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## European Technical Assessment

**ETA 14/0068**  
**30/04/2025**

English translation prepared by IETcc. Original version in Spanish language

### General Part

**Technical Assessment Body issuing the European Technical Assessment:**  
Instituto de Ciencias de la Construcción Eduardo Torroja (IETcc)

**Trade name of the construction  
product**

HEHO, HECLO, HEHC, HEA4, HEC4 drop in anchor

**Product family to which the  
construction product belongs**

Deformation controlled anchor made of galvanized steel or stainless steel of sizes M6, M8, M10, M12, M16 and M20 for use in concrete for redundant non-structural systems.

**Manufacturer**

**Index - Técnicas Expansivas S.L.**  
Segador 13.  
26006 Logroño (La Rioja) Spain.  
website: [www.indexfix.com](http://www.indexfix.com)

**Manufacturing plant**

Index plant 2

**This European Technical  
Assessment contains**

15 pages with 3 annexes, which form an integral part of this assessment.

**This European Technical  
Assessment is issued in accordance  
with Regulation (EU) No 305/2011,  
on the basis of**

European Technical Assessment EAD 330747-00-0601  
"Fasteners for use in concrete for redundant non-structural  
systems", ed. May 2018

**This ETA replaces**

ETA 14/0068 version 5 issued 19/10/2021



Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document.

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## SPECIFIC PART

### 1. Technical description of the product

The Index HEHO, HECLO, HEHC, in the range of M6 to M20, is an anchor made of galvanised steel. The Index HEA4, HEC4, in the range of M6 to M20, is an anchor made of stainless steel. They are placed into a drilled hole and anchored by deformation-controlled expansion. The anchorage is characterised by friction between the sleeve and concrete.

Product and installation descriptions are given in annexes A1, A2 and A3.

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

#### 2.1 Intended use

This ETA covers fasteners redundant non-structural systems. Redundant non-structural systems mean applications where, if excessive slip or failure of one fastener occurs, it is assumed that the load can be transmitted to adjacent fasteners without violating the requirements on the fixture in the serviceability and ultimate limit state.

The performances given in section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in annex B1.

#### 2.2 Relevant general conditions for the use of the product

The assessment methods included or referred to in this EAD have been written based on the manufacturer's request to take into account a working life of the fastener for the intended use of 50 years when installed in the works (provided that the fastener is subject to appropriate installation). These provisions are based upon the current state of the art and the available knowledge and experience.

When assessing the product, the intended use as foreseen by the manufacturer shall be taken into account. The real working life may be, in normal use conditions, considerably longer without major degradation affecting the basic requirements for works.

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or its representative nor by EOTA when drafting this EAD nor by the Technical Assessment Body issuing an ETA based on this EAD, but are regarded only as a mean for expressing the expected economically reasonable working life of the product.

This ETA covers fasteners for installation in pre-drilled holes in compacted reinforced or unreinforced normal weight concrete without fibers considering annexes B and C.

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

The identification tests and the assessment for the intended use of this product according to the Basic Work Requirements (BWR) were carried out in compliance with EAD 330747-00-0601, The characteristics of each system shall correspond to the respective values laid down in following tables of this ETA, checked by IETcc.

Methods of verification and of assessing and judging are listed afterwards.

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



| Essential characteristic | Relevant clause in EAD | Performance                                                         | Annex |
|--------------------------|------------------------|---------------------------------------------------------------------|-------|
| Reaction to fire         | ----                   | Anchorage satisfy requirements for class A1 according to EN 13501-1 | --    |
| Fire resistance          | 2.2.12                 | $F_{Rk,fi}^0$ [kN]<br>$M_{Rk,S,fi}^0$ [Nm]                          | C7    |

### 3.2 Safety and accessibility in use (BWR 4)

| Essential characteristic                                               | Relevant clause in EAD | Performance                                       | Annex    |
|------------------------------------------------------------------------|------------------------|---------------------------------------------------|----------|
| Characteristic resistance for all load directions and modes of failure | 2.2.10                 | $F_{Rk}^0$ [kN]<br>$s_{cr}$ [mm]<br>$c_{cr}$ [mm] | C4 to C6 |
| Durability:<br>HEHO, HECLO, HEHC<br>HEA4, HEC4                         | 2.2.11                 | Zinc plated<br>Stainless steel                    | A1       |

### 4. Assessment and Verification of Constancy of Performance (hereinafter AVCP) system applied, with reference to its legal base

The applicable European legal act for the system of Assessment and Verification of Constancy of Performance (see annex V to Regulation (EU) No 305/2011) is 97/161/EC.

The system to be applied is 2+.

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

Technical details necessary for the implementation of the AVCP system are laid down in the quality plan which is deposited at IETcc<sup>(1)</sup>.

Prepared by: PhD Julián Rivera (Innovative Products Assessment Unit, IETcc-CSIC)

Issued in Madrid on 30<sup>th</sup> of April 2025

Mr. Ángel Castillo Talavera

Director

on behalf of Instituto de Ciencias de la Construcción Eduardo Torroja

<sup>(1)</sup> The Quality Plan is a confidential part of the ETA and only handed over to the notified certification body involved in the assessment and verification of constancy of performance.



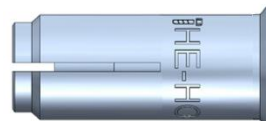
## Product



HEHO anchor



HECLO anchor



HEHC anchor



HEA4 anchor



HEC4 anchor

Identification on sleeve: Index logo + "HEHO (HECLO, HEHC, HEA4, HEC4)" + Metric; e.g:  HEHO M6

**Table A1: Dimensions**

| Anchor dimensions     |      | M6 | M8 | M10 | M12 | M12D | M16 | M20 |
|-----------------------|------|----|----|-----|-----|------|-----|-----|
| <b>HEHO, HECLO</b>    |      |    |    |     |     |      |     |     |
| ØD: External diameter | [mm] | 8  | 10 | 12  | 15  | 16   | 20  | 25  |
| Ød: internal diameter | [mm] | M6 | M8 | M10 | M12 | M12  | M16 | M20 |
| L: total length       | [mm] | 25 | 30 | 40  | 50  | 50   | 65  | 80  |
| <b>HEHC</b>           |      |    |    |     |     |      |     |     |
| ØD: External diameter | [mm] | -- | 10 | 12  | 15  | --   | --  | --  |
| Ød: internal diameter | [mm] | -- | M8 | M10 | M12 | --   | --  | --  |
| L: total length       | [mm] | -- | 25 | 25  | 25  | --   | --  | --  |
| <b>HEA4, HEC4</b>     |      |    |    |     |     |      |     |     |
| ØD: External diameter | [mm] | 8  | 10 | 12  | 15  | --   | 20  | 25  |
| Ød: internal diameter | [mm] | M6 | M8 | M10 | M12 | --   | M16 | M20 |
| L: total length       | [mm] | 25 | 30 | 40  | 50  | --   | 65  | 80  |

**Table A2: Materials**

| Item | Designation    | Material for HEHO, HECLO, HEHC                                       | Material for HEA4, HEC4   |
|------|----------------|----------------------------------------------------------------------|---------------------------|
| 1    | Sleeve         | Carbon steel, zinc plated $\geq 5 \mu\text{m}$ ISO 4042<br>Zn5/An/T0 | Stainless steel, grade A4 |
| 2    | Cone           | Carbon steel, zinc plated $\geq 5 \mu\text{m}$ ISO 4042<br>Zn5/An/T0 | Stainless steel, grade A4 |
| 3    | Retention disc | Plastic                                                              | Plastic                   |

HEHO, HECLO, HEHC, HEA4, HEC4 anchor

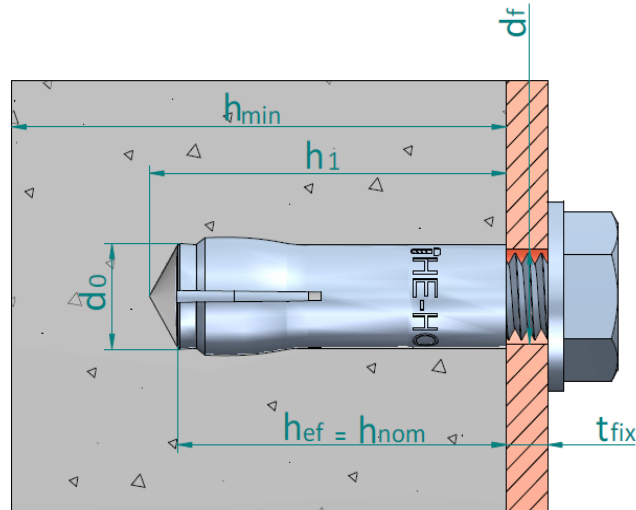
Product description

Product and materials

Annex A1



### Installed condition in concrete



- $h_{ef}$ : Effective anchorage depth
- $h_1$ : Depth of drilled hole
- $h_{nom}$ : Overall anchor embedment depth in the concrete
- $h_{min}$ : Minimum thickness of concrete member
- $t_{fix}$ : Thickness of fixture
- $d_0$ : Nominal diameter of drill bit
- $d_f$ : Fixture clearance hole diameter

### Setting tool



Setting tool can be assembled with a plastic handle for hand protection purposes

**Table A3: Setting tool dimensions**

| Setting tool dimensions        | M6  | M8   | M10  | M12  | M16  | M20  |
|--------------------------------|-----|------|------|------|------|------|
| <b>HEHO, HECLO, HEA4, HEC4</b> |     |      |      |      |      |      |
| Ø D <sub>1</sub> [mm]          | 18  | 18   | 18   | 18   | 26   | 28   |
| Ø D <sub>2</sub> [mm]          | 5,0 | 6,5  | 8,0  | 10,2 | 13,5 | 16,5 |
| L <sub>s</sub> [mm]            | 15  | 18   | 21   | 30   | 36   | 48   |
| <b>HEHC</b>                    |     |      |      |      |      |      |
| Ø D <sub>1</sub> [mm]          | --  | 18   | 18   | 18   | --   | --   |
| Ø D <sub>2</sub> [mm]          | --  | 6,5  | 8,0  | 10,2 | --   | --   |
| L <sub>s</sub> [mm]            | --  | 15,0 | 16,0 | 10,4 | --   | --   |

**HEHO, HECLO, HEHC, HEA4, HEC4 anchor**

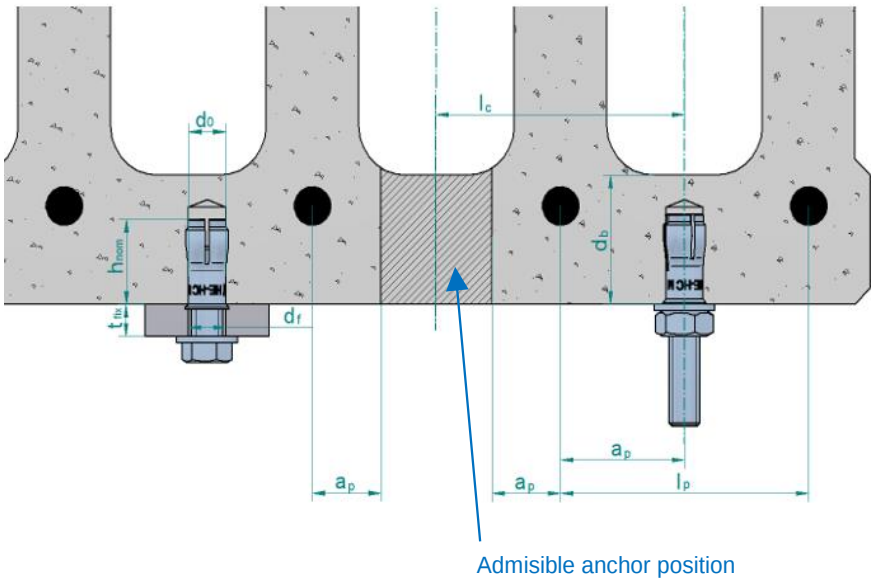
**Product description**

Installed condition in concrete and setting tool

**Annex A2**



**Installed condition in precast prestressed hollow core concrete slabs**



- d<sub>o</sub>: Nominal diameter of drill bit
- d<sub>f</sub>: Fixture clearance hole diameter
- d<sub>b</sub>: Bottom flange thickness
- a<sub>p</sub>: Distance between anchor position and prestressing steel ≥ 50 mm
- l<sub>c</sub>: Core distance ≥ 100 mm
- l<sub>p</sub>: Prestressing steel distance ≥ 100 mm
- t<sub>fix</sub>: Fixture thickness
- c: Edge distance

|                                                                       |          |
|-----------------------------------------------------------------------|----------|
| HEHC anchor                                                           | Annex A3 |
| Product description                                                   |          |
| Installed condition in precast prestressed hollow core concrete slabs |          |



## **Specifications of intended use**

### **Anchorage subjected to:**

- Static or quasi static loads for redundant non-structural systems.
- Use for anchorages with requirements related to resistance of fire (not for using in prestressed hollow core slabs).
- The anchor may only be used if in the design and installation specifications for the fixture the excessive slip or failure of one anchor will not result in a significant violation of the requirements on the fixture in the serviceability and ultimate state.

### **Base materials:**

- Reinforced or unreinforced normal weight concrete without fibres according to EN 206-1:2013+A2:2021.
- Strength classes C12/15 to C50/60 according to EN 206-1:2013+A2:2021: HEHO / HECLO anchors.
- Strength classes C20/25 to C50/60 according to EN 206-1:2013+A2:2021: HEHC / HEA4 / HEC4 anchors.
- Cracked or uncracked concrete.
- Precast, prestressed hollow core concrete slabs, strength C30/37 to C50/60 according to EN 206:2013+A2:2021: HEHC.

### **Use conditions (environmental conditions):**

- HEHO, HECLO, HEHC: anchorages subjected to dry internal conditions.
- HEA4, HEC4: anchorages subjected to dry internal conditions, to external atmospheric exposure (including industrial and marine environment) or to permanent internal damp conditions if no particular aggressive conditions exist. Such particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used). Atmospheres under Corrosion Resistance Class CRC III according to EN 1993-1-4:2006+A1:2015 annex A.

### **Design:**

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete.
- Verifiable calculation rules and drawings are prepared taking into 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.).
- Anchorages under static or quasi-static actions are designed for design method B in accordance with EN 1992-4:2018
- Anchorages under fire exposure are designed in accordance to EN 1992-4:2018. It must be ensured that local spalling of the concrete cover does not occur.

### **Installation:**

- Hole drilling by rotary plus hammer mode.
- Anchor installation carried out by appropriately qualified personal and under the supervision of the person responsible for technical matters of the site.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of aborted hole or smaller distance if the aborted hole is filled with high strength mortar and if under shear or oblique tension load it is not the direction of the load application.
- HEHO, HECLO, HEHC: the bolt or threaded rod to be used shall be property class 4.6, 4.8, 5.6, 5.8, 6.8 or 8.8 according to ISO 898-1.
- HEA4, HEC4: the bolt or threaded rod to be used shall be property class A4-50, A4-70 or A4-80 according to EN 3506-1:2009
- The length of the bolt shall be determined as:
  - Minimum bolt length =  $t_{fix} + l_{s,min}$
  - Maximum bolt length =  $t_{fix} + l_{s,max}$

|                                             |                 |
|---------------------------------------------|-----------------|
| <b>HEHO, HECLO, HEHC, HEA4, HEC4 anchor</b> | <b>Annex B1</b> |
| <b>Intended use</b>                         |                 |
| Specifications                              |                 |



**Table C1: Installation parameters in concrete for HEHO, HECLO, HEHC, HEA4, HEC4 anchor**

| Installation parameters              |                                       |      | Performances        |                     |                     |                     |                       |                     |                     |
|--------------------------------------|---------------------------------------|------|---------------------|---------------------|---------------------|---------------------|-----------------------|---------------------|---------------------|
|                                      |                                       |      | M6                  | M8                  | M10                 | M12                 | M12D                  | M16                 | M20                 |
| d <sub>0</sub>                       | Nominal diameter of drill bit:        | [mm] | 8                   | 10                  | 12                  | 15                  | 16                    | 20                  | 25                  |
| D                                    | Thread diameter:                      | [mm] | M6                  | M8                  | M10                 | M12                 | M12                   | M16                 | M20                 |
| d <sub>f</sub>                       | Fixture clearance hole diameter ≤     | [mm] | 7                   | 9                   | 12                  | 14                  | 14                    | 18                  | 22                  |
| T <sub>inst</sub>                    | Maximum installation torque:          | [Nm] | 4                   | 11                  | 17                  | 38                  | 38                    | 60                  | 100                 |
| HEHO, HECLO                          |                                       |      | HEHOM06<br>HECLOM06 | HEHOM08<br>HECLOM08 | HEHOM10<br>HECLOM10 | HEHOM12<br>HECLOM12 | HEHOM12D<br>HECLOM12D | HEHOM16<br>HECLOM16 | HEHOM20<br>HECLOM20 |
| ℓ <sub>s,min</sub>                   | Minimum screwing depth:               | [mm] | 6                   | 8                   | 10                  | 12                  | 12                    | 16                  | 20                  |
| ℓ <sub>s,max</sub>                   | Maximum screwing depth:               | [mm] | 10                  | 13                  | 17                  | 21                  | 21                    | 27                  | 34                  |
| h <sub>1</sub>                       | Depth of drilled hole:                | [mm] | 27                  | 33                  | 43                  | 54                  | 54                    | 70                  | 86                  |
| h <sub>nom</sub>                     | Overall anchor embedment depth:       | [mm] | 25                  | 30                  | 40                  | 50                  | 50                    | 65                  | 80                  |
| h <sub>ef</sub>                      | Effective anchorage depth:            | [mm] | 25                  | 30                  | 40                  | 50                  | 50                    | 65                  | 80                  |
| h <sub>min</sub>                     | Minimum thickness of concrete member: | [mm] | 100                 | 100                 | 100                 | 100                 | 100                   | 130                 | 160                 |
| S <sub>min</sub>                     | Minimum allowable spacing:            | [mm] | 60                  | 60                  | 80                  | 100                 | 100                   | 130                 | 160                 |
| C <sub>min</sub>                     | Minimum allowable distance:           | [mm] | 105                 | 105                 | 140                 | 175                 | 130                   | 230                 | 280                 |
| HEHC                                 |                                       |      | :                   | HEHCM08             | HEHCM10             | HEHCM12             | :                     | :                   | :                   |
| ℓ <sub>s,min</sub>                   | Minimum screwing depth:               | [mm] | --                  | 7                   | 8                   | 10                  | --                    | --                  | --                  |
| ℓ <sub>s,max</sub>                   | Maximum screwing depth:               | [mm] | --                  | 12                  | 13                  | 13                  | --                    | --                  | --                  |
| h <sub>1</sub>                       | Depth of drilled hole:                | [mm] | --                  | 28                  | 28                  | 29                  | --                    | --                  | --                  |
| h <sub>nom</sub>                     | Overall anchor embedment depth:       | [mm] | --                  | 25                  | 25                  | 25                  | --                    | --                  | --                  |
| h <sub>ef</sub>                      | Effective anchorage depth:            | [mm] | --                  | 25                  | 25                  | 25                  | --                    | --                  | --                  |
| h <sub>min</sub>                     | Minimum thickness of concrete member: | [mm] | --                  | 80                  | 80                  | 80                  | --                    | --                  | --                  |
| S <sub>min</sub>                     | Minimum allowable spacing:            | [mm] | --                  | 75                  | 75                  | 75                  | --                    | --                  | --                  |
| C <sub>min</sub>                     | Minimum allowable distance:           | [mm] | --                  | 60                  | 60                  | 60                  | --                    | --                  | --                  |
| HEA4, HEC4                           |                                       |      | HEA4M06<br>HEC4M06  | HEA4M08<br>HEC4M08  | HEA4M10<br>HEC4M10  | HEA4M12<br>HEC4M12  | :                     | HEA4M16<br>HEC4M16  | HEA4M20<br>HEC4M20  |
| ℓ <sub>s,min</sub>                   | Minimum screwing depth:               | [mm] | 6                   | 8                   | 10                  | 12                  | --                    | 16                  | 20                  |
| ℓ <sub>s,max</sub>                   | Maximum screwing depth:               | [mm] | 10                  | 13                  | 17                  | 21                  | --                    | 27                  | 34                  |
| h <sub>1</sub>                       | Depth of drilled hole:                | [mm] | 27                  | 33                  | 43                  | 54                  | --                    | 70                  | 86                  |
| h <sub>nom</sub>                     | Overall anchor embedment depth:       | [mm] | 25                  | 30                  | 40                  | 50                  | --                    | 65                  | 80                  |
| h <sub>ef</sub>                      | Effective anchorage depth:            | [mm] | 25                  | 30                  | 40                  | 50                  | --                    | 65                  | 80                  |
| h <sub>min</sub>                     | Minimum thickness of concrete member: | [mm] | 80                  | 80                  | 80                  | 100                 | --                    | 130                 | 160                 |
| S <sub>min</sub>                     | Minimum allowable spacing:            | [mm] | 60                  | 60                  | 100                 | 100                 | --                    | 130                 | 160                 |
| C <sub>min</sub>                     | Minimum allowable distance:           | [mm] | 65                  | 80                  | 100                 | 130                 | --                    | 175                 | 210                 |
| HEHO, HECLO, HEHC, HEA4, HEC4 anchor |                                       |      |                     |                     |                     |                     | Annex C1              |                     |                     |
| Performances                         |                                       |      |                     |                     |                     |                     |                       |                     |                     |
| Installation parameters in concrete  |                                       |      |                     |                     |                     |                     |                       |                     |                     |



**Table C2: Installation parameters in prestressed hollow core concrete slabs for HEHC anchor**

| Installation parameters in prestressed hollow core concrete slabs |                                 |      | Performances |         |         |         |    |    |    |
|-------------------------------------------------------------------|---------------------------------|------|--------------|---------|---------|---------|----|----|----|
| HEHC                                                              |                                 |      | :            | HEHCM08 | HEHCM10 | HEHCM12 | :  | :  | :  |
| $\ell_{s,min}$                                                    | Minimum screwing depth:         | [mm] | --           | 7       | 8       | 10      | -- | -- | -- |
| $\ell_{s,max}$                                                    | Maximum screwing depth:         | [mm] | --           | 12      | 13      | 13      | -- | -- | -- |
| $h_1$                                                             | Depth of drilled hole:          | [mm] | --           | 28      | 28      | 29      | -- | -- | -- |
| $h_{nom}$                                                         | Overall anchor embedment depth: | [mm] | --           | 25      | 25      | 25      | -- | -- | -- |
| $h_{ef}$                                                          | Effective anchorage depth:      | [mm] | --           | 25      | 25      | 25      | -- | -- | -- |
| $d_b$                                                             | Minimum bottom flange thickness | [mm] | --           | 35      | 35      | 35      | -- | -- | -- |
| $S_{min}$                                                         | Minimum allowable spacing:      | [mm] | --           | 200     | 200     | 200     | -- | -- | -- |
| $C_{min}$                                                         | Minimum allowable distance:     | [mm] | --           | 150     | 150     | 150     | -- | -- | -- |

HEHC anchor

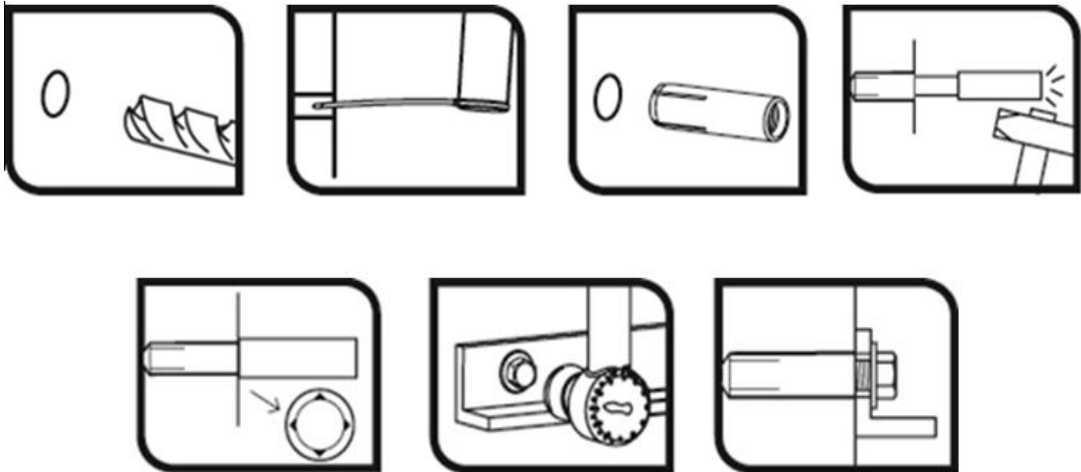
Performances

Installation parameters in prestressed hollow core concrete slabs

Annex C2



**Installation process**



|                                      |          |
|--------------------------------------|----------|
| HEHO, HECLO, HEHC, HEA4, HEC4 anchor | Annex C3 |
| Performances                         |          |
| Installation procedure               |          |



**Table C3: Essential characteristics in concrete to loads of design method B according to EN 1992-4 for HEHO, HECLO, HEHC anchor**

| Characteristic resistance in concrete C20/25 to C50/60 for all loads directions and failure modes |                                                              | Performances |      |      |       |       |       |       |
|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------|--------------|------|------|-------|-------|-------|-------|
|                                                                                                   |                                                              | M6           | M8   | M10  | M12   | M12D  | M16   | M20   |
| <b>Any load direction</b>                                                                         |                                                              |              |      |      |       |       |       |       |
| <b>HEHO, HECLO</b>                                                                                |                                                              |              |      |      |       |       |       |       |
| $F_{Rk}^0$                                                                                        | Characteristic resistance in C12/15 concrete: [kN]           | 1.5          | 3.0  | 4.0  | 6.0   | --    | 9.0   | 16.0  |
| $F_{Rk}^0$                                                                                        | Characteristic resistance in C20/25 to C50/60 concrete: [kN] | 2.0          | 3.0  | 5.0  | 7.5   | 6.0   | 12.0  | 20.0  |
| $\gamma_{ins}$                                                                                    | Robustness: [-]                                              | 1.2          | 1.2  | 1.4  | 1.4   | 1.4   | 1.4   | 1.4   |
| $S_{cr}$                                                                                          | Spacing for concrete cone failure: [mm]                      | 75           | 90   | 120  | 150   | 200   | 195   | 240   |
| $C_{cr}$                                                                                          | Edge distance for concrete cone failure: [mm]                | 40           | 45   | 60   | 75    | 150   | 100   | 120   |
| <b>HEHC</b>                                                                                       |                                                              |              |      |      |       |       |       |       |
| $F_{Rk}^0$                                                                                        | Characteristic resistance in C20/25 to C50/60 concrete: [kN] | --           | 2.5  | 4.0  | 4.0   | --    | --    | --    |
| $\gamma_{ins}$                                                                                    | Robustness: [-]                                              | --           | 1.2  | 1.2  | 1.2   | --    | --    | --    |
| $S_{cr}$                                                                                          | Spacing for concrete cone failure: [mm]                      | --           | 120  | 120  | 120   | --    | --    | --    |
| $C_{cr}$                                                                                          | Edge distance for concrete cone failure: [mm]                | --           | 60   | 60   | 60    | --    | --    | --    |
| <b>Shear loads: steel failure with lever arm</b>                                                  |                                                              |              |      |      |       |       |       |       |
| $M_{Rk,s}^0$                                                                                      | Characteristic bending moment, steel class 4.6 [Nm]          | 6.1          | 15.0 | 29.9 | 52.4  | 52.4  | 133.3 | 259.8 |
| $\gamma_{Ms}^{(1)}$                                                                               | Partial safety factor: [-]                                   | 1.67         |      |      |       |       |       |       |
| $M_{Rk,s}^0$                                                                                      | Characteristic bending moment, steel class 4.8 [Nm]          | 6.1          | 15.0 | 29.9 | 52.4  | 52.4  | 133.3 | 259.8 |
| $\gamma_{Ms}^{(1)}$                                                                               | Partial safety factor: [-]                                   | 1.25         |      |      |       |       |       |       |
| $M_{Rk,s}^0$                                                                                      | Characteristic bending moment, steel class 5.6 [Nm]          | 7.6          | 18.8 | 37.4 | 65.5  | 65.5  | 166.6 | 324.8 |
| $\gamma_{Ms}^{(1)}$                                                                               | Partial safety factor: [-]                                   | 1.67         |      |      |       |       |       |       |
| $M_{Rk,s}^0$                                                                                      | Characteristic bending moment, steel class 5.8 [Nm]          | 7.6          | 18.8 | 37.4 | 65.5  | 65.5  | 166.6 | 324.8 |
| $\gamma_{Ms}^{(1)}$                                                                               | Partial safety factor: [-]                                   | 1.25         |      |      |       |       |       |       |
| $M_{Rk,s}^0$                                                                                      | Characteristic bending moment, steel class 6.8 [Nm]          | 9.2          | 22.5 | 44.9 | 78.7  | 78.7  | 199.9 | 389.7 |
| $\gamma_{Ms}^{(1)}$                                                                               | Partial safety factor: [-]                                   | 1.25         |      |      |       |       |       |       |
| $M_{Rk,s}^0$                                                                                      | Characteristic bending moment, steel class 8.8 [Nm]          | 12.2         | 30.0 | 59.9 | 104.9 | 104.9 | 266.6 | 519.7 |
| $\gamma_{Ms}^{(1)}$                                                                               | Partial safety factor: [-]                                   | 1.25         |      |      |       |       |       |       |

1) In absence of other national regulations

|                                       |                 |
|---------------------------------------|-----------------|
| <b>HEHO, HECLO, HEHC anchor</b>       | <b>Annex C4</b> |
| <b>Performances</b>                   |                 |
| Essential characteristics in concrete |                 |



**Table C4: Essential characteristics in concrete to loads of design method B according to EN 1992-4 for HEA4, HEC4 anchor**

| Characteristic resistance in concrete C20/25 to C50/60<br>for all loads directions and failure modes |                                                              | Performances |      |      |       |       |       |
|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|--------------|------|------|-------|-------|-------|
|                                                                                                      |                                                              | M6           | M8   | M10  | M12   | M16   | M20   |
| <b>All load direction</b>                                                                            |                                                              |              |      |      |       |       |       |
| $F_{Rk}^0$                                                                                           | Characteristic resistance in C20/25 to C50/60 concrete: [kN] | 2.5          | 3.5  | 3.5  | 6.5   | 12.5  | 16.5  |
| $\gamma_{ins}$                                                                                       | Robustness: [-]                                              | 1.4          |      |      |       |       |       |
| $S_{cr}$                                                                                             | Spacing for concrete cone failure: [mm]                      | 200          | 200  | 200  | 200   | 260   | 320   |
| $C_{cr}$                                                                                             | Edge distance for concrete edge failure: [mm]                | 150          | 150  | 150  | 150   | 195   | 240   |
| <b>Shear loads: steel failure with lever arm</b>                                                     |                                                              |              |      |      |       |       |       |
| $M_{Rk,s}^0$                                                                                         | Characteristic bending moment, steel class A4-50 [Nm]        | 7.6          | 18.8 | 37.4 | 65.6  | 166.6 | 324.8 |
| $\gamma_{Ms}^{(1)}$                                                                                  | Partial safety factor: [-]                                   | 2.38         |      |      |       |       |       |
| $M_{Rk,s}^0$                                                                                         | Characteristic bending moment, steel class A4-70 [Nm]        | 10.6         | 26.3 | 52.4 | 91.8  | 233.1 | 454.7 |
| $\gamma_{Ms}^{(1)}$                                                                                  | Partial safety factor: [-]                                   | 1.56         |      |      |       |       |       |
| $M_{Rk,s}^0$                                                                                         | Characteristic bending moment, steel class A4-80 [Nm]        | 12.2         | 30.0 | 59.9 | 104.9 | 266.6 | 519.7 |
| $\gamma_{Ms}^{(1)}$                                                                                  | Partial safety factor: [-]                                   | 1.34         |      |      |       |       |       |

1) In absence of other national regulations

|                                      |          |
|--------------------------------------|----------|
| HEA4, HEC4 anchor                    | Annex C5 |
| Performances                         |          |
| Essential characteristic in concrete |          |



**Table C5: Essential characteristics in precast prestressed hollow core slabs to loads of design method B according to EN 1992-4 for HEHC anchor**

| Characteristic resistance in prestressed hollow core slabs concrete C30/37 to C50/60 for all loads directions and failure modes |                                                                                            | Performances |      |      |       |      |     |     |
|---------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|--------------|------|------|-------|------|-----|-----|
|                                                                                                                                 |                                                                                            | M6           | M8   | M10  | M12   | M12D | M16 | M20 |
| <b>Any load direction</b>                                                                                                       |                                                                                            |              |      |      |       |      |     |     |
| <b>HEHC</b>                                                                                                                     |                                                                                            |              |      |      |       |      |     |     |
| $F_{Rk}^0$                                                                                                                      | Characteristic resistance in prestressed hollow core concrete slabs C30/37 to C50/60: [kN] | --           | 5,5  | 6,0  | 6,5   | --   | --  | --  |
| $\gamma_{ins}$                                                                                                                  | Robustness: [-]                                                                            | --           | 1.2  | 1.4  | 1.4   | --   | --  | --  |
| $S_{cr}$                                                                                                                        | Spacing for concrete cone failure: [mm]                                                    | --           | 200  | 200  | 200   | --   | --  | --  |
| $C_{cr}$                                                                                                                        | Edge distance for concrete edge failure: [mm]                                              | --           | 150  | 150  | 150   | --   | --  | --  |
| <b>Shear loads: steel failure with lever arm</b>                                                                                |                                                                                            |              |      |      |       |      |     |     |
| $M_{Rk,s}^0$                                                                                                                    | Characteristic bending moment, steel class 4.6 [Nm]                                        | --           | 15.0 | 29.9 | 52.4  | --   | --  | --  |
| $\gamma_{Ms}^{1)}$                                                                                                              | Partial safety factor: [-]                                                                 | --           | 1.67 |      |       | --   | --  | --  |
| $M_{Rk,s}^0$                                                                                                                    | Characteristic bending moment, steel class 4.8 [Nm]                                        | --           | 15.0 | 29.9 | 52.4  | --   | --  | --  |
| $\gamma_{Ms}^{1)}$                                                                                                              | Partial safety factor: [-]                                                                 | --           | 1.25 |      |       | --   | --  | --  |
| $M_{Rk,s}^0$                                                                                                                    | Characteristic bending moment, steel class 5.6 [Nm]                                        | --           | 18.8 | 37.4 | 65.5  | --   | --  | --  |
| $\gamma_{Ms}^{1)}$                                                                                                              | Partial safety factor: [-]                                                                 | --           | 1.67 |      |       | --   | --  | --  |
| $M_{Rk,s}^0$                                                                                                                    | Characteristic bending moment, steel class 5.8 [Nm]                                        | --           | 18.8 | 37.4 | 65.5  | --   | --  | --  |
| $\gamma_{Ms}^{1)}$                                                                                                              | Partial safety factor: [-]                                                                 | --           | 1.25 |      |       | --   | --  | --  |
| $M_{Rk,s}^0$                                                                                                                    | Characteristic bending moment, steel class 6.8 [Nm]                                        | --           | 22.5 | 44.9 | 78.7  | --   | --  | --  |
| $\gamma_{Ms}^{1)}$                                                                                                              | Partial safety factor: [-]                                                                 | --           | 1.25 |      |       | --   | --  | --  |
| $M_{Rk,s}^0$                                                                                                                    | Characteristic bending moment, steel class 8.8 [Nm]                                        | --           | 30.0 | 59.9 | 104.9 | --   | --  | --  |
| $\gamma_{Ms}^{1)}$                                                                                                              | Partial safety factor: [-]                                                                 | --           | 1.25 |      |       | --   | --  | --  |

1) In absence of other national regulations

**HEHC anchor**

**Performances**

Essential characteristics in precast prestressed hollow core concrete slabs

**Annex C6**



**Table C6: Essential characteristics under fire exposure in concrete C20/25 to C50/50 in any load direction according to EN 1992-4 for HEHO, HECLO anchor**

| Characteristic resistance under fire exposure in concrete C20/25 to C50/60 for all load directions and failure modes |                                         |      | Performances |      |      |      |      |      |       |
|----------------------------------------------------------------------------------------------------------------------|-----------------------------------------|------|--------------|------|------|------|------|------|-------|
|                                                                                                                      |                                         |      | M6           | M8   | M10  | M12  | M12D | M16  | M20   |
| $F_{Rk,fi,30}^0$                                                                                                     | Characteristic resistance, 30 minutes   | [kN] | 0.36         | 0.71 | 1.01 | 1.89 | 1.89 | 3.52 | 5.50  |
| $F_{Rk,fi,60}^0$                                                                                                     | Characteristic resistance, 60 minutes:  | [kN] | 0.29         | 0.59 | 0.86 | 1.64 | 1.64 | 3.05 | 4.76  |
| $F_{Rk,fi,90}^0$                                                                                                     | Characteristic resistance, 90 minutes:  | [kN] | 0.22         | 0.47 | 0.71 | 1.38 | 1.38 | 2.58 | 4.02  |
| $F_{Rk,fi,120}^0$                                                                                                    | Characteristic resistance, 120 minutes: | [kN] | 0.19         | 0.41 | 0.63 | 1.26 | 1.26 | 2.34 | 3.65  |
| $M_{Rk,fi,30}^0$                                                                                                     | Charact. bending moment, 30 minutes:    | [Nm] | 0.27         | 0.73 | 1.30 | 2.94 | 2.94 | 7.48 | 14.58 |
| $M_{Rk,fi,60}^0$                                                                                                     | Charact. bending moment, 60 minutes:    | [Nm] | 0.22         | 0.60 | 1.11 | 2.55 | 2.55 | 6.47 | 12.62 |
| $M_{Rk,fi,90}^0$                                                                                                     | Charact. bending moment, 90 minutes:    | [Nm] | 0.17         | 0.48 | 0.91 | 2.15 | 2.15 | 5.47 | 10.65 |
| $M_{Rk,fi,120}^0$                                                                                                    | Charact. bending moment, 120 minutes:   | [Nm] | 0.14         | 0.42 | 0.81 | 1.95 | 1.95 | 4.96 | 9.67  |
| $S_{cr,fi}$                                                                                                          | Spacing:                                | [mm] | 4 x $h_{ef}$ |      |      |      |      |      |       |
| $C_{cr,fi}$                                                                                                          | Edge distance:                          | [mm] | 2 x $h_{ef}$ |      |      |      |      |      |       |

<sup>1)</sup> in absence of other national regulations the partial safety factor for resistance under fire exposure  $\gamma_{M,fi} = 1.0$  is recommended  
If fire attack is from more than one side, the design method may be taken if edge distance of the anchor is  $c \geq 300$  mm

**Table C7: Essential characteristics under fire exposure in concrete C20/25 to C50/50 in any load direction according to EN 1992-4 for HEHC anchor**

| Characteristic resistance under fire exposure in concrete C20/25 to C50/60 for all load directions and failure modes |                                         |      | Performances |              |      |      |     |     |
|----------------------------------------------------------------------------------------------------------------------|-----------------------------------------|------|--------------|--------------|------|------|-----|-----|
|                                                                                                                      |                                         |      | M6           | M8           | M10  | M12  | M16 | M20 |
| $F_{Rk,fi,30}^0$                                                                                                     | Characteristic resistance, 30 minutes   | [kN] | --           | 0.37         | 0.54 | 0.54 | --  | --  |
| $F_{Rk,fi,60}^0$                                                                                                     | Characteristic resistance, 60 minutes:  | [kN] | --           | 0.33         | 0.54 | 0.54 | --  | --  |
| $F_{Rk,fi,90}^0$                                                                                                     | Characteristic resistance, 90 minutes:  | [kN] | --           | 0.26         | 0.54 | 0.54 | --  | --  |
| $F_{Rk,fi,120}^0$                                                                                                    | Characteristic resistance, 120 minutes: | [kN] | --           | 0.16         | 0.43 | 0.43 | --  | --  |
| $M_{Rk,fi,30}^0$                                                                                                     | Charact. bending moment, 30 minutes:    | [Nm] | --           | 0.37         | 1.12 | 2.62 | --  | --  |
| $M_{Rk,fi,60}^0$                                                                                                     | Charact. bending moment, 60 minutes:    | [Nm] | --           | 0.34         | 0.97 | 1.97 | --  | --  |
| $M_{Rk,fi,90}^0$                                                                                                     | Charact. bending moment, 90 minutes:    | [Nm] | --           | 0.26         | 0.75 | 1.70 | --  | --  |
| $M_{Rk,fi,120}^0$                                                                                                    | Charact. bending moment, 120 minutes:   | [Nm] | --           | 0.19         | 0.60 | 1.31 | --  | --  |
| $S_{cr,fi}$                                                                                                          | Spacing:                                | [mm] | --           | 4 x $h_{ef}$ |      |      |     | --  |
| $C_{cr,fi}$                                                                                                          | Edge distance:                          | [mm] | --           | 2 x $h_{ef}$ |      |      |     | --  |

<sup>1)</sup> in absence of other national regulations the partial safety factor for resistance under fire exposure  $\gamma_{M,fi} = 1.0$  is recommended  
If fire attack is from more than one side, the design method may be taken if edge distance of the anchor is  $c \geq 300$  mm

**Table C8: Essential characteristics under fire exposure in concrete C20/25 to C50/50 in any load direction according to EN 1992-4 for HEA4, HEC4 anchor**

| Characteristic resistance under fire exposure in concrete C20/25 to C50/60 for all load directions and failure modes |                                         |      | Performances |      |      |      |      |       |
|----------------------------------------------------------------------------------------------------------------------|-----------------------------------------|------|--------------|------|------|------|------|-------|
|                                                                                                                      |                                         |      | M6           | M8   | M10  | M12  | M16  | M20   |
| $F_{Rk,fi,30}^0$                                                                                                     | Characteristic resistance, 30 minutes   | [kN] | 0.20         | 0.73 | 0.87 | 1.63 | 3.19 | 4.12  |
| $F_{Rk,fi,60}^0$                                                                                                     | Characteristic resistance, 60 minutes:  | [kN] | 0.18         | 0.59 | 0.87 | 1.63 | 3.19 | 4.12  |
| $F_{Rk,fi,90}^0$                                                                                                     | Characteristic resistance, 90 minutes:  | [kN] | 0.14         | 0.44 | 0.87 | 1.63 | 3.14 | 4.12  |
| $F_{Rk,fi,120}^0$                                                                                                    | Characteristic resistance, 120 minutes: | [kN] | 0.10         | 0.37 | 0.69 | 1.30 | 2.51 | 3.30  |
| $M_{Rk,fi,30}^0$                                                                                                     | Charact. bending moment, 30 minutes:    | [Nm] | 0.15         | 0.75 | 1.87 | 3.93 | 9.99 | 19.47 |
| $M_{Rk,fi,60}^0$                                                                                                     | Charact. bending moment, 60 minutes:    | [Nm] | 0.14         | 0.60 | 1.50 | 3.28 | 8.32 | 16.23 |
| $M_{Rk,fi,90}^0$                                                                                                     | Charact. bending moment, 90 minutes:    | [Nm] | 0.11         | 0.45 | 1.20 | 2.62 | 6.66 | 12.98 |
| $M_{Rk,fi,120}^0$                                                                                                    | Charact. bending moment, 120 minutes:   | [Nm] | 0.08         | 0.37 | 1.05 | 2.10 | 5.33 | 10.39 |
| $S_{cr,fi}$                                                                                                          | Spacing:                                | [mm] | 4 x $h_{ef}$ |      |      |      |      |       |
| $C_{cr,fi}$                                                                                                          | Edge distance:                          | [mm] | 2 x $h_{ef}$ |      |      |      |      |       |

<sup>1)</sup> in absence of other national regulations the partial safety factor for resistance under fire exposure  $\gamma_{M,fi} = 1.0$  is recommended  
If fire attack is from more than one side, the design method may be taken if edge distance of the anchor is  $c \geq 300$  mm

|                                               |          |
|-----------------------------------------------|----------|
| HEHO, HECLO, HEHC, HEA4, HEC4 anchor          | Annex C7 |
| Performances                                  |          |
| Essential characteristics under fire exposure |          |

