

The Catalonia Institute of  
Construction Technology

Wellington, 19  
E-08018 Barcelona  
Tel.: (+34) 93 309 34 04  
Fax: (+34) 93 300 48 52  
qualprod@itec.cat  
www.itec.cat



Institut de  
Tecnologia de la Construcció  
de Catalunya

Member of EOTA

## European Technical Approval

ETA 13/0916

Nombre comercial: **Kawo PSF**

*Trade name:*

Titular del DITE: **Rocast Srl**

*Holder of approval:*

Sos. Pantelimon 1-3  
021591 – Bucharest  
Romania



Área genérica y uso del  
producto de construcción:

Anclaje metálico por inyección para fábrica de albañilería

*Generic type and use of  
construction product:*

*Metal injection anchor for use in masonry*

Validez:  
*Validity:*

de  
*from* 26.06.2013  
hasta  
*to* 17.06.2018

Planta de fabricación:

*Manufacturing plant:*

**Rocast Srl**

El presente Documento de  
Idoneidad Técnica Europeo  
contiene:

24 páginas, incluyendo 12 anexos que forman parte del documento.

*This European Technical  
Approval contains:*

*24 pages including 12 annexes which form an integral part of the  
document.*



Organización Europea para la Idoneidad Técnica

European Organisation for Technical Approvals

## I LEGAL BASES AND GENERAL CONDITIONS

1. This European Technical Approval is issued by the Catalonia Institute of Construction Technology (ITeC) in accordance with:
  - Council Directive 89/106/EEC<sup>1</sup> of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products modified by the Council Directive 93/68/EEC<sup>2</sup> and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council<sup>3</sup>;
  - Real Decreto 1630/1992, de 29 de diciembre, por el que se dictan disposiciones para la libre circulación de productos de la construcción en aplicación de la Directiva 89/106/CEE<sup>4</sup>;
  - Real Decreto 1328/1995, de 28 de julio, por el que se modifican, en aplicación de la Directiva 93/68/CEE, las disposiciones para la libre circulación, aprobadas por el Real Decreto 1630/1992, de 29 de diciembre (BOE 19-8-95) y la Orden CTE/2276/2002 de 4 de septiembre;
  - Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex to Commission Decision 94/23/EC<sup>5</sup>;
  - Guideline for European Technical Approval of *Metal Injection Anchors for use in Masonry*, ETAG 029, edition June 2010.
2. The Catalonia Institute of Construction Technology (ITeC) is authorised to check whether the provisions of this European Technical Approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products with the European Technical Approval and for their fitness for the intended use remains with the holder of the European Technical Approval.
3. This European Technical Approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1; or manufacturing plants other than those indicated on page 1 of this European Technical Approval.
4. This European Technical Approval may be withdrawn by the Catalonia Institute of Construction Technology (ITeC) pursuant to information by the Commission according to Article 5(1) of Council Directive 89/106/EEC.
5. Reproduction of this European Technical Approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of the Catalonia Institute of Construction Technology (ITeC). In this case, partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European Technical Approval.
6. This European Technical Approval is issued in Spanish by the Catalonia Institute of Construction Technology (ITeC). This version corresponds fully to the version circulated in EOTA. Translations into other languages have to be designated as such.

<sup>1</sup> Official Journal of the European Communities N° L 40, 11.2.1989, p.12.

<sup>2</sup> Official Journal of the European Communities N° L 220, 30.8.1993, p.1.

<sup>3</sup> Official Journal of the European Union N° L 284, 31.10.2003, p.1.

<sup>4</sup> Boletín Oficial del Estado n° 34 de 9 de febrero de 1993.

<sup>5</sup> Official Journal of the European Communities N° L 17, 20.1.1994, p.34.

## **II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL**

### **1 Definition of product and intended use**

#### **1.1 Definition of the construction product**

Kawo PSF system is a bonded anchor (injection type) consisting of a mortar cartridge with polyester resin without styrene, a perforated sleeve and an anchor rod with hexagon nut and washer in the range M8, M10 and M12.

The steel elements are made of zinc coated steel or stainless steel.

The anchor rod is placed into a drilled hole filled with injection mortar and is anchored via the bond between steel element, injection mortar and masonry.

See annexes I, II and III for more details.

#### **1.2 Intended use**

The anchor is intended to be used for anchorages for which requirements for mechanical resistance and stability and safety in use in the sense of the Essential Requirements 1 and 4 of Council Directive 89/106/EEC shall be fulfilled and failure of anchorages made with these products would cause risk to human life and/or lead to considerable economic consequences.

The anchor is to be used only for anchorages subject to static or quasi-static loading in solid masonry (use category b) or in hollow or perforated masonry (use category c) according to annex IV.

The mortar strength class of masonry has to be M2,5 according to EN 998-2 at minimum.

The anchors may be installed in category w/w: installation and use in structures subject to dry or wet environmental conditions.

- Elements made of galvanized steel may be used in structures subject to dry internal conditions only.
- Elements made of stainless steel 1.4401, 1.4404 or 1.4571 may be used in structures subject to dry internal conditions and also in structures subject to external atmospheric exposure (including industrial and marine environment), or exposure to permanently damp internal 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).

The anchors may be used in the following service temperature range:

- Tb: - 40 °C to + 80 °C (maximum short term temperature + 80 °C and maximum long term temperature + 50 °C).

The provisions made in this European technical approval are based on an assumed working life 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 right products in relation to the expected economically reasonable working life of the works.

## 2 Characteristics of products and methods of verification

### 2.1 Characteristics of product

The anchor corresponds to the drawings and provisions given in annexes I to XII. The characteristic material values, dimensions and tolerances of the anchor not indicated in annexes shall correspond to the respective values laid down in the technical documentation<sup>6</sup> of this European technical approval.

The characteristic anchor values for the design of anchorages are given in annexes IX to XII.

The anchor satisfies the requirements for class A1 of the characteristic reaction to fire.

Regarding resistance to fire, no performance is determined.

### 2.2 Methods of verification

The assessment of fitness of the anchor for the intended use in relation to the requirements for mechanical resistance and stability and safety in use in the sense of the Essential Requirements 1 and 4 has been made in accordance with the Guideline for European Technical Approval of *Metal Injection Anchors for use in Masonry*, ETAG 029, edition June 2010, based on the Use categories b and c in respect of the base material and Category w/w in respect of installation and use.

In addition to the specific clauses relating to dangerous substances contained in this European Technical Approval, there may be other 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 EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

## 3 Evaluation of Conformity and CE marking

### 3.1 Attestation of Conformity

The system of attestation of conformity, specified by the European Commission in Commission Decision 97/177/EC<sup>7</sup>, is system 1 as described in Council Directive 89/106/EEC Annex III, and it is detailed as follows:

**System 1** for any intended uses.

**Tasks of the manufacturer:**

- Factory production control.
- Further testing of samples taken at the factory in accordance with a prescribed test plan.

**Tasks of the approved body:**

- Initial type testing of the product.
- Initial inspection of the factory and of factory production control.
- Continuous surveillance, assessment and approval of factory production control.

---

<sup>6</sup> The technical documentation of this European technical approval is deposited with the Catalonia Institute of Construction Technology and, as far as relevant for the tasks of the approved bodies involved in the attestation of conformity procedure, is handed over to the approved bodies.

<sup>7</sup> Official Journal of the European Communities N° 073, 14.03.1997.

## 3.2 Responsibilities

### 3.2.1 Tasks of the manufacturer

#### 3.2.1.1 Factory production control

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 in accordance with the *Control Plan*. This production control system shall ensure that the product is in conformity with this European Technical Approval (ETA).

Only the raw materials and materials stated in the technical documentation of this ETA may be used in the production of the products.

The factory production control shall be in accordance with the *Control Plan* relating to this ETA, which is part of the technical documentation of this European technical approval. The *Control Plan* is laid down in the context of the factory production control system operated by the manufacturer and deposited with the ITeC.<sup>a</sup>

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the *Control Plan*. On request they shall be presented to the ITeC.

The personnel involved in the production process shall be identified, sufficiently qualified and trained to operate and maintain the production equipment. Machinery and equipment shall be regularly maintained and this shall be documented. All processes and production procedures shall be recorded at regular intervals.

All testing equipment is maintained, calibrated and/or verified against measurement standards traceable to relevant international or national measurement standards.

The manufacturer shall ensure that handling, preservation and storage of test equipment is such that its accuracy and fitness for purpose is maintained. The calibration of all test equipment shall be repeated if any repair or failure occurs which could upset the calibration of the test equipment.

The manufacturer shall maintain a traceable documentation of the production process from purchasing or delivery of raw or basic raw materials up to the storage and delivery of finished products.

Products that do not comply with requirements as specified in the ETA shall be separated from the conforming products and marked as such. The manufacturer shall register non-compliant production and action(s) taken to prevent further non-conformities. External complaints shall also be documented, as well as actions taken.

#### 3.2.1.2 Testing of samples taken at the factory

The testing of samples taken at the factory shall be carried out in accordance with the *Control Plan*.

#### 3.2.1.3 Other tasks of the manufacturer

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of injection systems for use in masonry in order to undertake the actions laid down in section 3.2.2. For this purpose, the *Control Plan* referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of the ETA 13/0916 issued on 26.06.2013.

---

<sup>a</sup> The *Control Plan* is a confidential part of the European technical approval and only handed over to the approved body or bodies involved in the procedure of attestation of conformity.

### **3.2.2 Tasks of approved bodies**

The approved body shall perform the activities referred to above according to the specific conditions, in accordance with the provisions laid down in the *Control Plan* relating to this ETA.

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

#### **3.2.2.1 Initial type testing**

The verifications on which this ETA is based have been carried out on representative samples from the current production. The results of the tests performed as part of the assessment shall be used for initial type-testing (ITT) unless changes in the manufacturing procedure affect the product properties.

Any change in the manufacturing procedure which may affect the properties of the product shall be notified and the necessary type-testing revised according to the *Control Plan*.

#### **3.2.2.2 Initial inspection of factory and the factory production control**

The approved body shall assess the factory production control system to check that the factory production control is in conformity with this European Technical Approval and any subsidiary information. The approved body shall ensure that the manufacturer has acceptable premises, technical equipment and competent staff to produce the product as described in this European Technical Approval.

#### **3.2.2.3 Continuous surveillance, assessment and approval of factory production control**

Continuous surveillance of the factory production control is necessary to ensure continuing conformity with the ETA. It is recommended that surveillance inspections be conducted least once per year.

#### **3.2.2.4 Certification**

Once the ITT, the initial inspection and surveillance of the FPC have been performed and whether a favourable conclusion can be drawn on the basis of available information, the notified certification body shall issue an EC Certificate of product Conformity, permitting the manufacturer to issue an EC Declaration of Conformity, enabling CE Marking of the product.

In cases where the provisions of this European Technical Approval and its *Control Plan* are no longer fulfilled, the certification body shall withdraw the certificate and inform the Catalonia Institute of Construction Technology (ITeC) without delay.

### **3.3 CE marking**


#### **3.3.1 General**

The CE marking shall be affixed on product on a label attached to the packaging of product or on the accompanying documents. The letters "CE" shall be followed by the identification number of the approved certification body, where relevant, and be accompanied by the following additional information:

- The name and address of the ETA holder.
- The last two digits of year in which the CE marking was affixed.
- The number of the EC Certificate of Conformity for the product
- The number of the European Technical Approval.
- The reference of ETA-Guideline 029.
- Size of the anchor.
- Use category (b, c and w/w).

### 3.3.2 Example of CE marking

Example of CE marking and accompanying information for product:

 nnnn	Letters "CE"  Identification number of notified certification body
<b>Rocast Srl</b> Sos. Pantelimon 1-3 021591 – Bucharest Romania YY	Name and address of the ETA holder  Two last digits of year of affixing the CE marking
ETA 13/0916 ETAG 029	Number of European technical approval Number of guideline for European technical approval
MX Use category: b, c and w/w	Size of the anchor Use category

## 4 Assumptions under which the fitness of the product(s) for the intended use was favourably assessed

### 4.1 Manufacturing

The European Technical Approval is issued for the products on the basis of agreed data/information deposited with the ITeC, which identifies the products that have been assessed and judged. Changes to the product or production processes, which could result in this deposited data and information being incorrect, should be notified to ITeC before the changes are introduced. ITeC will decide whether such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and, if so, whether further assessment or alterations to the ETA shall be necessary.

The detailed description and conditions of the manufacturing process of product, and all the relevant design and installation criteria of product are specified in the technical documentation of the manufacturer deposited with the ITeC. The main aspects of this information are specified in the following chapters

### 4.2 Design of anchorages

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.

Verifiable calculations notes and drawings are prepared taking account the relevant masonry in the region of the anchorage (nature and strength of the base materials), 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 characteristic resistances are only valid for the types of bricks according to annex IV. The characteristic resistances for use in solid masonry are also valid for larger brick sizes and larger compressive strength of the masonry unit.

For other bricks in solid masonry and in hollow or perforated masonry, the characteristic resistance of the anchor may be determined by job site tests according to ETAG 029, Annex B under consideration of the  $\beta$ -factor according to annex X, table X.2 of this ETA.

### 4.3 Installation

The fitness for use of the anchor can only be assumed if the anchor is installed as follows:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters on the site;
- Use of the anchor only as supplied by the manufacturer without exchanging the components of an anchor;
- Anchor's installation in accordance with the manufacturer's specifications and drawings prepared for that purpose and using the tools indicated in the annex.
- Commercial standard threaded rods, washers and hexagon nuts may also be used if the following requirements are fulfilled:
  - material, dimensions and mechanical properties of the metal parts according to the specifications given in annex III.
  - confirmation of material and mechanical properties of the metal parts by inspection certificate 3.1 according to EN 10204, the documents should be stored,
  - marking of the threaded rod with the envisaged embedment depth. This may be done by the manufacturer of the rod or the person on job site.
- Checks before placing the anchor to ensure that the use category applies;
- Holes to be drilled perpendicular to the surface of the base material by using a hard-metal tipped hammer drill bit;
- In case of aborted drill hole: the drill hole shall be filled with mortar;
- Hole cleaning and anchor installation in accordance with manufacturer's installation instructions (annexes VII and VIII);
- Keeping the installation parameters (annexes II and III);
- Marking and keeping the effective anchorage depth;
- Keeping the edge distance and spacing according to annexes X and XII without minus tolerances;
- Observing the curing time according to annex III table III.4, until the anchor may be loaded;
- Minimum injection mortar temperature during installation is +5 ;
- During installation and curing the temperature of the bricks and injection mortar must not fall below + 5 °C and must not exceed + 35 °C, observing the curing time given in annex III table III.4;

## 5 Recommendations

### 5.1 Manufacturer's responsibilities

It is the manufacturer's responsibility to ensure that the information on the specific conditions according to 1 and 2 including annexes referred to as well as sections 4 and 5.2 is given to those who are concerned. This information may be made by reproduction of the respective parts of the issued European technical approval. In addition all installation data shall be shown clearly on the package and/or on an enclosed instruction sheet, preferably using illustration(s).

The minimum data required are:

- Installation parameters according to annex III;
- Material property class of metal parts according to annex III;
- Information on the installation procedure, including cleaning of the hole with the cleaning equipment, preferably by means of an illustration;



- Storage temperature of anchor components, minimum and maximum temperature of the base material, processing time (open time) of the mortar and curing time until the anchor may be loaded according to annex III;
- Identification of the manufacturing batch;

All data shall be presented in a clear and explicit form.

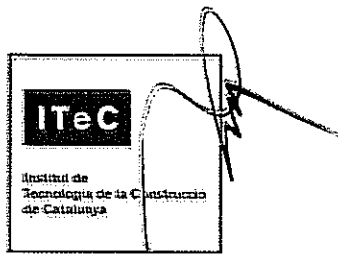
## **5.2 Recommendations on packaging, transport and storage**

The mortar cartridges shall be protected against sun radiation and shall be stored according to manufacturer's instruction in dry conditions at temperatures of least + 5 °C to not more than + 25 °C.

Mortar cartridges with expired shelf life must no longer be used.

On behalf of the Catalonia Institute of Construction Technology.

Barcelona, 26 June 2013



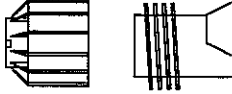
Anton Maria Checa Torres  
General Manager, ITeC

### Annex I: Product description and intended use

**Injection mortar Kawo PSF cartridges**

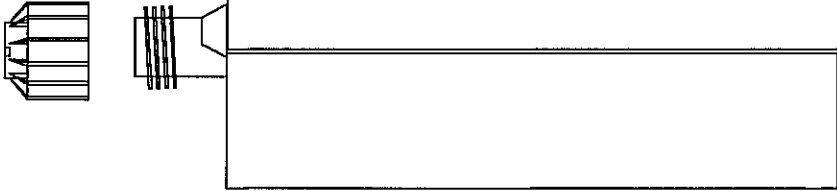
**Coaxial cartridges of 150, 280 and 410 ml  
Peeler cartridges of 280 ml**

Sealing cap



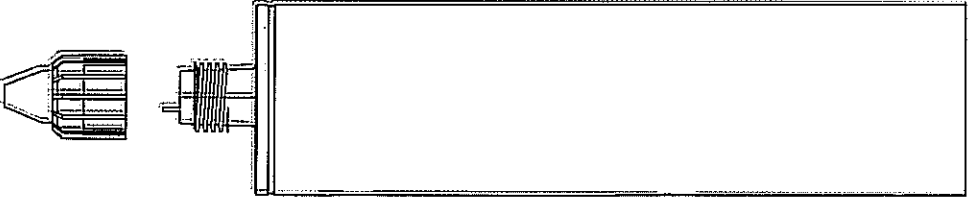
Imprint: Trade name – Kawo PSF Anchorage preparation Application pictograms Cartridge use Hazard code Processing and curing time Internal code to identify the product
---

**Side by side cartridges of 345 ml**




**Foil cartridges of 165 and 300 ml**

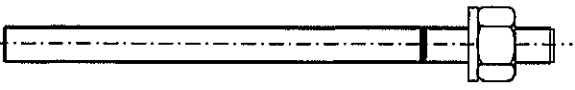
Sealing cap



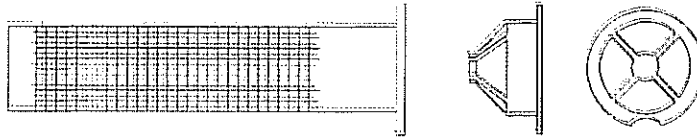
**Static mixer**



**Threaded rod with washer and hexagon nut**



**Plastic sleeve for hollow perforated masonry use**



Kawo PSF is to be used in the following conditions:

Use category in respect of the base material:

- Category b: metal injection anchors for use in solid masonry.
- Category c: metal injection anchors for use in hollow or perforated masonry.

Use category in respect of installation and use:

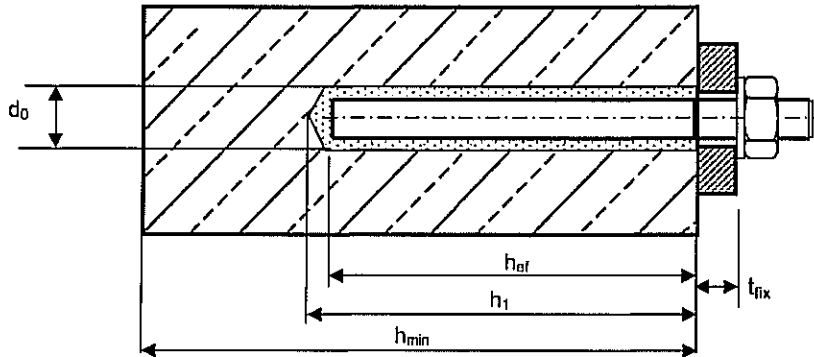
- Category w/w: installation and use in structures subject to dry or wet environmental conditions.

Use category in respect to the service temperature:

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

## Annex II: Product installation

### Anchor application in solid masonry without plastic sleeve



$h_{ef}$ : effective anchorage depth

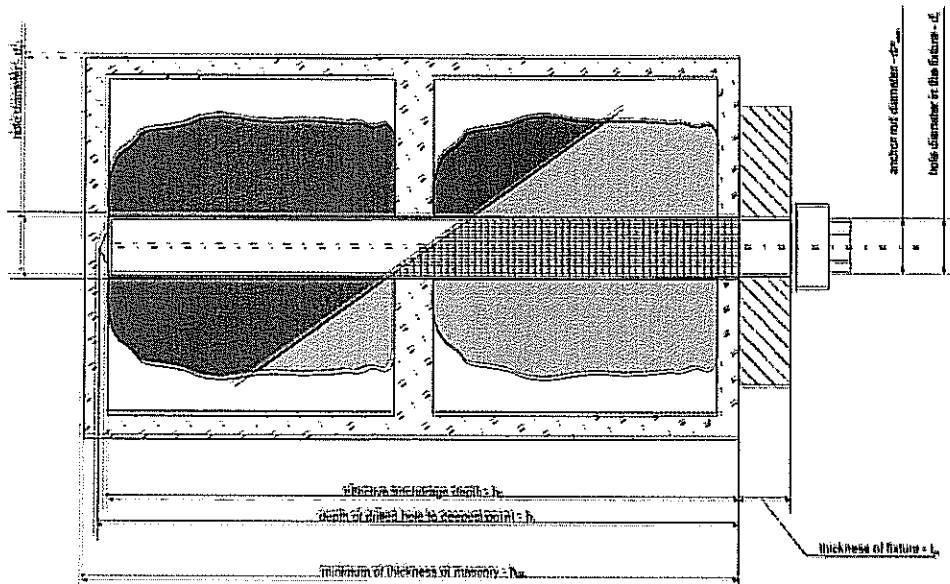
$h_1$ : depth of drilled hole to deepest point

$h_{min}$ : minimum thickness of masonry

$d_0$ : bore hole diameter

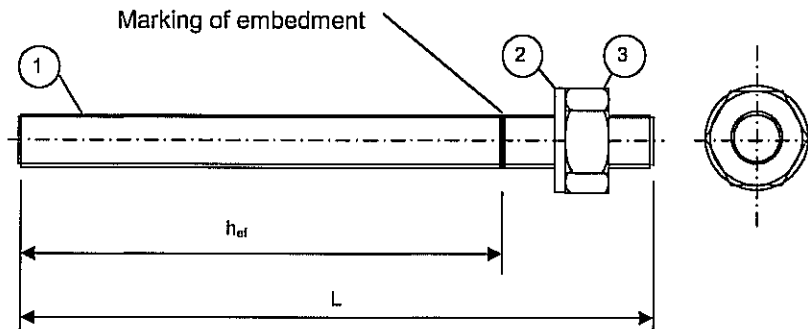
$t_{fix}$ : thickness of fixture

### Anchor application in hollow perforated masonry with plastic sleeve



### Annex III: Materials and curing time

Table III.1: Threaded rod materials.



Part	Designation	Material
<b>Steel, zinc plated <math>\geq 5 \mu\text{m}</math> acc. to EN ISO 4042 or Steel, hot-dip galvanised <math>\geq 40 \mu\text{m}</math> acc. to EN ISO 1461 and EN ISO 10684</b>		
1	Anchor rod	Steel, EN 10087 or EN 10263 Property class 5.8 or 8.8 EN ISO 898-1
2	Washer EN ISO 887, EN ISO 7089, EN ISO 7093 or EN ISO 7094	Steel, zinc plated or hot-dip galvanised
3	Hexagon nut EN ISO 4032	Property class 5 (for class 5.8 rod) EN 20898-2
<b>Stainless steel</b>		
1	Anchor rod	Material 1.4401/ 1.4404 / 1.4571, EN 10088-1 Property class 70 EN ISO 3506
2	Washer EN ISO 887, EN ISO 7089, EN ISO 7093 or EN ISO 7094	Material 1.4401/ 1.4404 / 1.4571, EN 10088
3	Hexagon nut EN ISO 4032	Material 1.4401/ 1.4404 / 1.4571, EN 10088 Property class 70 (for class 70 rod) EN ISO 3506

Table III.2: Threaded rod dimensions.

Size	d [mm]	$h_{ef}$ [mm]	
		Solid masonry	Hollow / perforated masonry
M8	8	80	85
M10	10	85	85
M12	12	95	85

**Table III.3:** Injection mortar composition.

Product	Composition	
Kawo PSF	Bonding agent	Unsaturated polyester resin styrene free

**Table III.4:** Minimum curing time.

Masonry temperature (°C)	Processing time (min)	Minimum curing time (min)	
		Dry	wet
5 °C	20	120	180
10 °C	13	90	135
15 °C	9	60	90
20 °C	6	45	68
25 °C	4	30	45
30 °C	3	20	30
35 °C	2	15	23

**Table III.5:** Sizes of plastic sleeve (mm).

Type	Nominal length [mm]	ø [mm]	Material of plastic sleeve and cantering cap
T10	85	16	Polypropylene
T12	85	20	

**Table III.6:** Installation parameters in solid masonry (without sleeve).

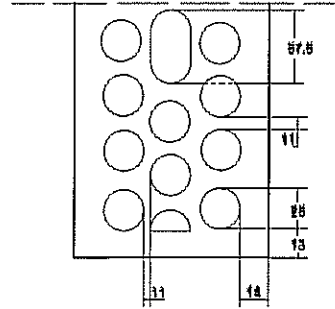
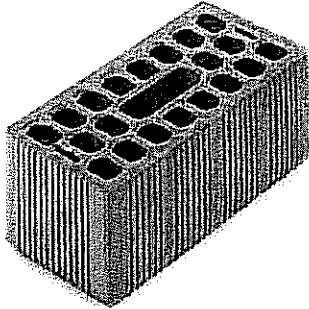
Threaded rod			M8	M10	M12
Nominal drill hole diameter	$d_0$	[mm]	10	12	14
Maximum diameter hole in the fixture	$d_{fix}$	[mm]	9	12	14
Embedment depth	$h_{ef}$	[mm]	80	85	95
Depth of the drilling hole	$h_1$	[mm]		$h_{ef} + 5$	
Torque moment	T	[N·m]	4	8	10
Thickness of fixture	$t_{fix, min}$	[mm]		> 0	
	$t_{fix, max}$	[mm]		< 1.500	
Minimum spacing	$s_{min}$	[mm]		see table XII.1	
Minimum edge distance	$c_{min}$	[mm]		see table XII.1	

**Table III.7:** Installation parameters in hollow masonry (with sleeve).

Threaded rod			M8	M10	M12
Plastic sleeve			T10	T12	
Nominal drill hole diameter	$d_0$	[mm]	16	20	
Maximum diameter hole in the fixture	$d_{fix}$	[mm]	12	14	
Embedment depth	$h_{ef}$	[mm]	85	85	
Depth of the drilling hole	$h_1$	[mm]		$h_{ef} + 5$	
Torque moment	T	[N·m]	4	6	
Thickness of fixture	$t_{fix, min}$	[mm]		> 0	
	$t_{fix, max}$	[mm]		< 1.500	
Minimum spacing	$s_{min}$	[mm]		see table XII.1	
Minimum edge distance	$c_{min}$	[mm]		see table XII.1	



**Brick n° 5: Hollow/perforated**



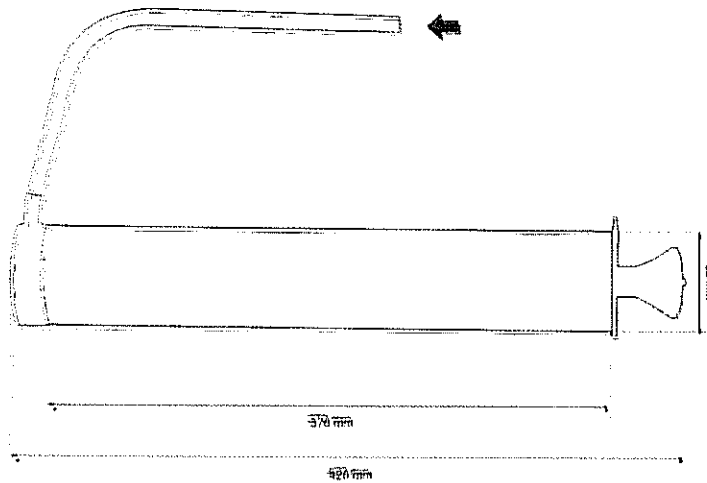
Category: I  
According to: EN 771-1 – LD (Low density)  
Dimensions (x,y,z): 250 x 120 x 120 mm  
 $f_b \geq 10 \text{ N/mm}^2$   
 $\rho \geq 935 \text{ kg/m}^3$   
(e.g. type "Bimattone -Mattoni doppio-")



## Annex V: Cleaning tools

### Cleaning pump

It is possible to use a manual blower pump, however the producer recommends to blow the hole using a mechanical air system with an air gun  $\varnothing$  3,5 mm, oil free compressed air and minimum pressure of 6 bar at 6 m<sup>3</sup>/h flow rate.



### Standard Brush: steel bristles

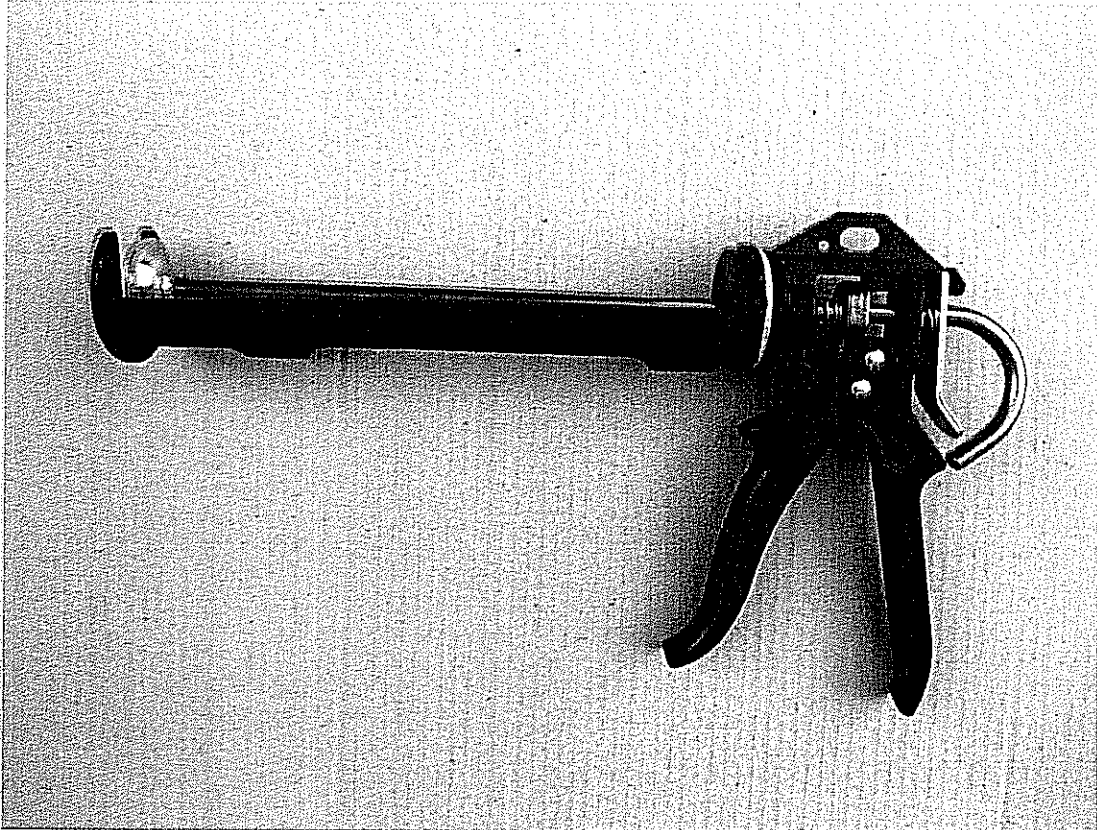


Table V.I. Standard brush diameter.

Threaded rod $\varnothing$			$\varnothing$ 8	$\varnothing$ 10	$\varnothing$ 12	$\varnothing$ 8	$\varnothing$ 10	$\varnothing$ 12
			Without sleeve			With sleeve		
$d_0$	Nominal drill hole	[mm]	10	12	14	16	16	20
$d_b$	Brush diameter	[mm]	13	14	16	16	16	20

## Annex VI: Tools for injection

### Manual injection pump



## Annex VII: Installation instructions for solid masonry.

	<p>Drill the hole with the correct diameter and depth according to annex III using a rotary percussive machine. Check the perpendicularity of the hole during the drilling operation.</p>
	<p>Clean the hole from drilling dust, core fragments, oil, water, grease and other contaminants prior to mortar injection (with manual blower and standard manual brush).</p>
	<p>The hole shall be cleaned by at least 4 blowing operations, by at least 4 brushing operations followed by at least 4 blowing operations.</p>
	<p>Before brushing, clean the brush and check if the brush diameter is sufficient according to annex V.</p>
	<p>For the cleaning tools see annex V.</p>
	<p>The threaded rod should be free of dirt, grease, oil or other foreign material.</p>
	<p>Unscrew the front cup of the cartridge, for 165 ml and 300 ml cut below the clip of inner bag, screw the cartridge on the mixer and insert the cartridge in the gun.</p>
	<p>For the mortar injection pump details see annex VI (manual injection pump).</p>
	<p>Before starting to use a new cartridge, discard the first swings of the product until a homogeneous colour is achieved.</p>
	<p>Fill the drilled hole uniformly starting from the bottom, in order to avoid trapping of air; remove the mixer slowly bit by bit during pressing-out.</p>
	<p>Fill the drill hole with a quantity of injection mortar corresponding to 2/3 of the drilled hole depth.</p>
	<p>Immediately insert the threaded rod slowly and with a slight twisting motion, removing excess of injection mortar around the threaded rod.</p>
	<p>Wait the curing time according to annex III.</p>
	<p>Do not move or load the anchor until is fully cured.</p>

**Annex VIII: Installation instructions for hollow/perforated masonry.**

	<p>Drill the hole with the correct diameter and depth according to annex III using a rotary percussive machine. Check the orthogonality of the hole during the drilling operation.</p>
<p>5.2.1</p>	<p>Clean the hole from drilling dust, core fragments, oil, water, grease and other contaminants prior to mortar injection (with manual blower and standard manual brush).</p>
	<p>The hole shall be cleaned by at least 4 blowing operations, by at least 2 brushing operations followed by at least 4 blowing operations.</p>
	<p>Before brushing clean the brush and check if the brush diameter is sufficient according to annex V.</p>
	<p>For the cleaning tools see annex V.</p>
	<p>The threaded rod should be free of dirt, grease, oil or other foreign material.</p>
	<p>For hollow materials choose the correct size sleeve (see annex III).</p>
	<p>Unscrew the front cup of the cartridge, for 165 ml and 300 ml cut below the clip of inner bag, screw the cartridge on the mixer and insert the cartridge in the gun.</p>
	<p>For the mortar injection pump details, see annex VI (manual injection pump).</p>
	<p>Before starting to use a new cartridge, discard the first swings of the product until an homogeneous colour is achieved.</p>
	<p>Remove the centering cap from the plastic sleeve.</p>
	<p>Insert in the hole the plastic sleeve (see annex III).</p>
	<p>Fill the sleeve uniformly starting from the bottom; remove the mixer slowly bit by bit during pressing-out; remove the mixer about 10 mm for each pressing operation.</p>
	<p>Fill the sleeve completely.</p>
	<p>Put on the centering cup on the filled plastic sleeve.</p>
	<p>Immediately insert the threaded rod, slowly and with a slight twisting motion, removing excess of injection mortar around the threaded rod. Observe the processing time according annex III.</p>
	<p>Wait the curing time according annex III. Do not move or load the anchor until it is fully cured.</p>

**Annex IX: Characteristic resistance under tension and shear load****Table IX.1.** Characteristic values for tension and shear load.

Size			Ø 8	Ø 10	Ø 12
Brick n° 1 according to EN 771	$\frac{N_{Rk,p}}{N_{Rk,b}}$	[kN]	0,6	0,6	0,6
	$V_{Rk,b}$	[kN]	2,5	4,0	3,5
Partial safety factor	$\gamma_M$	[-]		2,5	
Brick n° 2 according to EN 771	$\frac{N_{Rk,p}}{N_{Rk,b}}$	[kN]	0,5	0,75	0,6
	$V_{Rk,b}$	[kN]	2,0	6,0	4,5
Partial safety factor	$\gamma_M$	[-]		2,5	
Brick n° 3 according to EN 771	$\frac{N_{Rk,p}}{N_{Rk,b}}$	[kN]	0,75	0,9	0,75
	$V_{Rk,b}$	[kN]	2,0	4,0	5,0
Partial safety factor	$\gamma_M$	[-]		2,5	
Brick n° 4 according to EN 771	$\frac{N_{Rk,p}}{N_{Rk,b}}$	[kN]	0,9	0,75	1,2
	$V_{Rk,b}$	[kN]	2,5	3,0	3,5
Partial safety factor	$\gamma_M$	[-]		2,5	
Brick n° 5 according to EN 771	$\frac{N_{Rk,p}}{N_{Rk,b}}$	[kN]	0,6	0,5	0,6
	$V_{Rk,b}$	[kN]	3,0	3,5	3,5
Partial safety factor	$\gamma_M$	[-]		2,5	

## Annex X: Characteristic bending moments and $\beta$ -factor for job site test

**Table X.1.** Characteristic bending moments.

Type of material rod			Ø 8	Ø 10	Ø 12
Characteristic bending moment, Galvanized Steel, property class 5.8	$M_{Rk,s}$	[N·m]	18,7	37,4	65,5
Partial safety factor(1)	$\gamma_M$	[-]	1,25	1,25	1,25
Characteristic bending moment, Galvanized Steel, property class 8.8	$M_{Rk,s}$	[N·m]	30,0	59,8	104,8
Partial safety factor(1)	$\gamma_M$	[-]	1,25	1,25	1,25
Characteristic bending moment, Stainless Steel, property class 70	$M_{Rk,s}$	[N·m]	26,2	52,3	91,7
Partial safety factor(1)	$\gamma_M$	[-]	1,56	1,56	1,56

(1): If no other national regulations exist.

**Table X.2.**  $\beta$ -factor for job site tests according to ETAG 029 annex B.

Type of brick			Temperature range: - 40 °C / + 80 °C
Brick n° 1	$\beta$	[-]	0,37
Brick n° 2	$\beta$	[-]	
Brick n° 3	$\beta$	[-]	
Brick n° 4	$\beta$	[-]	
Brick n° 5	$\beta$	[-]	

**Annex XI: Displacement under tension and shear load****Table XI.1.** Displacement under tension load.

Type of brick				M8	M10	M12
Brick nº 1	Admissible service load	F	[kN]	0,18	0,19	0,20
	Displacement	$\delta_{NO}$	[mm]	0,10	0,01	0,01
		$\delta_{N,-}$	[mm]	0,21	0,02	0,02
Brick nº 2	Admissible service load	F	[kN]	0,15	0,21	0,20
	Displacement	$\delta_{NO}$	[mm]	0,01	0,02	0,01
		$\delta_{N,-}$	[mm]	0,02	0,05	0,02
Brick nº 3	Admissible service load	F	[kN]	0,24	0,28	0,22
	Displacement	$\delta_{NO}$	[mm]	0,01	0,01	0,01
		$\delta_{N,-}$	[mm]	0,01	0,03	0,02
Brick nº 4	Admissible service load	F	[kN]	0,27	0,23	0,34
	Displacement	$\delta_{NO}$	[mm]	0,02	0,04	0,01
		$\delta_{N,-}$	[mm]	0,04	0,08	0,02
Brick nº 5	Admissible service load	F	[kN]	0,20	0,15	0,20
	Displacement	$\delta_{NO}$	[mm]	0,01	0,04	0,03
		$\delta_{N,-}$	[mm]	0,02	0,08	0,06

**Table XI.2.** Displacement under shear load.

Type of brick				M8	M10	M12
Brick nº 1	Admissible service load	F	[kN]	0,73	1,26	1,12
	Displacement	$\delta_{vD}$	[mm]	0,61	0,95	1,29
		$\delta_{v,-}$	[mm]	1,21	1,90	2,58
Brick nº 2	Admissible service load	F	[kN]	0,65	1,77	1,40
	Displacement	$\delta_{vD}$	[mm]	0,53	1,72	1,03
		$\delta_{v,-}$	[mm]	1,06	3,43	2,06
Brick nº 3	Admissible service load	F	[kN]	0,58	1,16	1,46
	Displacement	$\delta_{vD}$	[mm]	0,46	0,85	1,26
		$\delta_{v,-}$	[mm]	0,93	1,71	2,51
Brick nº 4	Admissible service load	F	[kN]	0,83	0,86	1,08
	Displacement	$\delta_{vD}$	[mm]	0,53	1,94	0,61
		$\delta_{v,-}$	[mm]	1,07	3,87	1,23
Brick nº 5	Admissible service load	F	[kN]	0,92	1,07	1,05
	Displacement	$\delta_{vD}$	[mm]	0,82	1,40	1,12
		$\delta_{v,-}$	[mm]	1,63	2,80	2,24

**Annex XII: Position of anchors: indicative layout.****Table XII.1.** Position of anchors.

Brick n°	Anchor size								
	Ø 8			Ø 10			Ø 12		
	$C_{cr} =$ [mm]	$S_{scr,II} =$ [mm]	$S_{scr,I} =$ [mm]	$C_{cr} =$ [mm]	$S_{scr,II} =$ [mm]	$S_{scr,I} =$ [mm]	$C_{cr} =$ [mm]	$S_{scr,II} =$ [mm]	$S_{scr,I} =$ [mm]
1	100	560	200	100	560	200	120	560	200
2	100	276	133	100	276	133	120	276	133
3	100	450	250	100	450	250	120	450	250
4	120	240		127,5	255		142,5	285	
5	100	250	120	100	250	120	120	250	120

**Notes:** $S_{scr, I}$ : distance  $\perp$  horizontal joint. $S_{scr, II}$ : distance  $\parallel$  horizontal joint.