Deutsches Institut für Bautechnik DIBt

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments



# European Technical Assessment

# ETA-11/0323 of 22 August 2017

English translation prepared by DIBt - Original version in German language

**General Part**

| | |
|---|---|
| Technical Assessment Body issuing the European Technical Assessment: | Deutsches Institut für Bautechnik |
| Trade name of the construction product | Index SLRT |
| Product family to which the construction product belongs | Torque controlled expansion anchor for use in concrete |
| Manufacturer | INDEX Técnicas Expansivas S. L.<br>Segador 13. P.I. La Portalada II<br>26006 LOGROÑO-ESPAÑA<br>SPANIEN |
| Manufacturing plant | INDEX Plant 1 |
| This European Technical Assessment contains | 16 pages including 3 annexes which form an integral part of this assessment |
| This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of | European Assessment Document (EAD) 330232-00-0601 |
| This version replaces | ETA-11/0323 issued on 3 July 2015 |

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## Specific Part

### 1 Technical description of the product

The Index SLRT is an anchor made of galvanised steel of sizes M6, M8, M10, M12 and M16 which is placed into a drilled hole and anchored by torque-controlled expansion.

The product description is given in Annex A.

### 2 Specification of the intended use in accordance with the applicable European Assessment Document

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annex B.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the anchor of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

### 3 Performance of the product and references to the methods used for its assessment

### 3.1 Mechanical resistance and stability (BWR 1)

| Essential characteristic | Performance |
|---|---|
| Characteristic resistance for static and quasi static action and seismic performance category C1 and C2 | See Annex C 1 / C 2 |
| Displacements | See Annex C 5 |

### 3.2 Safety in case of fire (BWR 2)

| Essential characteristic | Performance |
|---|---|
| Reaction to fire | Anchorages satisfy requirements for Class A1 |
| Resistance to fire | See Annex C 3 / C 4 |

### 4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with European Assessment Documents EAD No. 330232-00-0601 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

## 5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

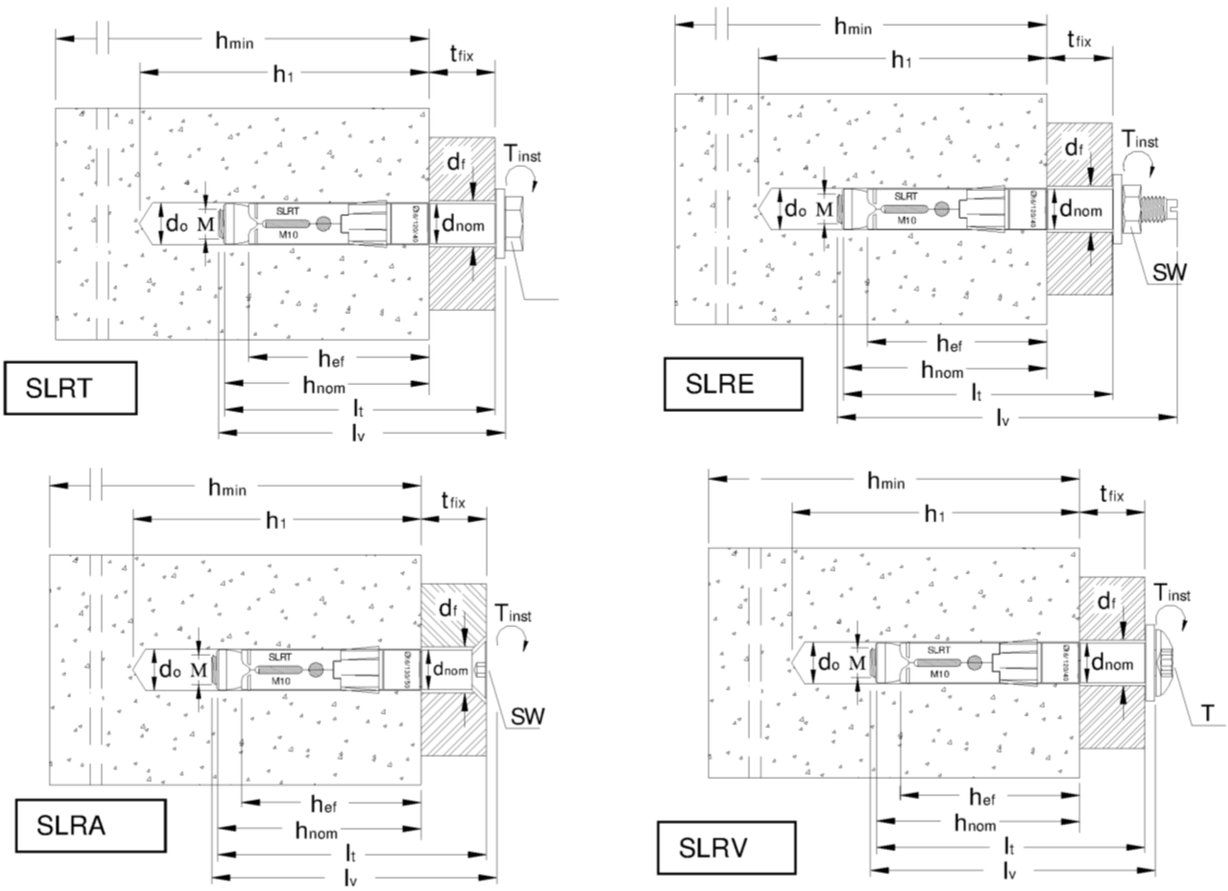
Issued in Berlin on 22 August 2017 by Deutsches Institut für Bautechnik

Lars Eckfeldt
p.p. Head of Department

*beglaubigt:*
Baderschneider

# Installed conditions

Installation for static, quasi-static and seismic performance category C1 and C2



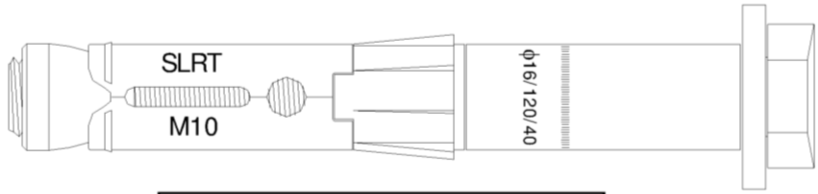

Designation

| | |
|---|---|
| $d_{nom}$ | Outside diameter of the anchor |
| $T_{inst}$ | Required torque moment |
| $t_{fix}$ | Thickness of the fixtures |
| $d_0$ | Diameter of the drill hole |
| $d_f$ | Diameter of the clearance hole in the fixture |
| $h_{min}$ | Minimum thickness of the concrete member |
| $h_{nom}$ | Overall anchor embedment depth |
| $h_{ef}$ | Anchorage depth |
| $l_t$ | Anchor length |
| $l_v$ | Bolt lenght |
| T | Hexalobular socket number |
| SW | Wrench size/Socket size |
| H | Hexagonal socket |

**Index SLRT**

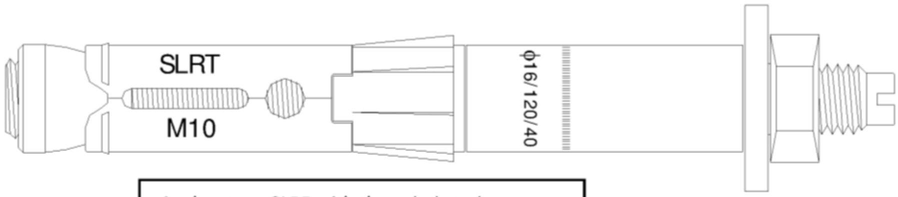
**Product description**
Installed condition

Annex A 1



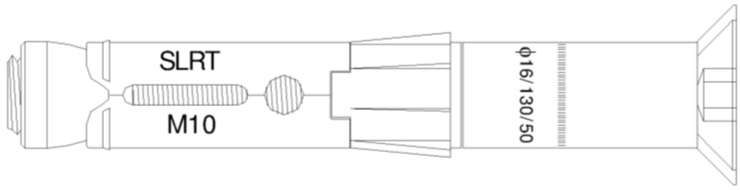

Anchor type SLRT with hexagonal head screw

**SLRT**



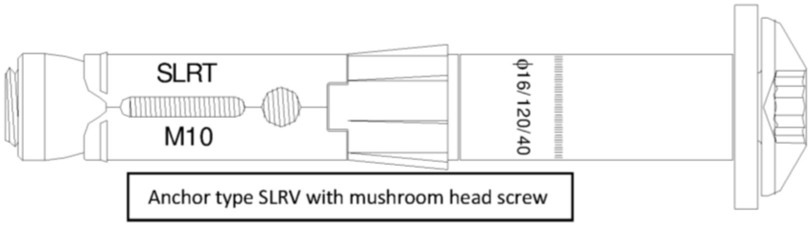

Anchor type SLRE with threaded stud

**SLRE**




Anchor type SLRA with flat countersunk head screw

**SLRA**




Anchor type SLRV with mushroom head screw

**SLRV**

***Table A1: Materials***

| ITEM | Description | Finishing |
|---|---|---|
| **1** | Zinc plated conical steel nut | Materials galvanised ≥ 5 [µm] according to ISO 4042:1999 |
| **2** | Zinc plated expansion steel sleeve (marking: SLRT / bolt size, e.g. M10) | |
| **3** | Nylon 6.6 cylinder with helix, red brick color | |
| **4** | Zinc plated steel extension (marking: $d_{nom}/l_t/t_{fix}$, e.g. Ø16/120/40) | |
| **5** | Zinc plated steel washer | |
| **6** | Zinc plated steel hexagonal head bolt, class 8.8 according to ISO 898-1:2012 | |
| **7** | Zinc plated steel hexagonal nut, class 8 according to ISO 898-2:2012 | |
| **8** | Zinc plated steel threaded stud, class 8.8 according to ISO 898-1:2012 | |
| **9** | Zinc plated steel countersunk washer, according to EN 10083:2006 | |
| **10** | Zinc plated steel flat countersunk head screw, class 8.8 accc.to ISO 898-1:2012 | |
| **11** | Zinc plated steel mushroom head screw, class 8.8 according to ISO 898-1:2012 | |

**Index SLRT**

**Product description**
Anchor types and components

Annex A 2

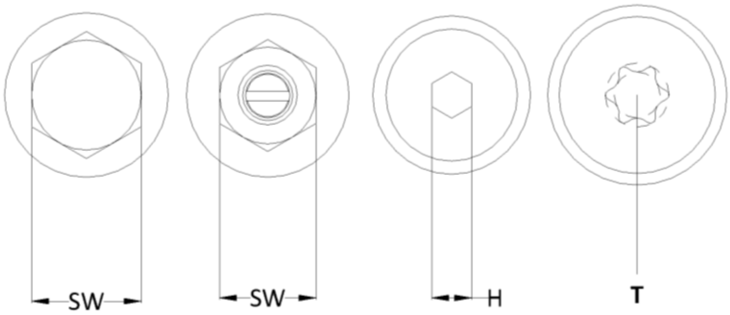



***Table A2: SLRT dimensions***

| Item | Outside diameter of anchor [mm] | Outside diameter of metric thread [mm] | Length range [mm] | Maximum thickness of fixture range [mm] |
|---|---|---|---|---|
| SLRT-M6 | 10 | 6 | 70 - 200 | 5 - 135 |
| SLRT-M8 | 12 | 8 | 80 - 200 | 10 - 130 |
| SLRT -M10 | 16 | 10 | 90 - 200 | 10 - 120 |
| SLRT -M12 | 18 | 12 | 110 – 250 | 10 - 150 |
| SLRT -M16 | 24 | 16 | 130 – 300 | 10 - 180 |

***Table A3: SLRE dimensions***

| Item | Outside diameter of anchor [mm] | Outside diameter of metric thread [mm] | Length range [mm] | Maximum thickness of fixture range [mm] |
|---|---|---|---|---|
| SLRE-M6 | 10 | 6 | 70 - 200 | 5 - 135 |
| SLRE-M8 | 12 | 8 | 80 - 200 | 10 - 130 |
| SLRE-M10 | 16 | 10 | 90 - 200 | 10 - 120 |
| SLRE-M12 | 18 | 12 | 110 – 250 | 10 - 150 |
| SLRE-M16 | 24 | 16 | 130 – 300 | 10 - 180 |

***Table A4: SLRA dimensions***

| Item | Outside diameter of anchor [mm] | Outside diameter of metric thread [mm] | Length range [mm] | Maximum thickness of fixture range [mm] |
|---|---|---|---|---|
| SLRA-M6 | 10 | 6 | 70 - 205 | 5 - 140 |
| SLRA-M8 | 12 | 8 | 85 - 205 | 15 - 135 |
| SLRA-M10 | 16 | 10 | 100 - 200 | 20 - 120 |
| SLRA-M12 | 18 | 12 | 120 - 200 | 20 - 100 |

***Table A5: SLRV dimensions***

| Item | Outside diameter of anchor [mm] | Outside diameter of metric thread [mm] | Length range [mm] | Maximum thickness of fixture range [mm] |
|---|---|---|---|---|
| SLRV -M8 | 12 | 8 | 80 - 200 | 10 - 130 |
| SLRV -M10 | 16 | 10 | 100 - 200 | 20 - 120 |

**Index SLRT**

**Product description**
Anchor's dimensions

Annex A 3

## Specifications of intended use

**Anchorages subject to:**

- Static and quasi-static loads: all sizes
- Seismic action for Performance Category C1: all sizes
- Seismic action for Performance Category C2: all sizes
- Resistance to fire exposure: all sizes

**Base materials:**

- Reinforced or unreinforced normal weight concrete according to EN 206-1:2000.
- Strength classes C20/25 to C50/60 according to EN 206-1:2000.
- Non-cracked or cracked concrete

**Use conditions (Environmental conditions):**

- Anchorages subject to dry internal conditions

**Design:**

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings (e.g. position of the anchor relative to reinforcement or to supports, etc.).
- Design of fastenings in accordance to FprEN 1992-4:2016 and EOTA Technical Report TR 055

**Installation:**

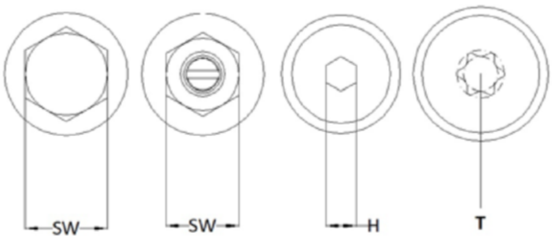
- Hole drilling by rotary plus hammer mode
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted hole is filled with high strength mortar and if under shear or oblique tension load it is not the direction of the load application.



| **Index SLRT** | Annex B 1 |
|---|---|
| **Intended use**<br>Specifications | |

### *Table B1: Installation parameters*

| Parameter | | SLRT M6 | SLRT M8 | SLRT M10 | SLRT M12 | SLRT M16 |
|---|---|---|---|---|---|---|
| Nominal drill hole diameter | $d_o$ = [mm] | 10 | 12 | 16 | 18 | 24 |
| Cutting diameter of drill bit | $d_{cut} \leq$ [mm] | 10,45 | 12,50 | 16,50 | 18,50 | 24,55 |
| Effective anchorage depth | $h_{ef}$ = [mm] | 55 | 60 | 70 | 90 | 105 |
| Depth of drill hole | $h_1$ = [mm] | 80 | 90 | 100 | 120 | 140 |
| Diameter of clearance in the fixture | $d_f$ = [mm] | 12 | 14 | 18 | 20 | 26 |
| Overall anchor embedment depth in the | $h_{nom}$ = [mm] | 65 | 70 | 80 | 100 | 120 |
| Required torque moment | $T_{inst}$ = [Nm] | 15 | 30 | 50 | 100 | 160 |
| Outside diameter of anchor | $d_{nom}$ = [mm] | 10 | 12 | 16 | 18 | 24 |
| Minimum thickness of concrete member | $h_{min}$ = [mm] | 110 | 120 | 140 | 180 | 210 |
| Minimum edge distance | $c_{min}$ = [mm] | 70 | 100 | 90 | 175 | 180 |
| | s ≥ [mm] | 110 | 160 | 175 | 255 | 290 |
| Minimum spacing | $s_{min}$ = [mm] | 55 | 110 | 80 | 135 | 130 |
| | c ≥ [mm] | 110 | 145 | 120 | 220 | 240 |




### *Table B2: Wrenches, sockets and maximum thickness of fixture*

| Item | | M6 | M8 | M10 | M12 | M16 |
|---|---|---|---|---|---|---|
| SLRT – Wrench size | SW = [mm] | 10 | 13 | 17 | 19 | 24 |
| Thickness of fixture | $t_{fix,max}$ = [mm] | 55 | 70 | 80 | 100 | 100 |
| | $t_{fix,min}$ = [mm] | 5 | 10 | 20 | 20 | 20 |
| SLRE – Wrench size | SW = [mm] | 10 | 13 | 17 | 19 | 24 |
| Thickness of fixture | $t_{fix,max}$ = [mm] | 55 | 70 | 80 | 100 | 100 |
| | $t_{fix,min}$ = [mm] | 5 | 10 | 20 | 20 | 20 |
| SLRA – Hexagonal socket size | H = [mm] | 4 | 5 | 6 | 8 | - |
| Thickness of fixture | $t_{fix,max}$ = [mm] | 60 | 55 | 50 | 100 | - |
| | $t_{fix,min}$ = [mm] | 20 | 15 | 30 | 20 | - |
| SLRV – Hexalobular socket number | T = [-] | - | 40 | 40 | - | - |
| Thickness of fixture | $t_{fix,max}$ = [mm] | - | 50 | 40 | - | - |
| | $t_{fix,min}$ = [mm] | - | 10 | 20 | - | - |

**Index SLRT**

**Intended use**
Installation parameters

Annex B 2

## *Drill bit*

| Anchor size | Drill bit item code |
|---|---|
| M6 / Ø10 | **BHDS10160** |
| M8 / Ø12 | **BHDS12160** |
| M10 / Ø16 | **BHDS16210** |
| M12 / Ø18 | **BHDS18210** |
| M16 / Ø24 | **BHDS24210** |

## *Blowing pump*

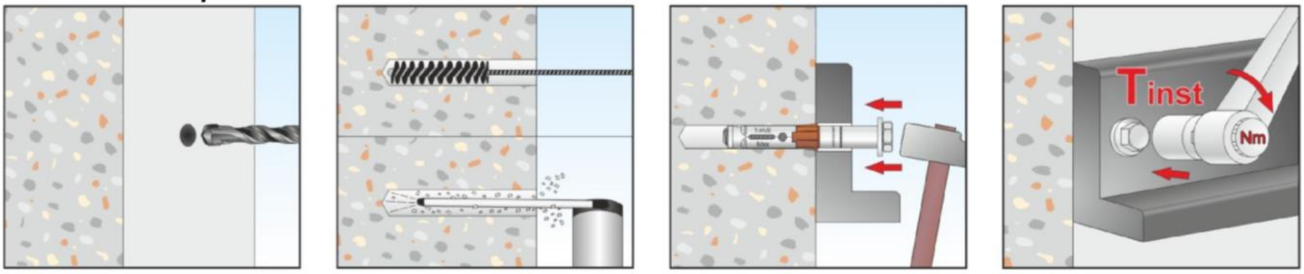
Item code: **MOBOMBA**

**Index SLRT**

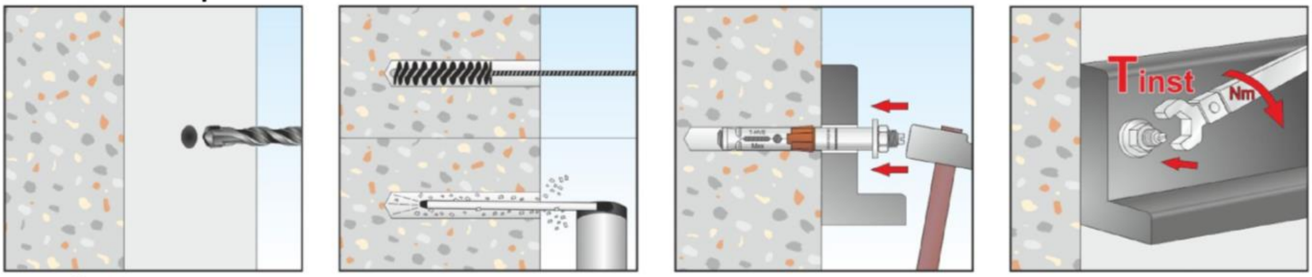
**Intended use**
Cleaning and setting tools

Annex B 3

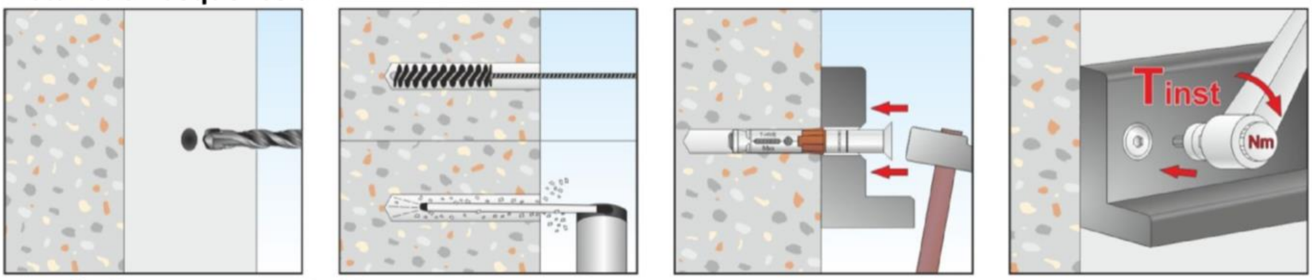
**Installation sequence SLRT**



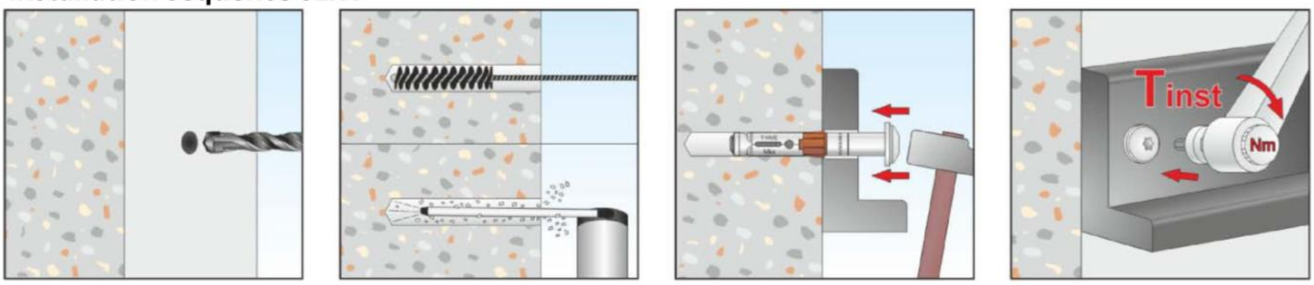

**Installation sequence SLRE**




**Installation sequence SLRA**




**Installation sequence SLRV**




| | |
|---|---|
| Step 1 | Drill a hole into the concrete in rotary plus hammer mode |
| Step 2 | Remove the dust into the hole using a 4 times a brush and 4 times a blowing pump |
| Step 3 | Place the fixture and hammer the anchor in the drill hole |
| Step 4 | Apply the required torque moment |



| | |
|---|---|
| **Index SLRT** | Annex B 4 |
| **Intended use**<br>Installation instructions | |

**Deutsches Institut für Bautechnik** DIBt

### *Table C1: Performances for design, tension*

| Type of anchor / Size | | | SLRT M6 | SLRT M8 | SLRT M10 | SLRT M12 | SLRT M16 |
|---|---|---|---|---|---|---|---|
| **Steel Failure** | | | | | | | |
| Characteristic Resistance | $N_{Rk,s}$ $N_{Rk,s,eq,C1}$ $N_{Rk,s,eq,C2}$ | [kN] | 16 | 29 | 46 | 67 | 125 |
| Partial safety factor | $\gamma_{Ms}$ [1)] | [-] | 1,5 | | | | |
| **Pull-out failure** | | | | | | | |
| Effective embedment depth | $h_{ef}$ | [mm] | 55 | 60 | 70 | 90 | 105 |
| Characteristic Resistance in uncracked concrete C20/25 | $N_{Rk,p}$ | [kN] | 16 | 16 | 20 | 35 | 45 |
| Characteristic Resistance in cracked concrete C20/25 | $N_{Rk,p}$ | [kN] | 5 | 6 | 16 | 25 | 35 |
| Characteristic Resistance for seismic performance category C1 | $N_{Rk,p,eq}$ | [kN] | 5 | 4,2 | 14,4 | 25 | 35 |
| Characteristic Resistance for seismic performance category C2 | $N_{Rk,p,eq}$ | [kN] | 3,9 | 4,2 | 11,7 | 18,5 | 31 |
| Increasing factors for $N_{Rk,p}$ for cracked and uncracked concrete | $\Psi_c$ | C30/37 | 1,22 | | | | |
| | | C40/50 | 1,41 | | | | |
| | | C50/60 | 1,58 | | | | |
| Installation safety factor | $\gamma_{inst}$ | [-] | 1,0 | | | | |
| **Concrete cone failure and splitting failure** | | | | | | | |
| Effective embedment depth | $h_{ef}$ | [mm] | 55 | 60 | 70 | 90 | 105 |
| Factor for $k_1$ | $k_{ucr,N}$ | [-] | 11,0 | | | | |
| Factor for $k_1$ | $k_{cr,N}$ | [-] | 7,7 | | | | |
| Spacing | $s_{cr,N}$ | [mm] | 165 | 180 | 210 | 270 | 315 |
| Edge distance | $c_{cr,N}$ | [mm] | 85 | 90 | 105 | 135 | 160 |
| Spacing(splitting) | $s_{cr,sp}$ | [mm] | 220 | 320 | 240 | 370 | 390 |
| Edge distance (splitting) | $c_{cr,sp}$ | [mm] | 110 | 160 | 120 | 185 | 195 |
| Installation safety factor | $\gamma_{inst}$ | [-] | 1,0 | | | | |

[1)] In absence of other national regulations.



**Index SLRT**

**Performances**
Characteristic resistance to tension loads

Annex C 1

### *Table C2: Performances for design, shear*

| Type of anchor / Size | | | SLRT M6 | SLRT M8 | SLRT M10 | SLRT M12 | SLRT M16 |
|---|---|---|---|---|---|---|---|
| **Steel Failure without level arm** | | | | | | | |
| Characteristic Resistance | $V_{Rk,s}$ | [kN] | 16 | 25 | 43 | 58 | 107 |
| Characteristic Resistance for seismic performance category C1 | $V_{Rk,s,eq}$ | [kN] | 11,4 | 17 | 28 | 43,5 | 96,3 |
| Characteristic Resistance for seismic performance category C2 | $V_{Rk,s,eq}$ | [kN] | 6,0 | 10,7 | 23,2 | 40,6 | 74,9 |
| Partial safety factor | $\gamma_{Ms}$ 1) | [-] | 1,45 | | | | |
| **Steel Failure with level arm** | | | | | | | |
| Characteristic bending moment | $M^0_{Rk,s}$ | [Nm] | 12 | 30 | 60 | 105 | 266 |
| Ductility factor | $k_7$ | [-] | 0,8 | | | | |
| Partial safety factor | $\gamma_{Ms}$ 1) | [-] | 1,45 | | | | |
| **Concete pryout failure** | | | | | | | |
| Effective embedmen depth | $h_{ef}$ | [mm] | 55 | 60 | 70 | 90 | 105 |
| Factor for pryout failure | $k_8$ | [-] | 1 | 2 | 2 | 2 | 2 |
| Installation safety factor | $\gamma_{inst}$ | [-] | 1,0 | | | | |
| **Concrete edge failure** | | | | | | | |
| Effective achorage legth | $l_{ef}$ | [mm] | 55 | 60 | 70 | 90 | 105 |
| Effective external diameter anchor | $d_{nom}$ | [mm] | 10 | 12 | 16 | 18 | 24 |
| Installation safety factor | $\gamma_{inst}$ | [-] | 1,0 | | | | |

1) In absence of other national regulations.



**Index SLRT**

**Performances**
Characteristic resistance to shear loads

Annex C 2

***Table C3: Performances under fire exposure in concrete C20/25 to C50/60 (tension)***

| Duration of fire resistance = 30min | | | M6 | M8 | M10 | M12 | M16 |
|---|---|---|---|---|---|---|---|
| **Steel Failure** | | | | | | | |
| Characteristic Resistance | $N_{Rk,s,fi,30}$ | [kN] | 0,2 | 0,4 | 0,9 | 1,7 | 3,1 |
| **Pull-out failure** | | | | | | | |
| Characteristic Resistance in concrete C20/25 to C50/60 | $N_{Rk,p,fi,30}$ | [kN] | 1,3 | 1,5 | 4,0 | 6,3 | 8,8 |
| **Concrete cone failure** | | | | | | | |
| Characteristic Resistance in concrete C20/25 to C50/60 | $N_{Rk,c,fi,30}$ | [kN] | 4,0 | 5,0 | 7,4 | 13,8 | 20,3 |
| **Duration of fire resistance = 60min** | | | **M6** | **M8** | **M10** | **M12** | **M16** |
| **Steel Failure** | | | | | | | |
| Characteristic Resistance | $N_{Rk,s,fi,60}$ | [kN] | 0,2 | 0,3 | 0,8 | 1,3 | 2,4 |
| **Pull-out failure** | | | | | | | |
| Characteristic Resistance in concrete C20/25 to C50/60 | $N_{Rk,p,fi,60}$ | [kN] | 1,3 | 1,5 | 4,0 | 6,3 | 8,8 |
| **Concrete cone failure** | | | | | | | |
| Characteristic Resistance in concrete C20/25 to C50/60 | $N_{Rk,c,fi,60}$ | [kN] | 4,0 | 5,0 | 7,4 | 13,8 | 20,3 |
| **Duration of fire resistance = 90min** | | | **M6** | **M8** | **M10** | **M12** | **M16** |
| **Steel Failure** | | | | | | | |
| Characteristic Resistance | $N_{Rk,s,fi,90}$ | [kN] | 0,1 | 0,3 | 0,6 | 1,1 | 2,0 |
| **Pull-out failure** | | | | | | | |
| Characteristic Resistance in concrete C20/25 to C50/60 | $N_{Rk,p,fi,90}$ | [kN] | 1,3 | 1,5 | 4,0 | 6,3 | 8,8 |
| **Concrete cone failure** | | | | | | | |
| Characteristic Resistance in concrete C20/25 to C50/60 | $N_{Rk,c,fi,90}$ | [kN] | 4,0 | 5,0 | 7,4 | 13,8 | 20,8 |
| **Duration of fire resistance = 120min** | | | **M6** | **M8** | **M10** | **M12** | **M16** |
| **Steel Failure** | | | | | | | |
| Characteristic Resistance | $N_{Rk,s,fi,120}$ | [kN] | 0,1 | 0,2 | 0,5 | 0,8 | 1,6 |
| **Pull-out failure** | | | | | | | |
| Characteristic Resistance in concrete C20/25 to C50/60 | $N_{Rk,p,fi,120}$ | [kN] | 1,0 | 1,2 | 3,2 | 5,0 | 7,0 |
| **Concrete cone failure** | | | | | | | |
| Characteristic Resistance in concrete C20/25 to C50/60 | $N_{Rk,c,fi,120}$ | [kN] | 3,2 | 4,0 | 5,9 | 11,1 | 16,3 |
| Spacing | $s_{cr,N}$ | [mm] | **4 x $h_{ef}$** | | | | |
| | $s_{min}$ | [mm] | 55 | 110 | 80 | 135 | 130 |
| Edge distance | $c_{cr,N}$ | [mm] | **2 x $h_{ef}$** | | | | |
| | $c_{min}$ | [mm] | $c_{min}$ = 2x$h_{ef}$; If fire attack comes from more than one side, the edge distance of the anchor has to be ≥ 300mm or ≥ 2 x $h_{ef}$ | | | | |



**Index SLRT**

**Performances**
Characteristic values for fire exposure under tension loads

Annex C 3

*Table C4: Performances under fire exposure in concrete C20/25 to C50/60 (shear)*

| **Duration of fire resistance = 30min** | | | **M6** | **M8** | **M10** | **M12** | **M16** |
|---|---|---|---|---|---|---|---|
| **Shear load without lever arm** | | | | | | | |
| Characteristic resistance | $V_{Rk,s,fi,30}$ | [kN] | 0,3 | 0,5 | 1,2 | 2,1 | 3,9 |
| **Shear load with lever arm** | | | | | | | |
| Characteristic bending resistance | $M^0_{Rk,s,fi,30}$ | [Nm] | 0,2 | 0,4 | 1,1 | 2,6 | 6,7 |
| **Duration of fire resistance = 60min** | | | **M6** | **M8** | **M10** | **M12** | **M16** |
| **Shear load without lever arm** | | | | | | | |
| Characteristic resistance | $V_{Rk,s,fi,60}$ | [kN] | 0,3 | 0,4 | 1,0 | 1,6 | 2,9 |
| **Shear load with lever arm** | | | | | | | |
| Characteristic bending resistance | $M^0_{Rk,s,fi,60}$ | [Nm] | 0,1 | 0,3 | 1,0 | 2,0 | 5,0 |
| **Duration of fire resistance = 90min** | | | **M6** | **M8** | **M10** | **M12** | **M16** |
| **Shear load without lever arm** | | | | | | | |
| Characteristic resi stance | $V_{Rk,s,fi,90}$ | [kN] | 0,2 | 0,3 | 0,8 | 1,4 | 2,5 |
| **Shear load with lever arm** | | | | | | | |
| Characteristic bending resistance | $M^0_{Rk,s,fi,90}$ | [Nm] | 0,1 | 0,3 | 0,8 | 1,7 | 4,3 |
| **Duration of fire resistance = 120min** | | | **M6** | **M8** | **M10** | **M12** | **M16** |
| **Shear load without lever arm** | | | | | | | |
| Characteristic resistance | $V_{Rk,s,fi,120}$ | [kN] | 0,2 | 0,2 | 0,6 | 1,0 | 1,9 |
| **Shear load with lever arm** | | | | | | | |
| Characteristic bending resistance | $M^0_{Rk,s,fi,120}$ | [Nm] | 0 | 0,2 | 0,6 | 1,3 | 3,3 |
| **Concrete pryout failure** | | | | | | | |
| The characteristic resistance $V_{Rk,cp,fi,Ri}$ in concrete C20/25 to C50/60 is determined by: $V_{Rk,c,fi(90)} = k_8 \times N_{Rk,c,fi(90)}$ (≤ R90) and $V_{Rk,c,fi(120)} = k_8 \times N_{Rk,c,fi(120)}$ (up to R120) | | | | | | | |
| **Concrete edge failure** | | | | | | | |
| The characteristic resistance $V_{rk,cp,fi,Ri}$ in concrete C20/25 to C50/60 is determined by: $V^0_{Rk,c,fi(90)} = 0{,}25 \times V^0_{Rk,c}$ (R30, R60, R90) and $V^0_{Rk,c,fi(120)} = 0{,}20 \times V^0_{Rk,c}$ (R120) with $V^0_{Rk,c}$ as an initial value of the characteristic resistance of a single anchor in cracked concrete C20/25 | | | | | | | |



| | |
|---|---|
| **Index SLRT** | Annex C 4 |
| **Performances**<br>Characteristic values for fire exposure under shear loads | |

### *Table C5: Displacements*

| **Tension loads in cracked and uncracked concrete** | | | **M6** | **M8** | **M10** | **M12** | **M16** |
|---|---|---|---|---|---|---|---|
| Service tension load in uncracked concrete C20/25 | N | [kN] | 7,6 | 7,6 | 9,5 | 16,7 | 21,4 |
| Displacements | $\delta_{N0}$ | [mm] | 1,3 | 1,5 | 1,0 | 1,3 | 1,8 |
| | $\delta_{N\infty}$ | [mm] | 1,3 | 1,5 | 1,0 | 1,3 | 1,8 |
| Service tension load in cracked concrete C20/25 | N | [kN] | 2,4 | 2,9 | 7,6 | 11,9 | 16,7 |
| Displacements | $\delta_{N0}$ | [mm] | 1,0 | 0,7 | 1,0 | 1,2 | 1,5 |
| | $\delta_{N\infty}$ | [mm] | 1,6 | 1,3 | 1,6 | 1,7 | 1,5 |
| **Shear loads in cracked and uncracked concrete** | | | **M6** | **M8** | **M10** | **M12** | **M16** |
| Service shear load in cracked and uncracked concrete C20/25 | V | [kN] | 7,7 | 12,3 | 21,0 | 23,3 | 52,5 |
| Displacements | $\delta_{V0}$ | [mm] | 2,4 | 2,6 | 2,5 | 3,0 | 4,0 |
| | $\delta_{V\infty}$ | [mm] | 3,6 | 3,9 | 3,8 | 4,5 | 6,0 |
| **Seismic performance category C2** | | | | | | | |
| **Damage limit state** | | | | | | | |
| Tension load | $\delta_{N,eq(DLS)}$ | [mm] | 5,56 | 5,24 | 4,23 | 5,39 | 6,74 |
| Shear load | $\delta_{V,eq(DLS)}$ | [mm] | 3,18 | 5,74 | 5,12 | 5,98 | 6,93 |
| **Ultimate limit state** | | | | | | | |
| Tension load | $\delta_{N,eq(ULS)}$ | [mm] | 22,70 | 17,65 | 14,50 | 16,03 | 20,59 |
| Shear load | $\delta_{V,eq(ULS)}$ | [mm] | 4,82 | 11,02 | 9,37 | 9,42 | 12,96 |