Deutsches Institut für Bautechnik

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Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

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

European Technical Assessment ETA-02/0006 of 25 July 2022

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	PEIKKO HPM L Anchor Bolts
Product family to which the construction product belongs	Cast-in anchor bolt of ribbed reinforcing steel
Manufacturer	PEIKKO GROUP CORPORATION Voimakatu 3 15101 Lahti FINNLAND
Manufacturing plant	Peikko Herstellwerke
This European Technical Assessment contains	12 pages including 3 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	EAD 330924-01-0601, Edition 04/2022
This version replaces	ETA-02/0006 issued on 19 August 2020

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Specific Part

1 Technical description of the product

The PEIKKO HPM L Anchor Bolts consist 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 embedded in concrete up to the threaded length.

The product description is given in Annex A.

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

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

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the anchor of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

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

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance under static and quasi-static tension load	See Annex B2 and C1
Characteristic resistance under static and quasi-static shear load	See Annex C2
Combined tension and shear under static and quasi-static shear load	See Annex C2
Displacement under static and quasi-static tension or shear load	See Annex C2

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	No performance assessed

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

In accordance with EAD No. 330924-01-0601, the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

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

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 25 July 2022 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock
Head of Section

beglaubigt:
Müller

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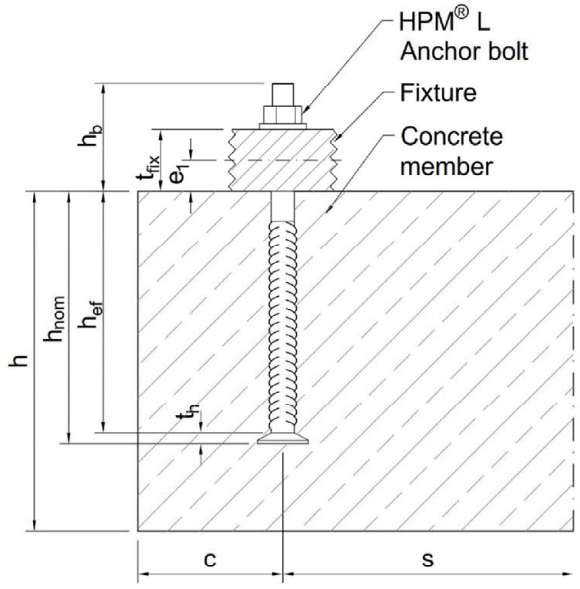
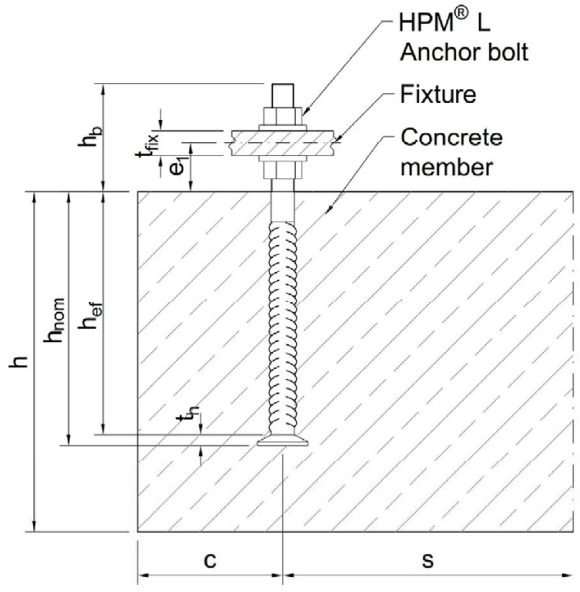


h = thickness of the concrete member
h_{nom} = overall length of the anchor bolt in the concrete
h_{ef} = effective embedment depth
t_h = thickness of the anchor bar head
h_b = protrusion height / thread length above concrete member
c = edge distance
s = spacing
t_{fix} = thickness of the fixture
e_1 = distance between shear load and concrete surface

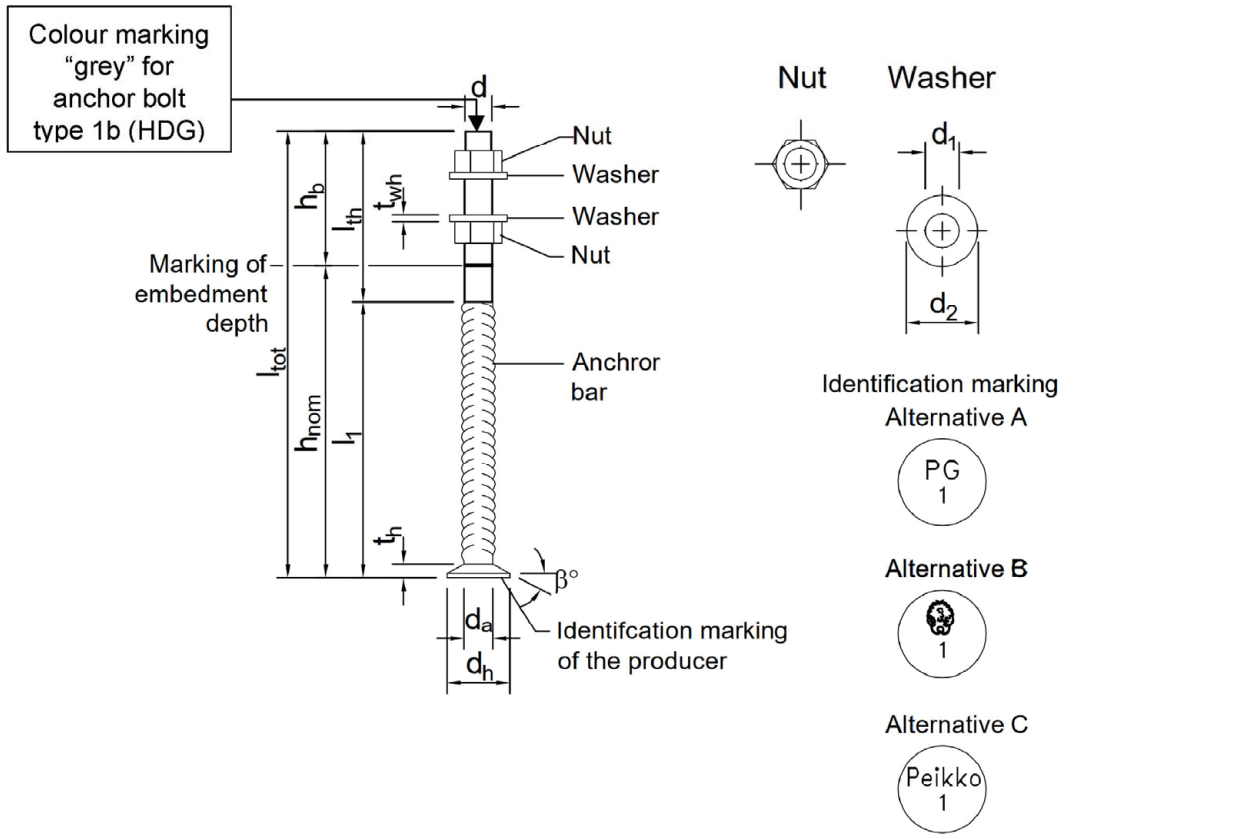
Figure 1. (a) General installation



h = thickness of the concrete member
h_{nom} = overall length of the anchor bolt in the concrete
h_{ef} = effective embedment depth
t_h = thickness of the anchor bar head
h_b = protrusion height / thread length above concrete member
c = edge distance
s = spacing
t_{fix} = thickness of the fixture
e_1 = distance between shear load and concrete surface

Figure 2. (b) Steel to steel contact

Peikko HPM® L Anchor Bolts	**Annex A1**
Product description **Installed conditions**	



l_{tot} = length of the anchor bolt
h_{nom} = overal length of the anchor bolt in the concrete
h_b = protrusion heigth / thread length above concrete member
l_1 = length without thread
l_{th} = length of the thread
t_h = thickness of the anchor bar head
d = thread diameter
d_h = diameter of the anchor bar head
d_a = diameter of the anchor bar
t_{wh} = thickness of the washer
d_1 = hole diameter of the washer
d_2 = outside diamter of the washer
β = inclination angle of the anchor bar head

Figure 3. Dimensions of HPM® L Anchor bolts

Table 1: Dimensions

Anchor bolt	Anchor bar										Washer			Nut [1]
	d_a	d_h	d	l_{tot}	h_{nom}	h_b	l_1	l_{th}	t_h	A_h	d_1	d_2	t_{wh}	
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm²]	[mm]	[mm]	[mm]	[-]
HPM® 16 L	16	38	16	280	175	105	140	140	10	933	17	40	6	M16
HPM® 20 L	20	46	20	350	235	115	210	140	12	1348	21	44	6	M20
HPM® 24 L	25	55	24	430	300	130	260	170	13	1885	26	56	6	M24
HPM® 30 L	32	70	30	500	350	150	310	190	15	3044	32	65	8	M30
HPM® 39 L	40	90	39	700	520	180	500	200	18	5105	41	90	10	M39

1) Dimensions according EN ISO 4032:2012

Peikko HPM® L Anchor Bolts	**Annex A2**
Product description **Dimensions, components and product marking**	

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Table 2: Materials of HPM® L Anchor bolts

Part	Type		Material	Mechanical properties
Anchor bolt	1a	HPM® ** L	Reinforcing steel B500B, B500C or B450B according to EN 1992-1-1:2004 + AC:2010, Annex C	$f_{uk} \geq 550$ N/mm^2 $f_{yk} \geq 470$ N/mm^2 according to EN 1992-1-1:2004 + AC:2010, Annex C
	1b	HPM® ** L-HDG	Reinforcing steel B500B, B500C or B450B according to EN 1992-1-1:2004 + AC:2010, Annex C, hot dip galvanized according to EN ISO 1461:2009 or EN ISO 10684:2004 + AC:2009	$f_{uk} \geq 550$ N/mm^2 $f_{yk} \geq 470$ N/mm^2 according to EN 1992-1-1:2004 + AC:2010, Annex C
Hexagonal nut	1a	HPM® ** L	According to EN ISO 4032:2012	Strength class 8 according to EN ISO 898-2:2012
	1b	HPM® ** L-HDG	According to EN ISO 4032:2012, hot dip galvanized according to EN ISO 1461:2009 or EN ISO 10684:2004 + AC:2009	Strength class 8 according to EN ISO 898-2:2012
Washer	1a	HPM® ** L	Steel S355J2 according to EN 10025:2004	According to EN 10025:2004
	1b	HPM® ** L-HDG	Steel S355J2 according to EN 10025:2004, hot dip galvanized according to EN ISO 1461:2009 or EN ISO 10684:2004 + AC:2009	According to EN 10025:2004

Peikko HPM® L Anchor Bolts	**Annex A3**
Product description **Materials**	

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Specifications of intended use

Anchorages subject to:

- Static and quasi-static tension, shear or combination of tension and shear.

Base materials:

- Reinforced normal weight concrete according to EN 206-1:2000.
- Strength classes C20/25 to C90/105 according to EN 206-1:2000.
- Cracked or uncracked concrete.

Intended use and environmental conditions:

- Anchor bars made of ribbed reinforcing steel, washer and hexagonal nut are made of steel:
  Anchor bolts for use in structures subject to dry internal conditions.

- Anchor bars made of ribbed reinforcing steel, washer and hexagonal nut are made of hot dip galvanised steel according to EN ISO 1461:2009 or EN ISO 10684:2004 + AC:2009 with at least 50 µm thickness:
  Anchor bolts for use in structures subject to internal conditions with usual humidity
  (exceptional permanently damp conditions and applications under water).

- Anchor bars made of ribbed reinforcing steel, washer and hexagonal nut are made of steel with concrete cover according to EN 1992-1-1:2004 + AC:2010:
  Anchor bolts for use in structures subject to appropriate exposition relating to the concrete cover.

Design:

- Anchor bolts are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor bars are indicated on the design drawings (e.g. position of the anchor bars relative to the reinforcement or to supports).
- For static and quasi-static loading the anchor bolts are designed in accordance with EN 1992-4:2018.
- The occurring splitting forces are resisted by the reinforcement. The required cross section of the minimum reinforcement is determined according EN 1992-4:2018, section 7.2.1.7.

Peikko HPM® L Anchor Bolts	**Annex B1**
Intended use **Specifications**	

Installation:

Placing anchor bolts into concrete

- The installation of anchor bolts is carried out by appropriately qualified personnel under the supervision of the person responsible for the technical matters on site.
- Use of the product only as supplied by the manufacturer.
- Installation in accordance with the manufacturers product installation instructions given in Annex B3.
- The anchor bolts are fixed to the formwork, reinforcement or auxiliary construction such that no movement of the product will occur during the time of laying the reinforcement and of placing and compacting the concrete.
- The anchor bolts are embedded in concrete up to the marking of installation depth.
- The concrete under the anchor bar head is properly compacted.
- The max. installation torque according Table 3 may not be exceeded.

Table 3: Installation parameters of HPM® L Anchor bolts

HPM® ...			**16 L**	**20 L**	**24 L**	**30 L**	**39 L**
Effective embedment 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
Protrusion height / thread length above concrete member	h_b	[mm]	105	115	130	150	180
Min. thickness of concrete member	h_{min}	[mm]	$h_{ef} + t_h + c_{nom}$ 1)				
Max. installation torque General installation, case (a)	T_{inst}	[Nm]	20	45	75	125	290
Max. installation torque Steel to steel contact, case (b)	T_{inst}	[Nm]	80	150	270	540	1200

1) Required concrete cover according to EN 1992-1-1:2004 + AC:2010

Peikko HPM® L Anchor Bolts	**Annex B2**
Intended use **Installation parameters**	

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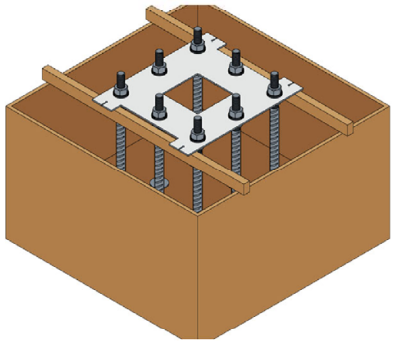
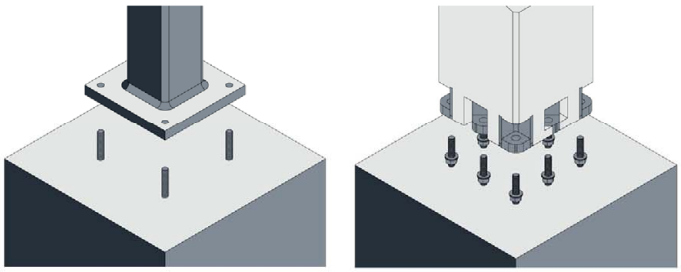
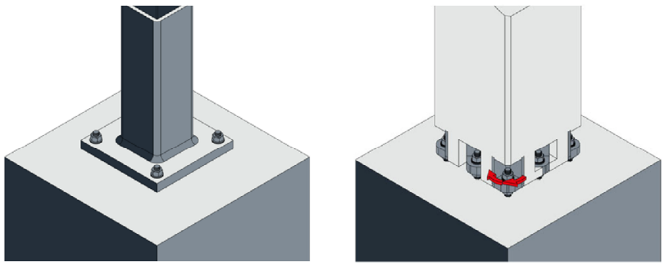
Installation instruction:



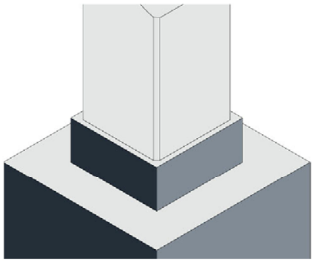
- Install the anchor bolts to the formwork by using a Peikko® installation template according design drawings to ensure the correct position, size and protrusion height (h_b) of the anchor bolts.
- Pay attention to a strong fixing of the anchor bolts to avoid moving during pouring.
- Compact concrete properly around and under the anchor bar head.
- After hardening of the concrete the installation template can be removed.



- For the installation of a steel column according to figure 1 (general installation) all nuts are removed.
- For the installation of a precast concrete column or steel column according to figure 2 (steel to steel contact) the lower levelling nuts are adjusted to the correct level.



- The connection is fixed by tightening the upper nuts.
  The installation torque T_{inst} acc. to Annex B2 may not be exceeded.



- The joint between the base structure and the column must be filled properly with non-shrinking mortar.

Peikko HPM® L Anchor Bolts	**Annex B3**
Intended use **Manufacturers product installation instructions (MPII)**	

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Table 4: Characteristic resistances of HPM® L Anchor bolts under tension load

HPM® ...			**16 L**	**20 L**	**24 L**	**30 L**	**39 L**
Steel failure							
Characteristic resistance	$N_{Rk,s}$	[kN]	86,2	134,6	193,9	308,3	536,7
Partial factor	γ_{Ms} 1)	[-]	1,4				
Concrete pull-out failure							
Characteristic resistance In uncracked concrete C20/25	$N_{Rk,p}$	[kN]	195,9	283,0	395,8	639,3	1072,1
Characteristic resistance in cracked concrete C20/25	$N_{Rk,p}$	[kN]	140,0	202,2	282,7	456,6	765,8
Increase factor for higher concrete grades for $N_{Rk,p}$ $N_{Rk,p} = N_{Rk,p\,(C20/25)} \cdot \psi_c$	ψ_c	C25/30	1,25				
		C30/37	1,50				
		C35/45	1,75				
		C40/50	2,00				
		C45/55	2,25				
		C50/60	2,50				
Partial factor	γ_{Mp} 1)	[-]	1,5				
Concrete cone failure							
Effective embedment depth	h_{ef}	[mm]	165	223	287	335	502
Factor for the influence of the load transfer mechanism	$k_{ucr,N}$	[-]	12,7				
	$k_{cr,N}$	[-]	8,9				
Characteristic spacing	$s_{cr,N} = s_{cr,sp}$	[mm]	3 h_{ef}				
Characteristic edge distance	$c_{cr,N} = c_{cr,sp}$	[mm]	1,5 h_{ef}				
Partial factor	γ_{Mc} 1)	[-]	1,5				
Concrete splitting							
A reinforcement has to be present to resist the splitting forces and limits the crack width to $w_k \leq 0{,}3$ mm. See EN 1992-4:2018, section 7.2.1.7							

1) In absence of other national regulations

Peikko HPM® L Anchor Bolts	**Annex C1**
Performance **Characteristic resistances under tension load**	

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Table 5: Characteristic resistances of HPM® L Anchor bolts under shear load

HPM® ...			**16 L**	**20 L**	**24 L**	**30 L**	**39 L**
Steel failure without lever arm							
Characteristic resistance	$V^0_{Rk,s}$	[kN]	43,1	67,3	96,9	154,2	268,3
Factor acc. EN 1992-4:2018, section 7.2.2.3.1	k_7	[-]	1,0				
Partial factor	γ_{Ms} 2)	[-]	1,5				
Steel failure with lever arm							
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	183	356	616	1236	2837
Partial factor	γ_{Ms} 2)	[-]	1,5				
Concrete pry-out failure							
Factor acc. EN 1992-4:2018, section 7.2.2.4	k_8 1)	[-]	2,0				
Partial factor	γ_{Mcp} 2)	[-]	1,5				
Concrete edge failure							
Effective embedment depth under shear load	l_f	[mm]	128	160	192	240	312
Effective outer diameter	$d_{nom} = d$	[mm]	16	20	24	30	39
Partial factor	γ_{Mc} 2)	[-]	1,5				

1) If supplementary reinforcement is present, the factor k_8 has to be multiplied by 0,75
2) In absence of national regulations

Combined tension and shear load			
Factor acc. EN 1992-4:2018, section 7.2.3	k_{11}	[-]	2/3

Table 6: Displacements of HPM® L Anchor bolts under tension load

HPM® ...			**16 L**	**20 L**	**24 L**	**30 L**	**39 L**
Tension load	N	[kN]	41	64	92	147	256
Short-term displacement	δ_{N0}	[mm]	0,3	0,3	0,4	0,4	0,6
Long-term displacement	$\delta_{N\infty}$	[mm]	0,6	0,6	0,8	0,8	1,2

Table 7: Displacements of HPM® L Anchor bolts under shear load

HPM® ...			**16 L**	**20 L**	**24 L**	**30 L**	**39 L**
Shear load	V	[kN]	18	25	41	66	115
Short-term displacement	δ_{V0}	[mm]	1,5	1,5	1,5	1,5	1,5
Long-term displacement	$\delta_{V\infty}$	[mm]	2,3	2,3	2,3	2,3	2,3

Peikko HPM® L Anchor Bolts

Performance
Characteristic resistances under shear load, combined tension and shear load
Displacements under tension and/ or shear load

Annex C2