

# ULTRAPLUS M12-M36

The undercut anchor for exceptionally high loads in cracked and non-cracked concrete – also for shock and seismic loads.

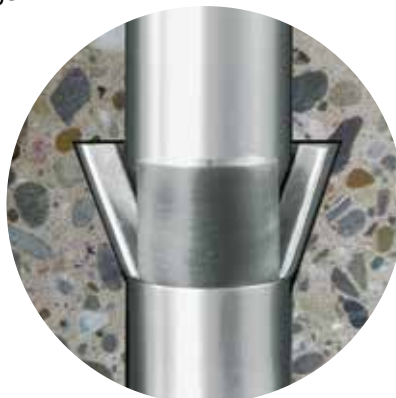
## FUNCTION

When the anchor is installed the expansion segments are driven down to the undercut in the drilled hole. The spring pressure automatically expands the segments into the undercut with an audible “click.” This results in a mechanical undercut connection without any expansion pressure. The “positive undercut” allows perfect bearing of the segments and ensures reliable transmission of the load into the concrete.



## BENEFITS

- Reliable fixing for high loads in cracked and non-cracked concrete
- High margin of safety due to positive undercutting
- Produced from high strength materials
- The spring automatically compensates for tolerances in the fixture thickness
- Modular design allowing for custom lengths and assemblies
- Reduced edge distances and spacings
- Proven performance history in resisting dynamic loads, shock loads and seismic loads. Expert reports available for these and other applications.



## CONSTRUCTION

With hex nut, washer, threaded stud and plastic retaining ring



## MATERIAL

High strength carbon steel, stainless steel

## BASE MATERIAL

Cracked and non-cracked concrete

## APPROVAL

ETA-04/0099 – Option 1 – Approved for cracked and non-cracked concrete

## LOAD RANGE

Tension:  $N_{perm} = 19.0 - 320.2$  [kN]

Shear:  $V_{perm} = 45.2 - 371.4$  [kN]

## PRODUCT RANGE

M12 – M36, carbon steel, zinc plated, HDG, sherradized, stainless steel

## CHARACTERISTICS

- Positive undercut anchor with strong mechanical interlock
- Instant loading
- Completely removable
- Through-fix installation
- No expansion forces
- Small edge distances and anchor spacings

## APPLICATIONS

- Nuclear power plants
- Water treatment plants
- Steel construction
- Industrial plants
- Petrochemical installations
- Cranes

## BENEFITS

- Extremely high tensile and shear capacity
- Custom lengths and assemblies readily available
- Positive undercutting (comparable performance to a cast-in headed stud)

## PRODUCT DESCRIPTION

The **ULTRAPLUS** undercut anchor is designed for use in applications where reliability and safety are essential, e.g. for anchoring safety relevant components in nuclear power plants, for industrial plants, conveyor systems, cranes, and also for special civil engineering solutions.

The **LIEBIG ULTRAPLUS** was developed to resist very high loads with its unique undercutting technology. After the hole is drilled, a separate undercut is created using the LIEBIG undercutting tool. When the anchor is inserted through the fixture, spring pressure opens the expanding segments.

These lock into the undercut with a clearly audible click. The result is a mechanical interlock without expansion stresses. By applying the specified torque, the fixture is fastened in position. The “positive undercut” allows perfect bearing of the segments and ensures reliable transmission of the load into the concrete.



European technical approval option1



# ULTRAPLUS M12-M36

Custom lengths available on request.

## ULTRAPLUS Carbon Steel Zinc Plated

Threaded stud with hex nut and washer

\*Available in high strength zinc plated, sherardised, HDG and stainless steel

Approval: ETA-04/0098 – Option 1 for cracked and non-cracked concrete



| Type               | Order Code   | Thread Size | Diameter x Depth of drilled hole | Max Fixture Thickness | Fixture Hole Diameter | Eff. Embedment Depth | Total Length | Weight (kg/100pcs) | Box Quantity |
|--------------------|--------------|-------------|----------------------------------|-----------------------|-----------------------|----------------------|--------------|--------------------|--------------|
| UP M12-23/140/20   | UP1223140020 | M12         | 23x190                           | 20                    | 24                    | 140                  | 220          | 48                 | 10           |
| UP M16-30/220/30   | UP1630220030 | M16         | 30x300                           | 30                    | 32                    | 220                  | 325          | 123                | 5            |
| UP M20-36/250/50   | UP2036250050 | M20         | 36x330                           | 50                    | 38                    | 250                  | 380          | 173                | 5            |
| UP M24-45/280/60*  | UP2445280060 | M24         | 45x410                           | 60                    | 46                    | 280                  | 460          | 408                | 2            |
| UP M36-67/420/100* | UP3667420100 | M36         | 67x570                           | 100                   | 68                    | 420                  | 700          | 1305               | 1            |

\*Not included in approval. Also available in HDG, sherardised and stainless steel

## INSTALLATION ACCESSORIES

Undercutting tool for core drilling rigs with 1/2" drive



Diamond cutting blade



| Compatible ULTRAPLUS | Order Code | KG/PC |
|----------------------|------------|-------|
| M12                  | D23        | 2.6   |
| M16                  | D30        | 3.1   |
| M20                  | D36        | 4.1   |
| M24                  | D45        | 5.1   |
| M36                  | D67        | 8.1   |

| Compatible ULTRAPLUS | Order Code | KG/PC |
|----------------------|------------|-------|
| M12                  | DE23       | 0.5   |
| M16                  | DE30       | 1.0   |
| M20                  | DE36       | 1.2   |
| M24                  | DE45       | 2.1   |
| M36                  | DE67       | 3.3   |

Undercutting tool is available for either purchase or hire.

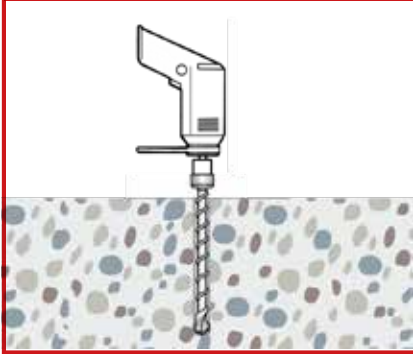
### Installation data

| Thread Size                   |                               |       |      | M12 | M16 | M20  | M24  | M36  |
|-------------------------------|-------------------------------|-------|------|-----|-----|------|------|------|
| Drill hole diameter           | $d_0$                         | [mm]  |      | 23  | 30  | 36   | 45   | 67   |
| Drill hole depth              | $h_1$                         | [mm]  |      | 190 | 300 | 330  | 410  | 570  |
| Diameter of undercutting      | $d_1$                         | [mm]  |      | 35  | 47  | 53.5 | 74   | 105  |
| Undercutting                  | $\Delta d_{cut}$              | [mm]  |      | 6   | 8.5 | 8.75 | 14.5 | 19   |
| Clearance hole in the fixture | Through-fix anchorage         | $d_f$ | [mm] | 24  | 32  | 38   | 46   | 68   |
|                               | Installation on threaded stud | $d_f$ | [mm] | 14  | 18  | 22   | 26   | 39   |
| Width across flats            | sw                            | [mm]  |      | 24  | 36  | 41   | 50   | 75   |
| Installation torque           | $T_{inst}$                    | [Nm]  |      | 120 | 250 | 300  | 790  | 2000 |

# ULTRAPLUS

## INSTALLATION INSTRUCTIONS

**1** Drill hole.



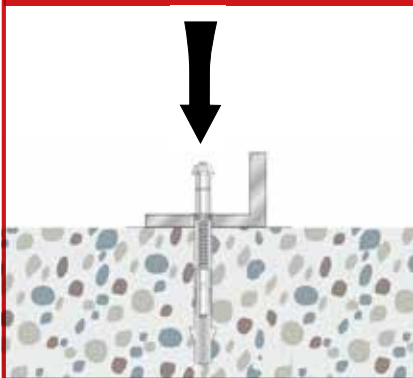
**2** Clean hole with a blow pump.



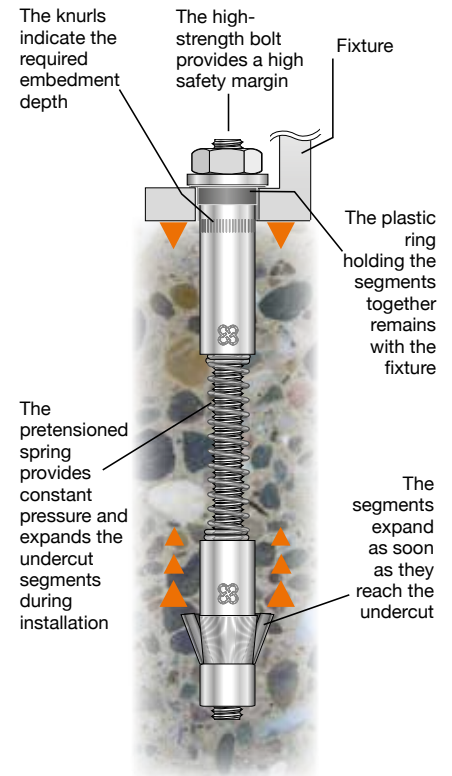
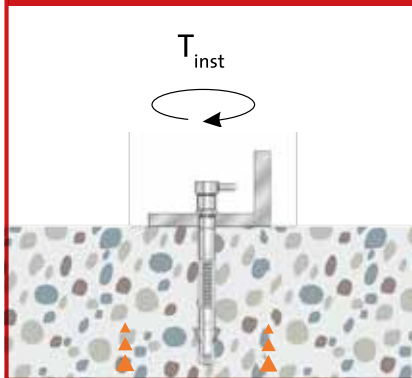
**3** Create the undercut using LIEBIG undercutting tool (approximately 15 to 70 seconds depending on the anchor size). Irrigate with water while undercutting.



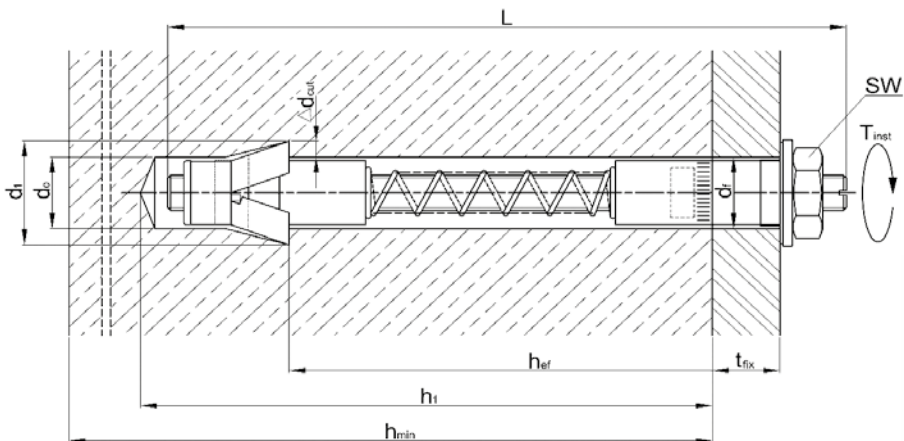
**4** Install the LIEBIG ULTRAPLUS undercut anchor. The plastic ring holding the undercutting segments together will remain at the fixture.



**5** Apply the specified installation torque using a calibrated torque wrench – the ULTRAPLUS undercut anchor is now installed and can resist loads immediately!



Installed anchor



**Installation video**  
now available on the  
EJOT UK YouTube  
channel

Custom lengths available on request.

## ULTRAPLUS Carbon Steel Zinc Plated

Permissible loads for single anchors with no influencing edge distances or spacings. Loads are calculated using partial safety factors from ETAG 001 and the characteristic anchor and installation data from this catalogue. Design calculations shall follow the requirements of ETA-04/0098. Material: Carbon steel zinc plated. Please contact EJOT UK for load and performance data for the stainless steel version, or consult the technical manual.

| Thread Size                    | M12            | M16            | M20            | M24            | M36            |
|--------------------------------|----------------|----------------|----------------|----------------|----------------|
| Effective embedment depth (mm) | 140            | 220            | 250            | 280            | 420            |
| Type UP                        | M12-23/140/... | M16-30/220/... | M20-36/250/... | M24-45/280/... | M36-67/420/... |

### Permissible tension loads<sup>1)</sup>

| $N_{perm}$ | Concrete                           | Thread Size | [kN] | M12  | M16  | M20   | M24   | M36   |
|------------|------------------------------------|-------------|------|------|------|-------|-------|-------|
|            |                                    |             |      |      |      |       |       |       |
|            | Cracked                            | C20/25      | [kN] | 19.0 | 35.7 | 45.2  | 80.3  | 147.6 |
|            |                                    | C30/37      | [kN] | 23.2 | 43.6 | 55.2  | 98.0  | 180.0 |
|            |                                    | C40/50      | [kN] | 26.9 | 50.4 | 63.8  | 113.3 | 208.1 |
|            |                                    | C50/60      | [kN] | 29.5 | 55.4 | 70.1  | 124.5 | 228.7 |
|            | Non-Cracked Concrete <sup>3)</sup> | C20/25      | [kN] | 28.6 | 45.2 | 66.7  | 111.9 | 206.6 |
|            |                                    | C30/37      | [kN] | 34.9 | 55.2 | 81.3  | 136.5 | 252.0 |
|            |                                    | C40/50      | [kN] | 40.3 | 63.8 | 94.0  | 157.8 | 291.3 |
|            |                                    | C50/60      | [kN] | 43.4 | 70.1 | 103.3 | 173.5 | 320.2 |

### Permissible shear loads<sup>1) 2)</sup>

| $V_{perm}$ | Concrete                           | Thread Size | [kN] | M12  | M16  | M20   | M24   | M36   |
|------------|------------------------------------|-------------|------|------|------|-------|-------|-------|
|            |                                    |             |      |      |      |       |       |       |
|            | Cracked                            | C20/25      | [kN] | 19.0 | 35.7 | 45.2  | 80.3  | 147.6 |
|            |                                    | C30/37      | [kN] | 23.2 | 43.6 | 55.2  | 98.0  | 180.0 |
|            |                                    | C40/50      | [kN] | 26.9 | 50.4 | 63.8  | 113.3 | 208.1 |
|            |                                    | C50/60      | [kN] | 29.5 | 55.4 | 70.1  | 124.5 | 228.7 |
|            | Non-Cracked Concrete <sup>3)</sup> | C20/25      | [kN] | 28.6 | 45.2 | 66.7  | 111.9 | 206.6 |
|            |                                    | C30/37      | [kN] | 34.9 | 55.2 | 81.3  | 136.5 | 252.0 |
|            |                                    | C40/50      | [kN] | 40.3 | 63.8 | 94.0  | 157.8 | 291.3 |
|            |                                    | C50/60      | [kN] | 43.4 | 70.1 | 103.3 | 173.5 | 320.2 |

### Permissible bending moments<sup>1) 5)</sup>

| $M_{perm}$ | [Nm] | M12  | M16   | M20   | M24   | M36    |
|------------|------|------|-------|-------|-------|--------|
|            |      | 62.4 | 158.1 | 309.0 | 534.5 | 1881.7 |

### Spacings, edge distances and member thicknesses

| Parameter                                  | Symbol     | [mm] | M12 | M16               | M20               | M24 | M36  |
|--|------------|------|-----|-------------------|-------------------|-----|------|
| Effective embedment depth                  | $h_{ef}$   | [mm] | 140 | 220               | 250               | 280 | 420  |
| Characteristic spacing <sup>4)</sup>       | $s_{cr,N}$ | [mm] | 420 | 660               | 750               | 840 | 1260 |
| Minimum spacing                            | $s_{min}$  | [mm] | 140 | 220               | 250               | 280 | 420  |
| Characteristic edge distance <sup>4)</sup> | $c_{cr,N}$ | [mm] | 210 | 330               | 375               | 420 | 630  |
| Minimum edge distance                      | $c_{min}$  | [mm] | 140 | 220               | 250               | 280 | 420  |
| Minimum member thickness                   | $h_{min}$  | [mm] | 240 | 360               | 400               | 500 | 700  |
|  |            |      | —   | 330 <sup>6)</sup> | 360 <sup>6)</sup> | —   | —    |

1) The permissible loads have been calculated using the partial safety factors for resistances stated in the ETA-approval and a partial safety factor for actions of  $\gamma_F = 1.4$ . The permissible loads are valid for unreinforced concrete and reinforced concrete with a rebar spacing  $s \geq 15$  cm and reinforced concrete with a rebar spacing  $s \geq 10$  cm if the rebar is 10 mm or smaller.

2) The permissible shear loads are based on a single anchor without influencing concrete edges. For shear loads applied close to an edge ( $c \leq 10 h_{ef}$  or 60 d) concrete edge failure must be checked per ETAG 001, Annex C, design method A.

3) Concrete is considered non-cracked when the tensile stress within the concrete is  $\sigma_L + \sigma_n \leq 0$ . In the absence of detailed verification  $\sigma_n = 3$  N/mm<sup>2</sup> can be assumed ( $\sigma_L$  equals the tensile stress within the concrete as a result of external loads, forces on anchors included).

4) If spacings or edge distances become smaller than the characteristic values (i.e.  $s \leq s_{cr,N}$  and/or  $c \leq c_{cr,N}$ ) a calculation per ETAG 001, Annex C, design method A must be performed. For details, see ETA-04/0098.

5) The permissible bending moments are only valid for the threaded stud (e.g. in case of a distance mounting).

6) This  $h_{min}$  only applies when the remote face of the concrete is inspected to ensure there has been no break-through as a result of drilling. Otherwise  $h_{min} = 360$  mm (M16) and  $h_{min} = 400$  mm (M20).



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