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European Technical Assessment

**ETA 16/0677
of 10/08/2016**

Technical Assessment Body issuing the ETA: Technical and Test Institute
for Construction Prague

Trade name of the construction product

WCF-PESF
WCF-PESF-C
WCF-PESF-S
WCF-PESF-E

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

Product area code: 33
Injection anchors for use in masonry

Manufacturer

KLIMAS sp. z o.o.
Ul. Wincentego Witosa 135/137 Kuźnica
Kiedrzyńska
42-233 Mykanów, POLSKA

Manufacturing plant(s)

KLIMAS sp. z o.o.
Manufacturing plant no. 3

**This European Technical Assessment
contains**

16 pages including 12 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 029, edition 2013, used as European
Assessment Document (EAD)

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full (excepted the confidential Annex(es) referred to above). However, partial reproduction may be made, with the written consent of the issuing Technical Assessment Body. Any partial reproduction has to be identified as such.

1. Technical description of the product

The WCF-PESF, WCF-PESF-C (faster curing time), WCF-PESF-S and WCF-PESF-E (extended curing time) for masonry is a bonded anchor consisting of a cartridge with injection mortar, a plastic sieve sleeve and an anchor rod with hexagon nut and washer or internal threaded socket. The steel elements are made of galvanized steel or stainless steel.

The sieve sleeve is pushed into a drilled hole and filled with injection mortar before the anchor rod or the socket with internal thread is placed in the sieve sleeve. The installation of the anchor rod in solid masonry can be also done without a sieve sleeve. The steel element is anchored via the bond between metal part, injection mortar and masonry.

The illustration and the description of the product are given in Annex A.

2. Specification of the intended use in accordance with the applicable EAD

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 provisions made in this European Technical Assessment are based on an assumed working life of the anchor of 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 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 |
|---|---------------|
| Reduction factor for job site tests (β – factor) | See Annex C 1 |
| Characteristic resistance for tension and shear loads | See Annex C 1 |
| Characteristic resistance for bending moments | See Annex C 1 |
| Displacement under shear and tension loads | See Annex C 1 |
| Edge distances and spacing | See Annex B 6 |

3.2 Safety in case of fire (BWR 2)

| Essential characteristic | Performance |
|--------------------------|---|
| Reaction to fire | Anchorage satisfy requirements for Class A1 |
| Resistance to fire | No performance assessed |

3.3 Hygiene, health and environment (BWR 3)

Regarding dangerous substances contained in this European Technical Assessment, there may be requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Regulation (EU) No 305/2011), these requirements need also to be complied with, when and where they apply.

3.4 Safety in use (BWR 4)

For basic requirement safety in use, the same criteria are valid as for Basic Requirement Mechanical resistance and stability.

3.5 Sustainable use of natural resources (BWR 7)

For the sustainable use of natural resources, no performance was determined for this product.

3.6 General aspects relating to fitness for use

Durability and serviceability are only ensured if the specifications of intended use according to Annex B 1 are kept.

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

According to the Decision 97/177/EC of the European Commission¹, the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table applies.

| Product | Intended use | Level or class | System |
|--------------------------------------|---|----------------|--------|
| Injection anchors for use in masonry | For fixing and/or supporting to masonry, structural elements (which contributes to the stability of the works) or heavy units | - | 1 |

5. Technical details necessary for the implementation of the AVCP system, as provided in the applicable EAD

5.1 Tasks of the manufacturer

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European Technical Assessment.

The manufacturer may only use raw materials stated in the technical documentation of this European Technical Assessment.

The factory production control shall be in accordance with the control plan which is a part of the technical documentation of this European Technical Assessment. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited at Technical and Test Institute for Construction Prague². The results of the factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

The manufacturer shall, on the basis of a contract, involve a body which is notified for the tasks referred to in section 4 in the field of anchors in order to undertake the actions laid down in section 5.2. For this purpose, the control plan referred to in this section and section 5.2 shall be handed over by the manufacturer to the notified body involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of this European Technical Assessment.

¹ Official Journal of the European Communities L 073 of 14.03.1997

² The control plan is a confidential part of the documentation of the European technical assessment, but not published together with the ETA and only handed over to the approved body involved in the procedure of AVCP.

5.2 Tasks of the notified bodies

The notified body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

The notified certification body involved by the manufacturer shall issue a certificate of constancy of performance of the product stating the conformity with the provisions of this European Technical Assessment.

In cases where the provisions of the European Technical Assessment and its control plan are no longer fulfilled, the notified body shall withdraw the certificate of constancy of performance and inform Technical and Test Institute for Construction Prague without delay.

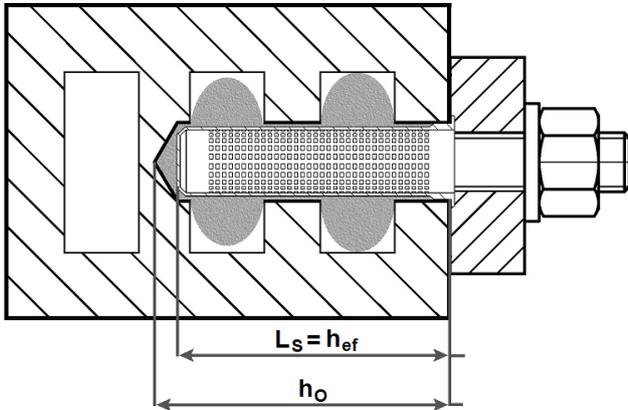
Issued in Prague on 10.08.2016

By

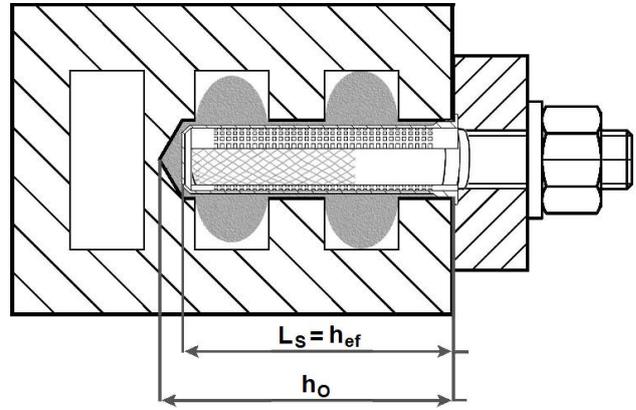
Ing. Mária Schaan
Head of the TAB

Installation in hollow or perforated brick masonry

Installation of anchor rod with sieve sleeve

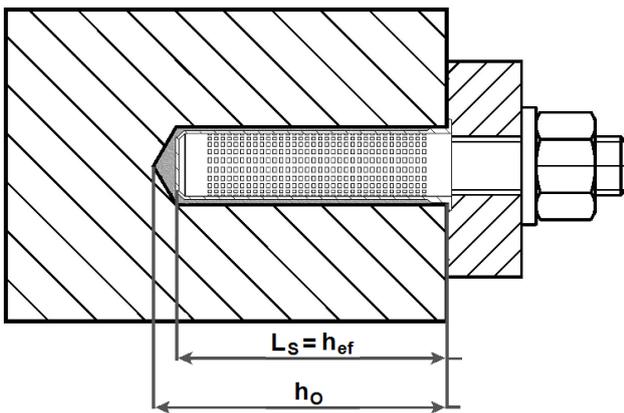


Installation of internal threaded socket with sieve sleeve

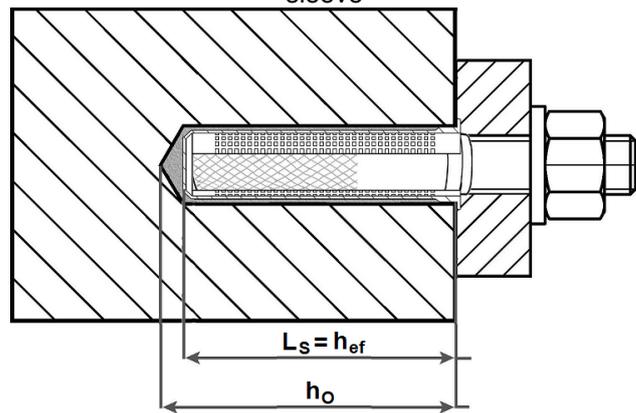


Installation in solid brick masonry

Installation of anchor rod with or without sieve sleeve



Installation of internal threaded socket with sieve sleeve



- L_s = length of the sieve sleeve
- h_{ef} = effective setting depth
- h_o = bore hole depth

**WCF-PESF, WCF-PESF-C, WCF-PESF-S, WCF-PESF-E
for masonry**

Product description
Installed condition

Annex A 1

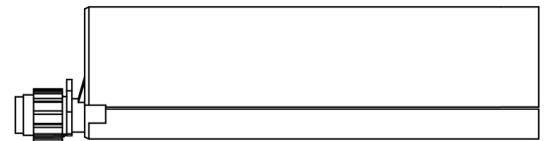
Coaxial cartridge

WCF-PESF, WCF-PESF-C, WCF-PESF-S, WCF-PESF-E 150 ml
 380 ml
 400 ml
 410 ml



Side by side cartridge

WCF-PESF, WCF-PESF-C, WCF-PESF-S, WCF-PESF-E 350 ml
 825 ml



Two part foil in a single piston component cartridge

WCF-PESF, WCF-PESF-C, WCF-PESF-S, WCF-PESF-E 170 ml
 300 ml
 850 ml



Peeler cartridge

WCF-PESF, WCF-PESF-C, WCF-PESF-S, WCF-PESF-E 280 ml

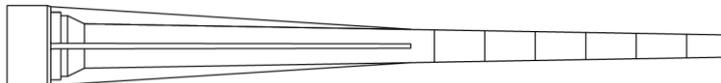


Marking of the mortar cartridges

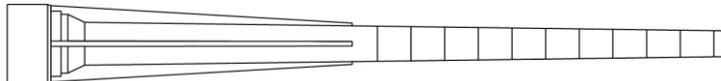
Identifying mark of the producer, Trade name, Charge code number, Storage life, Curing and processing time

Mixing nozzle

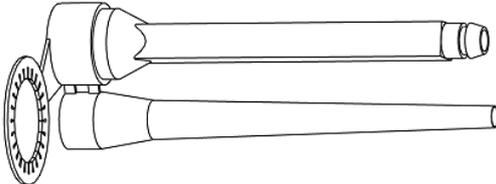
NN



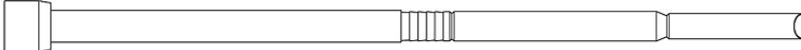
WN



SN



LN



KN for 850 ml

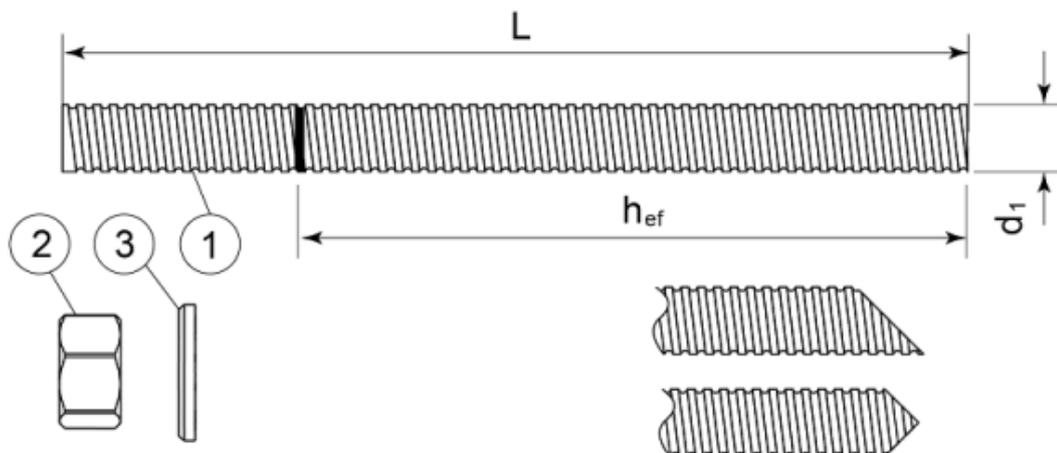


WCF-PESF, WCF-PESF-C, WCF-PESF-S, WCF-PESF-E for masonry

Product description
 Injection system

Annex A 2

Threaded rod M8, M10, M12



Standard commercial threaded rod with marked embedment depth

| Part | Designation | Material |
|---|--|--|
| Steel, zinc plated $\geq 5 \mu\text{m}$ acc. to EN ISO 4042 or Steel, hot-dip galvanized $\geq 40 \mu\text{m}$ acc. to EN ISO 1461 and EN ISO 10684 or Steel, zinc diffusion coating $\geq 15 \mu\text{m}$ acc. to EN 13811 | | |
| 1 | Anchor rod | Steel, EN 10087 or EN 10263 Property class 5.8, 8.8, 10.9* EN ISO 898-1 |
| 2 | Hexagon nut EN ISO 4032 | According to threaded rod, EN 20898-2 |
| 3 | Washer EN ISO 887, EN ISO 7089, EN ISO 7093 or EN ISO 7094 | According to threaded rod |
| Stainless steel | | |
| 1 | Anchor rod | Material: A2-70, A4-70, A4-80, EN ISO 3506 |
| 2 | Hexagon nut EN ISO 4032 | According to threaded rod |
| 3 | Washer EN ISO 887, EN ISO 7089, EN ISO 7093 or EN ISO 7094 | According to threaded rod |
| High corrosion resistant steel | | |
| 1 | Anchor rod | Material: 1.4529, 1.4565, EN 10088-1 |
| 2 | Hexagon nut EN ISO 4032 | According to threaded rod |
| 3 | Washer EN ISO 887, EN ISO 7089, EN ISO 7093 or EN ISO 7094 | According to threaded rod |

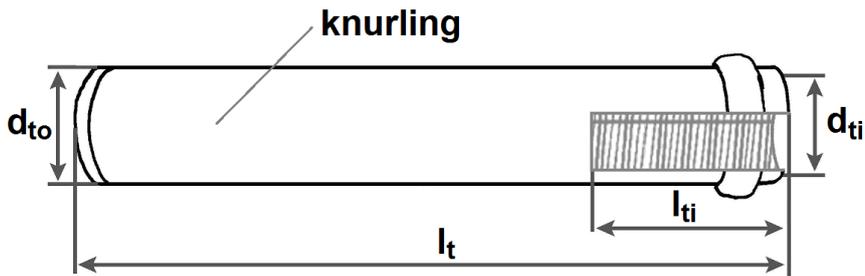
*Galvanized rod of high strength are sensitive to hydrogen induced brittle failure

WCF-PESF, WCF-PESF-C, WCF-PESF-S, WCF-PESF-E
for masonry

Product description
Threaded rod and materials

Annex A 3

Internal threaded socket



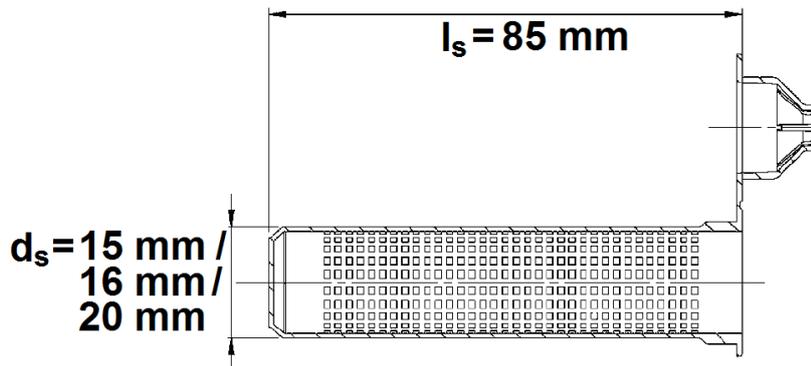
Marking:
Identifying mark of the producer "m"
Size of internal thread e.g. M8

Table A1: Dimensions of internal threaded socket

| Internal threaded socket | Inner diameter d_{ti} | Outer diameter d_{to} [mm] | Length of the internal thread l_{ti} [mm] | Total length l_t [mm] |
|--------------------------|----------------------------|---------------------------------|--|----------------------------|
| 12 x 80 | M8 | 12 | 30 | 80 |
| 14 x 80 | M10 | 14 | 30 | 80 |
| 16 x 80 | M12 | 16 | 30 | 80 |

| Designation | Material |
|--------------------------|--|
| Internal threaded socket | strength class 5.8 EN ISO 898-1, galvanized $\geq 5 \mu\text{m}$ EN ISO 4042 |

Sieve sleeve



Types:
SH15/85
SH16/85
SH20/25

| Designation | Material |
|--------------|---------------|
| Sieve sleeve | Polypropylene |

WCF-PESF, WCF-PESF-C, WCF-PESF-S, WCF-PESF-E for masonry

Product description
Internal threaded socket and materials
Sleeve

Annex A 4

Specifications of intended use

Anchorage subject to:

- Static and quasi-static loads

Base materials

- Solid brick masonry (Use category b), according to Annex B2.
- Hollow brick masonry (Use category c), according to Annex B2 to B3.
- Mortar strength class of the masonry M2,5 at minimum according to EN 998-2:2010.
- For other bricks in solid masonry and in hollow or perforated masonry, the characteristic resistance of the anchorages may be determined by job site tests according to ETAG 029, Annex B and under consideration of the β -factor to Annex C1, Table C1.

Note: The characteristic resistance for solid bricks are also valid for larger brick sizes and larger compressive strength of the masonry unit.

Temperature range:

- T_a : -40°C to +40°C (max. short. term temperature +40°C and max. long term temperature +24°C)
- T_b : -40°C to +80°C (max. short. term temperature +80°C and max. long term temperature +50°C)

Use conditions (Environmental conditions)

- Structures subject to dry internal conditions (zinc coated steel)

Use categories in respect of installation and use:

- Category d/d
- Category w/d

Design:

- Verifiable calculation notes and drawings are prepared taking account the relevant masonry in the region of the anchorage, the loads to be transmitted and their transmission to the supports of the structure. The position of the anchor is indicated on the design drawings.
- The anchorages are designed in accordance with the ETAG 029, Annex C, Design method A, under the responsibility of an engineer experienced in anchorages and masonry work.

Installation:

- Dry or wet structures
- Anchor Installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.

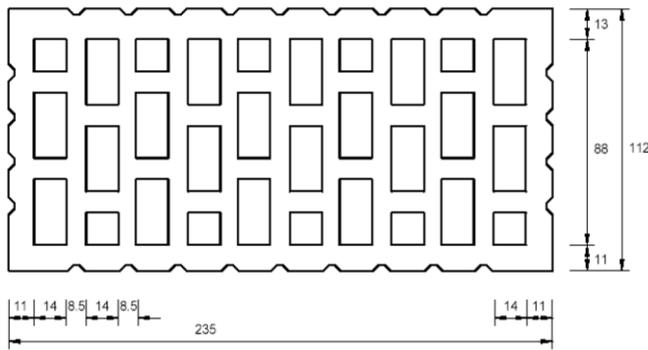
**WCF-PESF, WCF-PESF-C, WCF-PESF-S, WCF-PESF-E
for masonry**

**Intended use
Specifications**

Annex B 1

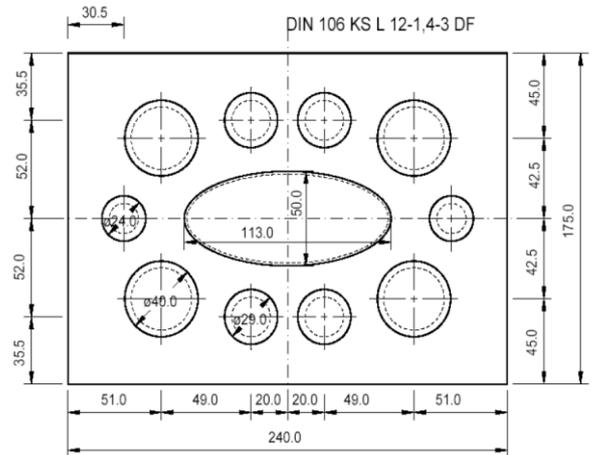
Table B1: Types and dimensions of block and bricks

Brick N° 1



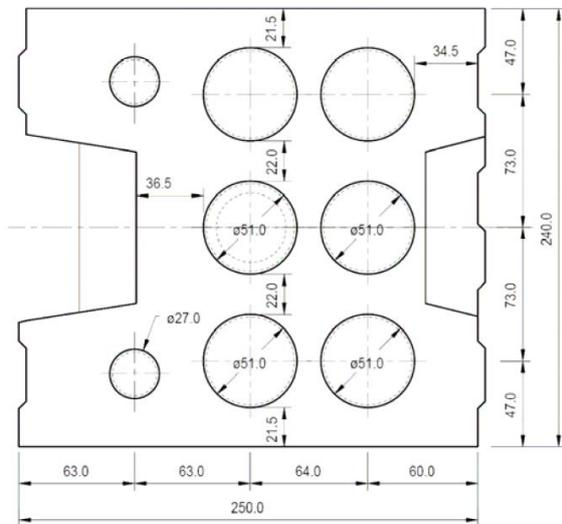
Hollow clay brick HLz 12-1,0-2DF
 according to EN 771-1
 length/width/height = 235 mm/112 mm/115 mm
 $f_b \geq 12 \text{ N/mm}^2 / \rho \geq 1,0 \text{ kg/dm}^3$

Brick N° 2



Hollow sand lime brick KSL 12-1,4-3DF
 according to EN 771-2
 length/width/height = 240 mm/175 mm/113 mm
 $f_b \geq 12 \text{ N/mm}^2 / \rho \geq 1,4 \text{ kg/dm}^3$

Brick N° 3



Hollow sand lime brick KSL 12-1,4-8DF
 according to EN 771-2
 length/width/height = 250 mm/240 mm/237 mm
 $f_b \geq 12 \text{ N/mm}^2 / \rho \geq 1,4 \text{ kg/dm}^3$

Brick N° 4

Solid clay brick Mz 12-2,0-NF
 according to EN 771-1
 length/width/height = 240 mm/116 mm/71 mm
 $f_b \geq 12 \text{ N/mm}^2 / \rho \geq 2,0 \text{ kg/dm}^3$

Brick N° 5

Solid sand lime brick KS 12-2,0-NF
 according to EN 771-2
 length/width/height = 240 mm/115 mm/70 mm
 $f_b \geq 12 \text{ N/mm}^2 / \rho \geq 2,0 \text{ kg/dm}^3$

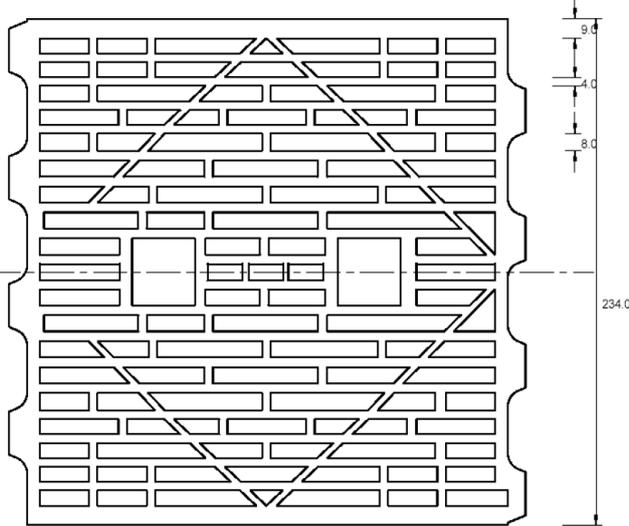
**WCF-PESF, WCF-PESF-C, WCF-PESF-S, WCF-PESF-E
 for masonry**

Intended use
 Brick types and properties

Annex B 2

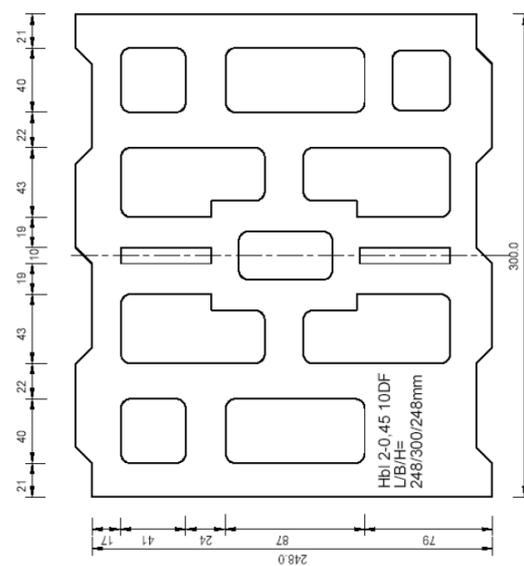
Table B2: Types and dimensions of block and bricks

Brick N° 6



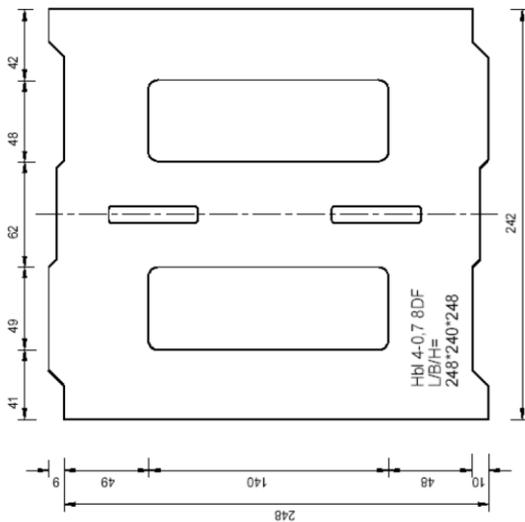
Hollow clay brick HLzW 6-0,7-8DF according to EN 771-1
length/width/height = 250 mm/240 mm/240 mm
 $f_b \geq 6 \text{ N/mm}^2 / \rho \geq 0,8 \text{ kg/dm}^3$

Brick N° 7



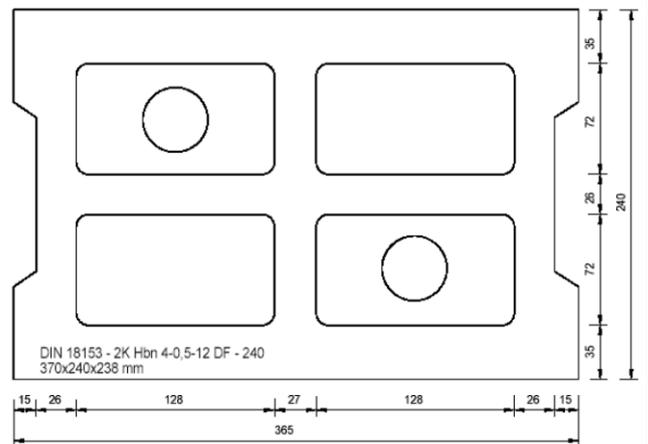
Lightweight concrete hollow block Hbl 2-0,45-10DF according to EN 771-3
length/width/height = 250 mm/300 mm/248 mm
 $f_b \geq 2,0 \text{ N/mm}^2 / \rho \geq 0,45 \text{ kg/dm}^3$

Brick N° 8



Lightweight concrete hollow block Hbl 4-0,7-8DF according to EN 771-3
length/width/height = 250 mm/240 mm/248 mm
 $f_b \geq 4,0 \text{ N/mm}^2 / \rho \geq 0,7 \text{ kg/dm}^3$

Brick N° 9



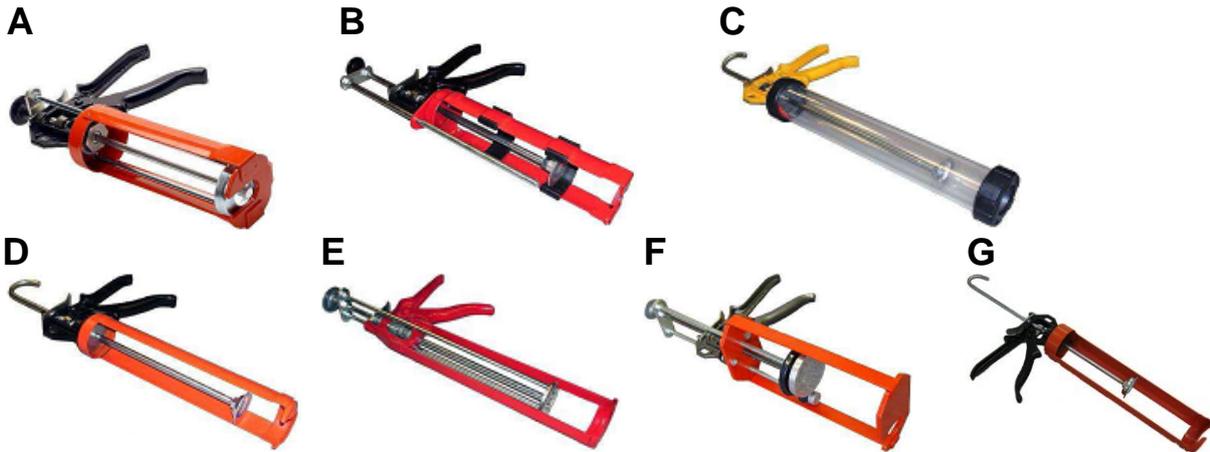
Concrete masonry unit Hbn 4-12DF according to EN 771-3
length/width/height = 370 mm/240 mm/238 mm
 $f_b \geq 4 \text{ N/mm}^2 / \rho \geq 1,2 \text{ kg/dm}^3$

WCF-PESF, WCF-PESF-C, WCF-PESF-S, WCF-PESF-E for masonry

Intended use
Brick types and properties

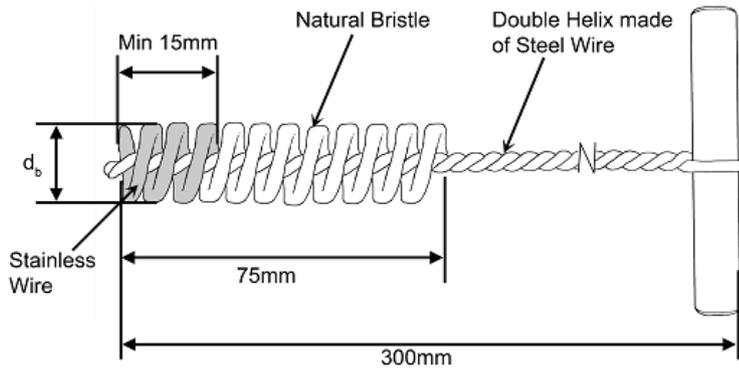
Annex B 3

Applicator gun

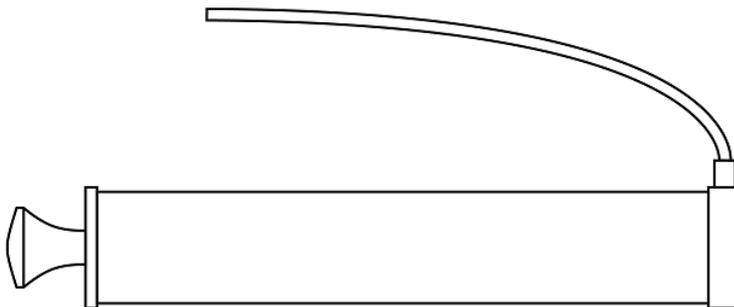


| Applicator gun | A | B | C | D | E | F | G |
|----------------|------------------------------------|-----------------------|--------------------------------|---|------------------|-----------------------|-----------------------|
| Cartridge | Coaxial 380ml 400ml 410ml | Side by side 350ml | Foil capsule 170ml 300ml | Foil capsule 170ml 300ml Peeler 280ml | Coaxial 150ml | Side by side 825ml | Foil capsule 850ml |

Cleaning brush



Cleaning pump

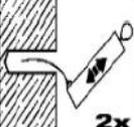
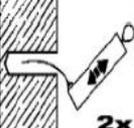
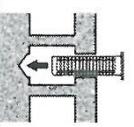
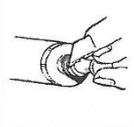
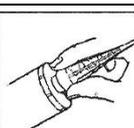
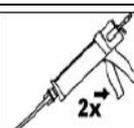
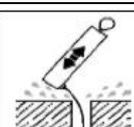
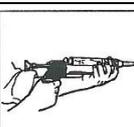
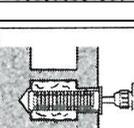
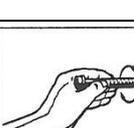
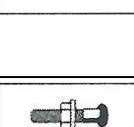
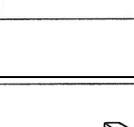


WCF-PESF, WCF-PESF-C, WCF-PESF-S, WCF-PESF-E
for masonry

Intended use
Applicator guns
Cleaning brush, Cleaning pump

Annex B 4

Installation instructions

| | | | |
|---|--|---|---|
|  | <p>1. Drill the hole to the correct diameter and depth using a rotary percussive machine.</p> |  | <p>2. Use the Cleaning pump to clean the hole.</p> |
|  | <p>3. Use the Cleaning brush to clean the hole. Diameter of Cleaning brush according to Table B3.</p> |  | <p>4. Use the Cleaning pump to clean the hole.</p> |
|  | <p>5. Use the Cleaning brush to clean the hole. Diameter of Cleaning brush according to Table B3.</p> |  | <p>6. Use the Cleaning pump to clean the hole.</p> |
|  | <p>7. If used in hollow or perforated brick masonry: Plug the centering cap and insert the correct perforated sleeve flush with the surface of the base material.</p> |  | <p>8. Once the hole is prepared, remove the screw cap from the cartridge.</p> |
|  | <p>9. Attach the mixer nozzle and place the cartridge in the applicator gun.</p> |  | <p>10. Dispense the first part to waste, until an even colour is achieved.</p> |
|  | <p>11. Remove any remaining water from the hole.</p> |  | <p>12. Insert the nozzle to the far end of the hole (using extension tubing if necessary) and inject the resin, withdrawing the nozzle/tube as the hole fills.</p> |
|  | <p>13. If used in hollow or perforated brick masonry: Insert mixer nozzle to the end of the perforated sleeve and completely fill the sleeve with resin. Withdraw the mixer nozzle as the sleeve fills.</p> |  | <p>14. Immediately insert the fixing (steel element) slowly and with a slight twisting motion. Remove excess resin from around the mouth of the hole.</p> |
|  | <p>15. Leave the fixing undisturbed until the cure time (see Table B5) has elapsed.</p> |  | <p>16. Attach the fixture and tighten the nut. Maximum installation torque moment according to Table B3.</p> |

**WCF-PESF, WCF-PESF-C, WCF-PESF-S, WCF-PESF-E
for masonry**

Intended use
Installation instructions

Annex B 5

Table B3: Installation parameters in solid and hollow masonry

| Anchor type | | Anchor rod | | | | | | Internal threaded socket | | | | | |
|---|--------------------------|------------|------------|------------|------------|------------|------------|--------------------------|------------|------------|----|----|----|
| Size | | M8 | M10 | M12 | M8 | M10 | M12 | M8 | M10 | M12 | | | |
| Internal threaded socket | $d_{to \times l_t}$ [mm] | - | - | - | - | - | - | 12x80 | 14x80 | 16x80 | | | |
| Sieve sleeve | l_s [mm] | - | - | - | 85 | 85 | 85 | 85 | 85 | 85 | | | |
| | d_s [mm] | - | - | - | 15 | 16 | 15 | 16 | 20 | 15 | 16 | 20 | 20 |
| Nominal drill hole diameter | d_0 [mm] | 15 | 15 | 20 | 15 | 16 | 15 | 16 | 20 | 15 | 16 | 20 | 20 |
| Diameter of cleaning brush | d_b [mm] | 20 \pm 1 | 20 \pm 1 | 22 \pm 1 | 20 \pm 1 | 20 \pm 1 | 22 \pm 1 | 20 \pm 1 | 22 \pm 1 | 22 \pm 1 | | | |
| Depth of the drill hole | h_0 [mm] | 90 | | | | | | | | | | | |
| Effective anchorage depth | h_{ef} [mm] | 85 | | | | | | 80 | | | | | |
| Diameter of clearance hole in the fixture | $d_f \leq$ [mm] | 9 | 12 | 14 | 9 | 12 | 14 | 9 | 12 | 14 | | | |
| Torque moment | $T_{inst} \leq$ [mm] | 2 | | | | | | | | | | | |

Table B4: Edge distances and spacing

| Base material ¹⁾ | Anchor rod | | | | | | | | |
|-----------------------------|--------------------|--|--------------------------------|--------------------|--|--------------------------------|--------------------|--|--------------------------------|
| | M8 | | | M10 | | | M12 | | |
| | $c_{cr} = c_{min}$ | $s_{cr \parallel} = s_{min \parallel}$ | $s_{cr \perp} = s_{min \perp}$ | $c_{cr} = c_{min}$ | $s_{cr \parallel} = s_{min \parallel}$ | $s_{cr \perp} = s_{min \perp}$ | $c_{cr} = c_{min}$ | $s_{cr \parallel} = s_{min \parallel}$ | $s_{cr \perp} = s_{min \perp}$ |
| [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| Brick N° 1 | 100 | 235 | 115 | 100 | 235 | 115 | 120 | 235 | 115 |
| Brick N° 2 | 100 | 240 | 113 | 100 | 240 | 113 | 120 | 240 | 113 |
| Brick N° 3 | 100 | 250 | 237 | 100 | 250 | 237 | 120 | 250 | 237 |
| Brick N° 4 | 128 | 255 | 255 | 128 | 255 | 255 | 128 | 255 | 255 |
| Brick N° 5 | 128 | 255 | 255 | 128 | 255 | 255 | 128 | 255 | 255 |
| Brick N° 6 | 100 | 250 | 240 | 100 | 250 | 240 | 120 | 250 | 240 |
| Brick N° 7 | 100 | 250 | 248 | 100 | 250 | 248 | - | - | - |
| Brick N° 8 | 100 | 250 | 248 | 100 | 250 | 248 | 120 | 250 | 248 |
| Brick N° 9 | 100 | 370 | 238 | 100 | 370 | 238 | 120 | 370 | 238 |

| Base material ¹⁾ | Internal threaded socket | | | | | | | | |
|-----------------------------|--------------------------|--|--------------------------------|--------------------|--|--------------------------------|--------------------|--|--------------------------------|
| | M8 | | | M10 | | | M12 | | |
| | $c_{cr} = c_{min}$ | $s_{cr \parallel} = s_{min \parallel}$ | $s_{cr \perp} = s_{min \perp}$ | $c_{cr} = c_{min}$ | $s_{cr \parallel} = s_{min \parallel}$ | $s_{cr \perp} = s_{min \perp}$ | $c_{cr} = c_{min}$ | $s_{cr \parallel} = s_{min \parallel}$ | $s_{cr \perp} = s_{min \perp}$ |
| [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] |
| Brick N° 1 | 100 | 235 | 115 | 120 | 235 | 115 | 120 | 235 | 115 |
| Brick N° 2 | 100 | 240 | 113 | 120 | 240 | 113 | 120 | 240 | 113 |
| Brick N° 3 | - | - | - | 120 | 250 | 237 | 120 | 250 | 237 |
| Brick N° 4 | 128 | 255 | 255 | 128 | 255 | 255 | 128 | 255 | 255 |
| Brick N° 5 | 128 | 255 | 255 | 128 | 255 | 255 | 128 | 255 | 255 |
| Brick N° 6 | 100 | 250 | 240 | 120 | 250 | 240 | 120 | 250 | 240 |
| Brick N° 7 | 100 | 250 | 248 | 120 | 250 | 248 | 120 | 250 | 248 |
| Brick N° 8 | - | - | - | 120 | 250 | 248 | 120 | 250 | 248 |
| Brick N° 9 | 100 | 370 | 238 | 120 | 370 | 238 | 120 | 370 | 238 |

¹⁾ Brick N° according to Annex B 2 and B 3

WCF-PESF, WCF-PESF-C, WCF-PESF-S, WCF-PESF-E for masonry

Intended use
Installation parameters

Annex B 6

Table B5.1: Minimum curing time WCF-PESF

| Resin cartridge temperature [°C] | T Work [mins] | Base material Temperature [°C] | T Load [mins] |
|----------------------------------|---------------|--------------------------------|---------------|
| min +5 | 18 | min +5 | 145 |
| +5 to +10 | 10 | +5 to +10 | |
| +10 to +20 | 6 | +10 to +20 | 85 |
| +20 to +25 | 5 | +20 to +25 | 50 |
| +25 to +30 | 4 | +25 to +30 | 40 |
| +30 | | +30 | 35 |

Table B5.2: Minimum curing time WCF-PESF-C

| Resin cartridge temperature [°C] | T Work [mins] | Base material Temperature [°C] | T Load [mins] |
|----------------------------------|---------------|--------------------------------|---------------|
| min +5 | 5 | -10 to -5 | 4 hours |
| | | -5 to +5 | 125 |
| +5 to +10 | 3,5 | +5 to +10 | 60 |
| +10 to +20 | 2 | +10 to +20 | 40 |
| +20 to +25 | 1,5 | +20 to +25 | 20 |
| +25 to +30 | 1 | +25 to +30 | 15 |
| +30 | | +30 | 10 |

Table B5.3: Minimum curing time WCF-PESF-S

| Resin cartridge temperature [°C] | T Work [mins] | Base material Temperature [°C] | T Load [mins] |
|----------------------------------|---------------|--------------------------------|---------------|
| min +5 | 10 | -5 to +5 | 180 |
| +5 to +10 | 5 | +5 to +10 | 60 |
| +10 to +20 | 3 | +10 to +20 | 40 |
| +20 to +25 | 2,5 | +20 to +25 | 20 |
| +25 to +30 | 2 | +25 to +30 | 15 |
| +30 | | +30 | 10 |

Table B5.4: Minimum curing time WCF-PESF-E

| Resin cartridge temperature [°C] | T Work [mins] | Base material Temperature [°C] | T Load [mins] |
|----------------------------------|---------------|--------------------------------|---------------|
| min +10 | 30 | min +10 | 5 hours |
| +10 to +20 | 15 | +10 to +20 | |
| +20 to +25 | 10 | +20 to +25 | 145 |
| +25 to +30 | 7,5 | +25 to +30 | 85 |
| +30 to +35 | 5 | +30 to +35 | 50 |
| +35 to +40 | 3,5 | +35 to +40 | 40 |
| +40 to +45 | 2,5 | +40 to +45 | 35 |
| +45 | | +45 | 12 |

T work is typical gel time at highest temperature

T load is set at the lowest temperature

**WCF-PESF, WCF-PESF-C, WCF-PESF-S, WCF-PESF-E
for masonry**

Intended use
Working and curing time

Annex B 7

Table C1: Characteristic resistance under tension and shear loading

| Base material | Anchor rods $N_{Rk} = V_{Rk}$ [kN] ¹⁾ | | | Internal threaded sockets $N_{Rk} = V_{Rk}$ [kN] ¹⁾ | | |
|---------------|---|-----|-----|---|------|------|
| | M8 | M10 | M12 | M8 | M10 | M12 |
| Brick N° 1 | 2,5 | 2,0 | 2,0 | 1,5 | 2,5 | 2,5 |
| Brick N° 2 | 0,75 | 1,2 | 0,5 | 0,6 | 0,75 | 0,9 |
| Brick N° 3 | 0,75 | 1,2 | 0,5 | - | 0,75 | 0,4 |
| Brick N° 4 | 1,5 | 1,5 | 3,0 | 2,0 | 3,0 | 4,0 |
| Brick N° 5 | 0,75 | 0,9 | 1,5 | 2,0 | 1,5 | 0,9 |
| Brick N° 6 | 1,2 | 1,2 | 0,9 | 0,9 | 1,5 | 0,6 |
| Brick N° 7 | 0,6 | 0,3 | - | 0,5 | 0,3 | 0,75 |
| Brick N° 8 | 0,6 | 1,5 | 1,2 | - | 0,4 | 0,6 |
| Brick N° 9 | 2,5 | 1,5 | 2,5 | 0,6 | 1,2 | 0,9 |

¹⁾ For design according ETAG 029, Annex C: $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,s}$; $N_{Rk,pb}$ according to ETAG 029, Annex C
For $V_{Rk,s}$ see Annex C1, Table C2; Calculation of $V_{Rk,pb}$ and $V_{Rk,c}$ according to ETAG 029, Annex C

Table C2: Characteristic bending moment

| Size | | M8 | M10 | M12 |
|--|------------------|----|-----|-----|
| Steel grade 5.8 | $M_{Rk,s}$ [N.m] | 19 | 37 | 66 |
| Steel grade 8.8 | $M_{Rk,s}$ [N.m] | 30 | 60 | 105 |
| Steel grade 10.9 | $M_{Rk,s}$ [N.m] | 37 | 75 | 131 |
| Stainless steel grade A2-70, A4-70 | $M_{Rk,s}$ [N.m] | 26 | 52 | 92 |
| Stainless steel grade A4-80 | $M_{Rk,s}$ [N.m] | 30 | 60 | 105 |
| Stainless steel grade 1.4529 strength class 70 | $M_{Rk,s}$ [N.m] | 26 | 52 | 92 |
| Stainless steel grade 1.4565 strength class 70 | $M_{Rk,s}$ [N.m] | 26 | 52 | 92 |

Table C3: Displacements under tension and shear load

| Base material | F [kN] | δ_{N0} [mm] | $\delta_{N\infty}$ [mm] | δ_{V0} [mm] | $\delta_{V\infty}$ [mm] |
|------------------------------|---------------------------------|--------------------|-------------------------|--------------------|-------------------------|
| Solid bricks | $N_{Rk} / (1,4 \cdot \gamma_M)$ | 0,6 | 1,2 | 1,0 ¹⁾ | 1,5 ¹⁾ |
| Perforated and hollow bricks | | 0,14 | 0,28 | 1,0 ¹⁾ | 1,5 ¹⁾ |

¹⁾ the hole gap between bolt and fixture shall be considered additionally

Table C4: β - factors for job site tests according to ETAG 029, Annex B

| Brick N° | N° 1 | N° 2 | N° 3 | N° 4 | N° 5 | N° 6 | N° 7 | N° 8 | N° 9 |
|------------------|------|------|------|------|------|------|------|------|------|
| β - factor | 0,62 | 0,28 | 0,22 | 0,48 | 0,26 | 0,43 | 0,42 | 0,36 | 0,60 |

WCF-PESF, WCF-PESF-C, WCF-PESF-S, WCF-PESF-E
for masonry

Performances

Characteristic resistance, displacement
 β -factors for job site testing under tension load

Annex C 1