

## YDEEVNEDEKLARATION

### DoP 0203

til Upat Express Anchor IMC (Metalanker til brug i beton)

DA

|                                                                                                                                                                   |                                                                                                                                                                                                                                                                   |                                                                              |                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|----------------------------------------------------------------|
| 1. <u>Varetypens unikke identifikationskode:</u>                                                                                                                  | <b>DoP 0203</b>                                                                                                                                                                                                                                                   |                                                                              |                                                                |
| 2. <u>Anvendelsesformål:</u>                                                                                                                                      | <b>Eftermonteret befæstelse i ikke-revnet beton.<br/>Se appendiks, specifikt Bilage B1- B3</b>                                                                                                                                                                    |                                                                              |                                                                |
| 3. <u>Fabrikant:</u>                                                                                                                                              | <b>Upat Vertriebs GmbH, Bebelstraße 11, 79108 Freiburg im Breisgau, Tyskland</b>                                                                                                                                                                                  |                                                                              |                                                                |
| 4. <u>Bemyndiget repræsentant:</u>                                                                                                                                | –                                                                                                                                                                                                                                                                 |                                                                              |                                                                |
| 5. <u>System(er) til vurdering og kontrol af konstansen af ydeevnen:</u>                                                                                          | <b>1</b>                                                                                                                                                                                                                                                          |                                                                              |                                                                |
| 6. <u>Europæisk vurderingsdokument:</u><br>Europæisk Teknisk Vurdering<br>Teknisk vurderingsorgan:<br>Notificeret organ(er)                                       | <b>EAD 330232-01-0601, (Edition 12/ 2019)<br/>ETA-10/0169; 2020-07-14<br/>DIBt- Deutsches Institut für Bautechnik<br/>1343 MPA Darmstadt / 2873 TU Darmstadt</b>                                                                                                  |                                                                              |                                                                |
| 7. <u>Deklareret ydeevne(r):</u><br><b>Mekanisk modstand og stabilitet (BWR 1)</b><br>Karakteristisk modstand for træklast (statisk og quasi-statisk belastning): | Modstand overfor stålsvig:<br>Modstand overfor svigt ved udtrækning:<br><br>Modstand overfor svigt af beton-kegle:<br>Robusthed:<br><br>Min. kant og indbyrdes afstand:<br>Kantafstand til forhindring af flækning under belastning:                              | Bilag C1<br>Bilag C1<br><br>Bilag C1<br>Bilag C1<br><br>Bilag C3<br>Bilag C1 | $E_s = 210\,000\text{ MPa}$<br><br><br>$k_{cr,N} = \text{NPD}$ |
| Karakteristisk modstand for tværlast (statisk og quasi-statisk belastning), Methode A:                                                                            | Modstand overfor stålsvig (tværlast):<br>Modstand overfor svigt ved udtrækning:                                                                                                                                                                                   | Bilag C2<br>Bilag C2                                                         |                                                                |
| Karakteristisk modstand og Forskydninger for seismiske ydelseskategorier C1 og C2:                                                                                | Modstand overfor spændingslast, forskydninger, kategori C1:<br>Modstand overfor spændingslast, forskydninger, kategori C2:<br>Modstand overfor tværlast, forskydninger, kategori C1:<br>Modstand overfor tværlast, forskydninger, kategori C2:<br>Faktor ringhul: | NPD<br>NPD<br>NPD<br>NPD<br>NPD                                              |                                                                |
| Karakteristisk modstand for forenklet design:                                                                                                                     | Metode B:<br><br>Metode C:                                                                                                                                                                                                                                        | NPD<br><br>NPD                                                               |                                                                |
| Forskydninger og Holdbarhed:                                                                                                                                      | Forskydninger under statisk og quasi-statisk belastning:<br>Holdbarhed:                                                                                                                                                                                           | Bilag C3<br>Bilag A4, B1                                                     |                                                                |
| <b>Brandbeskyttelse (BWR 2)</b><br>Brandegenskaber:<br>Brandbeskyttelse:                                                                                          | Klasse (A1)<br>Brandbeskyttelse overfor stålsvig (spændingslast):<br>Brandbeskyttelse overfor svigt ved udtrækning<br>Brandbeskyttelse overfor stålsvig (tværlast):                                                                                               | NPD<br>NPD<br>NPD                                                            |                                                                |



Einfach. Sicher.



8. Relevant teknisk dokumentation og/eller specifik teknisk dokumentation:

-

Ydeevnen for den vare, der er anført ovenfor, er i overensstemmelse med den deklarerede ydeevne. Denne ydeevnedeklaration er udarbejdet i overensstemmelse med forordning (EU) nr. 305/2011 på eneansvar af den fabrikant, der er anført ovenfor.

Underskrevet for fabrikanten og på dennes vegne af:

Thilo Pregartner, Dr.-Ing.  
Tumlingen, 2020-07-27

Peter Schillinger, Dipl.-Ing.

Denne DoP er tilgængelig i forskellige sprogversioner. I tilfælde af fortolkningsmæssig uoverensstemmelse, henvises der til den engelske version, som altid er gældende.

Appendikset indeholder frivillige og udvidede informationer på engelsk. Disse overgår de lokale (sprogneutrale) retslige krav.

## Specific Part

### 1 Technical description of the product

The Upat Express Anchor IMC is an anchor made of zinc plated, hot-dip galvanised or stainless steel 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 fastener 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 fastener 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 to tension load<br>(static and quasi-static loading)              | See Annex<br>C 3, C 1   |
| Characteristic resistance to shear load<br>(static and quasi-static loading)                | See Annex<br>C 2        |
| Displacements<br>(static and quasi-static loading)                                          | See Annex<br>C 3        |
| Characteristic resistance and displacements for seismic<br>performance categories C1 and C2 | No performance assessed |
| Durability                                                                                  | See Annex B 1           |

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

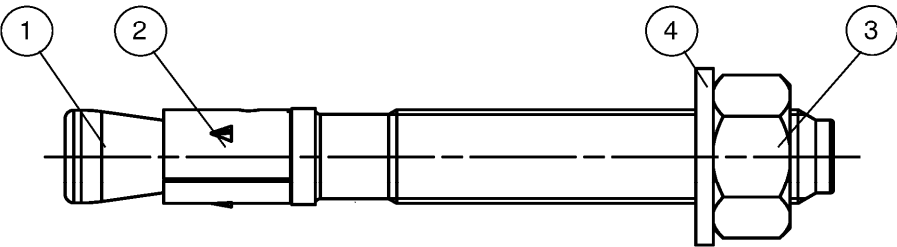
| Essential characteristic | Performance             |
|--------------------------|-------------------------|
| Reaction to fire         | Class A1                |
| Resistance to fire       | No performance assessed |

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

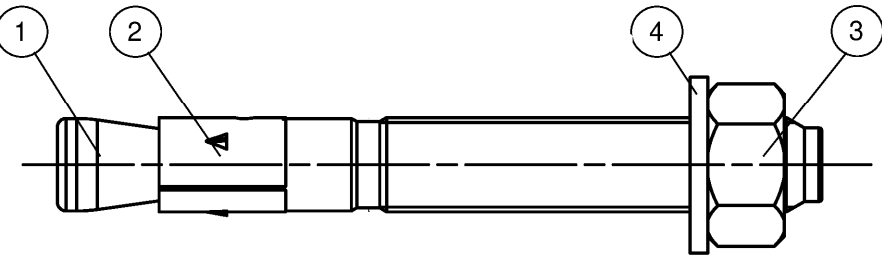
In accordance with the European Assessment Document EAD 330232-01-0601 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

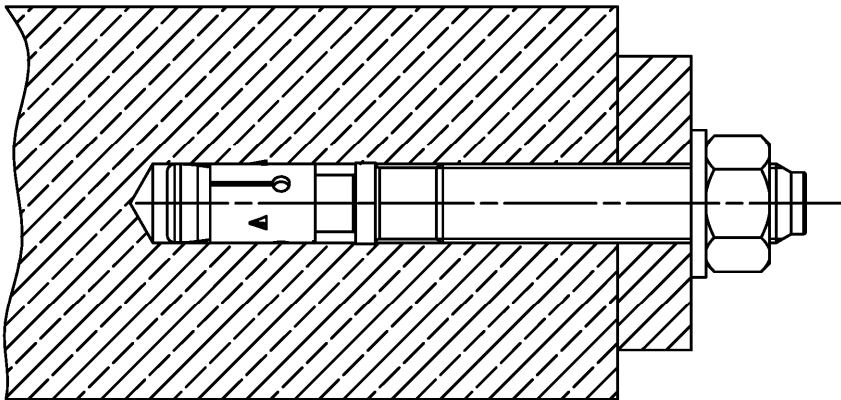
Cone bolt manufactured by cold - forming:



Cone bolt manufactured by turning:



- ① Cone bolt (cold – formed or turned)
- ② Expansion sleeve
- ③ Hexagon nut
- ④ Washer



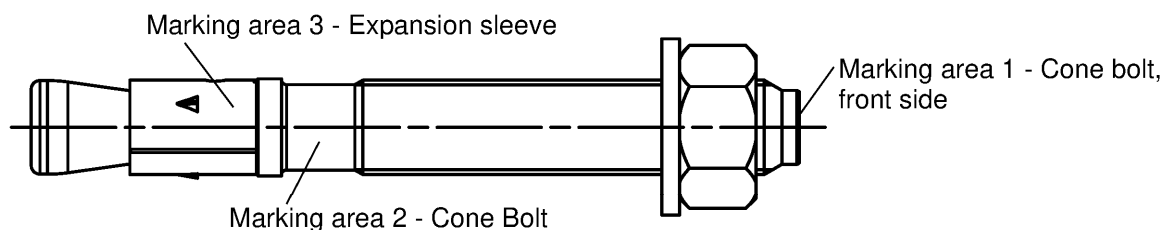
(Fig. not to scale)

Upat Express Anchor IMC

**Product description**  
Installed condition

**Annex A 1**

## IMC for use with standard and reduced anchorage depth ( $h_{ef, sta}$ and $h_{ef, red}$ )



Product label, example:

U-IMC

12/10 R

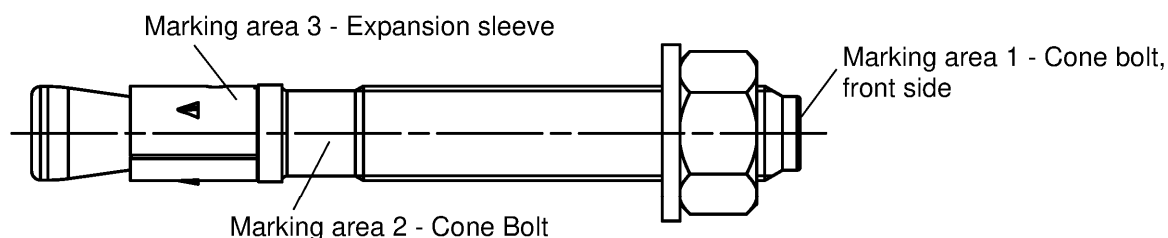
Brand | type of fastener  
placed at marking area 2 or 3

Thread size / max. thickness of the fixture ( $t_{fix}$ ) for  $h_{ef, sta}$   
identification R or HDG placed at marking area 2

**Table A2.1:** Letter-code on marking area 1 and maximum thickness of fixture  $t_{fix}$  [mm]:

| marking                             |          | A  | B  | C  | D  | E  | F  | G  | H  | I  | K  | L  | M  | N   | O   | P   | R   | S   | T   | U   | V   | W   | X   | Y   | Z   |
|-------------------------------------|----------|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| max. $t_{fix}$ for $h_{ef, sta}$    | M6-M20   | 5  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80  | 90  | 100 | 120 | 140 | 160 | 180 | 200 | 250 | 300 | 350 | 400 |
| max. $t_{fix}$<br>for $h_{ef, red}$ | M8, M10  | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 70 | 80 | 90  | 100 | 110 | 130 | 150 | 170 | 190 | 210 | 260 | 310 | 360 | 410 |
|                                     | M12, M16 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 75 | 85 | 95  | 105 | 115 | 135 | 155 | 175 | 195 | 215 | 265 | 315 | 365 | 415 |
|                                     | M20      | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 85 | 95 | 105 | 115 | 125 | 145 | 165 | 185 | 205 | 225 | 275 | 325 | 375 | 425 |

## IMC K for use with reduced anchorage depth only ( $h_{ef, red}$ ):



Product label, example:

U-IMC

12/10 K R

Brand | type of fastener  
placed at marking area 2 or 3

Thread size / max. thickness of the fixture ( $t_{fix}$ )  
identification K for  $h_{ef, red}$   
identification R or HDG placed on marking area 2

**Table A2.2:** Letter-code on marking area 1 and maximum thickness of fixture  $t_{fix}$  [mm]:

| Markierung                       |        | -A- | -B- | -C- | -D- | -E- | -F- | -G- | -H- | -I- | -K- | -L- | -M- | -N- | -O- | -P- | -R- | -S- | -T- | -U- | -V- | -W- | -X- | -Y- | -Z- |
|----------------------------------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| max. $t_{fix}$ for $h_{ef, red}$ | M8-M20 | 5   | 10  | 15  | 20  | 25  | 30  | 35  | 40  | 45  | 50  | 60  | 70  | 80  | 90  | 100 | 120 | 140 | 160 | 180 | 200 | 250 | 300 | 350 | 400 |

Identification for  $h_{ef, red}$  is the letter-code between 2 hyphen

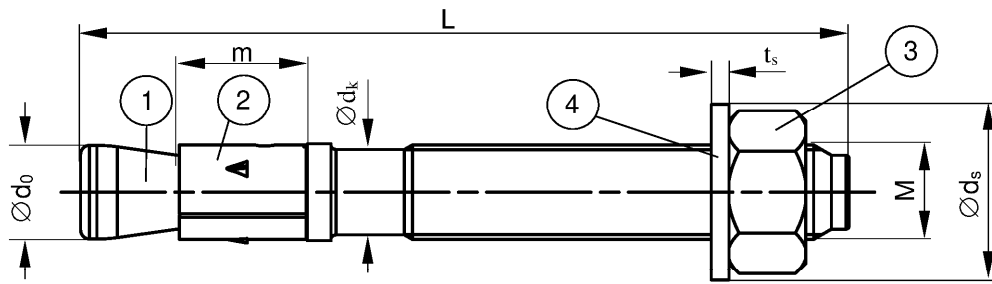
(Fig. not to scale)

Upat Express Anchor IMC

**Product description**  
Product label and letter code

**Annex A 2**

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**Table A3.1:** Anchor dimensions [mm]

| Part                 | Designation      |                  | IMC, IMC R |      |      |      |      |      |
|----------------------|------------------|------------------|------------|------|------|------|------|------|
|                      |                  |                  | M6         | M8   | M10  | M12  | M16  | M20  |
| 1                    | Cone bolt        | M                | M6         | M8   | M10  | M12  | M16  | M20  |
|                      |                  | Ø d <sub>0</sub> | 5,9        | 7,9  | 9,9  | 11,9 | 15,9 | 19,6 |
|                      |                  | Ø d <sub>k</sub> | 5,2        | 7,1  | 8,9  | 10,8 | 14,5 | 18,2 |
| 2                    | Expansion sleeve | m                | 10         | 11,5 | 13,5 | 16,5 | 21,5 | 33,5 |
| 3                    | Hexagon nut      | SW               | 10         | 13   | 17   | 19   | 24   | 30   |
| 4                    | Washer           | t <sub>s</sub>   | 1,0        | 1,4  | 1,8  | 2,3  | 2,7  | 2,7  |
|                      |                  | Ø d <sub>s</sub> | 11,5       | 15   | 19   | 23   | 29   | 36   |
| Thickness of fixture |                  | t <sub>fix</sub> | 0          | 0    | 0    | 0    | 0    | 0    |
|                      |                  |                  | 200        | 200  | 250  | 300  | 400  | 500  |
| Length of fastener   |                  | L <sub>min</sub> | 45         | 56   | 71   | 86   | 120  | 139  |
|                      |                  | L <sub>max</sub> | 245        | 261  | 316  | 396  | 520  | 654  |

(Fig. not to scale)

Upat Express Anchor IMC

**Product description**  
Dimensions

**Annex A 3**

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**Table A4.1: Materials IMC (zinc plated  $\geq 5\mu\text{m}$ , ISO 4042:2018)**

| Part | Designation      | Material                                        |
|------|------------------|-------------------------------------------------|
| 1    | Cone bolt        | Cold form steel or free cutting steel           |
| 2    | Expansion sleeve | Cold strip, EN 10139:2016 <sup>1)</sup>         |
| 3    | Hexagon nut      | Steel, property class min. 8, EN ISO 898-2:2012 |
| 4    | Washer           | Cold strip, EN 10139:2013                       |

<sup>1)</sup> Optional stainless steel EN 10088:2014

**Table A4.2: Materials IMC HDG (hot-dip galvanised  $\geq 50\mu\text{m}$ , ISO 10684: 2004 <sup>2)</sup>)**

| Part | Designation      | Material                                        |
|------|------------------|-------------------------------------------------|
| 1    | Cone bolt        | Cold form steel or free cutting steel           |
| 2    | Expansion sleeve | Stainless steel EN 10088:2014                   |
| 3    | Hexagon nut      | Steel, property class min. 8, EN ISO 898-2:2012 |
| 4    | Washer           | Cold strip, EN 10139:2016                       |

<sup>1)</sup> Alternative method sherardized  $\geq 50\mu\text{m}$ , EN 13811:2003

**Table A4.3: Materials IMC R**

| Part | Designation      | Material                                                                  |
|------|------------------|---------------------------------------------------------------------------|
| 1    | Cone bolt        | Stainless steel EN 10088:2014                                             |
| 2    | Expansion sleeve | Stainless steel EN 10088:2014                                             |
| 3    | Hexagon nut      | Stainless steel EN 10088:2014<br>ISO 3506-2: 2009; property class min. 70 |
| 4    | Washer           | Stainless steel EN 10088:2014                                             |

Upat Express Anchor IMC

**Product description**  
Materials

**Annex A 4**

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## Specifications of intended use

### Anchorage subject to:

| Express Anchor IMC, IMC R     |                 |                        | M6 <sup>1)</sup> | M8 <sup>1)</sup> | M10 | M12 | M16 | M20 |
|-------------------------------|-----------------|------------------------|------------------|------------------|-----|-----|-----|-----|
| Material                      | Steel           | Zinc plated            | ✓                |                  |     |     |     |     |
|                               |                 | Hot-dip galvanized HDG | -.2)             | ✓                |     |     |     |     |
|                               | Stainless steel | R                      | ✓                |                  |     |     |     |     |
|                               |                 |                        |                  |                  |     |     |     |     |
| Static and quasi-static loads |                 |                        | ✓                |                  |     |     |     |     |
| Reduced anchorage depth       |                 |                        | -.2)             | ✓                |     |     |     |     |
| Uncracked concrete            |                 |                        | ✓                |                  |     |     |     |     |

<sup>1)</sup> Use of IMC 6 (gvz/R) and IMC 8 (gvz/HDG/R) with  $h_{ef} = 30\text{mm}$  restricted to anchoring of structural components which are statically indeterminate

<sup>2)</sup> Anchor type not part of the assessment

### Base materials:

- Reinforced or unreinforced normal concrete without fibres of strength classes C20/25 to C50/60 according to EN 206:2013+A1:2016

### Use conditions (Environmental conditions):

- Structures subject to dry internal conditions:
- For all other conditions according to EN 1993-1-4:2015-10 corresponding to corrosion resistance class CRC III

**IMC, IMC HDG**

**IMC R**

### Design:

- Anchorage is to be designed under the responsibility of an engineer experienced in anchorages and concrete work
- Verifiable calculation notes and drawings are to be 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 according to EN 1992-4:2018 and TR 055

Upat Express Anchor IMC

**Intended Use**  
Specifications

**Annex B 1**

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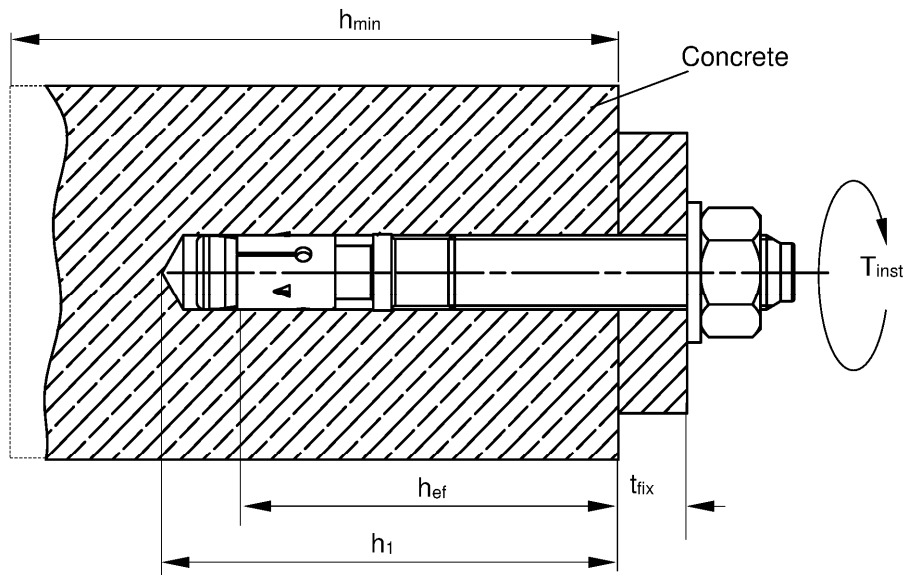
**Table B2.1:** Installation parameters

| Type of anchor / size <b>IMC, IMC R</b>                    | <b>M6</b>        | <b>M8</b>        | <b>M10</b> | <b>M12</b> | <b>M16</b> | <b>M20</b> |
|------------------------------------------------------------|------------------|------------------|------------|------------|------------|------------|
| Nominal drill hole diameter $d_0 =$                        | 6                | 8                | 10         | 12         | 16         | 20         |
| Cutting diameter of drill bit $d_{cut} \leq$               | 6,45             | 8,45             | 10,45      | 12,50      | 16,50      | 20,55      |
| Standard anchorage depth $h_{ef,sta} =$                    | 30 <sup>1)</sup> | 40               | 50         | 65         | 80         | 105        |
| Reduced anchorage depth $h_{ef,red} =$ [mm]                | - <sup>2)</sup>  | 30 <sup>1)</sup> | 40         | 50         | 65         | 80         |
| Standard drill hole depth $h_{1,sta} \geq$                 | 40               | 56               | 68         | 85         | 104        | 135        |
| Reduced drill hole depth $h_{1,red} \geq$                  | - <sup>2)</sup>  | 46 <sup>1)</sup> | 58         | 70         | 89         | 110        |
| Diameter of clearance hole in the fixture $d_f \leq$       | 7                | 9                | 12         | 14         | 18         | 22         |
| Required torque moment IMC (zinc plated) $T_{inst} =$ [Nm] | 4                | 15               | 30         | 50         | 100        | 200        |
| Required torque moment IMC (hot-dip galvanized)            | - <sup>3)</sup>  | 15               | 30         | 40         | 70         | 200        |
| Required torque moment IMC R                               | 4                | 10               | 20         | 35         | 80         | 150        |

<sup>1)</sup> Use restricted to anchoring of structural components which are statically indeterminate

<sup>2)</sup> No performance assessed

<sup>3)</sup> Anchor type not part of the assessment



$h_{ef}$  = Effective embedment depth  
 $t_{fix}$  = Thickness of the fixture  
 $h_1$  = Depth of drill hole to deepest point  
 $h_{min}$  = Minimum thickness of concrete member  
 $T_{inst}$  = Required setting torque

(Fig. not to scale)

Upat Express Anchor IMC

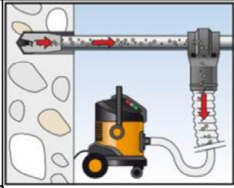
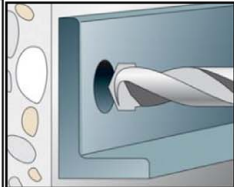
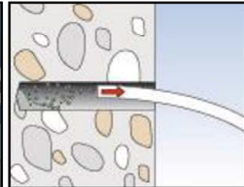
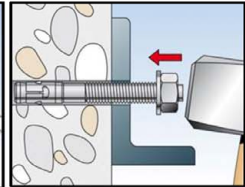
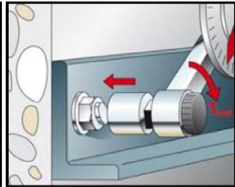
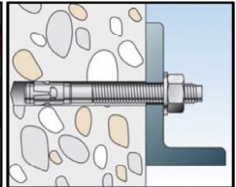
**Intended Use**  
Installation parameters

**Annex B 2**

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## Installation instructions

- Fastener installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site
- Use of the fastener only as supplied by the manufacturer without exchanging the components of the fastener
- Checking before placing the fastener to ensure that the strength class of the concrete in which the fastener is to be placed is in the range given and is not lower than that of the concrete to which the characteristic loads apply
- Check of concrete being well compacted, e.g. without significant voids
- Hammer or hollow drilling
- Drill hole created perpendicular  $\pm 5^\circ$  to concrete surface, positioning without damaging the reinforcement
- In case of aborted hole: new drilling at a minimum distance twice the depth of the aborted drill hole or smaller distance if the aborted drill hole is filled with high strength mortar and if under shear or oblique tension load it is not in the direction of load application

|                 |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |
|-----------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Hollow drilling |  | Continue with step 3, 4 and 5                                                     |                                                                                   |                                                                                    |                                                                                     |
| Hammer drilling |  |  |  |  |  |
|                 | 1                                                                                 | 2                                                                                 | 3                                                                                 | 4                                                                                  | 5                                                                                   |

| No. | Description                                                  |                                                        |
|-----|--------------------------------------------------------------|--------------------------------------------------------|
| 1   | Create drill hole with hammer drill                          | Create drill hole with hollow drill and vacuum cleaner |
| 2   | Clean drill hole                                             | -                                                      |
| 3   | Set anchor                                                   |                                                        |
| 4   | Expand anchor with prescribed installation torque $T_{inst}$ |                                                        |
| 5   | Finished installation                                        |                                                        |

| Types of drills |                                                                                     |
|-----------------|-------------------------------------------------------------------------------------|
| Hammer drill    |  |
| Hollow drill    |  |

Upat Express Anchor IMC

**Intended Use**  
Installation instructions

**Annex B 3**

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**Table C1.1:** Characteristic values of **tension** resistance under static and quasi-static action

| Type of anchor / size                                                       |                                 |        | M6                                                                      | M8                | M10  | M12  | M16  | M20  |
|-----------------------------------------------------------------------------|---------------------------------|--------|-------------------------------------------------------------------------|-------------------|------|------|------|------|
| Steel failure for standard and reduced anchorage depth IMC                  |                                 |        |                                                                         |                   |      |      |      |      |
| Characteristic resistance IMC                                               | N <sub>Rk,s</sub>               | [kN]   | 8,3                                                                     | 16,5              | 27,2 | 41,6 | 77,9 | 107  |
| Partial factor                                                              | γ <sub>Ms</sub> <sup>1)</sup>   | [-]    | 1,5                                                                     | 1,4               | 1,4  | 1,4  | 1,5  | 1,5  |
| Steel failure for standard and reduced anchorage depth IMC R                |                                 |        |                                                                         |                   |      |      |      |      |
| Characteristic resistance IMC R                                             | N <sub>Rk,s</sub>               | [kN]   | 10,6                                                                    | 16,5              | 27,2 | 41,6 | 78   | 111  |
| Partial factor                                                              | γ <sub>Ms</sub> <sup>1)</sup>   | [-]    | 1,5                                                                     | 1,4               | 1,4  | 1,4  | 1,4  | 1,5  |
| Pullout failure for standard anchorage depth IMC, IMC R                     |                                 |        |                                                                         |                   |      |      |      |      |
| Characteristic resistance C20/25                                            | N <sub>Rk,p</sub>               | [kN]   | 6 <sup>4)</sup>                                                         | 12,5              | 17,4 | 25,8 | 35,2 | 52,9 |
| Pullout failure for reduced anchorage depth IMC, IMC R                      |                                 |        |                                                                         |                   |      |      |      |      |
| Characteristic resistance C20/25                                            | N <sub>Rk,p</sub>               | [kN]   | - <sup>5)</sup>                                                         | 6 <sup>4)</sup>   | 12,5 | 17,4 | 25,8 | 35,2 |
| Increasing factors for N <sub>Rk,p</sub>                                    | ψ <sub>c</sub>                  | C25/30 | 1,12                                                                    |                   |      |      |      |      |
|                                                                             |                                 | C30/37 | 1,22                                                                    |                   |      |      |      |      |
|                                                                             |                                 | C35/45 | 1,32                                                                    |                   |      |      |      |      |
|                                                                             |                                 | C40/50 | 1,41                                                                    |                   |      |      |      |      |
|                                                                             |                                 | C45/55 | 1,50                                                                    |                   |      |      |      |      |
|                                                                             |                                 | C50/60 | 1,58                                                                    |                   |      |      |      |      |
| Installation factor                                                         | γ <sub>inst</sub>               | [-]    | 1,0                                                                     |                   |      |      |      |      |
| Concrete cone and splitting failure for standard anchorage depth IMC, IMC R |                                 |        |                                                                         |                   |      |      |      |      |
| Effective anchorage depth                                                   | h <sub>ef, sta</sub>            | [mm]   | 30 <sup>4)</sup>                                                        | 40                | 50   | 65   | 80   | 105  |
| Factor for uncracked concrete                                               | k <sub>ucr,N</sub>              | [-]    | 11,0 <sup>2)</sup>                                                      |                   |      |      |      |      |
| Spacing                                                                     | s <sub>cr,N</sub>               | [mm]   | 3 h <sub>ef, sta</sub>                                                  |                   |      |      |      |      |
| Edge distance                                                               | c <sub>cr,N</sub>               |        | 1,5 h <sub>ef, sta</sub>                                                |                   |      |      |      |      |
| Spacing (splitting failure)                                                 | s <sub>cr,sp</sub>              |        | 130 <sup>4)</sup>                                                       | 190               | 200  | 290  | 350  | 370  |
| Edge distance (splitting failure)                                           | c <sub>cr,sp</sub>              |        | 65 <sup>4)</sup>                                                        | 95                | 100  | 145  | 175  | 185  |
| Characteristic resistance to splitting                                      | N <sup>0</sup> <sub>Rk,sp</sub> | [kN]   | min {N <sup>0</sup> <sub>Rk,c</sub> , N <sub>Rk,p</sub> } <sup>3)</sup> |                   |      |      |      |      |
| Concrete cone and splitting failure for reduced anchorage depth IMC, IMC R  |                                 |        |                                                                         |                   |      |      |      |      |
| Effective anchorage depth                                                   | h <sub>ef, red</sub>            | [mm]   | - <sup>5)</sup>                                                         | 30 <sup>4)</sup>  | 40   | 50   | 65   | 80   |
| Factor for uncracked concrete                                               | k <sub>ucr,N</sub>              | [-]    | 11,0 <sup>2)</sup>                                                      |                   |      |      |      |      |
| Spacing                                                                     | s <sub>cr,N</sub>               | [mm]   | 3 h <sub>ef, red</sub>                                                  |                   |      |      |      |      |
| Edge distance                                                               | c <sub>cr,N</sub>               |        | 1,5 h <sub>ef, red</sub>                                                |                   |      |      |      |      |
| Spacing (splitting failure)                                                 | s <sub>cr,sp</sub>              |        | - <sup>5)</sup>                                                         | 190 <sup>4)</sup> | 200  | 290  | 350  | 370  |
| Edge distance (splitting failure)                                           | c <sub>cr,sp</sub>              |        | - <sup>5)</sup>                                                         | 95 <sup>4)</sup>  | 100  | 145  | 175  | 185  |

<sup>1)</sup> In absence of other national regulations

<sup>2)</sup> Based on concrete strength as cylinder strength

<sup>3)</sup>  $N_{Rk,c}^0$  according to EN 1992-4:2018

<sup>4)</sup> Use restricted to anchoring of structural components which are statically indeterminate

<sup>5)</sup> No performance assessed

Upat Express Anchor IMC

#### Performances

Characteristic values of **tension** resistance

**Annex C 1**

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**Table C2.1:** Characteristic values of **shear** resistance under static and quasi-static action

| Type of anchor / size                                                    |                                                          | M6                | M8                 | M10  | M12  | M16   | M20 |
|--------------------------------------------------------------------------|----------------------------------------------------------|-------------------|--------------------|------|------|-------|-----|
| Installation factor $\gamma_{\text{inst}}$ [-]                           |                                                          | 1,0               |                    |      |      |       |     |
| Steel failure without lever arm for standard and reduced anchorage depth |                                                          |                   |                    |      |      |       |     |
| Characteristic resistance                                                | $\frac{\text{IMC}}{\text{IMC R}} V^0_{\text{Rk,s}}$ [kN] | 6,0 <sup>2)</sup> | 13,3               | 21,0 | 31,3 | 55,1  | 67  |
|                                                                          |                                                          | 5,3 <sup>2)</sup> | 12,8               | 20,3 | 27,4 | 51    | 86  |
| Steel failure with lever arm for standard anchorage depth                |                                                          |                   |                    |      |      |       |     |
| Characteristic bending moment                                            | $\frac{\text{IMC}}{\text{IMC R}} M^0_{\text{Rk,s}}$ [Nm] | 9,4 <sup>2)</sup> | 26,2               | 52,3 | 91,6 | 232,2 | 422 |
|                                                                          |                                                          | 8 <sup>2)</sup>   | 26                 | 52   | 85   | 216   | 454 |
| Steel failure with lever arm for reduced anchorage depth                 |                                                          |                   |                    |      |      |       |     |
| Characteristic bending moment                                            | $\frac{\text{IMC}}{\text{IMC R}} M^0_{\text{Rk,s}}$ [Nm] | - <sup>3)</sup>   | 19,9 <sup>2)</sup> | 45,9 | 90,0 | 226,9 | 349 |
|                                                                          |                                                          | -                 | 21 <sup>2)</sup>   | 47   | 85   | 216   | 353 |
| Partial factor steel failure                                             | $\gamma_{\text{Ms}}^{1)}$ [-]                            | 1,25              |                    |      |      |       |     |
| Factor for ductility                                                     | $k_7$ [-]                                                | 1,0               |                    |      |      |       |     |
| Concrete pryout failure for standard anchorage depth IMC, IMC R          |                                                          |                   |                    |      |      |       |     |
| Factor for pryout failure                                                | $k_8$ [-]                                                | 1,4               | 1,8                | 2,1  | 2,3  | 2,3   | 2,3 |
| Concrete pryout failure for reduced anchorage depth IMC, IMC R           |                                                          |                   |                    |      |      |       |     |
| Factor for pryout failure                                                | $k_8$ [-]                                                | - <sup>3)</sup>   | 1,8                | 2,1  | 2,3  | 2,3   | 2,3 |
| Concrete edge failure for standard anchorage depth IMC, IMC R            |                                                          |                   |                    |      |      |       |     |
| Effective length of anchor                                               | $l_{\text{f,sta}}$ [mm]                                  | 30 <sup>2)</sup>  | 40                 | 50   | 65   | 80    | 105 |
| Effective diameter of anchor                                             | $d_{\text{nom}}$                                         | 6                 | 8                  | 10   | 12   | 16    | 20  |
| Concrete edge failure for reduced anchorage depth IMC, IMC R             |                                                          |                   |                    |      |      |       |     |
| Effective length of anchor                                               | $l_{\text{f,red}}$ [mm]                                  | - <sup>3)</sup>   | 30 <sup>2)</sup>   | 40   | 50   | 65    | 80  |
| Effective diameter of anchor                                             | $d_{\text{nom}}$                                         | - <sup>3)</sup>   | 8                  | 10   | 12   | 16    | 20  |

<sup>1)</sup> In absence of other national regulations

<sup>2)</sup> Use restricted to anchoring of structural components which are statically indeterminate

<sup>3)</sup> No performance assessed

Upat Express Anchor IMC

#### Performances

Characteristic values of **shear** resistance

## Annex C 2

Appendix 10/ 11

**Table C3.1:** Minimum thickness of concrete members, minimum spacing and minimum edge distance

| Type of anchor / size <b>IMC, IMC R</b> |                             |                | <b>M6</b>        | <b>M8</b>                 | <b>M10</b>                | <b>M12</b> | <b>M16</b>                 | <b>M20</b>                  |
|-----------------------------------------|-----------------------------|----------------|------------------|---------------------------|---------------------------|------------|----------------------------|-----------------------------|
| Standard<br>anchorage<br>depth          | Effective anchorage depth   | $h_{ef, sta}$  | 30 <sup>2)</sup> | 40                        | 50                        | 65         | 80                         | 105                         |
|                                         | Minimum thickness of member | $h_{min}$      | 100              | 100                       | 100                       | 120        | 160                        | 200                         |
|                                         | Minimum spacing             | $s_{min}$ [mm] | 40               | 40                        | 50<br>(70 <sup>1)</sup> ) | 70         | 90<br>(120 <sup>1)</sup> ) | 120                         |
|                                         | Minimum edge distance       | $c_{min}$      | 40               | 40<br>(45 <sup>1)</sup> ) | 50<br>(55 <sup>1)</sup> ) | 70         | 90<br>(80 <sup>1)</sup> )  | 120                         |
| Reduced<br>anchorage<br>depth           | Effective anchorage depth   | $h_{ef, red}$  | – <sup>3)</sup>  | 30 <sup>2)</sup>          | 40                        | 50         | 65                         | 80                          |
|                                         | Minimum thickness of member | $h_{min}$      | – <sup>3)</sup>  | 100                       | 100                       | 100        | 120                        | 160                         |
|                                         | Minimum spacing             | $s_{min}$ [mm] | – <sup>3)</sup>  | 40<br>(50 <sup>1)</sup> ) | 50                        | 70         | 90                         | 120<br>(140 <sup>1)</sup> ) |
|                                         | Minimum edge distance       | $c_{min}$      | – <sup>3)</sup>  | 40<br>(45 <sup>1)</sup> ) | 80                        | 100        | 120                        | 120                         |

1) Values for IMC R

2) Use restricted to anchoring of structural components which are statically indeterminate

3) No performance assessed

**Table C3.2:** Displacements under static and quasi static **tension** loads

| Type of anchor / size <b>IMC, IMC R</b> |                                        |      | <b>M6</b>                | <b>M8</b> | <b>M10</b> | <b>M12</b>               | <b>M16</b> | <b>M20</b>               |
|-----------------------------------------|----------------------------------------|------|--------------------------|-----------|------------|--------------------------|------------|--------------------------|
| Standard anchorage depth                | $h_{ef, sta}$                          | [mm] | 30                       | 40        | 50         | 65                       | 80         | 105                      |
| Tension load C20/25                     | N                                      | [kN] | 2,8                      | 6,1       | 8,5        | 12,6                     | 17,2       | 25,8                     |
| Displacements                           | $\frac{\delta_{N0}}{\delta_{N\infty}}$ | [mm] | 1,9                      | 0,6       | 0,9        | 1,5 (1,9 <sup>1)</sup> ) | 1,8        | 1,8 (2,0 <sup>1)</sup> ) |
|                                         |                                        |      | 3,1 (2,7 <sup>1)</sup> ) |           |            |                          |            |                          |
| Reduced anchorage depth                 | $h_{ef, red}$                          |      | – <sup>2)</sup>          | 30        | 40         | 50                       | 65         | 80                       |
| Tension load C20/25                     | N                                      | [kN] | – <sup>2)</sup>          | 2,8       | 6,1        | 8,5                      | 12,6       | 17,2                     |
| Displacements                           | $\frac{\delta_{N0}}{\delta_{N\infty}}$ | [mm] |                          | 0,4       | 0,7        | 0,7                      | 0,9        | 1,0                      |
|                                         |                                        |      | 1,6 (1,7 <sup>1)</sup> ) |           |            |                          |            |                          |

1) Values for IMC R

2) No performance assessed

**Table C3.3:** Displacements under static and quasi static **shear** loads

| Type of anchor / size <b>IMC, IMC R</b> |                                        |      | <b>M6</b> | <b>M8</b> | <b>M10</b> | <b>M12</b> | <b>M16</b> | <b>M20</b> |
|-----------------------------------------|----------------------------------------|------|-----------|-----------|------------|------------|------------|------------|
| Shear load IMC                          | V                                      | [kN] | 3,4       | 7,6       | 12,0       | 17,9       | 31,5       | 38,2       |
| Displacements IMC                       | $\frac{\delta_{V0}}{\delta_{V\infty}}$ | [mm] | 0,7       | 1,5       | 1,6        | 2,0        | 3,0        | 2,6        |
|                                         |                                        |      | 1,1       | 2,3       | 2,4        | 3,0        | 4,5        | 3,9        |
| Shear load IMC R                        | V                                      | [kN] | 3,0       | 7,3       | 11,6       | 15,7       | 29,1       | 49,0       |
| Displacements IMC R                     | $\frac{\delta_{V0}}{\delta_{V\infty}}$ | [mm] | 1,5       | 1,4       | 2,1        | 2,6        | 2,7        | 4,6        |
|                                         |                                        |      | 2,3       | 2,2       | 3,2        | 3,9        | 4,1        | 7,0        |

Upat Express Anchor IMC

#### Performances

Minimum thickness of concrete members, minimum spacing and minimum edge distance  
Displacements due to tension and shear loads

### Annex C 3

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