



## European Technical Approval ETA-02/0006

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung <i>Trade name</i>	PEIKKO HPM/L Ankerbolzen <i>PEIKKO HPM/L anchor bolt</i>
Zulassungsinhaber <i>Holder of approval</i>	Peikko Group OY Voimakatu 3 15101 LAHTI FINNLAND
Zulassungsgegenstand und Verwendungszweck <i>Generic type and use of construction product</i>	PEIKKO HPM/L Ankerbolzen zum Anschluss von Stahlbeton- Fertigteilstützen <i>PEIKKO HPM/L anchor bolt for the connection of prefabricated reinforced concrete columns</i>
Geltungsdauer: <i>Validity:</i>	vom <i>from</i> bis <i>to</i> 13 November 2012 13 November 2017
Herstellwerk <i>Manufacturing plant</i>	Peikko Herstellwerk 3

Diese Zulassung umfasst  
*This Approval contains*

12 Seiten einschließlich 5 Anhänge  
*12 pages including 5 annexes*

Diese Zulassung ersetzt  
*This Approval replaces*

ETA-02/0006 mit Geltungsdauer vom 08.11.2007 bis 30.11.2012  
*ETA-02/0006 with validity from 08.11.2007 to 30.11.2012*

## I LEGAL BASES AND GENERAL CONDITIONS

- 1 This European technical approval is issued by Deutsches Institut für Bautechnik in accordance with:
  - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products<sup>1</sup>, modified by 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>;
  - *Gesetz über das In-Verkehr-Bringen von und den freien Warenverkehr mit Bauprodukten zur Umsetzung der Richtlinie 89/106/EWG des Rates vom 21. Dezember 1988 zur Angleichung der Rechts- und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte und anderer Rechtsakte der Europäischen Gemeinschaften (Bauproduktengesetz - BauPG) vom 28. April 1998<sup>4</sup>, as amended by Article 2 of the law of 8 November 2011<sup>5</sup>;*
  - 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>6</sup>.
- 2 Deutsches Institut für Bautechnik is authorized 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 to 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 Deutsches Institut für Bautechnik, in particular 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 Deutsches Institut für Bautechnik. 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 The European technical approval is issued by the approval body in its official language. This version corresponds fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

<sup>1</sup> Official Journal of the European Communities L 40, 11 February 1989, p. 12

<sup>2</sup> Official Journal of the European Communities L 220, 30 August 1993, p. 1

<sup>3</sup> Official Journal of the European Union L 284, 31 October 2003, p. 25

<sup>4</sup> *Bundesgesetzblatt Teil I 1998*, p. 812

<sup>5</sup> *Bundesgesetzblatt Teil I 2011*, p. 2178

<sup>6</sup> Official Journal of the European Communities L 17, 20 January 1994, p. 34

## II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

### 1 Definition of the product and intended use

#### 1.1 Definition of the product

The Peikko HPM/L anchor bolt consists of ribbed reinforcing steel B500B of the diameters 16, 20, 25, 32 and 40 mm, two hexagon nuts and two washers. One of the ends of the bolt is provided with an anchor head and the other end with a thread of the sizes M16, M20, M24, M30, and M39.

The anchor bolt is imbedded in concrete up to the marking of the anchorage depth.

For the installed anchor bolt see figure given in Annex 1.

#### 1.2 Intended use

The anchor bolt 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 bolt is to be used only for anchorages subject to static or quasi-static loading in reinforced normal weight concrete of strength classes C20/25 at minimum and C50/60 at most according to EN 206-1:2000-07. The anchor bolt may be anchored in cracked and non-cracked concrete.

The anchor bolts may only be used for the connection of prefabricated reinforced concrete columns in combination with the Peikko saddle (support) made of steel (anchor plate with welded-on reinforcement and angles for the location of the anchor bolts).

To ensure resistance to corrosion of the anchor bolts the assembly joints between the concrete member and the prefabricated reinforced concrete column with the saddle as well as the cavities for incorporating the anchor bolts shall subsequently be grouted all-over with high-strength nonshrink mortar. The concrete cover must observe the minimum values given in the national rules in relation to the environmental conditions.

The provisions made in this European technical approval are based on an assumed working life of the anchor bolt 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 the product and methods of verification

#### 2.1 Characteristics of the product

The characteristic material values, dimensions and tolerances of the anchor bolt not indicated in the Annexes shall correspond to respective values laid down in the technical documentation<sup>7</sup> of this European technical approval.

<sup>7</sup> The technical documentation of this European technical approval is deposited at Deutsches Institut für Bautechnik and, as far as it is relevant to the tasks of the approved body involved in the attestation of conformity procedure, is handed over to the approved bodies.

Regarding the requirements concerning safety in case of fire (ER 2) it is assumed that the construction product meets the requirements of class A1 in relation to reaction to fire in accordance with the stipulations of the Commission decision 96/603/EC, amended by 200/605/EC.

The dimensions of the anchor bolt shall correspond to the values given in Table 1, Annex 2.

The anchor bolt is identified according to the type, the thread diameter and the total length, e.g. HPM 24/L.

Each anchor bolt is marked with the identifying mark of the producer according to Annex 2. The anchorage depth is marked.

The anchor bolt shall only be packaged and supplied as a complete unit.

The characteristic values for the design calculation of the anchorage are given in Annexes 3 to 5.

## 2.2 Method of verification

The assessment of the fitness of the product for the intended use with regard to the requirements of mechanical resistance and stability as well as safety in use in the sense of the Essential Requirements 1 and 4 was performed based on the following verifications:

### Verifications for tension loads for

- |  |                       |
|--|-----------------------|
| 1. Steel failure - anchor bolt                 | $N_{Rk,s}$            |
| 2. Concrete failure - pull-out                 | $N_{Rk,p}$            |
| 3. Concrete failure - concrete cone            | $N_{Rk,c}$            |
| 4. Concrete failure - splitting due to loading | $N_{Rk,sp}$           |
| 5. Concrete failure - blow-out                 | $N_{Rk,cb}$           |
| 6. Reinforcement                               | $N_{Rk,re}, N_{Rd,a}$ |
| 7. Displacement under tension loads            | $\delta_N$            |

### Verifications for shear loads for

- |                                     |                       |
|-------------------------------------|-----------------------|
| 1. Steel failure without lever arm  | $V_{Rk,s}$            |
| 2. Concrete failure - pry-out       | $V_{Rk,cp}$           |
| 3. Concrete failure - concrete edge | $V_{Rk,c}$            |
| 4. Reinforcement                    | $N_{Rk,re}, N_{Rd,a}$ |
| 5. Displacement under shear loads   | $\delta_V$            |

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 Construction Products Directive, these requirements need also to be complied with, when and where they apply.

## 3 Evaluation and attestation of conformity and CE-marking

### 3.1 System of attestation of conformity

According to the Decision 96/582/EEC of the European Commission<sup>8</sup> system 2(i) (referred to as System 1) of the attestation of conformity applies.

<sup>8</sup> Official Journal of the European Communities L 254 of 8.10.1996

This system of attestation of conformity is defined as follows:

System 1: Certification of the conformity of the product by an approved certification body on the basis of:

- (a) Tasks for the manufacturer:
  - (1) factory production control;
  - (2) further testing of samples taken at the factory by the manufacturer in accordance with a prescribed control plan;
- (b) Tasks for the approved body:
  - (3) initial type-testing of the product;
  - (4) initial inspection of factory and of factory production control;
  - (5) continuous surveillance, assessment and approval of factory production control.

Note: Approved bodies are also referred to as "notified bodies".

## 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. This production control system shall insure that the product is in conformity with this European technical approval.

The manufacturer may only use initial/raw/constituent materials stated in the technical documentation of this European technical approval.

The factory production control shall be in accordance with the control plan relating to this European technical approval 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 Deutsches Institut für Bautechnik.<sup>9</sup>

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

#### 3.2.1.2 Other tasks for 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 anchors 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 this European technical approval.

### 3.2.2 Tasks of the approved bodies

The approved body shall perform the

- initial type-testing of the product,
- initial inspection of factory and of factory production control,
- continuous surveillance, assessment and approval of factory production control

in accordance with the provisions laid down in the control plan.

<sup>9</sup> The control plan is a confidential part of the European technical approval and only handed over to the approved body involved in the procedure of attestation of conformity. See section 3.2.2.

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.

The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the product stating the conformity with the provisions of this European technical approval.

In cases where the provisions of the European technical approval and its control plan are no longer fulfilled the certification body shall withdraw the certificate of conformity and inform Deutsches Institut für Bautechnik without delay.

### 3.3 CE marking

The CE marking shall be affixed on each packaging of the anchor bolt. 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 producer (legal entity responsible for the manufacture),
- the last two digits of the 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,
- name of the product.

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

### 4.1 Manufacturing

The European technical approval is issued for the product on the basis of agreed data/information, deposited with Deutsches Institut für Bautechnik, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to Deutsches Institut für Bautechnik before the changes are introduced. Deutsches Institut für Bautechnik will decide whether or not such changes affect the approval and consequently the validity of the CE marking on the basis of the approval and if so whether further assessment or alterations to the approval shall be necessary.

### 4.2 Design

The fitness of the product for the intended use is given under the following condition:

The design of the anchorage is based on CEN/TS 1992-4:2009 "Design of fastenings for use in concrete", part 1 and 2 under the responsibility of an engineer experienced in anchorages and concrete work.

It is generally assumed that the concrete is cracked and that the occurring splitting forces are resisted by the reinforcement. The required cross section of the minimum reinforcement is determined according CEN/TS 1992-4-2:2009, section 6.2.6.2 b).

Taking into account the loads to be anchored verifiable calculation notes and drawings are prepared.

The position of the product is indicated on the design drawings (e.g. position of the anchor bolts towards the reinforcement or the supports).

#### **4.3 Installation of the anchor bolts**

The fitness for use of the anchorage can only be assumed, if the following installation conditions are kept:

- Installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters on site.
- Use of the product only as supplied by the manufacturer without exchanging the components.
- Installation in accordance with the manufacturer's specifications and the design drawings.
- The anchorage is fixed on the formwork or auxiliary constructions in a way that no movement of the product will occur during placing of reinforcement or during placing and compacting of the concrete.
- The concrete under the head of the anchor bolt is properly compacted (no significant voids).
- The installation joint between concrete member (in which the anchor bolts are anchored) and the prefabricated reinforced concrete column to be connected using a saddle (support) is subsequently filled with a concrete of high strength nonshrink mortar and the acting loads are transmitted via the bond action (composite action) into the individual anchor bolt of the group.
- Compliance with the installation parameters.

### **5 Indications to the manufacturer**

#### **5.1 Responsibility of the manufacturer**

It is in the responsibility of the manufacturer to ensure that the information on the specific conditions according to 1 and 2 including Annexes referred to and 4.2 and 4.3 is given to those who are concerned. This information may be made by reproduction of the respective parts of the 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).

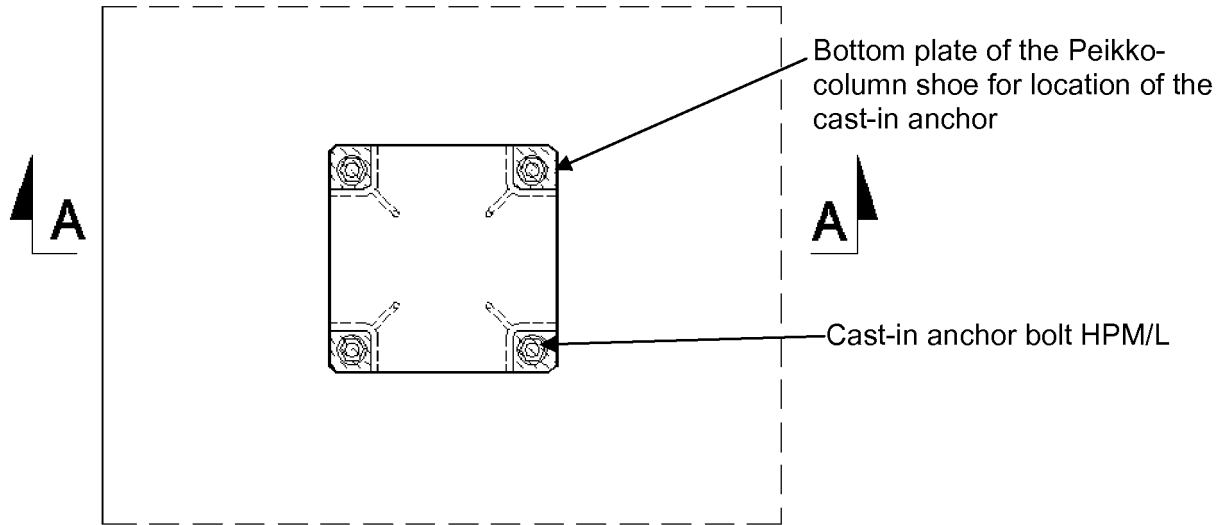
The minimum data required are:

- diameter of the anchor bolts,
- length of the anchor bolts,
- minimum anchorage depth,
- details on the installation of procedure, preferably by using illustrations,
- identification of the manufacturing batch.

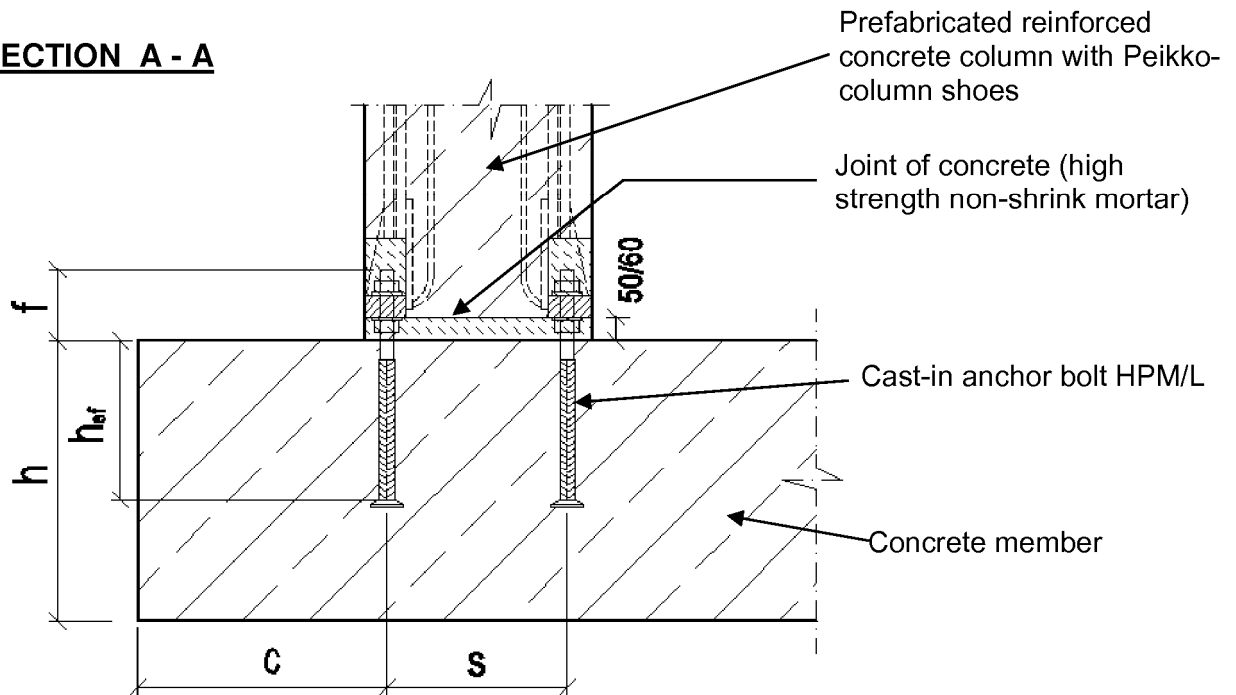
All data shall be presented in a clear and explicit form.

Andreas Kummerow  
p. p. Head of Department

*beglaubigt:*  
Müller



**SECTION A - A**



- Legend:**
- $h$  = thickness of concrete member
  - $h_{ef}$  = effective anchorage depth
  - $c$  = edge distance
  - $s$  = spacing
  - $f$  = cantilevered length of anchor bolt above concrete member

dimensions in mm

**PEIKKO HPM/L anchor bolt**

Installed anchor bolt

**Annex 1**  
of the European  
technical approval  
**ETA-02/0006**



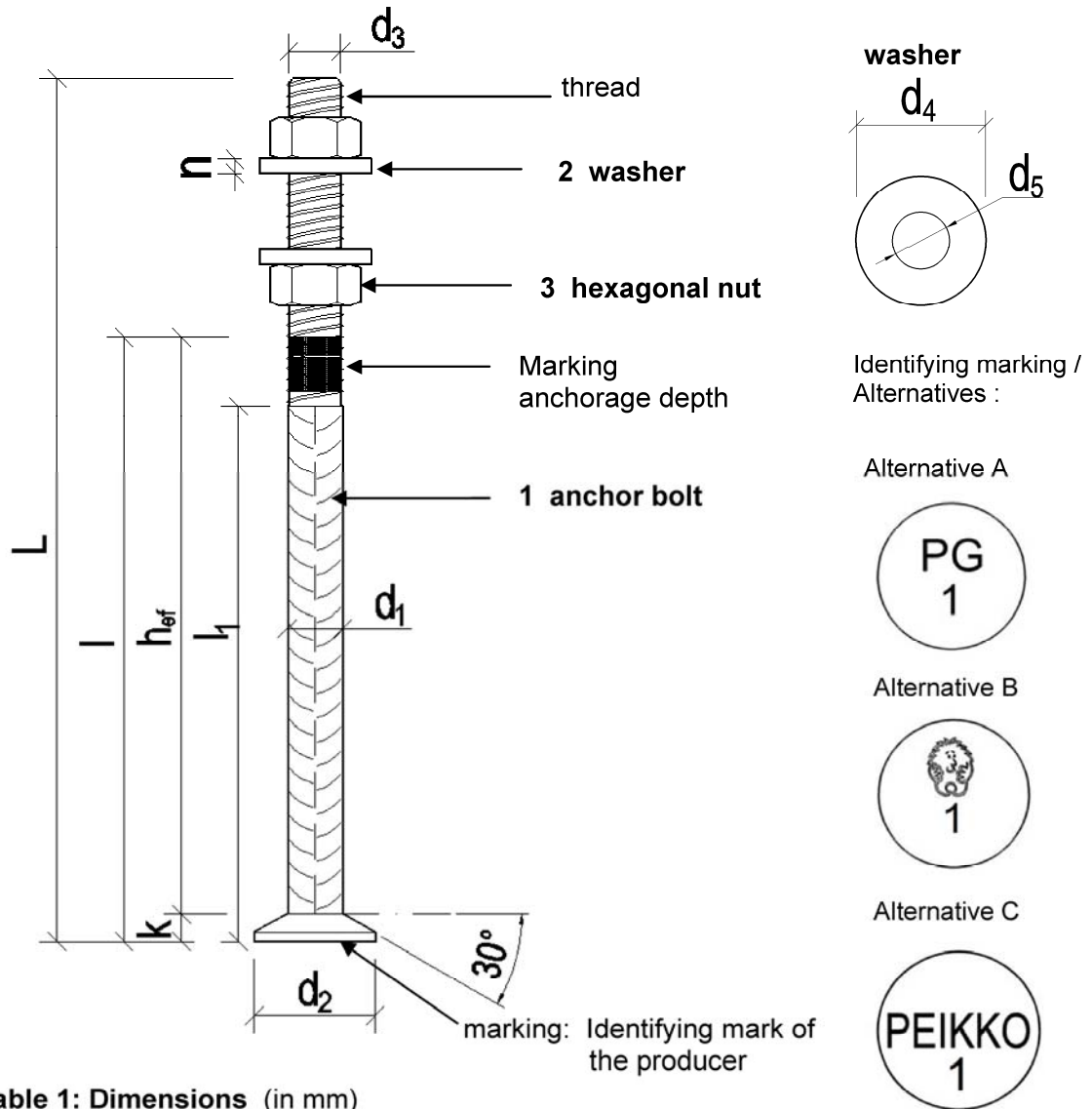


Table 1: Dimensions (in mm)

Compo- nents	1 anchor bolt								2 washer			3 hexagonal nut <sup>1)</sup>
	d <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>	L	l	l <sub>1</sub>	h <sub>ef</sub>	k	d <sub>4</sub>	d <sub>5</sub>	n	
HPM 16/L	16	38	16	280	175	140	165	10	38	18	5	M16
HPM 20/L	20	46	20	350	235	210	223	12	46	22	6	M20
HPM 24/L	25	55	24	430	300	260	287	13	55	25	6	M24
HPM 30/L	32	70	30	500	350	310	335	15	65	31	8	M30
HPM 39/L	40	90	39	700	515	500	502	18	90	41	8	M39

1) dimensions according to EN ISO 4032:2000

**PEIKKO HPM/L anchor bolt**

Details of the anchor bolt,  
components and dimensions

**Annex 2**

of the European  
technical approval  
**ETA-02/0006**

**Table 2: Materials**

Components		Materials
1	anchor bolt	Ø16-40 reinforcing steel B 500B according to EN 10080:2005
2	washer	steel S355J2 according to EN 10025: 2004
3	hexagonal nut	steel class 8 according to EN 20898-2: 1993

**Table 3: Installation**

Anchor bolt HPM / L, thread diameter			M 16	M 20	M 24	M 30	M 39
anchorage depth	$h_{ef}$	[mm]	165	223	287	335	502
minimum spacing	$s_{min}$	[mm]	80	100	100	130	150
minimum edge distance	$c_{min}$	[mm]	50	70	70	100	130
cantilevered length of anchor bolt above concrete member	$f$	[mm]	105	115	130	150	180
thickness of concrete member	$h_{min}$	[mm]	$h_{ef} + k + c_{nom}^{1)}$				

1) required concrete cover according to EN 1992-1-1:2004 + AC:2010 and national rules

**Arrangement for the anchor bolts:**

Regulations for the arrangement of the anchor bolts are given CEN/TS 1992-4-1:2009, section 1.2.3.

**PEIKKO HPM/L anchor bolt**

Materials and installation

**Annex 3**  
of the European  
technical approval  
**ETA-02/0006**

**Table 4: Characteristic values of resistance to tension loads for anchor bolts**

Anchor bolt HPM/L – thread diameter		M16	M20	M24	M30	M39
<b>Steel failure</b>						
Characteristic resistance	$N_{Rk,s}$ [kN]	86	134	194	308	537
Partial safety factor	$\gamma_{Ms}$	1.4				
<b>Pull-out failure for cracked concrete</b>						
Characteristic resistance	$N_{Rk,p}$ [kN]	140	200	250	450	750
Partial safety factor	$\gamma_{Mp}^{1)}$	1.5				
<b>Concrete cone failure</b>						
Effective anchorage depth	$h_{ef}$ [mm]	165	223	287	335	502
Spacing	$S_{cr,N}$ [mm]= $S_{cr,sp}^{2)}$	$3h_{ef}$				
Edge distance	$C_{cr,N}$ [mm] = $C_{cr,sp}^{2)}$	$1.5h_{ef}$				
Partial safety factor	$\gamma_{Mc}^{1)}$	1.5				
Factor to take into account the influence of load transfer mechanisms	cracked concrete	$k_{cr}$	8,5			
	non-cracked concrete	$k_{ucr}$	11,9			
<b>Local concrete blow out failure</b>						
Partial safety factor	$\gamma_{Mcb}^{1)}$	1.5				

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

<sup>2)</sup> Reinforcement resists the splitting forces and limits the crack width to  $w_k \leq 0,3$  mm according to CEN/TS 1992-4-2:2009, section 6.2.6.2

**Table 5: Displacements under tension loads**

Anchor bolt HPM/L - thread diameter	M16	M20	M24	M30	M39
Displacements <sup>1)</sup> to 0.9 mm under following loads in [kN]	41	64	92	147	256

<sup>1)</sup> The indicated displacements are valid for short term loading, the displacements can be increased under long term loading to 1.8 mm.

**PEIKKO HPM/L anchor bolt**

Characteristic values of resistance under tension loads and displacements

**Annex 4**  
of the European  
technical approval  
**ETA-02/0006**

**Table 6: Characteristic values of resistance to shear loads for anchor bolts**

Anchor bolt HPM/L – thread diameter		M16	M20	M24	M30	M39
<b>Steel failure without lever arm</b>						
Characteristic resistance	$V_{Rk,s}$ [kN]	39	60	87	138	241
Partial safety factor	$\gamma_{Ms}$	1.5				
<b>Steel failure with lever arm</b>						
Characteristic bending resistance	$M^o_{Rk,s}$ [Nm]	183	357	618	1237	2778
Partial safety factor	$\gamma_{Ms}$	1.5				
<b>Concrete pry-out failure</b>						
Factor in equation (32) CEN/TS 1992-4-2:2009, section 6.3.4	$k_3$ <sup>1)</sup>	2,0				
Partial safety factor	$\gamma_{Mcp}$ <sup>2)</sup>	1.5				
<b>Concrete edge failure</b>						
Effective length of anchor bolt in shear loading	$l_f = h_{ef}$ [mm]	165	223	287	335	502
Effective outside diameter	$d_{nom} = d_1$ [mm]	16	20	24	30	39
Partial safety factor	$\gamma_{Mc}$ <sup>2)</sup>	1.5				

<sup>1)</sup> In case of supplementary reinforcement the factor  $k_3$  should be multiplied with 0,75

<sup>2)</sup> In the absence of other national regulations

**Table 7: Displacements under shear loads**

Anchor bolt HPM/L - thread diameter	M16	M20	M24	M30	M39
Displacements <sup>1)</sup> to 1.5 mm under following loads in [kN]	18	25	41	66	115

<sup>1)</sup> The indicated displacements are valid for short term loading, the displacements can be increased under long term loading to 2.0 mm.

### Combined tension and shear load

The factor  $k_7$  is for combined tension and shear load according to CEN/TS 1992-4-2:2009, section 6.4.1.3  $k_7 = 2/3$

### PEIKKO HPM/L anchor bolt

Characteristic values of resistance to shear loads and displacements, combined tension and shear load

**Annex 5**  
of the European  
technical approval  
**ETA-02/0006**