Deutsches Institut für Bautechnik

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Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

# European Technical Assessment

# ETA-14/0336 of 12 April 2021

English translation prepared by DIBt - Original version in German language

**General Part**

| | |
|---|---|
| Technical Assessment Body issuing the European Technical Assessment: | Deutsches Institut für Bautechnik |
| Trade name of the construction product | CELO Hollow block frame plug HBR 10 |
| Product family to which the construction product belongs | Plastic anchor d=10mm for multiple use in masonry for non-structural applications |
| Manufacturer | CELO Befestigungssysteme GmbH<br>Industriestraße 6<br>86551 Aichach<br>DEUTSCHLAND |
| Manufacturing plant | Plant 1 |
| This European Technical Assessment contains | 16 pages including 3 annexes which form an integral part of this assessment |
| This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of | ETAG 020, Edition March 2012,<br>used as EAD according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011. |
| This version replaces | ETA-14/0336 issued on 31 October 2014 |

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## Specific Part

### 1 Technical description of the product

The hollow block frame plug HBR 10 is a plastic anchor consisting of a plastic sleeve made of polyamide and an accompanying specific screw of galvanised steel or stainless steel

The plastic sleeve is expanded by screwing in the specific screw which presses the sleeve against the wall of the drilled hole.

The product description is given in Annex A.

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

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

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the anchors 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 Safety in case of fire (BWR 2)

| Essential characteristic | Performance |
|---|---|
| Reaction to fire | Class A 1 |
| Resistance to fire | No performance assessed |

### 3.2 Mechanical resistance and stability (BWR 4)

| Essential characteristic | Performance |
|---|---|
| Resistance to steel failure under tension loading | See Annex C 1 |
| Resistance to steel or polymer failure under shear loading | See Annex C 1 |
| Resistance to pull-out or concrete failure or polymer failure under tension loading (use category a) | No performance assessed |
| Resistance in any load direction without lever arm (use category b, c and d) | See Annexes C 1 – C 2 |
| Edge distance and spacing (use category a) | No performance assessed |
| Edge distance and spacing (use category b, c and d) | See Annex B 2 – B 3 |
| Displacements under short-term and long-term loading | See Annex C 3 |
| Durability | See Annex B1 |

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

In accordance with guideline for European technical approval ETAG 020, March 2012 used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011 the applicable European legal act is: 97/463/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 control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 12 April 2021 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock
Head of Section

*beglaubigt:*
Aksünger

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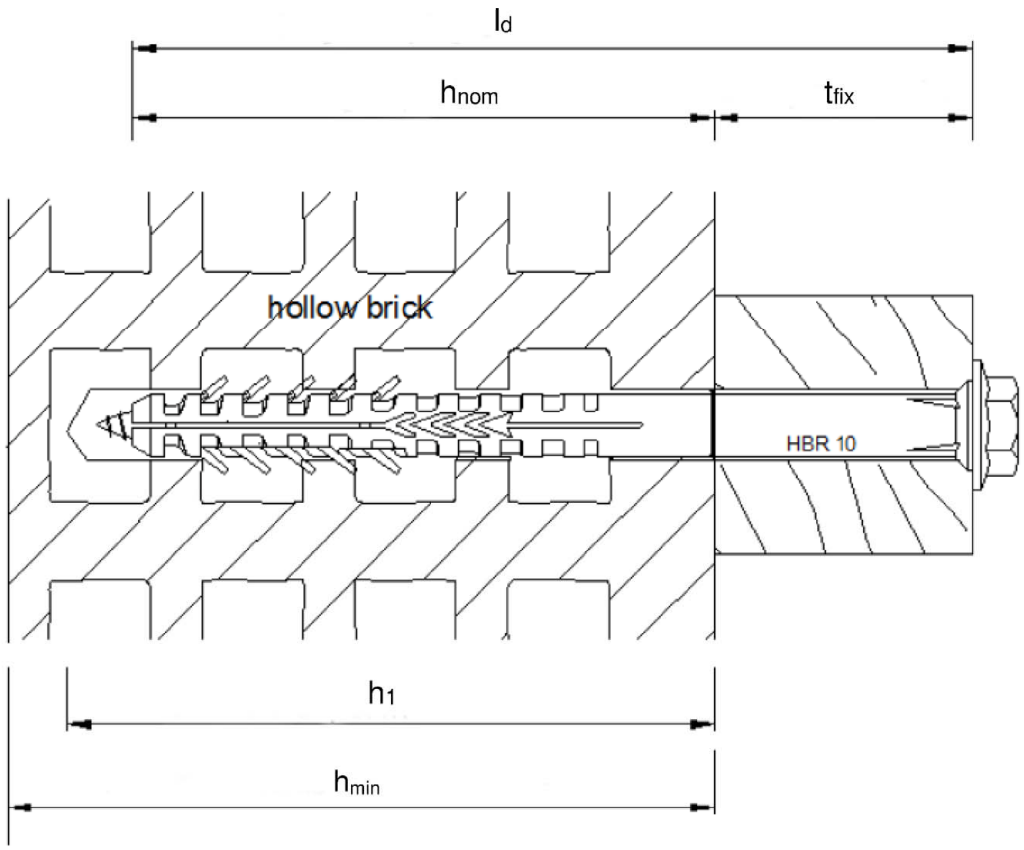
## Installed condition




| | | |
|---|---|---|
| $h_{nom}$ | = | overall plastic anchor embedment depth in the base material |
| $h_1$ | = | depth of drilled hole to deepest point |
| $h_{min}$ | = | minimum thickness of member |
| $t_{fix}$ | = | thickness of fixture |
| $l_d$ | = | length of plug |

| | |
|---|---|
| **Hollow block frame plug HBR 10** | **Annex A 1** |
| **Product description**<br>Installed condition | |

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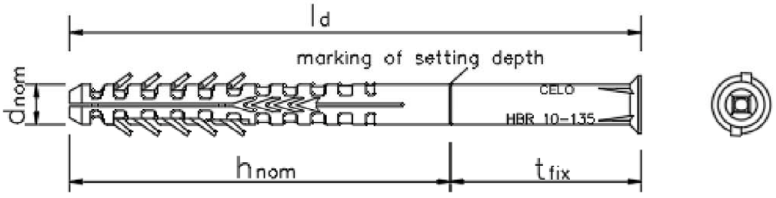
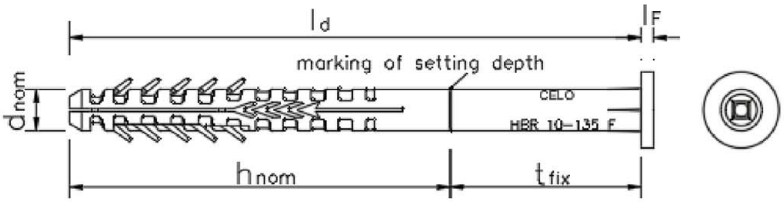
## Product description

### Anchor sleeve HBR 10

Sleeve with countersunk head (S) or with flathead (F)




HBR 10 Type S

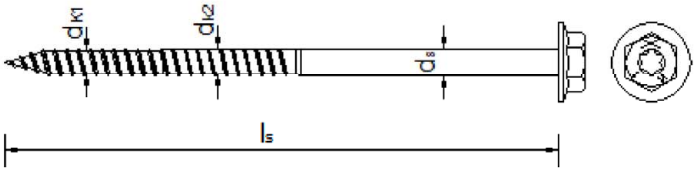



HBR 10 Type F

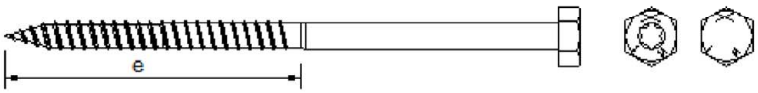
| | | | | | | |
|---|---|---|---|---|---|---|
| **Marking:** | Brand | Type | diameter ($d_{nom}$) - length ($l_d$) | | | |
| **Example:** | **CELO (or logo)** | **HBR** | **10** | **-** | **135** | |

### Special screw

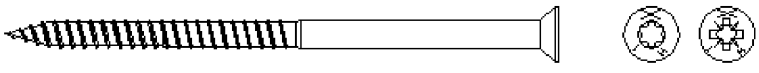
Screw head with different tool fittings




Type SSKS
galvanised steel or
stainless steel (A4)




Type SSK
galvanised steel or
stainless steel (A4)



Type TX or PZ
galvanised steel or
stainless steel (A4)

| | | | | | |
|---|---|---|---|---|---|
| **Marking:** | Brand | steel grade | Code No screw length | | manufacturer code |
| **Example:** | **X** | **6.8** | **14** | | **1** |

| | |
|---|---|
| **Hollow block frame plug HBR 10** | **Annex A 2** |
| **Product description**<br>Anchor types, specification screws | |

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## Table A1: Dimensions [mm]

| Anchor sleeve | | | | | |
|---|---|---|---|---|---|
| | $l_d$ | Ø $d_{nom}$ | $t_{fix}$ min | $t_{fix}$ max | $h_{nom}$ |
| **HBR 10** | ≥90 | 10 | ≥ 1 | 1000 | 90 |

| Special screw | | | | | |
|---|---|---|---|---|---|
| | $l_s$ 1) | Ø $d_s$ | Ø $d_{k1}$ 2) | Ø $d_{k2}$ 2) | e |
| **HBR 10** | ≥95 | 7 | 5,8 | 6,3 | 75 |

1) To ensure, that the screw penetrates the anchor sleeve, $l_s$ must be $l_d + l_F + 5$ mm

2) Ø $d_{k1}$ and Ø $d_{k2}$ are core diameters of the thread

## Table A2: Materials

| Designation | Material |
|---|---|
| **anchor sleeve** | Polyamid PA 6 |
| **special screw (steel, zinc plated)** | Steel, zinc plated, galvanised ≥ 5 µm acc. EN ISO 4042:2011-01<br>$f_{yk}$ ≥ 480 N/mm², $f_{uk}$ ≥ 600 N/mm² (≥ 6.8 screw) |
| **special screw (stainless steel)** | Stainless steel A4, acc. To EN 10088-3:2014<br>material 1.4401 or 1.4571<br>$f_{yk}$ ≥ 450 N/mm², $f_{uk}$ ≥ 700 N/mm²<br>strength class 70 |

**Hollow block frame plug HBR 10**

**Product description**
Dimensions and materials

**Annex A 3**

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## Specifications of intended use

**Anchorages subject to:**
- Static and quasi-static loads
- Multiple fixing of non-structural applications

**Base materials:**
- Solid brick masonry (use category b), according to Annex C1.
  Note: The characteristic resistance is also valid for larger brick sizes and higher compressive strength of the masonry unit.
- Hollow brick masonry (use category c), according to Annex C2.
- Mortar strength class of the masonry ≥ M2,5 according to EN 998-2:2010.
- For other base materials of the use categories b and c the characteristic resistance of the anchor may be determined by job site tests according to ETAG 020, Annex B Edition March 2012.

**Temperature Range:**
- a) -40 °C to +40 °C (max. long term temperature +24 °C, max. short term temperature +40 °C).
- b) -40 °C to +80 °C (max. long term temperature +50 °C, max. short term temperature +80 °C).

**Use conditions (Environmental conditions):**
- Structures subject to dry internal conditions (zinc coated steel, stainless steel).
- The specific screw made of galvanised steel also be used in structures subject to external atmospheric exposure, if the area of the head of the screw is protected against moisture and driving rain after mounting of the fixing unit in this way, that intrusion of moisture into the anchor shaft is prevented. Therefore there shall be an external cladding or a ventilated rainscreen mounted in front of the head of the screw and the head of the screw itself shall be coated with a soft plastic, permanently elastic bitumen-oil-combination coating (e. g. undercoating or body cavity protection for cars).
- Structures subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition, if no particular aggressive conditions exist (stainless steel).

  Note: 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).

**Design:**
- The anchorages are designed in accordance with the ETAG 020, Annex C Edition March 2012 under the responsibility of an engineer experienced in anchorages and masonry work.
- Verifiable calculation notes and drawings shall be prepared taking account of the loads to be anchored, the nature and strength of the base materials and the dimensions of the anchorage members as well as of the relevant tolerances. The position of the anchor is indicated on the design drawings.
- Fasteners are only to be used for multiple use for non-structural application, according to ETAG 020 Edition March 2012.

**Installation:**
- Hole drilling by the drill modes according to Annex C1 and C2.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Installation temperature from -10 °C to +40 °C.
- Exposure to UV due to solar radiation of the anchor not protected ≤ 6 weeks.

| **Hollow block frame plug HBR 10** | **Annex B 1** |
|---|---|
| **Intended Use**<br>Specifications | |

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## Table B1: Installation parameters

| **Anchor type** | | | **HBR 10** |
|---|---|---|---|
| Drill hole diameter | $d_0$ = | [mm] | 10 |
| Cutting diameter of drill bit | $d_{cut} \leq$ | [mm] | 10,45 |
| Depth of drill hole to the deepest point [1)] | $h_1 \geq$ | [mm] | 100 |
| Overall plastic anchor embedment depth in the base material [1), 2)] | $h_{nom} \geq$ | [mm] | 90 |
| Diameter of clearence hole in the fixture | $d_f \leq$ | [mm] | 10,5 |

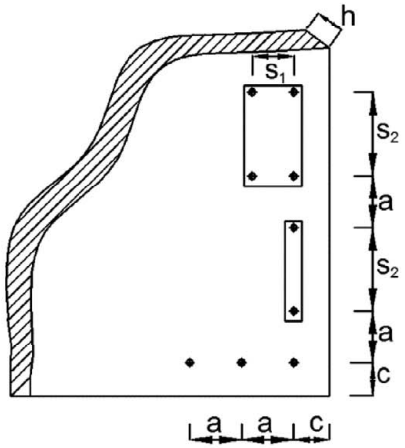
1) see Annex A1

2) For hollow and perforated masonry the influence of $h_{nom}$ > 90 mm has to be detected by job site tests

## Table B2: Minimum thickness of member, edge distance and spacing in solid masonry

| Base material | Minimum thickness of member | Minimum edge distance | Minimum spacing | | |
|---|---|---|---|---|---|
| | | | | **Anchor Group** | |
| | | | | perpendicular to free edge | parallel to free edge |
| | $h_{min}$ [mm] | $c_{min}$ [mm] | $a_{min}$ [mm] | $s_{1,min}$ [mm] | $s_{2,min}$ [mm] |
| Sand-lime solid brick **KS 12-1,8 3DF** | 175 | 100 | 250 | 200 | 400 |

### Scheme of distances and spacing in solid masonry




**Hollow block frame plug HBR 10**

**Intended Use**
Installation parameters, edge distances and spacing's for use in solid masonry

**Annex B 2**

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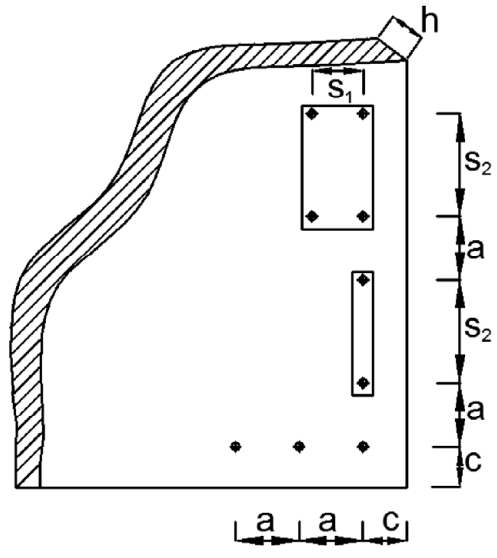
## Table B3: Minimum distances and dimensions in hollow

| Base material | Minimum thickness of member | Minimum edge distance | Minimum spacing | | |
|---|---|---|---|---|---|
| | | | | **Anchor Group** [1] | |
| | | | | perpendicular to free edge | parallel to free edge |
| | $h_{min}$ | $c_{min}$ | $a_{min}$ | $s_{1,min}$ | $s_{2,min}$ |
| | [mm] | [mm] | [mm] | [mm] | [mm] |
| Hollow clay brick **HLz 12-1,0 3DF** | 175 | 80 | 250 | 160 | 320 |
| Hollow sand-lime brick **KSL 12-1,4 3DF** | 175 | 80 | 250 | 180 | 360 |
| Hollow concrete block **HBL 2-0,8 16DF** | 240[2] | 50[2] | 250[2] | 100[2] | 200[2] |

[1] The design method is valid for single anchors and anchor groups with two or four anchors.

[2] Only for installation in longside of masonry (see annex C 4 figure 3)

### Scheme of distances and spacing in hollow masonry




| | |
|---|---|
| **Hollow block frame plug HBR 10** | **Annex B 3** |
| **Intended Use**<br>Edge distances and spacing's for use in hollow masonry | |

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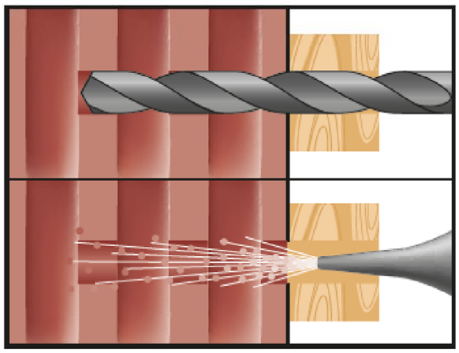
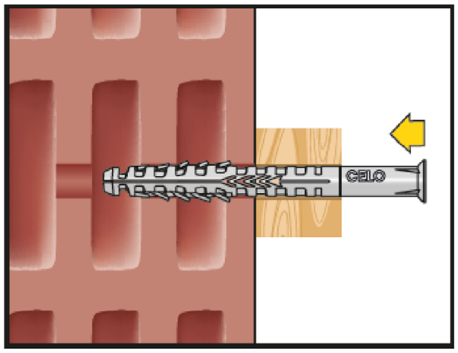
## Installation instructions

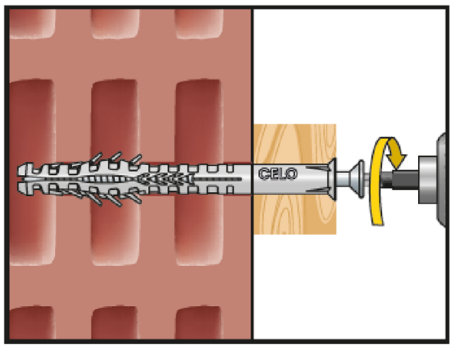


Make the drill hole (can be drilled also through the fixing part).

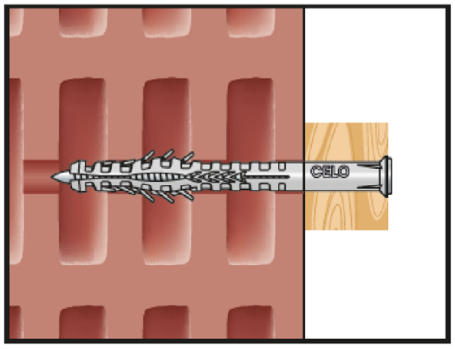
Clean the hole.




Put the plug completely into the hole. The plug must be long enough that the setting depth is ensured.




Turn in the special screw with a screwdriver to fix the fixing part.




The plug is mounted correctly when the screw is completely in the plug.

| **Hollow block frame plug HBR 10** | **Annex B 4** |
|---|---|
| **Intended use**<br>Installation instruction | |

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## Table C1: Characteristic bending resistance of the screw

| **Expansion element = special screw Ø 7 mm** | | | **material** | |
|---|---|---|---|---|
| | | | galvanised steel | stainless steel |
| Characteristic bending resistance | $M_{Rk,s}$ | [Nm] | **22,7** | **26,4** |
| Partial safety factor | $\gamma_{Ms}$ [1)] | | **1,25** | **1,56** |

1) In absence of other national regulations

## Table C2: Characteristic resistance of the screw

| **Failure of expansion element** | | | **material** | |
|---|---|---|---|---|
| | | | galvanised steel | stainless steel |
| Character. tension resistance | $N_{Rk,s}$ | [kN] | **22,1** | **25,8** |
| Partial safety factor for $N_{Rk,s}$ | $\gamma_{Ms}$ [1] | | **1,5** | **1,87** |
| Characteristic shear resistance | $V_{Rk,s}$ | [kN] | **11,0** | **12,9** |
| Partial safety factor for $V_{Rk,s}$ | $\gamma_{Ms}$ [1)] | | **1,25** | **1,56** |

1) In absence of other national regulations

## Table C3: Characteristic resistance $F_{Rk}$ in [kN] in solid masonry (use category "b")

| Base material | Bulk density class $\rho$ [kg/dm³] | Minimum compressive strength $f_b$ [N/mm²] | Min. DF or min. size (L x W x H) [mm] | drill method | Characteristic resistance $F_{Rk}$ [kN] | |
|---|---|---|---|---|---|---|
| | | | | | $\vartheta$ = 24/40 °C | $\vartheta$ = 50/80 °C |
| Sand-lime solid brick **KS 12-1,8 3DF** DIN V 106:2005-10/ EN 771-2:2011 | ≥ 1,8 | 12 | 3 DF (240*175*113) | Hammer drilling | **3,0** | **3,0** |
| Partial safety factor | | | $\gamma_{Mm}$ [1)] | | **2,5** | |

1) In absence of other national regulations

**Hollow block frame plug HBR 10**

**Performances**
Characteristic resistance of the screw,
Characteristic resistance for use in solid masonry

**Annex C 1**

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## Table C4: Characteristic resistance $F_{Rk}$ in [kN] in hollow or perforated masonry (use category "c")

| Base material | Bulk density class $\rho$ [kg/dm³] | Minimum compressive strength $f_b$ [N/mm²] | Min. DF or min. size (L x W x H) [mm] | figure/ geometry | drill method | Characteristic resistance $F_{Rk}$ [kN] | |
|---|---|---|---|---|---|---|---|
| | | | | | | $\vartheta$ = 24/40 °C | $\vartheta$ = 50/80 °C |
| Hollow clay brick **HLz 12-1,0 3DF** DIN V 105-100:2012-01/ EN 771-1:2011 | ≥ 1,0 | 12 | 3 DF (240*175*113) | Annex C4, figure 1 | Rotary drilling only | **1,20** | **0,90** |
| Hollow Sand-lime brick **KSL 12-1,4 3DF** DIN V 106:2005-10/ EN 771-2:2011 | ≥ 1,4 | 12 | 3 DF (240*175*113) | Annex C4, figure 2 | Rotary drilling only | **0,75** | **0,75** |
| Hollow concrete block **HBL 2-0,8 16DF** DIN V 18151-100:2005-100 | ≥ 0,8 | 2 | 16 DF (496*240*238) | Annex C4, figure 3 | Rotary drilling only | **0,40**[2)] | **0,40**[2)] |
| Partial safety factor | | | | $\gamma_{Mm}$[1)] | | **2,5** | |

1) In absence of other national regulations
2) Only for installation in longside of masonry (see annex C 4 figure 3)

**Hollow block frame plug HBR 10**

**Performances**
Characteristic resistance for use in hollow masonry

**Annex C 2**

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## Table C5a: Displacement under tension and shear load in masonry for temperature ϑ = 24/40 °C

| Base material | F | Displacements | | | |
|---|---|---|---|---|---|
| | | Tension load | | Shear load | |
| | | $\delta_{NO}$ | $\delta_{N\infty}$ | $\delta_{VO}$ | $\delta_{V\infty}$ |
| | [kN] | [mm] | [mm] | [mm] | [mm] |
| Sand-lime solid brick **KS 12-1,8 3DF** DIN V 106:2005-10/ EN 771-2:2011 | 0,86 | 0,1 | 0,1 | 2) | 2) |
| Hollow clay brick **HLz 12-1,0 3DF** DIN 105-100:2012-01 / EN 771-1:2011 | 0,34 | 0,1 | 0,1 | 1,9 | 2,8 |
| Hollow Sand-lime brick **KSL 12-1,4 3DF** DIN V 106:2005-10 / EN 771-2:2011 | 0,21 | 0,1 | 0,1 | 2,0 | 3,0 |
| Hollow concrete block **HBL 2-0,8 16DF** DIN V 18151-100:2005-100 | 0,11 1) | 0,1 1) | 0,1 1) | 4,8 1) | 7,1 1) |

1) Only for installation in longside of masonry (see annex C 4 figure 3)

2) No performance assessed

## Table C5b: Displacement under tension and shear load in masonry for temperature ϑ = 50/80 °C

| Base material | F | Displacements | | | |
|---|---|---|---|---|---|
| | | Tension load | | Shear load | |
| | | $\delta_{NO}$ | $\delta_{N\infty}$ | $\delta_{VO}$ | $\delta_{V\infty}$ |
| | [kN] | [mm] | [mm] | [mm] | [mm] |
| Sand-lime solid brick **KS 12-1,8 3DF** DIN V 106:2005-10/ EN 771-2:2011 | 0,86 | 0,1 | 0,1 | 2) | 2) |
| Hollow clay brick **HLz 12-1,0 3DF** DIN 105-100:2012-01 / EN 771-1:2011 | 0,26 | 0,2 | 0,3 | 2,1 | 3,2 |
| Hollow Sand-lime brick **KSL 12-1,4 3DF** DIN V 106:2005-10 / EN 771-2:2011 | 0,21 | 0,2 | 0,4 | 1,5 | 2,3 |
| Hollow concrete block **HBL 2-0,8 16DF** DIN V 18151-100:2005-100 | 0,11 1) | 0,1 1) | 0,1 1) | 4,5 1) | 6,7 1) |

1) Only for installation in longside of masonry (see annex C 4 figure 3)

2) No performance assessed

**Hollow block frame plug HBR 10**

**Performances**
Displacement for use in masonry

**Annex C 3**

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## Table C6: Geometry and dimensions of hollow or perforated brick

Figure 1

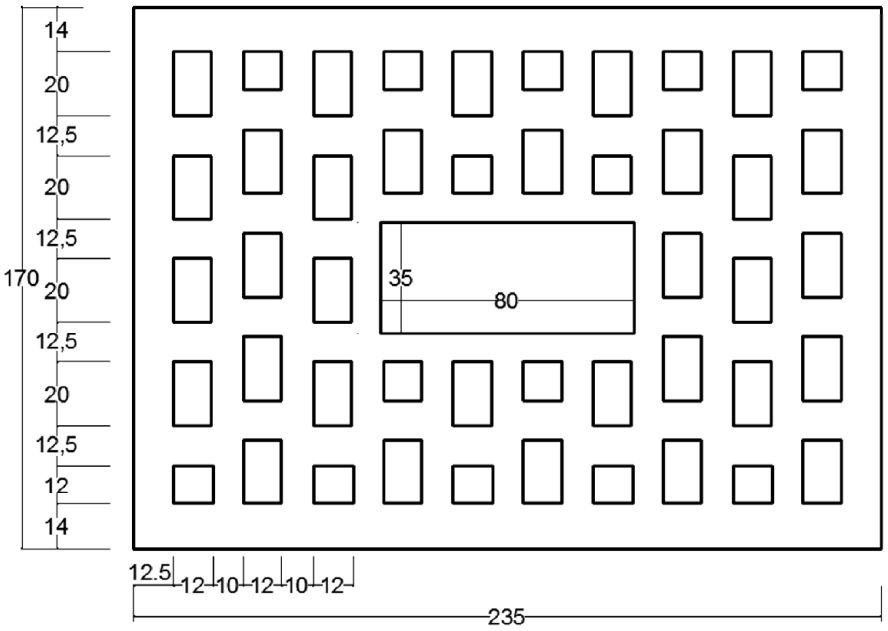
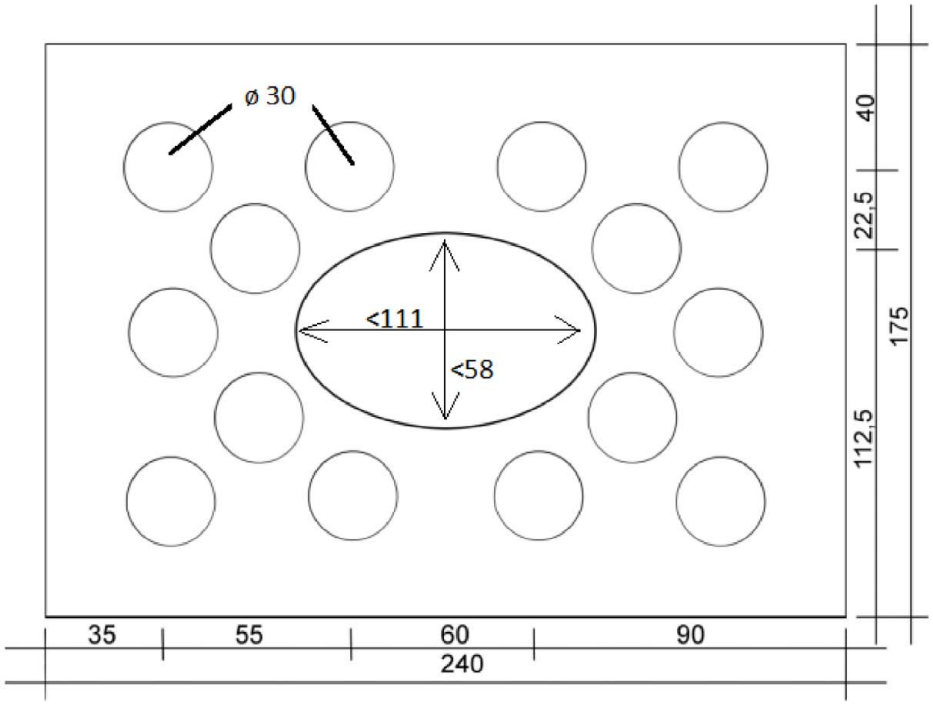



Figure 2




| | |
|---|---|
| **Hollow block frame plug HBR 10** | **Annex C 4** |
| **Performances**<br>Geometry and dimensions of hollow or perforated brick | |

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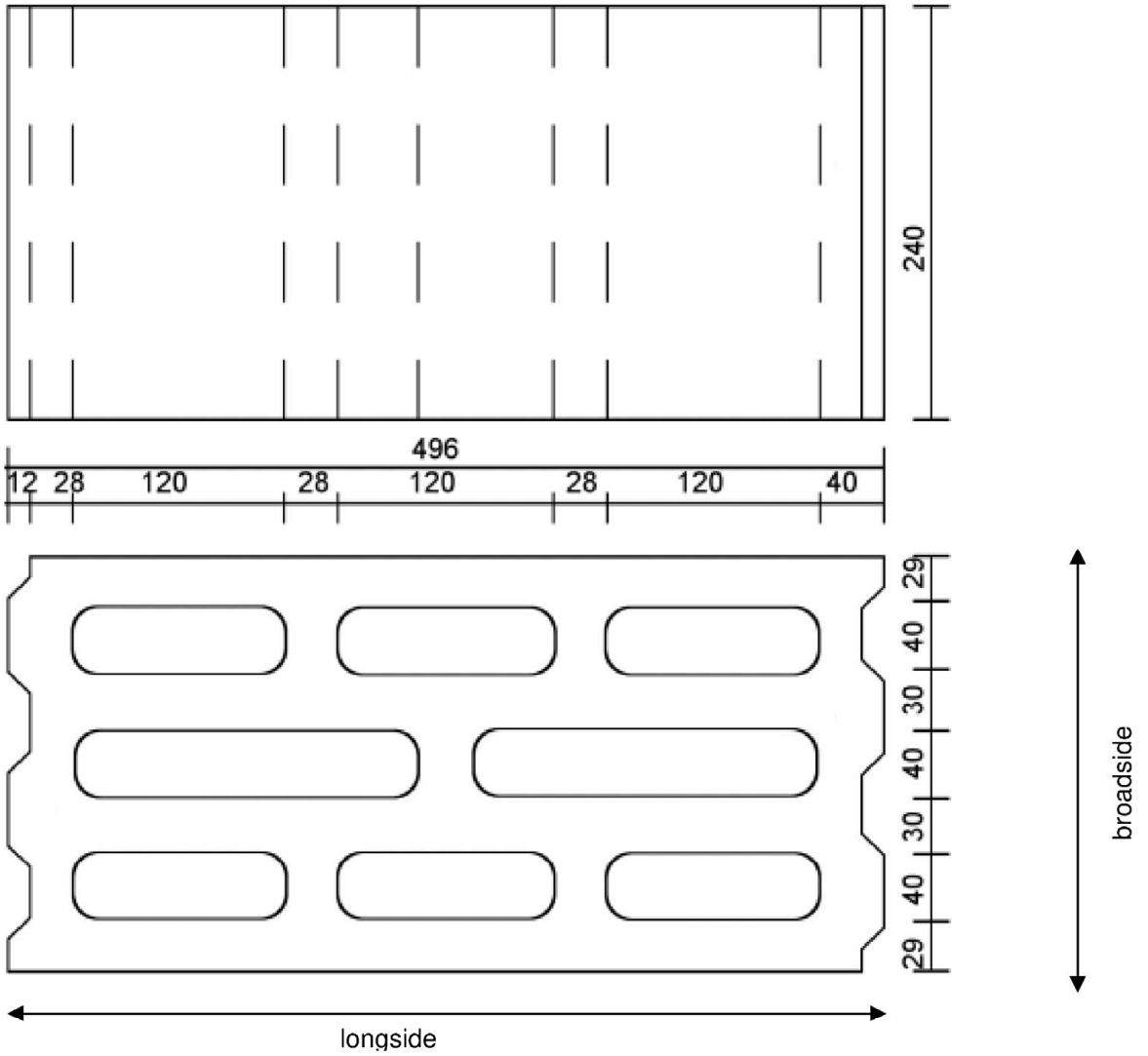
Figure 3




| Figure | Base material | Bulk density class ρ [kg/dm³] | Minimum compressive strength $f_b$ [N/mm²] | Min. DF or min. size (L x W x H) [mm] |
|---|---|---|---|---|
| 1 | Hollow clay brick **HLZ 12-1,0 3DF** DIN 105-100:2012-01 / EN 771-1:2011 | ≥ 1,0 | 12 | 3 DF (230*170*113) |
| 2 | Hollow sand-lime brick **KSL 12-1,4 3DF** DIN V 106:2005-10 / EN 771-2:2011 | ≥ 1,4 | 12 | 3 DF (240*175*113) |
| 3 | Hollow concrete block **HBL 2-0,8 16DF** DIN V 18151-100:2005-100 | ≥ 0,8 | 2 | 16 DF (496*240*238) |

**Hollow block frame plug HBR 10**

**Performances**
Geometry and dimensions of hollow or perforated brick

**Annex C 5**