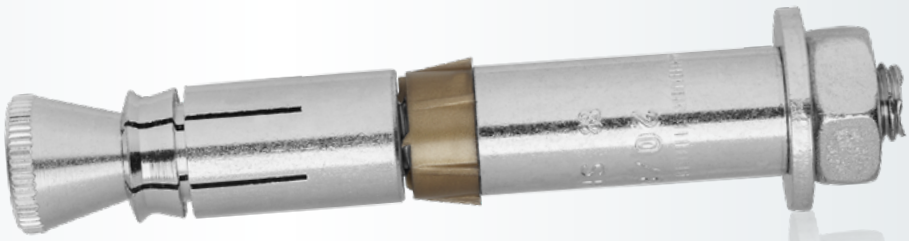
EJOT®



# LIEBIG® SUPERPLUS Undercut Anchors

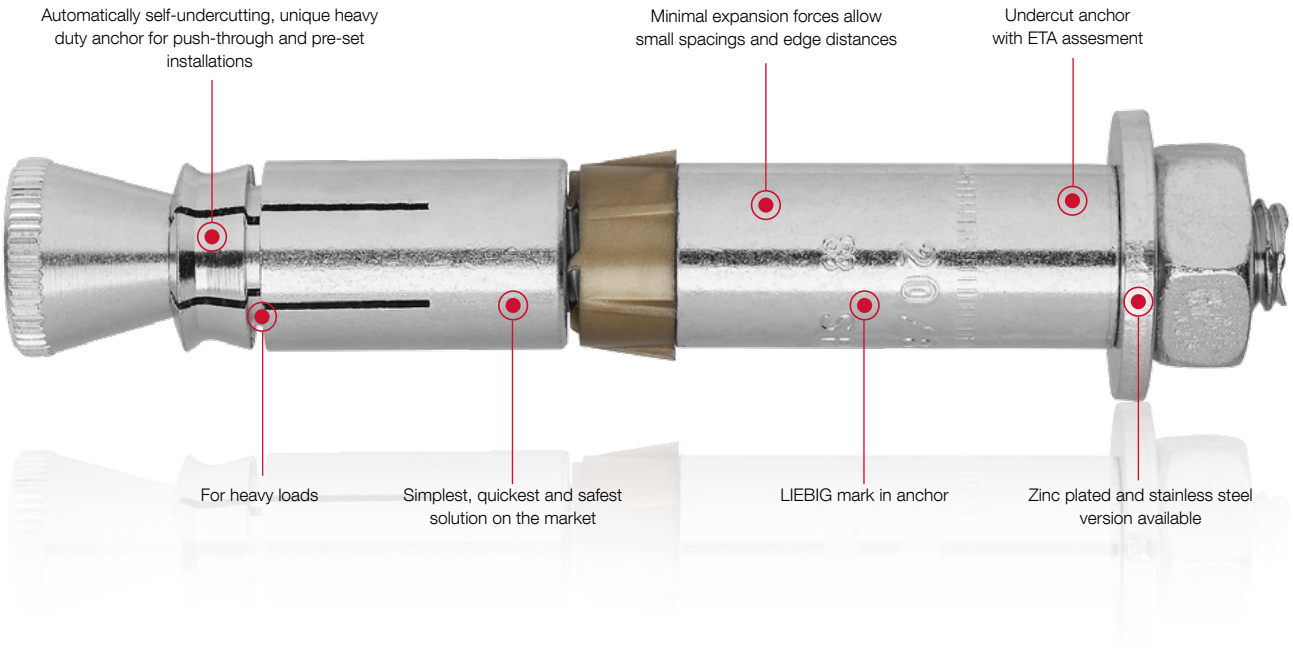
Simply the best heavy duty self-undercutting anchor in the world

LIEBIG

Bringing it together.

# Simply the best heavy duty self-undercutting anchor in the world

No special drill bits, undercut tools or setting tools needed




## Product description

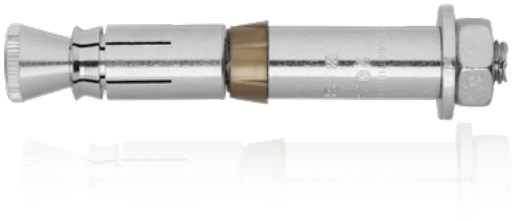
- Automatically self-undercutting and mechanical interlock.
- Unique heavy duty anchor for concrete C20/25…C50/60.
- For push-through and pre-set installation methods.
- Good suitability for overhead installation.
- For static, quasi-static and seismic loads.
- Economical: No special drill bits, undercut tools or setting tools needed.
- Minimal expansion forces allow small spacings and edge distances.
- Suitable for special conditions such as power plant use.
- ZP for dry indoor and temporary outdoor use. A4 for indoor, outdoor and industrial use.

ETA-01/0011
Option 1

## SUPERPLUS BLS

- Push-through installations
- Zinc electropl. acc. EN ISO 4042, t ≥ 5 µm
- Dry indoor conditions, indoor with temporary condensation

ETA-01/0011 Option 1



## SUPERPLUS BLS-P

- Pre-set installations
- Zinc electropl. acc. EN ISO 4042, t ≥ 5 µm
- Dry indoor conditions, indoor with temporary condensation

ETA-01/0011 Option 1

## SUPERPLUS BLS A4

- Push-through installations
- Stainless steel A4
- For indoor, outdoor and industrial use

ETA-01/0011 Option 1

## SUPERPLUS SD A4

- Push-through installations
- Stainless steel A4
- Used for fixing step irons

ETA-01/0011 Option 1

## SUPERPLUS ILS

- Pre-set installations
- Zinc electroplated acc. EN ISO 4042, t ≥ 5 µm
- Internal thread M8

## SUPERPLUS LPA A4

- Stainless steel A4
- Retrofitted grounding systems

## SUPERPLUS SLS A4

- Push through installations
- Stainless steel A4
- For indoor, outdoor and industrial use

ETA-01/0011 Option 1

## SUPERPLUS SKLS A4

- Push through installations
- Stainless steel A4
- For indoor, outdoor and industrial use

ETA-01/0011 Option 1

# Base materials

**Approved for**

- Cracked concrete
- Non-cracked concrete

# Approvals / Cerfications / Applications

| Description of document | | Authority/ Laboratory | ID | Additional info |
|---|---|---|---|---|
| **European Technical Assessment** | | Centre Scientifique et Technique du Bâtiment | ETA-01/0011 | ETAG 001-1 Option 1 |
| **Fire resistance** | | Centre Scientifique et Technique du Bâtiment | ETA-01/0011 | EOTA TR 020 - Evaluation of Anchorages in Concrete concerning Resistance to Fire |
| **Seismic resistance** | | Centre Scientifique et Technique du Bâtiment | ETA-01/0011 | EOTA TR 045 - Design of Metal Anchors For Use In Concrete Under Seismic Actions |
| **EJOT Anchor Fix calculation software** |  | EJOT software | | Free download: www.ejot.com/software-anchorfix |

# Static and quasi-static loads: BLS, BLS-P, ILS

**The data of these tables is based on:**

- ETA-01/0011: Zinc plated versions BLS, BLS-P
- Concrete C20/25, $f_{ck,cube}$ = 25 N/mm²
- Installation has been done correctly
- Push-through installation BLS and pre-set installation BLS-P, see setting instructions
- Without influence of edge- and spacing distances
- In minimum base material thickness

| Anchor size | | | M8 | | M12 | | M16 | |
|---|---|---|---|---|---|---|---|---|
| Effective anchorage depth $h_{ef}$ | | [mm] | 40 | 80 | 80 | 150 | 150 | 200 |
| Nominal anchorage depth $h_{nom}$ | | [mm] | 52 | 92 | 96 | 166 | 168 | 218 |

## Characteristic resistances

| Anchor size | | | M8 | | M12 | | M16 | |
|---|---|---|---|---|---|---|---|---|
| **Non-cracked concrete** | | | | | | | | |
| Tensile $N_{Rk}$ | | [kN] | 12.8 | 29.3* | 36.1 | 67.4* | 92.8 | 125.6* |
| Shear $V_{Rk}$ | Push-through installation: BLS | [kN] | 12.8 | 41.4* | 70.0 | 70.0* | 118.0* | 118.0* |
| Shear $V_{Rk}$ | Pre-set installation: ILS, BLS-P | [kN] | 12.8 | 15.0 | 34.0* | 34.0* | 63.0* | 63.0* |
| **Cracked concrete** | | | | | | | | |
| Tensile $N_{Rk}$ | | [kN] | 9.1 | 16.0 | 25.0 | 40.0 | 50.0 | 75.0 |
| Shear $V_{Rk}$ | Push-through installation: BLS | [kN] | 9.1 | 41.4* | 51.5 | 70.0* | 118.0 | 118.0* |
| Shear $V_{Rk}$ | Pre-set installation: ILS, BLS-P | [kN] | 9.1 | 15 | 34.0* | 34.0* | 63.0* | 63.0* |
| Characteristic bending moment $M^0_{Rk,s}$ | | [Nm] | 30 | | 105 | | 266 | |

## Design resistances

| Anchor size | | | M8 | | M12 | | M16 | |
|---|---|---|---|---|---|---|---|---|
| **Non-cracked concrete** | | | | | | | | |
| Tensile $N_{Rd}$ | | [kN] | 8.5 | 19.6* | 24.1 | 44.9* | 61.9 | 83.7* |
| Shear $V_{Rd}$ | Push-through installation: BLS | [kN] | 8.5 | 33.2* | 48.2 | 56.0* | 94.4* | 94.4* |
| Shear $V_{Rd}$ | Pre-set installation: ILS, BLS-P | [kN] | 8.5 | 12.0 | 27.2* | 27.2* | 50.4* | 50.4* |
| **Cracked concrete** | | | | | | | | |
| Tensile $N_{Rd}$ | BLS, BLS-P | [kN] | 6.0 | 10.6 | 16.7 | 26.6 | 33.3 | 50.0 |
| Shear $V_{Rd}$ | Push-through installation: BLS | [kN] | 6.0 | 33.2* | 34.3 | 56.0* | 88.2 | 94.4* |
| Shear $V_{Rd}$ | Pre-set installation: ILS, BLS-P | [kN] | 6.0 | 12.0 | 27.2* | 27.2* | 50.4* | 50.4* |
| Design bending moment $M_{Rd,s}$ | | [Nm] | 24 | | 84 | | 213 | |

## Recommended loads

| Anchor size | | | M8 | | M12 | | M16 | |
|---|---|---|---|---|---|---|---|---|
| **Non-cracked concrete** | | | | | | | | |
| Tensile $N_{rec}$ | | [kN] | 6.1 | 13.9* | 17.2 | 32.1* | 44.1 | 59.8* |
| Shear $V_{rec}$ | Push-through installation: BLS | [kN] | 6.1 | 23.7* | 34.4 | 40.0* | 67.4* | 67.4* |
| Shear $V_{rec}$ | Pre-set installation: ILS, BLS-P | [kN] | 6.1 | 8.6 | 19.3* | 19.3* | 35.9* | 35.9* |
| **Cracked concrete** | | | | | | | | |
| Tensile $N_{rec}$ | | [kN] | 4.3 | 7.6 | 11.9 | 19.0 | 23.8 | 35.7 |
| Shear $V_{rec}$ | Push-through installation: BLS | [kN] | 4.3 | 23.7* | 24.6 | 40.0* | 63.0 | 67.4* |
| Shear $V_{rec}$ | Pre-set installation: ILS, BLS-P | [kN] | 4.3 | 8.6 | 19.3* | 19.3* | 35.9* | 35.9* |
| Recommended bending moment $M_{rec,s}$ | | [Nm] | 17 | | 60 | | 152 | |
| *= Failure mode is STEEL | | | | | | | | |

- The partial safety factor for action is $\gamma$ = 1.4.
- ILS steel grade ≥ 8.8.

# Static and quasi-static loads: BLS A4, SD A4, SLS A4, SKLS A4

**The data of these tables is based on:**

- ETA-01/0011: Stainless steel versions BLS A4, SD A4, SLS A4, SKLS A4
- Concrete C20/25, $f_{ck,cube}$ = 25 N/mm²
- Installation has been done correctly
- Push-through installation BLS A4 see setting instructions
- Without influence of edge- and spacing distances
- In minimum base material thickness

| Anchor size | | M8 | | M12 | | M16 | |
|---|---|---|---|---|---|---|---|
| Effective anchorage depth $h_{ef}$ | [mm] | 40 | 80 | 80 | 150 | 150 | 200 |
| Nominal anchorage depth $h_{nom}$ | [mm] | 52 | 92 | 96 | 166 | 168 | 218 |

## Characteristic resistances

| Anchor size | | | M8 | | M12 | | M16 | |
|---|---|---|---|---|---|---|---|---|
| **Non-cracked concrete** | | | | | | | | |
| Tensile $N_{Rk}$ | | [kN] | 12.8 | 29.3* | 36.1 | 67.4* | 92.8 | 125.6* |
| Shear $V_{Rk}$ | Push-through installation | [kN] | 12.8 | 44.6* | 72.3 | 90.3* | 169.8* | 169.8* |
| **Cracked concrete** | | | | | | | | |
| Tensile $N_{Rk}$ | | [kN] | 9.0 | 12.0 | 25.0 | 40.0 | 60.0 | 60.0 |
| Shear $V_{Rk}$ | Push-through installation | [kN] | 9.1 | 44.6* | 51.5 | 90.3* | 132.3 | 169.8 |
| Characteristic bending moment $M^0_{Rk,s}$ | | [Nm] | 30 | | 105 | | 266 | |
| *= Failure mode is STEEL | | | | | | | | |

## Design resistances

| Anchor size | | | M8 | | M12 | | M16 | |
|---|---|---|---|---|---|---|---|---|
| **Non-cracked concrete** | | | | | | | | |
| Tensile $N_{Rd}$ | | [kN] | 8.5 | 18.3* | 24.1 | 42.1* | 61.9 | 78.5* |
| Shear $V_{Rd}$ | Push-through installation: BLS | [kN] | 8.5 | 33.6* | 48.2 | 67.9* | 123.8 | 127.7* |
| **Cracked concrete** | | | | | | | | |
| Tensile $N_{Rd}$ | | [kN] | 6.0 | 8.0 | 16.7 | 26.6 | 40.0 | 40.0 |
| Shear $V_{Rd}$ | Push-through installation: BLS | [kN] | 6.0 | 33.6* | 34.3 | 67.9* | 88.2 | 127.7* |
| Design bending moment $M_{Rd,s}$ | | [Nm] | 23 | | 79 | | 200 | |
| *= Failure mode is STEEL | | | | | | | | |

## Recommended loads

| Anchor size | | | M8 | | M12 | | M16 | |
|---|---|---|---|---|---|---|---|---|
| **Non-cracked concrete** | | | | | | | | |
| Tensile $N_{rec}$ | | [kN] | 6.1 | 13.1* | 17.2 | 30.1* | 44.2 | 56.1* |
| Shear $V_{rec}$ | Push-through installation: BLS | [kN] | 6.1 | 24.0* | 34.4 | 48.5* | 88.4 | 91.2* |
| **Cracked concrete** | | | | | | | | |
| Tensile $N_{rec}$ | | [kN] | 4.3 | 5.7 | 11.9 | 19.0 | 28.6 | 28.6 |
| Shear $V_{rec}$ | Push-through installation: BLS | [kN] | 4.3 | 24.0* | 24.5 | 48.5* | 63.0 | 91.2* |
| Recommended bending moment $M_{rec,s}$ | | [Nm] | 16 | | 56 | | 143 | |
| *= Failure mode is STEEL | | | | | | | | |

The partial safety factor for action is $\gamma$ = 1.4.

# **Seismic resistance C1:** BLS, BLS-P

Design acc. EOTA TR 045: Performance Category C1

**The data of these tables is based on:**

- ETA-01/0011: Zinc plated anchors BLS, BLS-P
- Concrete C20/25, $f_{ck,cube}$ = 25 N/mm²
- Installation has been done correctly
- Without influence of edge- and spacing distances
- In minimum base material thickness

## Characteristic resistances C1

| Anchor size | | | M12 | | M16 | |
|---|---|---|---|---|---|---|
| Effective anchorage depth $h_{ef}$ | | [mm] | 80 | 150 | 150 | 200 |
| | | | | | | |
| Tensile resistance C1 | $N^0_{Rk,\,seis,\,C1}$ | [kN] | 25.0 | 40.0 | 50.0 | 50.0 |
| Shear resistance C1 | $V^0_{Rk,\,seis,\,C1}$ | [kN] | 30.3* | 30.3* | 62.8* | 62.8* |
| *= Failure mode is STEEL | | | | | | |

## Design resistances C1

| Anchor size | | | M12 | | M16 | |
|---|---|---|---|---|---|---|
| Effective anchorage depth $h_{ef}$ | | [mm] | 80 | 150 | 150 | 200 |
| | | | | | | |
| Tensile resistance C1 | $N_{Rd,\,seis,\,C1}$ | [kN] | 14.6 | 26.6 | 33.3 | 33.3 |
| Shear resistance C1 | $V_{Rd,\,seis,\,C1}$ | [kN] | 12.1* | 12.1* | 25.1* | 25.1* |
| *= Failure mode is STEEL | | | | | | |

## Recommended loads C1

| Anchor size | | | M12 | | M16 | |
|---|---|---|---|---|---|---|
| Effective anchorage depth $h_{ef}$ | | [mm] | 80 | 150 | 150 | 200 |
| | | | | | | |
| Tensile resistance C1 | $N_{rec,\,seis,\,C1}$ | [kN] | 10.4 | 19.0 | 23.8 | 23.8 |
| Shear resistance C1 | $V_{rec,\,seis,\,C1}$ | [kN] | 8.7* | 8.7* | 17.9* | 17.9* |
| *= Failure mode is STEEL | | | | | | |

The partial safety factor for action is $\gamma = 1.4$.
$\alpha_{seis}$ and $\alpha_{gap}$ included as per EOTA TR 045.
Values don't consider any filling of annular gap between anchor and fixture.

# Seismic resistance C2: BLS, BLS-P

Design acc. EOTA TR 045: Performance Category C2

**The data of these tables is based on:**

- ETA-01/0011: Zinc plated anchors BLS, BLS-P
- Concrete C20/25, $f_{ck,cube}$ = 25 N/mm²
- Installation has been done correctly
- Without influence of edge- and spacing distances
- In minimum base material thickness

## Characteristic resistances C2

| Anchor size | | | M12 | | M16 | |
|---|---|---|---|---|---|---|
| Effective anchorage depth $h_{ef}$ | | [mm] | 80 | 150 | 150 | 200 |
| | | | | | | |
| Tensile resistance C2 | $N^0_{Rk,\,seis,\,C2}$ | [kN] | 25.0 | 40.0 | 50.0 | 50.0 |
| Shear resistance C2 | $V^0_{Rk,\,seis,\,C2}$ | [kN] | 18.2* | 18.2* | 51.5* | 51.5* |
| *= Failure mode is STEEL | | | | | | |

## Design resistances C2

| Anchor size | | | M12 | | M16 | |
|---|---|---|---|---|---|---|
| Effective anchorage depth $h_{ef}$ | | [mm] | 80 | 150 | 150 | 200 |
| | | | | | | |
| Tensile resistance C2 | $N_{Rd,\,seis,\,C2}$ | [kN] | 14.6 | 26.6 | 33.3 | 33.3 |
| Shear resistance C2 | $V_{Rd,\,seis,\,C2}$ | [kN] | 7.3* | 7.3* | 20.6* | 20.6* |
| *= Failure mode is STEEL | | | | | | |

## Recommended loads C2

| Anchor size | | | M12 | | M16 | |
|---|---|---|---|---|---|---|
| Effective anchorage depth $h_{ef}$ | | [mm] | 80 | 150 | 150 | 200 |
| | | | | | | |
| Tensile resistance C2 | $N_{rec,\,seis,\,C2}$ | [kN] | 10.4 | 19.0 | 23.8 | 23.8 |
| Shear resistance C2 | $V_{rec,\,seis,\,C2}$ | [kN] | 5.2* | 5.2* | 14.7* | 14.7* |
| *= Failure mode is STEEL | | | | | | |

The partial safety factor for action is $\gamma = 1.4$.
$\alpha_{seis}$ and $\alpha_{gap}$ included as per EOTA TR 045.
Values don't consider any filling of annular gap between anchor and fixture.

# **Fire resistance:** BLS, BLS-P, BLS A4, SD A4, SLS A4, SKLS A4

Design method acc. to EOTA TR 020.

**The data of these tables is based on:**

- ETA-01/0011: Zinc plated and stainless steel A4 anchors
- Concrete C20/25, $f_{ck,cube}$ = 25 N/mm²
- Installation has been done correctly
- Without influence of edge- and spacing distances
- In minimum base material thickness

## Characteristic resistances

| Anchor size | | | | M8 | | M12 | | M16 | |
|---|---|---|---|---|---|---|---|---|---|
| Effective anchorage depth $h_{ef}$ | | | [mm] | 40 | 80 | 80 | 150 | 150 | 200 |
| **Cracked and non-cracked concrete** | | | | | | | | | |
| **Zinc-plated** | **R30** | Tensile $N_{Rk}$ | [kN] | 0.37 | | 1.70 | | 3.10 | |
| | | Shear $V_{Rk}$ | [kN] | 0.37 | | 1.70 | | 3.10 | |
| | **R120** | Tensile $N_{Rk}$ | [kN] | 0.18 | | 0.84 | | 1.60 | |
| | | Shear $V_{Rk}$ | [kN] | 0.18 | | 0.84 | | 1.60 | |
| **Stainless steel A4** | **R30** | Tensile $N_{Rk}$ | [kN] | 0.73 | | 2.50 | | 4.70 | |
| | | Shear $V_{Rk}$ | [kN] | 0.73 | | 2.50 | | 4.70 | |
| | **R120** | Tensile $N_{Rk}$ | [kN] | 0.37 | | 1.30 | | 2.50 | |
| | | Shear $V_{Rk}$ | [kN] | 0.37 | | 1.30 | | 2.50 | |

## Design resistances

| Anchor size | | | | M8 | | M12 | | M16 | |
|---|---|---|---|---|---|---|---|---|---|
| Effective anchorage depth $h_{ef}$ | | | [mm] | 40 | 80 | 80 | 150 | 150 | 200 |
| **Cracked and non-cracked concrete** | | | | | | | | | |
| **Zinc-plated** | **R30** | Tensile $N_{Rd}$ | [kN] | 0.37 | | 1.70 | | 3.10 | |
| | | Shear $V_{Rd}$ | [kN] | 0.37 | | 1.70 | | 3.10 | |
| | **R120** | Tensile $N_{Rd}$ | [kN] | 0.18 | | 0.84 | | 1.60 | |
| | | Shear $V_{Rd}$ | [kN] | 0.18 | | 0.84 | | 1.60 | |
| **Stainless steel A4** | **R30** | Tensile $N_{Rd}$ | [kN] | 0.73 | | 2.50 | | 4.70 | |
| | | Shear $V_{Rd}$ | [kN] | 0.73 | | 2.50 | | 4.70 | |
| | **R120** | Tensile $N_{Rd}$ | [kN] | 0.37 | | 1.30 | | 2.50 | |
| | | Shear $V_{Rd}$ | [kN] | 0.37 | | 1.30 | | 2.50 | |

## Recommended loads

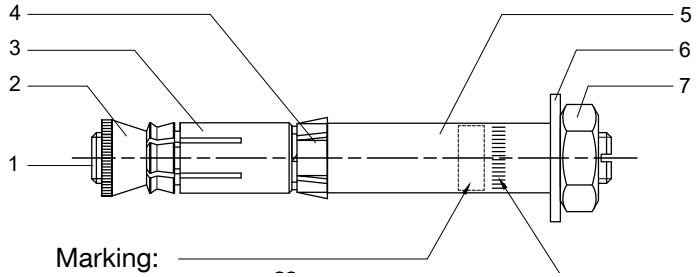
| Anchor size | | | | M8 | | M12 | | M16 | |
|---|---|---|---|---|---|---|---|---|---|
| Effective anchorage depth $h_{ef}$ | | | [mm] | 40 | 80 | 80 | 150 | 150 | 200 |
| **Cracked and non-cracked concrete** | | | | | | | | | |
| **Zinc-plated** | **R30** | Tensile $N_{rec}$ | [kN] | 0.37 | | 1.70 | | 3.10 | |
| | | Shear $V_{rec}$ | [kN] | 0.37 | | 1.70 | | 3.10 | |
| | **R120** | Tensile $N_{rec}$ | [kN] | 0.18 | | 0.84 | | 1.60 | |
| | | Shear $V_{rec}$ | [kN] | 0.18 | | 0.84 | | 1.60 | |
| **Stainless steel A4** | **R30** | Tensile $N_{rec}$ | [kN] | 0.73 | | 2.50 | | 4.70 | |
| | | Shear $V_{rec}$ | [kN] | 0.73 | | 2.50 | | 4.70 | |
| | **R120** | Tensile $N_{rec}$ | [kN] | 0.37 | | 1.30 | | 2.50 | |
| | | Shear $V_{rec}$ | [kN] | 0.37 | | 1.30 | | 2.50 | |

In absence of other national regulations the partial safety factor for resistance under fire exposure $\gamma_{M,fi}$ = 1.0 is recommended.

# Mechanical properties

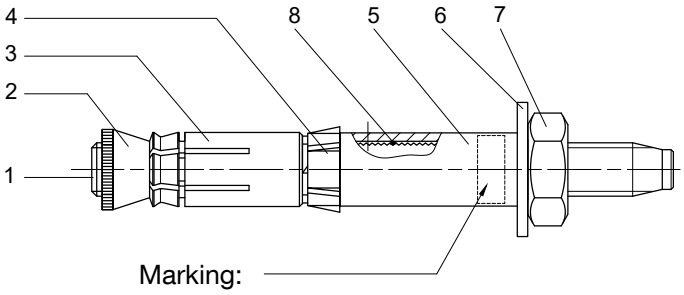
## Zinc-plated BLS

| Part | | Material |
|---|---|---|
| 1 | Threaded rod | EN ISO 898-1: grade 8.8 |
| 2 | Threaded cone | Carbon steel |
| 3 | Expansion shield | Carbon steel |
| 4 | Plastic grip | PE |
| 5 | Distance sleeve | Carbon steel |
| 6 | Washer | Carbon steel EN 10139 |
| 7 | Hexagonal nut | EN ISO 898-2, property class 8 |



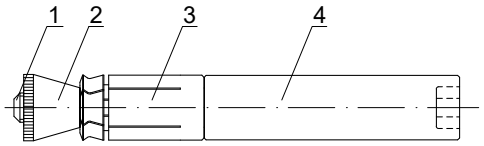

## Zinc-plated BLS-P

| Part | | Material |
|---|---|---|
| 1 | Threaded rod | EN ISO 898-1: grade 8.8 |
| 2 | Threaded cone | Carbon steel |
| 3 | Expansion shield | Carbon steel |
| 4 | Plastic grip | PE |
| 5 | Distance sleeve | Carbon steel |
| 6 | Washer | Carbon steel EN 10139 |
| 7 | Hexagonal nut | EN ISO 898-2, property class 8 |
| 8 | Grip | Drop of glue, tape or rubber O-ring |



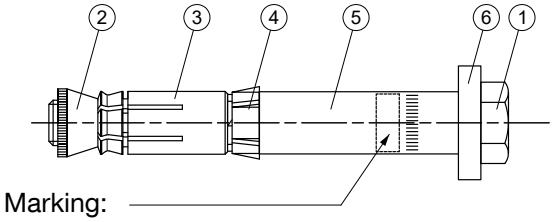

## Zinc-plated ILS

| Part | | Material |
|---|---|---|
| 1 | Threaded rod | EN ISO 898-1: grade 8.8 |
| 2 | Threaded cone | Carbon steel |
| 3 | Expansion shield | Carbon steel |
| 4 | Screw socket | Carbon steel (internal thread M8) |



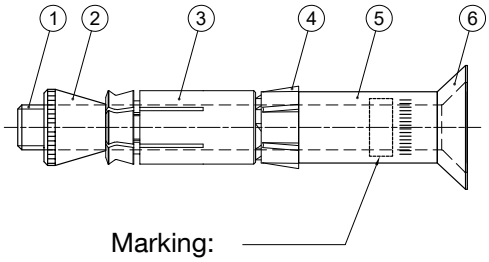

## Stainless steel SLS A4

| Part | | Material |
|---|---|---|
| 1 | Hexagonal screw | Stainless steel A4 |
| 2 | Threaded cone | Stainless steel A4 |
| 3 | Expansion shield | Stainless steel A4 |
| 4 | Plastic grip | PE |
| 5 | Distance sleeve | Stainless steel A4 |
| 6 | Washer | Stainless steel A4 |



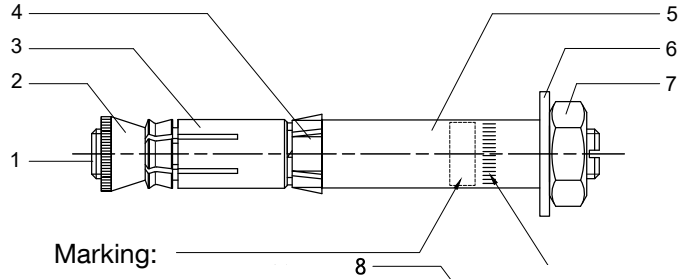

## Stainless steel SKLS A4

| Part | | Material |
|---|---|---|
| 1 | Countersunk screw | Stainless steel A4 |
| 2 | Threaded cone | Stainless steel A4 |
| 3 | Expansion shield | Stainless steel A4 |
| 4 | Plastic grip | PE |
| 5 | Distance sleeve | Stainless steel A4 |
| 6 | Washer | Stainless steel A4 |

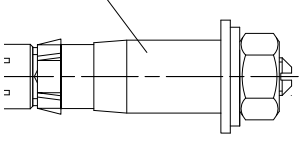



## Stainless steel BLS A4, SD A4

| Part | | Material |
|---|---|---|
| 1 | Threaded rod | Property class A4-80; EN ISO 3506-1 |
| 2 | Threaded cone | Stainless steel A4 |
| 3 | Expansion shield | Stainless steel A4 |
| 4 | Plastic grip | PE |
| 5 | Distance sleeve | Stainless steel A4 |
| 6 | Washer | Stainless steel A4 |
| 7 | Hexagonal nut | EN ISO 3506-2; property class A4-80 |
| 8 | Plastic sleeve | PA; DIN EN ISO 1874-1 |




**SD A4**

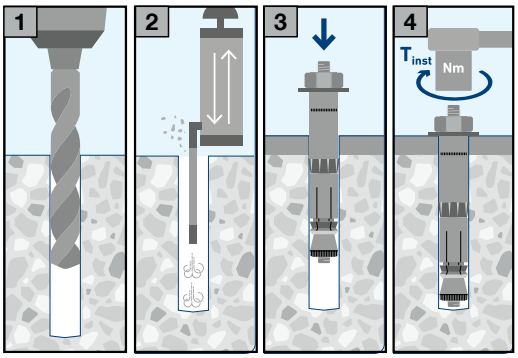


# Setting instructions

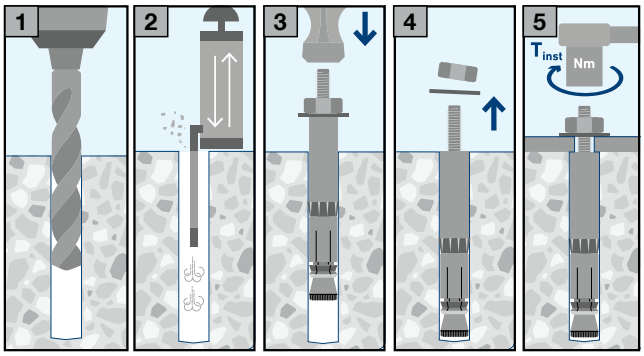
## Installation equipment

| Specification | M8 | M12 | M16 |
|---|---|---|---|
| Drill bit | SDS+ 2-CUT or 4-CUT | | |
| | 14 | 20 | 25 |
| Rotary hammer | 750…1200 r.p.m / 1.8 …3.3 J | | |
| | | 360…550 r.p.m / 4.9 …11.5 J | |
| Additional tools | Air pump/compressor, hammer, torque wrench, socket | | |

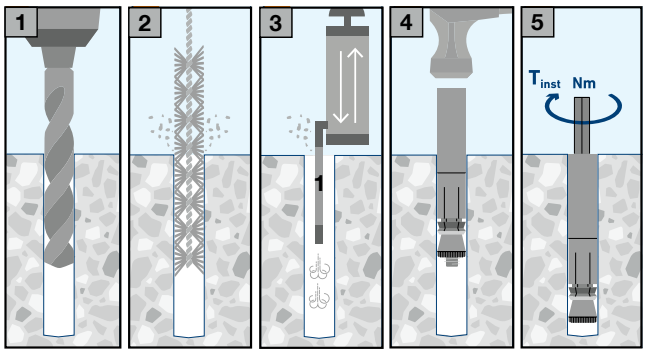
### BLS, BLS A4, SD A4, SLS A4



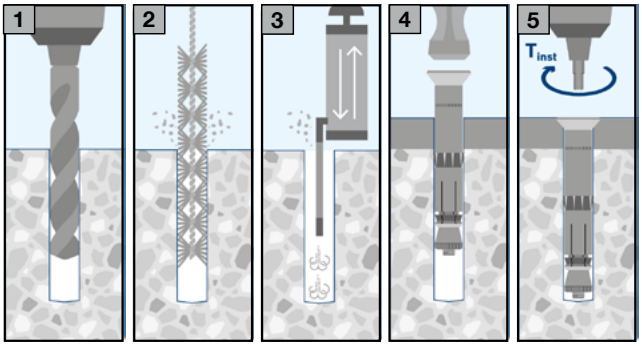

### BLS-P



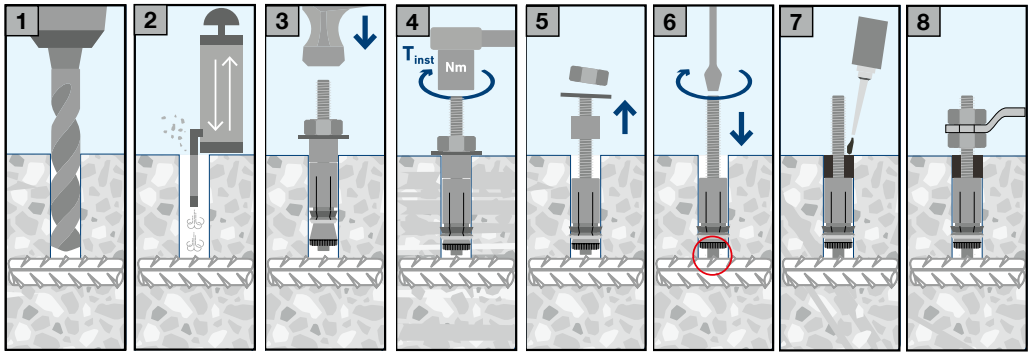

### ILS




### SKLS A4




### LPA A4



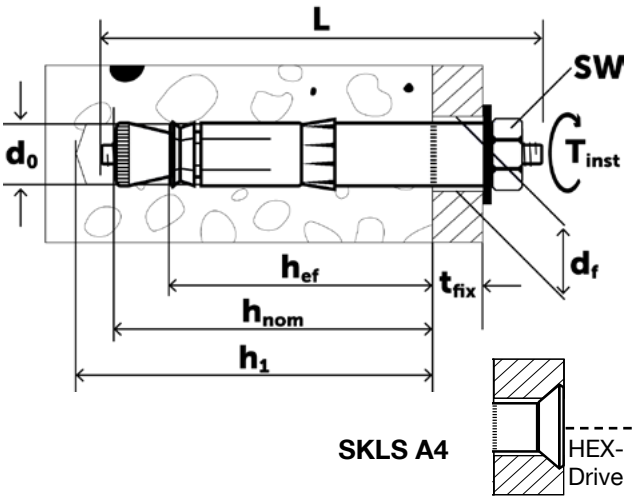
# **Installation data:** BLS, BLS-P, BLS A4, SD A4, SLS A4, SKLS A4

| Parameters and anchor sizes | | | | M8 | | M12 | | M16 | |
|---|---|---|---|---|---|---|---|---|---|
| Effective anchorage depth | | $h_{ef}$ | [mm] | 40 | 80 | 80 | 150 | 150 | 200 |
| Nominal anchorage depth | | $h_{nom}$ | [mm] | 52 | 92 | 96 | 166 | 168 | 218 |
| Drill hole diameter | | $d_0$ | [mm] | 14 | | 20 | | 25 | |
| Diameter of the drill bit at the upper tolerance limit | | $d_{cut,max} \leq$ | [mm] | 14.50 | | 20.55 | | 25.55 | |
| Depth of drilled hole to deepest point | | $h_1 \geq$ | [mm] | 60 | 100 | 105 | 175 | 185 | 235 |
| Diameter of clearance hole in the fixture | In-place installation (BLS) | $d_f$ | [mm] | 16 | | 21 | | 26 | |
| | Mounting on the threaded bolt (BLS-P/dist. Mounting) | | | 10 | | 14 | | 18 | |
| Installation torque | | $T_{inst}$ | [mm] | 25 | | 80 | | 180 | |

## Push-through installation

(BLS, BLS A4, SLS A4, SKLS A4)

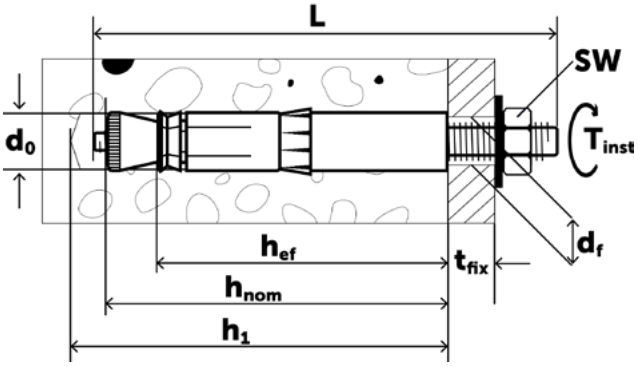
- BLS and SD versions installed through fixture using an ordinary hammer and tightened to specified torque.




## Pre-set installation

(BLS-P)

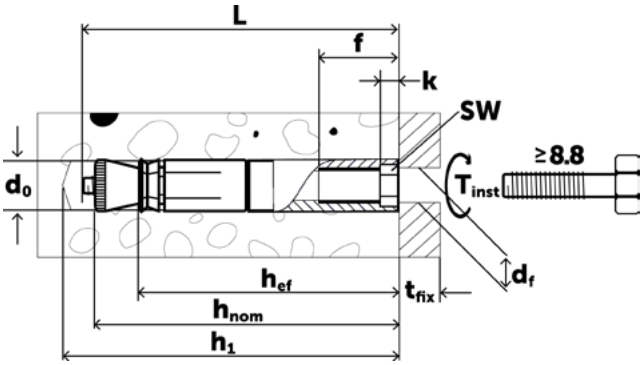
- BLS-P versions installed into the drill-hole using an ordinary hammer. Then, nut and washer are removed, fixture installed, washer and nut installed, and tightened to the specified torque.




## Pre-set installation

(ILS)

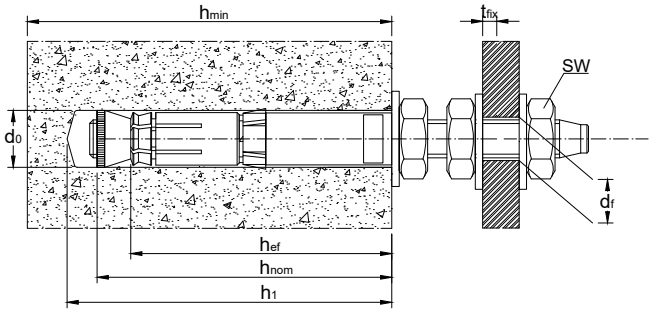
- ILS is installed into the drill-hole using an ordinary hammer. Then, anchor is tightened to the specified torque with hexagonal drive. Bolt is installed to the anchor through the fixture.




## Distance mounting

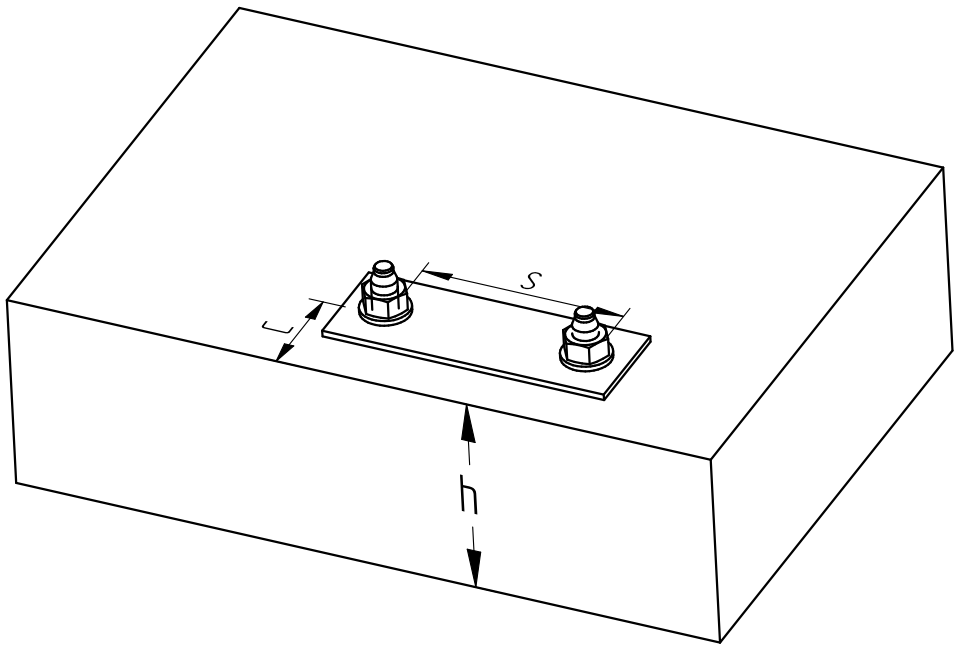
(BLS-P)

- BLS-P anchors can be used for distance mountings.



# Minimum thickness of concrete member, spacing and edge distance: BLS, BLS-P, BLS A4, SD A4, SLS A4, SKLS A4

| Cracked and non-cracked concrete | | | | | M8 | | M12 | | M16 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Effective anchorage depth | | $h_{ef}$ | [mm] | | 40 | 80 | 80 | 150 | 150 | 200 |
| Nominal anchorage depth | | $h_{nom}$ | [mm] | | 52 | 92 | 96 | 166 | 168 | 218 |
| Minimum thickness of base material | | $h_{min}$ | [mm] | | 100 | 160 | 160 | 300 | 300 | 400 |
| Zinc-plated | Minimum spacing | $s_{min}$ | [mm] | | 100 | 80 | 120 | 150 | 200 | 150 |
| | Minimum edge distance | $c \geq$ | [mm] | | 80 | 50 | 100 | 80 | 150 | 100 |
| Stainless steel | Minimum spacing | $c_{min}$ | [mm] | | 80 | 80 | 150 | 150 | 150 | 180 |
| | Minimum edge distance | $s \geq$ | [mm] | | 60 | 50 | 100 | 80 | 100 | 100 |
| Critical spacing for splitting failure and concrete cone failure * | Center spacing (splitting) | $s_{cr,sp}$ | [mm] | | 140 | 360 | 360 | 540 | 560 | 560 |
| | Center spacing | $s_{cr,N}$ | [mm] | | 120 | 240 | 240 | 450 | 450 | 600 |
| Critical edge distance for splitting failure and concrete cone failure * | Edge distance (splitting) | $c_{cr,sp}$ | [mm] | | 70 | 180 | 180 | 270 | 280 | 280 |
| | Edge distance | $c_{cr,sp}$ | [mm] | | 60 | 120 | 120 | 225 | 225 | 300 |

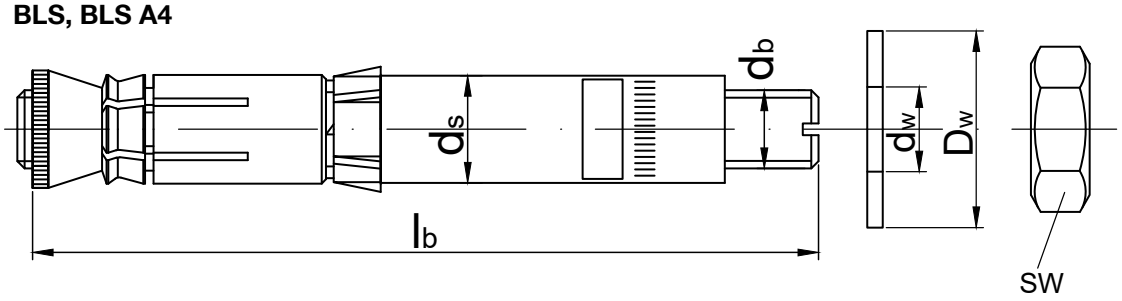


# Anchor dimensions

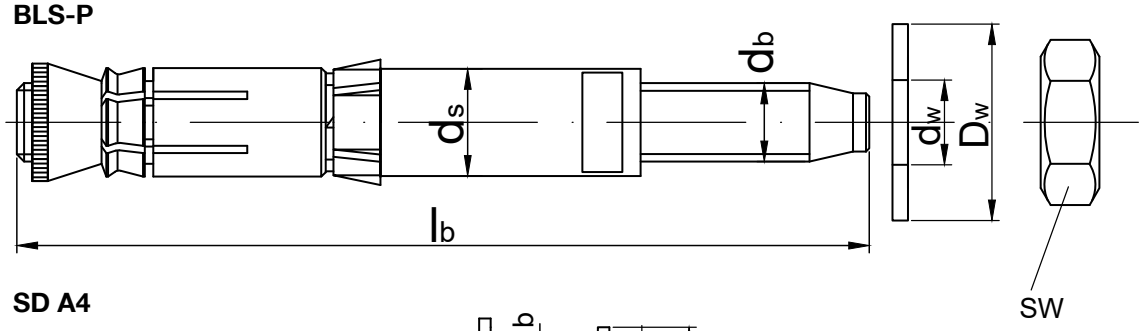
| Size / Drill Ø / Anchorage depth $h_{ef}$ / $T_{fix}$ | Product code | Length of bolt ($l_b$) | Diameter of bold ($d_b$) | Max. diameter of sleeve ($d_s$) | Washer diameter ($D_w$) | Washer diameter ($d_w$) | Washer thickness S | SW |
|---|---|---|---|---|---|---|---|---|
| **Self-undercutting anchor SUPERPLUS BLS** | | | | | | | | |
| M8-14/80/25 | 9 654 080 025 | 130 | 8 | 13.8 | 20 | 8.4 | 1.5 | 17 |
| M12-20/80/15 | 9 650 080 015 | 130 | 12 | 19.1 | 30 | 13 | 3.5 | 19 |
| M12-20/80/30 | 9 650 080 030 | 145 | 12 | 19.1 | 30 | 13 | 3.5 | 19 |
| M16/25/150/30 | 9 655 150 030 | 220 | 16 | 24.1 | 40 | 17 | 6 | 19 |
| M16/25/200/40 | 9 655 200 040 | 280 | 16 | 24.1 | 40 | 17 | 6 | 24 |
| M16/25/200/60 | 9 655 200 060 | 300 | 16 | 24.1 | 40 | 17 | 6 | 24 |
| **Self-undercutting anchor SUPERPLUS BLS-P** | | | | | | | | |
| M12-20/80/15 | 9 650 180 015 | 135 | 12 | 19.1 | 24 | 13 | 2.5 | 19 |
| M12-20/150/30 | 9 651 150 030 | 220 | 12 | 19.1 | 24 | 13 | 2.5 | 19 |
| M16/25/150/40 | 9 655 150 040 | 290 | 16 | 24.1 | 30 | 17 | 3 | 24 |
| **Self-undercutting anchor SUPERPLUS BLS A4** | | | | | | | | |
| M8-14/80/25 A4 | 9 654 080 254 | 130 | 8 | 13.8 | 20 | 8.4 | 1.5 | 16 |
| M12-20/80/15 A4 | 9 650 080 154 | 130 | 12 | 19.1 | 30 | 13 | 3.5 | 22 |
| M16-25/150/30 A4 | 9 655 150 304 | 220 | 16 | 24.1 | 40 | 17 | 4 | 24 |
| M16-25/150/40 A4 | 9 655 150 404 | 230 | 16 | 24.1 | 40 | 17 | 4 | 24 |
| **Self-undercutting anchor SUPERPLUS SLS A4** | | | | | | | | |
| M8-14/40/15 A4 | 9 653 144 015 | 70 | 8 | 13.7 | 21 | 8.4 | 4 | 13 |
| M8-14/80/25 A4 | 9 653 148 025 | 120 | 8 | 13.7 | 21 | 8.4 | 4 | 13 |
| M12-20/80/15 A4 | 9 653 208 015 | 120 | 12 | 19 | 30 | 13 | 6 | 19 |
| **Self-undercutting anchor SUPERPLUS SKLS A4 (HEX-Drive)** | | | | | | | | |
| M8-14/40/15 A4 | 9654 144 015 | 70 | 8 | 13.7 | 27 | 8.4 | 6.5 | 5 |
| M8-14/80/25 A4 | 9654 148 025 | 120 | 8 | 13.7 | 24 | 8.4 | 6.5 | 5 |
| M12-20/80/15 A4 | 9654 208 015 | 120 | 12 | 19 | 33 | 13 | 8 | 8 |
| **Step Iron Anchor SUPERPLUS SD A4** | | | | | | | | |
| M8-14/40 SD A4 | 9 650 814 040 | 95 | 8 | 15.5 | 20 | 8.4 | 2 | 16 |
| M8-14/60SA A4N | 9 650 040 060 | 115 | 8 | 15.5 | 20 | 8.4 | 2 | 16 |
| **Self-undercutting anchor SUPERPLUS ILS** | | | | | | | | |
| M8-14/80 | 9 650 814 080 | 95 | 8 | 13.8 | - | - | - | 8 |
| **Lightning protection anchor SUPERPLUS LPA A4** | | | | | | | | |
| M8-14BS085 A4 | 9 650 814 085 | 85 | 8 | 13.8 | 20 | 8.4 | 2 | 13 |

# Anchor dimensions

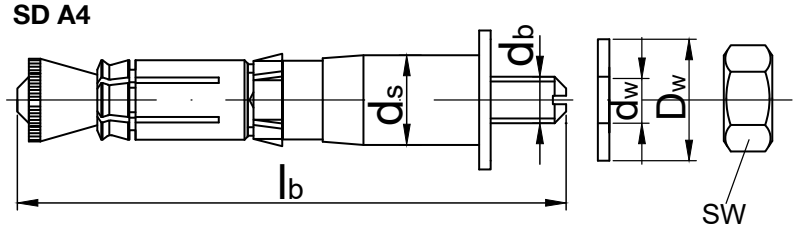
**BLS, BLS A4**



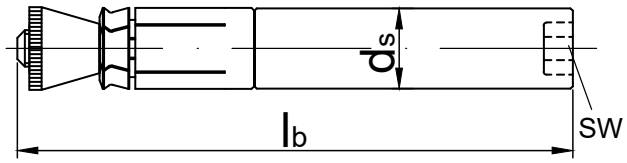

**BLS-P**



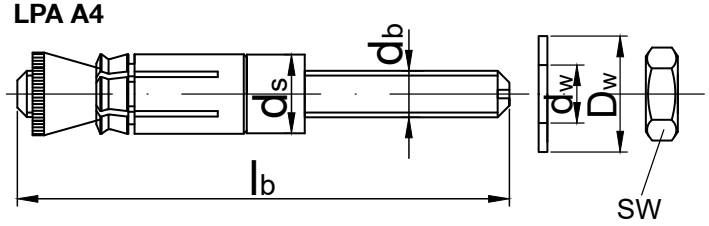

**SD A4**



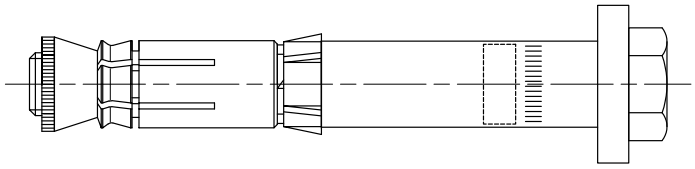

**ILS**



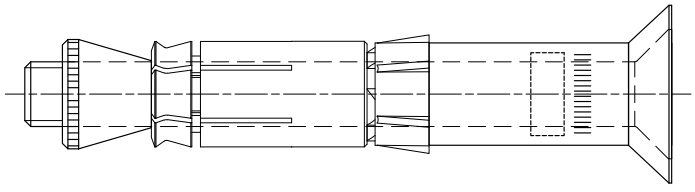

**LPA A4**




**SLS A4**



**SKLS A4**



# Delivery program

| | | | | BLS | BLS-P | BLS A4 | SLS A4 | SKLS A4 | SD A4 | ILS | LPA A4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | |  |  |  |  |  |  |  |  |
| Thread size | Size / Drill ø / Anchorage depth $h_{ef}$ / $T_{fix}$ | $T_{fix}$ | Length | Zinc | Zinc | A4 | A4 | A4 | A4 | Zinc | A4 |
| M8 | M8-14/40/15 | 15 | 80 | • | | | • | • | | | |
| | M8-14BS085 A4 | | 85 | | | | | | | | o |
| | M8-14/40 SD A4 | 25 | 95 | | | | | | • | | |
| | M8-14/80 | | 95 | | | | | | | o | |
| | M8-14/60 SA A4N | 25 | 115 | | | | | | • | | |
| | M8-14/80/25 | 25 | 130 | • | | • | • | • | | | |
| M12 | M12-20/80/15 | 15 | 130 | • | | • | | | | | |
| | M12-20/80/15 | 15 | 135 | | • | | • | • | | | |
| | M12-20/80/30 | 30 | 145 | • | | • | | | | | |
| | M12-20/150/30 | 30 | 215 | • | | | | | | | |
| | M12-20/150/50 | 50 | 220 | | • | | | | | | |
| M16 | M16-25/150/30 | 30 | 220 | • | | • | | | | | |
| | M16-25/150/40 | 40 | 240 | | • | | | | | | |
| | M16-25/200/40 | 40 | 280 | • | | | | | | | |
| | M16-25/200/40 | 40 | 290 | | • | | | | | | |
| | M16-25/200/60 | 60 | 300 | • | | | | | | | |

o No ETA

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