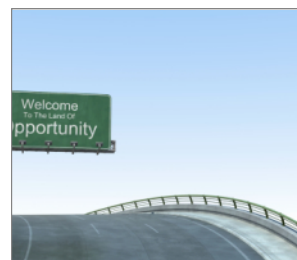


R-SPL-II-L SafetyPlus Loose Bolt

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:

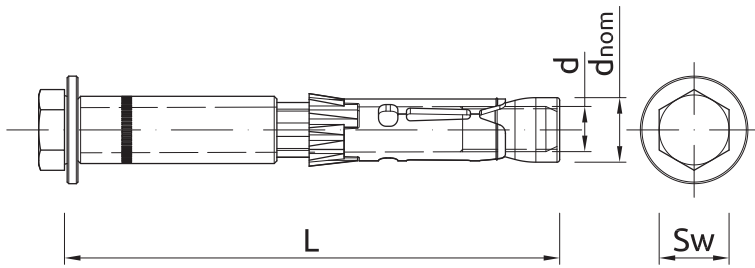
- Cracked concrete C20/25-C50/60
- Non-cracked concrete C20/25-C50/60
- Unreinforced concrete
- Reinforced concrete

Installation guide



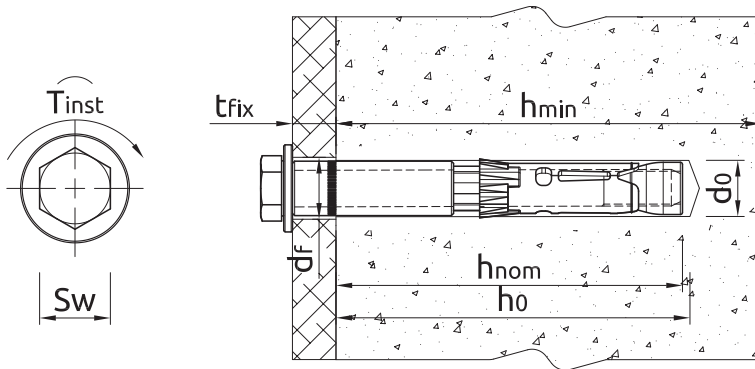
1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blowpump or equivalent method)
3. Insert anchor through fixture into hole and tap until required installation depth is achieved
4. Tighten to the recommended torque

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	80	50	12
M8	R-SPL-II-08080/10L	8	12	80	10	14
	R-SPL-II-08090/20L	8	12	90	20	14
	R-SPL-II-08120/50L	8	12	120	50	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-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-16125/10L	16	24	125	10	26
	R-SPL-II-16140/25L	16	24	140	25	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
Installation torque	T_{inst}	[Nm]	10	20	45	80	150
Min. hole depth in substrate	h_o	[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 ²]	800	800	800	800	830
Nominal yield strength - tension	f_{yk}	[N/mm ²]	640	640	640	640	660
Cross sectional area - tension	A_s	[mm ²]	20.1	36.6	58	84.3	157
Elastic section modulus	W_{el}	[mm ³]	21.2	50.3	98.2	169.7	402.1
Characteristic bending resistance	$M_{Rk,s}^0$	[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
NON-CRACKED CONCRETE						
Effective embedment depth h_{ef}	[mm]	49.00	59.00	67.00	88.00	99.00
CRACKED CONCRETE						
Effective embedment depth h_{ef}	[mm]	49.00	59.00	67.00	88.00	99.00
CHARACTERISTIC LOAD						
TENSION LOAD N_{Rk}						
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
SHEAR LOAD V_{Rk}						
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
DESIGN LOAD						
TENSION LOAD N_{Rd}						
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
SHEAR LOAD V_{Rd}						
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
RECOMMENDED LOAD						
TENSION LOAD N_{rec}						
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
SHEAR LOAD V_{rec}						
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
TENSION LOAD							
STEEL FAILURE							
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
COMBINED PULL-OUT AND CONCRETE CONE FAILURE; NON-CRACKED CONCRETE C20/25							
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
COMBINED PULL-OUT AND CONCRETE CONE FAILURE; CRACKED CONCRETE C20/25							
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	ψ_c	-	1.22	1.22	1.22	1.22	1.22
Increasing factors for $N_{Rd,p}$ - C40/50	ψ_c	-	1.41	1.41	1.41	1.41	1.41
Increasing factors for $N_{Rd,p}$ - C50/60	ψ_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
SHEAR LOAD							
CONCRETE EDGE FAILURE; NON-CRACKED CONCRETE C20/25							
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
CONCRETE EDGE FAILURE; CRACKED CONCRETE C20/25							
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
CONCRETE PRY-OUT FAILURE; NON-CRACKED CONCRETE C20/25							
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
CONCRETE PRY-OUT FAILURE; CRACKED CONCRETE C20/25							
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
STEEL FAILURE							
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	14.00	26.00	42.00	50.00	97.00
Design resistance $V_{Ms} = 1.25$	$V_{Rd,s}$	[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
R (for EI) = 30 min							
TENSION LOAD							
STEEL FAILURE							
Characteristic resistance	$N_{Rk,s}$	[kN]	0.20	0.37	0.87	1.69	3.14
PULL-OUT FAILURE							
Characteristic resistance	$N_{Rk,p}$	[kN]	2.25	3.00	4.00	6.25	8.88
CONCRETE CONE FAILURE							
Characteristic resistance	$N_{Rk,c}$	[kN]	3.03	4.81	6.61	13.08	17.55
SHEAR LOAD							
CONCRETE PRY-OUT FAILURE							
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
STEEL FAILURE							
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
R (for EI) = 60 min							
TENSION LOAD							
STEEL FAILURE							
Characteristic resistance	$N_{Rk,s}$	[kN]	0.18	0.33	0.75	1.26	2.36
PULL-OUT FAILURE							
Characteristic resistance	$N_{Rk,p}$	[kN]	2.25	3.00	4.00	6.25	8.88
CONCRETE CONE FAILURE							
Characteristic resistance	$N_{Rk,c}$	[kN]	3.03	4.81	6.61	13.08	17.55
SHEAR LOAD							
CONCRETE PRY-OUT FAILURE							
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
STEEL FAILURE							
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
R (for EI) = 90 min							
TENSION LOAD							
STEEL FAILURE							
Characteristic resistance	$N_{Rk,s}$	[kN]	0.14	0.26	0.58	1.10	2.04
PULL-OUT FAILURE							
Characteristic resistance	$N_{Rk,p}$	[kN]	2.25	3.00	4.00	6.25	8.88
CONCRETE CONE FAILURE							
Characteristic resistance	$N_{Rk,c}$	[kN]	3.03	4.81	6.61	13.08	17.55
SHEAR LOAD							
CONCRETE PRY-OUT FAILURE							
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
STEEL FAILURE							
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
R (for EI) = 120 min							
TENSION LOAD							
STEEL FAILURE							
Characteristic resistance	$N_{Rk,s}$	[kN]	0.10	0.18	0.46	0.84	1.57
PULL-OUT FAILURE							
Characteristic resistance	$N_{Rk,p}$	[kN]	1.80	2.40	3.20	5.00	7.10
CONCRETE CONE FAILURE							
Characteristic resistance	$N_{Rk,c}$	[kN]	2.42	3.85	5.29	10.46	14.04
SHEAR LOAD							
CONCRETE PRY-OUT FAILURE							
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
STEEL FAILURE							
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
TENSION LOAD, STEEL FAILURE							
Characteristic resistance	$N_{Rk,s}$	[kN]	16.00	29.00	46.00	67.00	126.00
Partial safety factor	$\gamma_{MsN,seisC1}$	-	1.50				
TENSION LOAD, PULL-OUT FAILURE							
Characteristic resistance	$N_{Rk,p}$	[kN]	6.80	12.00	16.00	25.00	35.50
Partial safety factor	$\gamma_{Mp,seisC1}$	-	1.50				
SHEAR LOAD, STEEL FAILURE							
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
TENSION LOAD, STEEL FAILURE							
Characteristic resistance	$N_{Rk,s}$	[kN]	-	29.00	46.00	67.00	126.00
Partial safety factor	$\gamma_{MsN,seisC2}$	-	1.50				
TENSION LOAD, PULL-OUT FAILURE							
Characteristic resistance	$N_{Rk,p}$	[kN]	-	3.90	7.80	15.20	28.80
Partial safety factor	$\gamma_{Mp,seisC2}$	-	1.50				
SHEAR LOAD, STEEL FAILURE							
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 ¹⁾	6	80	50	400	9600	2.2	17.2	442.8	5010445007217
	R-SPL-II-06110/50L ¹⁾	6	80	50	300	7200	2.9	17.4	447.6	5010445007224
M8	R-SPL-II-08080/10L ¹⁾	8	80	25	250	6000	1.62	16.2	418.4	5010445007231
	R-SPL-II-08090/20L ¹⁾	8	90	25	250	6000	1.80	18.0	462.0	5010445007248
	R-SPL-II-08120/50L ¹⁾	8	120	25	150	3600	2.4	14.4	375.6	5010445007255
M10	R-SPL-II-10090/10L ¹⁾	10	90	20	160	3840	2.3	18.7	479.3	5010445007262
	R-SPL-II-10100/20L ¹⁾	10	100	20	200	4800	2.6	25.6	644.4	5010445007279
	R-SPL-II-10130/50L ¹⁾	10	130	20	120	2880	3.4	20.2	513.8	5010445007286
M12	R-SPL-II-12110/10L ¹⁾	12	110	20	80	1920	4.2	17.0	437.0	5010445007293
	R-SPL-II-12125/25L ¹⁾	12	125	20	20	3840	4.8	4.8	959.1	5010445007309
	R-SPL-II-12150/50L ¹⁾	12	150	20	60	1440	5.6	16.8	433.2	5010445007316
M16	R-SPL-II-16125/10L ¹⁾	16	125	10	60	1440	4.4	26.2	659.3	5010445007323
	R-SPL-II-16140/25L ¹⁾	16	140	10	40	960	4.8	19.4	494.4	5010445007330

1) ETA-14/0345