

# R-SPL SafetyPlus - Loose Bolt

High performance mechanical anchor - loose bolt option



## Approvals and Reports

- ETA-11/0126



## Product information

### Features and benefits

- High performance in non-cracked concrete confirmed by ETA Option 7
- 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
- Fire resistant

### Applications

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

### Base materials

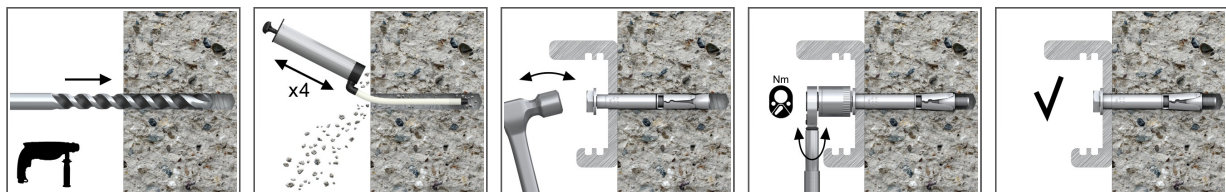
#### Approved for use in:

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

#### Also suitable for use in:

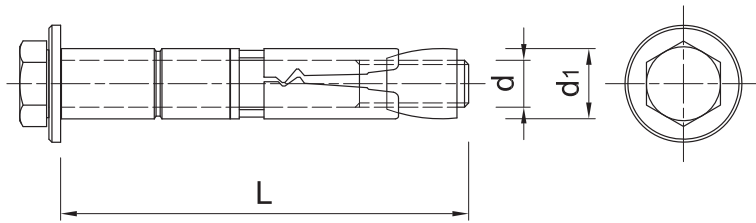
- Natural Stone (after site testing)

## Installation guide



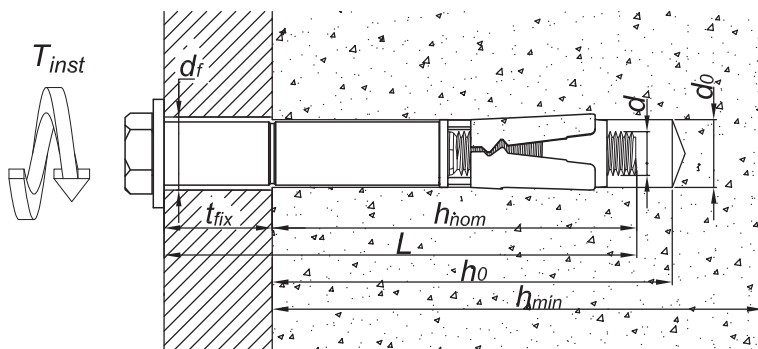
1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blowpump or equivalent method)
3. Insert anchor through fixture into hole and tap until required installation depth is achieved
4. Tighten to the recommended torque

Product information



Size	Product Code	Anchor			Fixture	
		Thread size	External diameter	Length	Max. thickness	Hole diameter
		$d$	$d_{nom}$	$L$	$t_{fix}$	$d_f$
		[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	50	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	$d_o$	[mm]	12	15	18	24	28
Installation torque	$T_{inst}$	[Nm]	25	50	80	180	275
Wrench size	Sw	[mm]	13	17	19	24	30
Min. hole depth in substrate	$h_o$	[mm]	85	95	105	130	160
Min. 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/mm <sup>2</sup> ]	800	800	800	800	800
Nominal yield strength - tension	$f_{yk}$	[N/mm <sup>2</sup> ]	640	640	640	640	640
Cross sectional area - tension	$A_s$	[mm <sup>2</sup> ]	36.6	58	84.3	157	245
Elastic section modulus	$W_{el}$	[mm <sup>3</sup> ]	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
<b>MEAN ULTIMATE LOAD</b>							
TENSION LOAD $N_{Ru,m}$	[kN]		10.84	14.46	19.28	42.17	48.19
SHEAR LOAD $V_{Ru,m}$	[kN]		20.28	31.68	45.62	81.95	77.81
<b>CHARACTERISTIC LOAD</b>							
TENSION LOAD $N_{Rk}$	[kN]		9.00	12.00	16.00	35.00	40.00
SHEAR LOAD $V_{Rk}$	[kN]		19.20	30.00	43.20	77.60	73.68
<b>DESIGN LOAD</b>							
TENSION LOAD $N_{Rd}$	[kN]		5.00	6.67	8.89	19.44	22.22
SHEAR LOAD $V_{Rd}$	[kN]		15.36	24.00	34.56	62.08	58.94

## Design performance data

(-) failure is not decisive

Size			M8	M10	M12	M16	M20
Effective embedment depth	$h_{ef}$	[mm]	60.00	70.00	80.00	100.00	125.00
<b>TENSION LOAD</b>							
<b>STEEL FAILURE</b>							
Characteristic resistance	$N_{Rk,s}$	[kN]	29.30	46.40	57.40	125.60	196.00
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]	9.00	12.00	16.00	35.00	40.00
<b>PULL-OUT FAILURE</b>							
Installation safety factor	$\gamma_{inst}$	-	1.20	1.20	1.20	1.20	1.20
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	$\gamma_{inst}$	-	1.20	1.20	1.20	1.20	1.20
Factor for non-cracked concrete	$k_{ucr,N}$	-	11.00	11.00	11.00	11.00	11.00
Spacing	$s_{cr,N}$	[mm]	180.00	210.00	240.00	300.00	375.00
Edge distance	$c_{cr,N}$	[mm]	90.00	105.00	120.00	150.00	188.00
<b>CONCRETE SPLITTING FAILURE</b>							
Installation safety factor	$\gamma_{inst}$	-	1.20	1.20	1.20	1.20	1.20
Spacing	$s_{cr,sp}$	[mm]	180.00	210.00	240.00	300.00	375.00
Edge distance	$c_{cr,sp}$	[mm]	90.00	105.00	120.00	150.00	188.00

## Design performance data

Size			M8	M10	M12	M16	M20
<b>SHEAR LOAD</b>							
<b>STEEL FAILURE</b>							
Characteristic resistance without lever arm	$V_{Rk,s}$	[kN]	19.20	30.00	43.20	77.60	73.68
Ductility factor	$k_{\gamma}$	-	0.80	0.80	0.80	0.80	0.80
Characteristic resistance with lever arm	$M_{Rk,s}$	[Nm]	45.04	87.97	152.01	365.97	728.54
Partial safety factor	$\gamma_{Ms}$	-	1.25	1.25	1.25	1.25	1.25
<b>CONCRETE PRY-OUT FAILURE</b>							
Factor	k	-	2.00	2.00	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]	60.00	70.00	80.00	100.00	125.00
Anchor diameter	$d_{nom}$	[mm]	8.00	10.00	12.00	16.00	20.00
Installation safety factor	$\gamma_{inst}$	-	1.00	1.00	1.00	1.00	1.00

## 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-08090/15 <sup>1)</sup>	8	90	50	50	8000	3.8	3.8	638.0	5010445500107
R-SPL-08110/40 <sup>1)</sup>	8	110	50	50	8000	4.6	4.6	770.8	5010445500152
R-SPL-10105/20 <sup>1)</sup>	10	105	50	50	8000	6.6	6.6	1089.2	5010445500206
R-SPL-10120/40 <sup>1)</sup>	10	120	50	50	6000	7.9	7.9	976.2	5010445500251
R-SPL-10140/60 <sup>1)</sup>	10	140	50	50	4000	9.0	9.0	752.0	5010445500305
R-SPL-12120/25 <sup>1)</sup>	12	120	25	25	4000	5.8	5.8	956.4	5010445500350
R-SPL-12150/50 <sup>1)</sup>	12	150	25	25	3000	7.0	7.0	870.6	5010445500404
R-SPL-16145/25 <sup>1)</sup>	16	145	10	10	1600	4.8	4.8	801.4	5010445500503
R-SPL-16170/50 <sup>1)</sup>	16	170	10	10	1200	5.6	5.6	700.3	5010445500558
R-SPL-20175/30 <sup>1)</sup>	20	175	10	10	1200	8.4	8.4	1033.4	5010445500657

1) ETA-11/0126