

## R-SPL-C SafetyPlus - Countersunk

High performance mechanical anchor - countersunk version



### 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 restraint
- Road Signs
- Heavy machinery
- Racking systems
- Industrial doors
- Safety barriers

#### Base materials

##### Approved for use in:

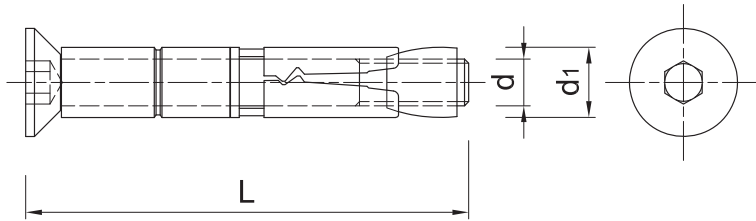
- Non-cracked concrete C20/25-C50/60
- Reinforced concrete
- Concrete

### Installation guide



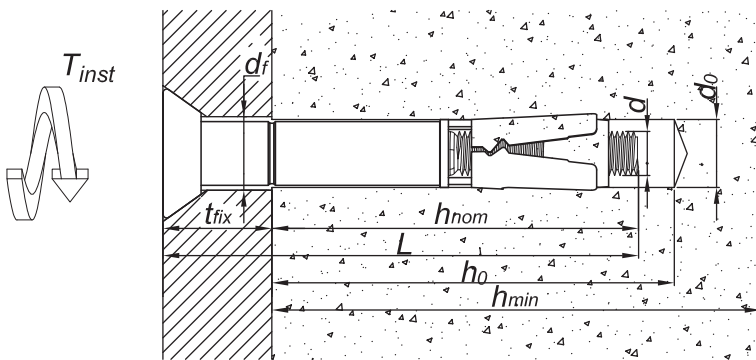
1. Drill a hole of required diameter and depth
2. Clear the hole of drilling dust and debris (using blowpump or equivalent method)
3. Insert anchor through fixture into hole and tap until required installation depth is achieved
4. Tighten to the recommended torque

## Product information



| Size | Product Code     | Anchor      |                   |        | Fixture          |                |
|------|------------------|-------------|-------------------|--------|------------------|----------------|
|      |                  | Thread size | External diameter | Length | Max. thickness   | Hole diameter  |
|      |                  | d           | d <sub>nom</sub>  | L      | t <sub>fix</sub> | d <sub>f</sub> |
|      |                  | [mm]        | [mm]              | [mm]   | [mm]             | [mm]           |
| M8   | R-SPL-C-08090/20 | 8           | 12                | 90     | 20               | 22*/14         |
| M10  | R-SPL-C-10105/25 | 10          | 15                | 105    | 25               | 28*/17         |
| M12  | R-SPL-C-12125/30 | 12          | 18                | 125    | 30               | 33*/20         |
| M16  | R-SPL-C-16145/30 | 16          | 24                | 145    | 30               | 40*/26         |

## Installation data



| Size                         |                   |      | M8  | M10 | M12 | M16 |
|------------------------------|-------------------|------|-----|-----|-----|-----|
| Thread diameter              | d                 | [mm] | 8   | 10  | 12  | 16  |
| Hole diameter in substrate   | d <sub>0</sub>    | [mm] | 12  | 15  | 18  | 24  |
| Min. hole depth in substrate | h <sub>0</sub>    | [mm] | 85  | 95  | 105 | 130 |
| Installation torque          | T <sub>inst</sub> | [Nm] | 25  | 50  | 80  | 180 |
| Installation depth           | h <sub>nom</sub>  | [mm] | 70  | 80  | 90  | 110 |
| Min. substrate thickness     | h <sub>min</sub>  | [mm] | 100 | 105 | 120 | 150 |
| Min. spacing                 | s <sub>min</sub>  | [mm] | 60  | 70  | 80  | 100 |
| Min. edge distance           | c <sub>min</sub>  | [mm] | 90  | 105 | 120 | 150 |
| Wrench size                  | [English]:        |      | 6   | 8   | 10  | 12  |

## Mechanical properties

| Size                                        |                                |                      | M8    | M10   | M12    | M16    |
|---------------------------------------------|--------------------------------|----------------------|-------|-------|--------|--------|
| Nominal ultimate tensile strength - tension | f <sub>uk</sub>                | [N/mm <sup>2</sup> ] | 800   | 800   | 800    | 800    |
| Nominal yield strength - tension            | f <sub>yk</sub>                | [N/mm <sup>2</sup> ] | 640   | 640   | 640    | 640    |
| Cross sectional area - tension              | A <sub>s</sub>                 | [mm <sup>2</sup> ]   | 36.6  | 58    | 84.3   | 157    |
| Elastic section modulus                     | W <sub>el</sub>                | [mm <sup>3</sup> ]   | 50.3  | 98.2  | 169.7  | 402.1  |
| Characteristic bending resistance           | M <sup>0</sup> <sub>Rk,s</sub> | [Nm]                 | 45.04 | 87.97 | 152.01 | 365.97 |
| Design bending resistance                   | M                              | [Nm]                 | 36.03 | 70.38 | 121.61 | 292.78 |

## Basic performance data

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

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

## Design performance data

Data based on ETA-11/0126 Option 7

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

## Design performance data

### Reduction / increasing resistance factors for edge distance and spacing

#### Edge distance (tension)

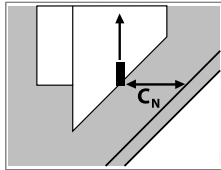
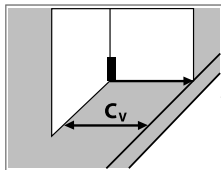


Table only valid for one edge  $< c_{cr,N}$  and  $S \geq S_{cr,N}$ . For other cases use the Rawlplug Anchor Calculator

Reduction factors for edge distance  $< c_{cr,N}$  applicable to  $N_{Rd}$  or  $N_{rec}$  for non-cracked concrete from 'Basic Performance' table

| $c_v$ [m] | M6                |           | M8                |           | M10               |           | M12               |           | M16               |           |
|-----------|-------------------|-----------|-------------------|-----------|-------------------|-----------|-------------------|-----------|-------------------|-----------|
|           | $h > 1,84h_{min}$ | $h_{min}$ | $h > 1,84h_{min}$ | $h_{min}$ | $h > 1,84h_{min}$ | $h_{min}$ | $h > 1,84h_{min}$ | $h_{min}$ | $h > 1,84h_{min}$ | $h_{min}$ |
| 50        | 0,61              | 0,61      |                   |           |                   |           |                   |           |                   |           |
| 55        | 0,65              | 0,65      |                   |           |                   |           |                   |           |                   |           |
| 60        | 0,69              | 0,69      | 0,60              | 0,60      |                   |           |                   |           |                   |           |
| 70        | 0,78              | 0,78      | 0,67              | 0,67      | 0,64              | 0,64      |                   |           |                   |           |
| 75        | 0,81              | 0,81      | 0,70              | 0,70      | 0,67              | 0,67      |                   |           |                   |           |
| 90        | 0,90              | 0,90      | 0,80              | 0,80      | 0,77              | 0,77      | 0,71              | 0,71      |                   |           |
| 100       | 0,95              | 0,95      | 0,85              | 0,85      | 0,83              | 0,83      | 0,77              | 0,77      | 0,75              | 0,75      |
| 120       | 1,00              | 1,00      | 0,94              | 0,94      | 0,92              | 0,92      | 0,87              | 0,87      | 0,85              | 0,85      |
| 140       |                   |           | 1,00              | 1,00      | 1,00              | 1,00      | 0,97              | 0,97      | 0,95              | 0,95      |
| 160       |                   |           |                   |           |                   |           | 1,00              | 1,00      | 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

| $c_v$ [m] | M6           |           | M8           |           | M10          |           | M12          |           | M16          |           |
|-----------|--------------|-----------|--------------|-----------|--------------|-----------|--------------|-----------|--------------|-----------|
|           | $h > 1,5c_v$ | $h_{min}$ | $h > 1,5c_v$ | $h_{min}$ | $h > 1,5c_v$ | $h_{min}$ | $h > 1,5c_v$ | $h_{min}$ | $h > 1,5c_v$ | $h_{min}$ |
| 50        | 0,50         | 0,50      |              |           |              |           |              |           |              |           |
| 55        | 0,57         | 0,57      |              |           |              |           |              |           |              |           |
| 60        | 0,64         | 0,64      | 0,42         | 0,42      |              |           |              |           |              |           |
| 70        | 0,79         | 0,77      | 0,51         | 0,51      | 0,30         | 0,30      |              |           |              |           |
| 75        | 0,87         | 0,82      | 0,56         | 0,56      | 0,33         | 0,33      |              |           |              |           |
| 90        | 1,00         | 0,96      | 0,72         | 0,68      | 0,41         | 0,41      | 0,38         | 0,38      |              |           |
| 100       |              | 1,00      | 0,83         | 0,74      | 0,48         | 0,46      | 0,43         | 0,43      | 0,24         | 0,24      |
| 120       |              |           | 0,94         | 0,87      | 0,61         | 0,54      | 0,55         | 0,55      | 0,30         | 0,30      |
| 140       |              |           | 1,03         | 0,99      | 0,75         | 0,61      | 0,67         | 0,62      | 0,37         | 0,36      |
| 160       |              |           | 1,12         | 1,11      | 0,90         | 0,68      | 0,80         | 0,70      | 0,44         | 0,40      |
| 180       |              |           | 1,14         | 1,14      | 1,00         | 0,76      | 0,94         | 0,77      | 0,51         | 0,44      |
| 200       |              |           |              |           |              | 0,83      | 1,00         | 0,84      | 0,59         | 0,48      |
| 250       |              |           |              |           |              | 1,00      | 1,00         | 1,00      | 0,80         | 0,58      |
| 300       |              |           |              |           |              |           |              |           | 1,00         | 0,68      |
| 350       |              |           |              |           |              |           |              |           |              | 0,77      |
| 400       |              |           |              |           |              |           |              |           |              | 0,87      |
| 450       |              |           |              |           |              |           |              |           |              | 0,96      |
| 500       |              |           |              |           |              |           |              |           |              | 1,00      |

## Design performance data

### Spacing

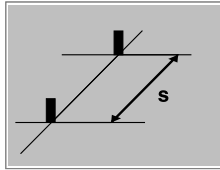


Table only valid for one spacing  $< s_{cr,N}$  and  $c \geq c_{cr,N}$ . For other cases use the Rawlplug Anchor Calculator

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

| $C_N$<br>[mm] | M8                   |           | M10                  |           | M12                  |           | M16                  |           | M20                  |           |
|---------------|----------------------|-----------|----------------------|-----------|----------------------|-----------|----------------------|-----------|----------------------|-----------|
|               | $h \geq 1.84h_{min}$ | $h_{min}$ | $h \geq 1.84h_{min}$ | $h_{min}$ | $h \geq 1.84h_{min}$ | $h_{min}$ | $h \geq 1.84h_{min}$ | $h_{min}$ | $h \geq 1.84h_{min}$ | $h_{min}$ |
| 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-C-08090/20 <sup>1)</sup> | 8                | 90          | 50             | 50    | 8000   | 3.6         | 3.6   | 605.2  | 5010445502101 |
| M10  | R-SPL-C-10105/25 <sup>1)</sup> | 10               | 105         | 50             | 50    | 8000   | 6.6         | 6.6   | 1085.2 | 5010445502200 |
| M12  | R-SPL-C-12125/30 <sup>1)</sup> | 12               | 125         | 25             | 25    | 4000   | 5.8         | 5.8   | 949.2  | 5010445502354 |
| M16  | R-SPL-C-16145/30 <sup>1)</sup> | 16               | 145         | 10             | 10    | 1600   | 4.6         | 4.6   | 763.4  | 5010445502507 |

<sup>1)</sup> ETA-11/0126