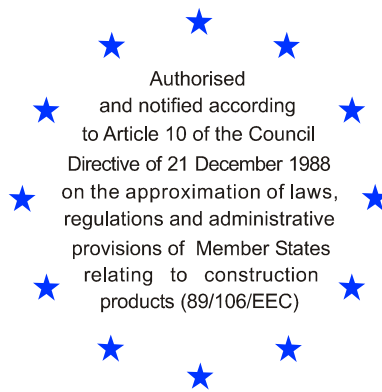


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DIBt

Mitglied der EOTA
Member of EOTA

European Technical Approval ETA-04/0056

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung
Trade name

Peikko-Ankerbolzen aus Stahl und nichtrostendem Stahl
Peikko-Anchor bolts made of steel and stainless steel

Zulassungsinhaber
Holder of approval

Peikko Group Oy
Voimakatu 3
15101 LAHTI
FINNLAND

Zulassungsgegenstand
und Verwendungszweck
*Generic type and use
of construction product*

Stahlplatte mit einbetonierten Peikko Ankerbolzen
Steel plate with cast-in Peikko anchor(s)

Geltungsdauer: vom
Validity: from
bis
to

17. Februar 2010
17. Februar 2015

Herstellwerk
Manufacturing plant

No. 1
No. 3
No. 4
No. 5

Diese Zulassung umfasst
This Approval contains

16 Seiten einschließlich 8 Anhänge
16 pages including 8 annexes



Europäische Organisation für Technische Zulassungen
European Organisation for Technical Approvals

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 products¹, modified by Council Directive 93/68/EEC² and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council³;
 - 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 1998⁴, as amended by law of 31 October 2006⁵;
 - Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC⁶.
- 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.

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

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

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

4 *Bundesgesetzblatt Teil I 1998*, p. 812

5 *Bundesgesetzblatt Teil I 2006*, p.2407, 2416

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

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of product and intended use

1.1 Definition of product

The steel plate with cast-in Peikko-anchor bolts consists of one or more anchor bolts that are welded on to a steel plate in the manufacturing plant. The anchor bolts and the plate consist of steel or stainless steel. The anchor bolts may also consist of a reinforcing steel B 500 B.

The anchor bolts with smooth shaft and provided with an anchor head (Type SBKL and PKL) consist of steel with a shaft diameter of 12, 13, 16, 19 and 20 mm. The anchor bolts with smooth shaft of the size of 12 mm, 16 mm and 20 mm the anchor head is cold formed by upsetting and for all other sizes the anchor head is hot formed by upsetting. The anchor bolts (Type JPL) consist of ribbed reinforcing steel and provided with an anchor head with a diameter of the shaft of 16, 20 and 25 mm.

The anchor bolts (Type SBKL, PKL and JPL) are welded on to the steel plate via the metal active gas welding, process 135 (MAG-welding) and process 136 (flux cored arc welding) according to EN ISO 4063:2000.

The product is surface-flush anchored in the concrete.

For the installed product see figure given in Annex 1.

1.2 Intended use

The steel plate with welded-on anchor bolts is intended for uses where requirements concerning mechanical resistance and stability as well as safety in use in the sense of the Essential Requirements ER1 and ER4 of the Directive 89/106/EEC shall be satisfied and where failure of the anchorage may cause risk to human life and health and/or lead to considerable economic consequences.

The steel plate with welded-on anchor bolts is to be used for the anchorage under static or quasi static actions in reinforced normal concrete of the minimum strength class C20/25 according to EN 206-1:2000-07. The construction product may be anchored in cracked and non-cracked concrete. The anchorage is admissible with single bolts or groups of anchor bolts, which consist of two up to nine anchor bolts. The construction product can be stressed by a tensile load, shear load or a combination of tensile and shear loads.

Further steel components may be welded-on to the steel plate on the side which is not cast-in.

The intended use of the steel plate with the welded-on anchor bolts concerning corrosion is given in Annex 4 and 5, Table 2 depending on the chosen material.

The provisions made in this European technical approval are based on an assumed working life of the product 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 method of verification

2.1 Characteristics of the product

2.1.1 General

The characteristic material values, dimensions and tolerances of the product not indicated in the Annexes shall correspond to respective values laid down in the technical documentation⁷ of this European technical approval.

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 characteristic values for the design calculation of the anchorage are given in Annexes 7 and 8.

2.1.2 Anchor bolt

The anchor bolts made of steel and stainless steel with smooth shaft (Type SBKL and PKL) and anchor bolts of ribbed reinforcing steel (Type JPL) shall correspond to the materials, mechanical properties and dimensions given in Annex 4 and 5.

It is also permissible to use two anchor bolts welded one on top of the other by MAG-welding (see Annex 2). A padded ring is to be placed under the head of the first anchor bolt. The padded ring is to be secured in its position to make a permanent compression of ≥ 5 mm possible. The padded ring can be made, for example, of technical felt or cellular rubber. The external diameter of the padded ring shall exceed the head diameter and the inside diameter shall be less than the shaft diameter. The padded ring shall prevent a contact of the lower head at the concrete and a transmission of loads by the lower bolt head.

2.1.3 Steel plate

The steel plates, on which anchor bolts with smooth shaft (Type SBKL and PKL) or of ribbed reinforcing steel (Type JPL) will be welded, shall correspond to the materials and mechanical properties given in Annex 4 and 5.

2.1.4 Welded joint

The welding-on of the anchor bolts to the steel plate may only be carried out in the manufacturing plant.

The anchor bolts of the Type SBKL and PKL shall be butt-welded to the steel plate with filled welds. The anchor bolt of the Type JPL may be inserted in a hole in the steel plate and welded with filled welds.

2.1.5 Marking

Each anchor bolt is marked on the head with the identifying mark of the producer and the used material according to Annex 2 and 3.

The steel plate is permanently printed with the Type "SBKL", "PKL" or "JPL" and if applicable for stainless steel with a letter code according Annex 4 and 5, Table 2 for the intended use.

⁷ The technical documentation for this European Technical Approval is deposited at Deutsches Institut für Bautechnik 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.

2.2 Methods 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 | $N_{RK,s}$ |
| 2. Concrete failure - pullout | $N_{RK,p}$ |
| 3. Concrete failure - concrete cone | $N_{RK,c}$ |
| 4. Concrete failure - splitting due to installation | $c_{min}, s_{min}, h_{min}$ |
| 5. Concrete failure - splitting due to loading | $N_{RK,sp}$ |
| 6. Concrete failure - blow-out | $N_{RK,cb}$ |
| 7. Reinforcement | $N_{RK,re}, N_{Rd,a}$ |
| 8. Displacement under tension loads | $\bar{\delta}_N$ |

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 | $\bar{\delta}_V$ |

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 Commission⁸ system 2(i) (referred to as System 1) of the attestation of conformity applies.

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 test plan;

⁸ Official Journal of the European Communities L 254 of 08.10.1996.

- (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 Responsibility

3.2.1 Tasks for 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.⁹

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 for 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.

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.

⁹ 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.

3.3 CE marking

The CE marking shall be affixed on the packaging. 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,
- number of the EC certificate of conformity for the product,
- 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

4.2.1 General

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 building.

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

The fitness of the anchorage for the intended use can be assumed only, 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 with exact position, dimensions of the steel plate and size and length of the anchor bolts.
- The anchorage is fixed to 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). For large fixtures (steel plate > 400 mm x 400 mm) vent openings are provided. These are specified in the installation instructions.
- Compliance with the installation parameters.

Welding-on of the intended and designed steel components to the cast-in construction product may only be performed by companies meeting the corresponding quality requirements for welding according to EN ISO 3834:2005 "Quality requirements for fusion welding of metallic materials". The quality level shall be according EN ISO 3834-2:2005 "Part 2: Comprehensive quality requirements".

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).

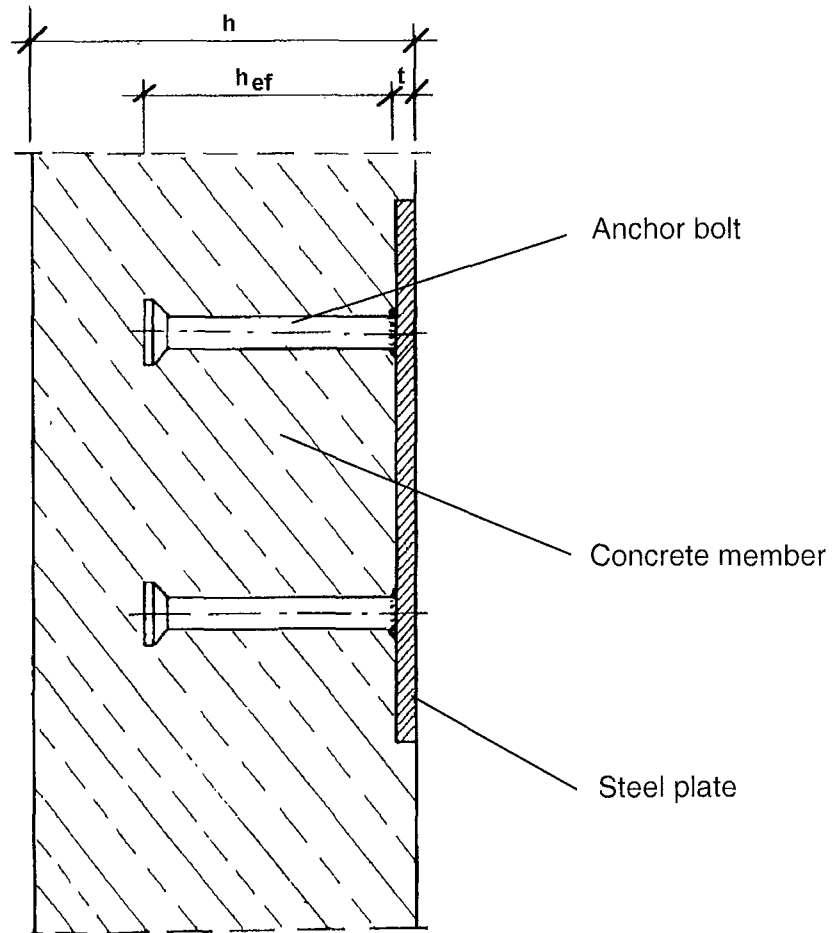
The minimum data required are:

- Dimensions of the steel plate,
- diameter of the anchor bolts,
- length of the anchor bolts,
- number of the anchor bolts,
- material of the steel plate,
- material of the anchor bolts,
- details on the procedure of installation, preferably by using illustrations.

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

Dipl.-Ing. Georg Feistel
Head of Division Construction Engineering
of Deutsches Institut für Bautechnik
Berlin, 17 February 2010

beglaubigt
Müller



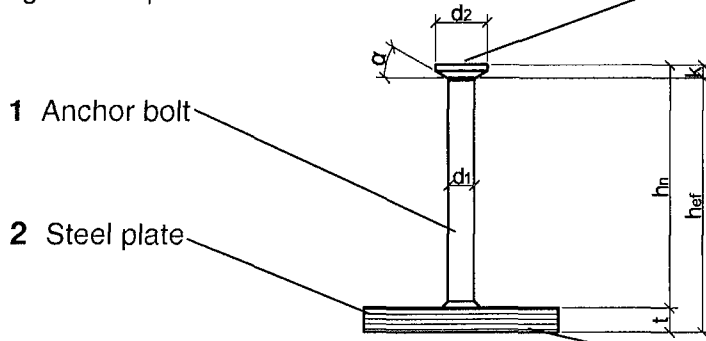
- h_{ef} = effective anchorage depth
- h = thickness of concrete member
- t = thickness of the steel plate

Cast-in steel plate with welded on Peikko anchor bolts made of steel and stainless steel

Product and intended use

Annex 1
of the European
technical approval
ETA-04/0056

Fig. 1: Simple anchor-bolt



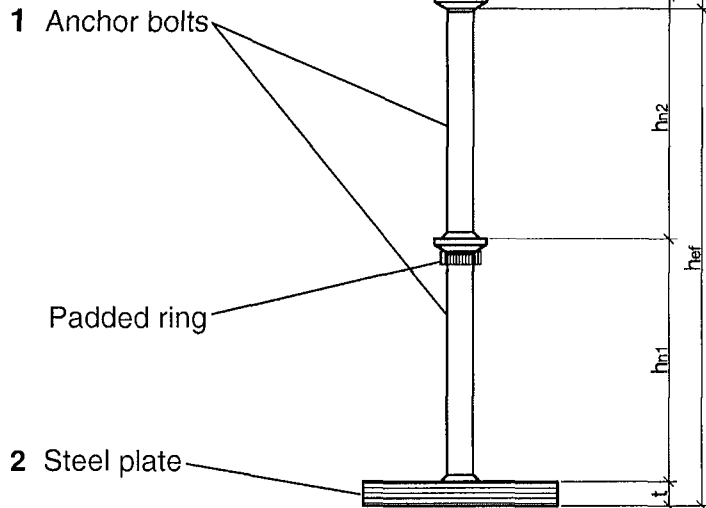
Marking of anchor bolts:
according to Annex 3

1 Anchor bolt

2 Steel plate

$$h_{ef} = h_n - k + t \quad (1)$$

Fig. 2: Doubled anchor-bolt



Marking of steel plate:
according to
Table 2, Annex 4 and 5
(e.g. SBKLRr, JPL,
PKLHh, ...)

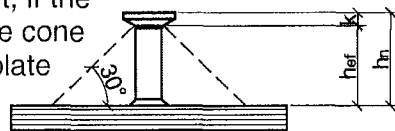
1 Anchor bolts

Padded ring

2 Steel plate

$$h_{ef} = h_{n1} + h_{n2} - k_2 + t \quad (2)$$

Fig. 3: Short anchor-bolt, if the theoretic concrete cone meets the steel plate at angle of ~ 30°



$$h_{ef} = h_n - k \quad (3)$$

- d_1 = diameter of shaft
- d_2 = diameter of head
- h_{ef} = effective anchorage depth
- h_n = nominal length of the anchor bolt (after welding)
- k = thickness of the head
- t = thickness of the steel plate
- α = 30°

**Cast-in steel plate with welded on
Peikko anchor bolts made of steel and stainless steel**

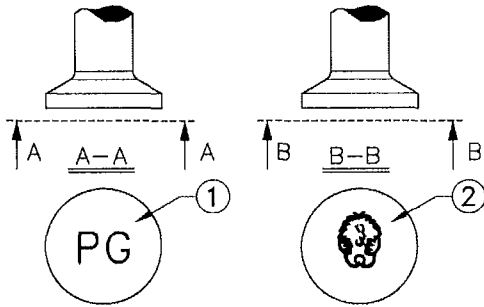
Details of the construction product

Annex 2
of the European
technical approval
ETA-04/0056

Marking for anchor bolts made of steel

ALTERNATIVE A

ALTERNATIVE B



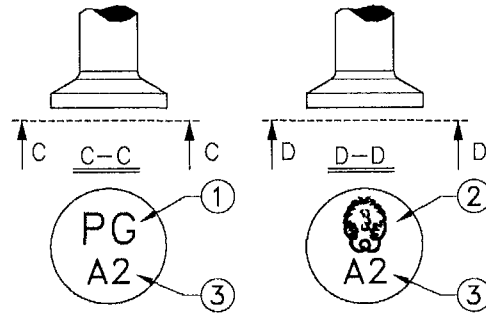
LEGENDS :

- ① PG = Peikko Group
- ② Alternative marking: Peikko-logo

Marking for anchor bolts made of stainless steel

ALTERNATIVE A

ALTERNATIVE B



LEGENDS :

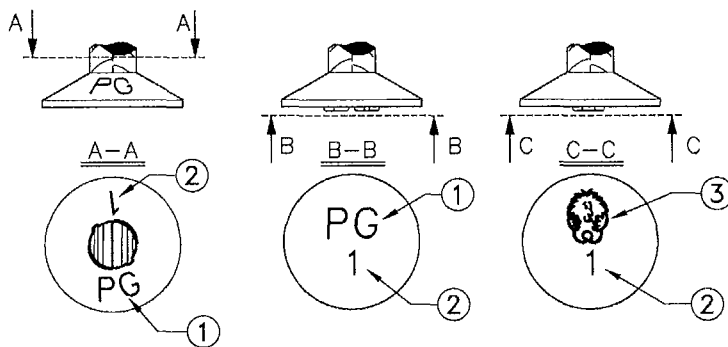
- ① PG = Peikko Group
- ② Alternative marking: Peikko-logo
- ③ Marking for stainless steel:
A2 = materials 1.4301 and 1.4303
A4 = materials 1.4401

Marking for anchor bolts made of reinforcing steel B500B

ALTERNATIVE A

ALTERNATIVE B

ALTERNATIVE C



LEGENDS :

- ① PG = Peikko Group
- ② Factory number
- ③ Alternative marking: Peikko-logo

Cast-in steel plate with welded on Peikko anchor bolts made of steel and stainless steel

Marking for anchor bolts

Annex 3
of the European
technical approval
ETA-04/0056

Table 1: Dimensions

Type		Shaft diameter d_1 [mm]		Head diameter d_h [mm]		Nominal length		Thickness of the head k [mm]	
						min h_n [mm]	max h_n [mm]		
SBKL, PKL	JPL	SBKL, PKL	JPL	SBKL, PKL	JPL			SBKL, PKL	JPL
12	-	12	-	24	-	50	200	6	-
13	-	13	-	25	-	50	200	6	-
16	16	16	16	32	44	50	350	8	10
19	-	19	-	40	-	75	350	10	-
20	20	20	20	40	58	75	350	10	13
-	25	-	25	-	72	75	525	-	16

Table 2: Materials

Part	Denomination	Material	Mechanical properties	Intended use
Type SBKL (Ø12 – Ø20), PKL (Ø12, Ø13), P2KL (Ø16), P3KL (Ø20)				
1	Anchor-bolt with smooth shaft Ø12, Ø13 [mm]	Steel according to EN 10025:2004 S235J2+N	$f_{uk} \geq 450 \text{ N/mm}^2$, $f_{yk} \geq 350 \text{ N/mm}^2$	dry internal conditions
	$\geq \text{Ø}16$ [mm]	S355J2+N		
2	Steel plate	Steel according to EN 10025:2004 S235JR;S235JO;S235J2+N;S235J2 S355JR;S355JO;S355J2+N;S355J2; S355K2+N;S355K2	$f_{uk} = 340\text{-}470 \text{ N/mm}^2$, $f_{yk} = 225 \text{ N/mm}^2$ $f_{uk} = 510\text{-}680 \text{ N/mm}^2$, $f_{yk} = 345 \text{ N/mm}^2$	
Type SBKLR (Ø12 – Ø20), PKLR (Ø12, Ø13), P2KLR (Ø16), P3KLR (Ø20)				
1	Anchor-bolt with smooth shaft Ø12, Ø13 [mm]	Steel according to EN 10025:2004 S235J2+N	$f_{uk} \geq 450 \text{ N/mm}^2$, $f_{yk} \geq 350 \text{ N/mm}^2$	dry internal conditions
	$\geq \text{Ø}16$ [mm]	S355J2+N		
2	Steel plate	Steel according to EN 10088:2005 1.4301;1.4303;1.4306;1.4307	$f_{uk} = 340\text{-}470 \text{ N/mm}^2$, $f_{yk} = 225 \text{ N/mm}^2$	
Type SBKLH (Ø12 – Ø20), PKLH (Ø12, Ø13), P2KLH (Ø16), P3KLH (Ø20) ¹⁾				
1	Anchor-bolt with smooth shaft Ø12, Ø13 [mm]	Steel according to EN 10025:2004 S235J2+N	$f_{uk} \geq 450 \text{ N/mm}^2$, $f_{yk} \geq 350 \text{ N/mm}^2$	in structures subject to dry conditions and in structures subject to external atmospheric exposure (including industrial and marine environment) or exposure in 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. desulphurization plants or road tunnels where de-icing material is used)
	$\geq \text{Ø}16$ [mm]	S355J2+N		
2	Steel plate	Steel according to EN 10088:2005 1.4401;1.4404;1.4432;1.4436;1.4571	$f_{uk} = 340\text{-}470 \text{ N/mm}^2$, $f_{yk} = 225 \text{ N/mm}^2$	
Type SBKLRr (Ø12 – Ø20), PKLRr (Ø12, Ø13), P2KLRr (Ø16), P3KLRr (Ø20)				
1	Anchor-bolt with smooth shaft Ø12, Ø13 [mm]	Steel according to EN 10088:2005 1.4301; 1.4303	$f_{uk} \geq 450 \text{ N/mm}^2$, $f_{yk} \geq 350 \text{ N/mm}^2$	dry internal conditions
	$\geq \text{Ø}16$ [mm]			
2	Steel plate	Steel according to EN 10088:2005 1.4301;1.4303;1.4306;1.4307	$f_{uk} = 340\text{-}470 \text{ N/mm}^2$, $f_{yk} = 225 \text{ N/mm}^2$	

1) The spacing between anchor-bolt and the edge of the steel plate shall be not less than 50 mm, else the product shall only be used in dry internal conditions

**Cast-in steel plate with welded on
Peikko anchor bolts made of steel and stainless steel**

Dimensions,
materials

Annex 4
of the European
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ETA-04/0056

Part	Denomination	Material	Mechanical properties	Intended use
Type SBKLHh (Ø12 – Ø20), PKLHh (Ø12, Ø13), P2KLHh (Ø16), P3KLHh (Ø20)				
1	Anchor-bolt with smooth shaft Ø12, Ø13 [mm] ≥ Ø16 [mm]	Steel according to EN 10088:2005 1.4401	$f_{uk} \geq 450 \text{ N/mm}^2$, $f_{yk} \geq 350 \text{ N/mm}^2$	in structures subject to dry conditions and in structures subject to external atmospheric exposure (including industrial and marine environment) or exposure in 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. desulphurization plants or road tunnels where de-icing material is used)
2	Steel plate	Steel according to EN 10088:2005 1.4401;1.4404;1.4432;1.4436;1.4571	$f_{uk} = 340\text{-}470 \text{ N/mm}^2$, $f_{yk} = 225 \text{ N/mm}^2$	
Type SBKLHr (Ø12 – Ø20), PKLHr (Ø12, Ø13), P2KLHr (Ø16), P3KLHr (Ø20)				
1	Anchor-bolt with smooth shaft Ø12, Ø13 [mm] ≥ Ø16 [mm]	Steel according to EN 10088:2005 1.4301;1.4303	$f_{uk} \geq 450 \text{ N/mm}^2$, $f_{yk} \geq 350 \text{ N/mm}^2$	in structures subject to dry conditions and in structures subject to external atmospheric exposure (including industrial and marine environment) or exposure in 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. desulphurization plants or road tunnels where de-icing material is used)
2	Steel plate	Steel according to EN 10088:2005 1.4401;1.4404;1.4432;1.4436;1.4571	$f_{uk} = 340\text{-}470 \text{ N/mm}^2$, $f_{yk} = 225 \text{ N/mm}^2$	
Type JPL				
1	Anchor-bolt of ribbed reinforcing steel	Steel according to EN 10080:2005 A500HW;BSt500S;B500B	$f_{uk} \geq 550 \text{ N/mm}^2$, $f_{yk} \geq 500 \text{ N/mm}^2$	dry internal conditions
2	Steel plate	Steel according to EN 10025:2004 S235JR;S235J0;S235J2+N;S235J2 S355JR;S355J0;S355J2+N;S355J2; S355K2+N;S355K2	$f_{uk} = 340\text{-}470 \text{ N/mm}^2$, $f_{yk} = 225 \text{ N/mm}^2$ $f_{uk} = 510\text{-}680 \text{ N/mm}^2$, $f_{yk} = 345 \text{ N/mm}^2$	
Type JPLR				
1	Anchor-bolt of ribbed reinforcing steel	Steel according to EN 10080:2005 A500HW;BSt500S;B500B	$f_{uk} \geq 550 \text{ N/mm}^2$, $f_{yk} \geq 500 \text{ N/mm}^2$	dry internal conditions
2	Steel plate	Steel according to EN 10088:2005 1.4301;1.4303;1.4306;1.4307	$f_{uk} = 340\text{-}470 \text{ N/mm}^2$, $f_{yk} = 225 \text{ N/mm}^2$	
Type JPLH¹⁾				
1	Anchor-bolt of ribbed reinforcing steel	Steel according to EN 10080:2005 A500HW;BSt500S;B500B	$f_{uk} \geq 550 \text{ N/mm}^2$, $f_{yk} \geq 500 \text{ N/mm}^2$	in structures subject to dry conditions and in structures subject to external atmospheric exposure (including industrial and marine environment) or exposure in 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. desulphurization plants or road tunnels where de-icing material is used)
2	Steel plate	Steel according to EN 10088:2005 1.4401;1.4404;1.4432;1.4436;1.4571	$f_{uk} = 340\text{-}470 \text{ N/mm}^2$, $f_{yk} = 225 \text{ N/mm}^2$	

1) The spacing between anchor-bolt and the edge of the steel plate shall be not less than 50 mm, else the product shall only be used in dry internal conditions

Table 3: Installation parameters

Type	Nominal size [mm]	SBKL, PKL					JPL		
		12	13	16	19	20	16	20	25
Anchorage depth	min h_{ef} [mm]	50	50	50	75	75	50	75	75
Minimum spacing	s_{min} [mm]	70	70	80	100	100	80	100	100
Minimum edge distance	c_{min} [mm]	50	50	50	70	70	50	70	70
Minimum thickness of concrete member	h_{min} [mm]	$h_{ef} + k + c_{nom}^{1)}$							

¹⁾ c_{nom} = required concrete cover according to national regulations

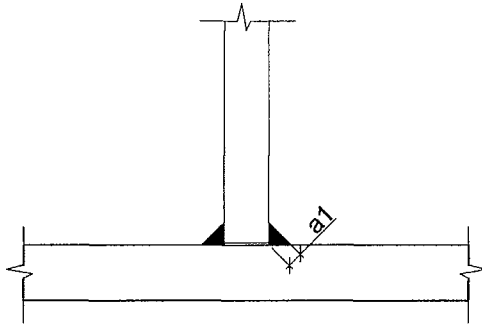
Cast-in steel plate with welded on Peikko anchor bolts made of steel and stainless steel

Materials,
installation parameters

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Description of the welded joints (fillet welds)

Types SBKL, PKL



Type JPL

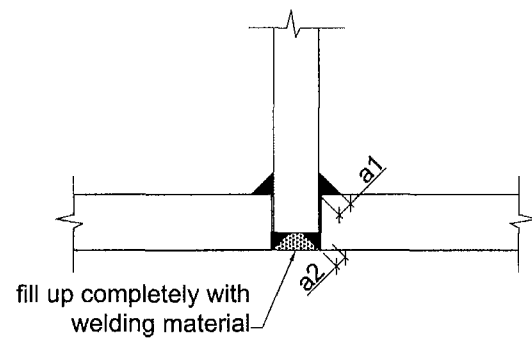


Table 4: Thickness of the welded joints

Types SBKL, PKL		Type JPL		
Diameter [mm]	Thickness of the welded joint a_1 [mm]	Diameter [mm]	Thickness of the welded joint a_1 [mm]	a_2 [mm]
12	3.5	-	-	-
13	4.0	-	-	-
16	5.0	16	5.0	3.0
19	5.5	-	-	-
20	6.0	20	6.0	3.0
-	-	25	8.0	3.0

Arrangement of the anchor bolts

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

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Arrangement of the anchor bolts

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Table 5: Characteristic values of resistance to tension load per anchor bolt

Type		SBKL, PKL					JPL		
		12	13	16	19	20	16	20	25
Nominal size									
Steel failure									
Characteristic resistance (tension load)	$N_{Rk,s}$ [kN]	51	60	90	127	141	110	173	270
Partial safety factor	γ_{Ms} ¹⁾	1.54					1.40		
Pull-out failure (C20/25)									
Characteristic resistance (tension load)	$N_{Rk,p}$ [kN]	51	54	90	146	141	198	349	537
Increasing factors ψ for the characteristic resistance	C25/30	1.10							
	C30/37	1.22							
	C35/45	1.34							
	C40/50	1.41							
	C45/55	1.48							
	\geq C50/60	1.55							
Partial safety factor	γ_{Mp} ¹⁾	1.5							
Concrete cone failure / splitting due to loading									
Effective anchorage depth	h_{ef} [mm]	$h_n - k + t$ ³⁾							
Characteristic spacing	$s_{cr,N} = s_{cr,sp}$ [mm] ²⁾	$3h_{ef}$							
Characteristic edge distance	$c_{cr,N} = c_{cr,sp}$ [mm] ²⁾	$1.5h_{ef}$							
factor for cracked concrete	k_{cr} [-]	8.5							
factor for non-cracked concrete	k_{ucr} [-]	11.9							
Partial safety factor	γ_{Mc} ¹⁾	1.5							
Blow-out failure									
Partial safety factor	γ_{Mcb} ¹⁾	1.5							

1) In absence of other national regulations

2) Reinforcement resists the splitting forces and limits the crack width to $w_w \leq 0.3$ mm

3) For simple anchor-bolts (For doubled anchor-bolts resp. short anchor-bolts see Fig. 2 resp. Fig. 3, Annex 2)

Table 6: Displacement under tensile load

Type	Nominal size	SBKL, PKL					JPL		
		12	13	16	19	20	16	20	25
	Displacements ³⁾ to 0.9 mm under following loads in [kN]	19	20	33	50	52	52	82	128
³⁾ The indicated displacements are valid for short term loading, the displacements may increase under long term loading to 1.8 mm									

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Characteristic values of resistance under tension loads, displacements

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Table 7 Characteristic values of resistance to shear loads per anchor bolt

Type		SBKL, PKL					JPL		
		12	13	16	19	20	16	20	25
Nominal size									
Steel failure									
Characteristic resistance (shear load)	$V_{Rk,s}$ [kN]	30	36	54	76	85	66	103	162
Partial safety factor	γ_{Ms} ¹⁾	1.28					1.5		
Concrete pry-out failure									
Factor according CEN/TS 1992-4-2:2009, section 6.3.4 without supplementary reinforcement	k_3 ²⁾	2.0							
Partial safety factor	γ_{Mcp} ¹⁾	1.5							
Concrete edge failure									
Effective length of the anchor bolt	$l_f = h_{ef}$ [mm]	$h_n - k + t$ ³⁾							
Effective outside diameter	$d_{nom} = d_1$ [mm]	12	13	16	19	20	16	20	25
Partial safety factor	γ_{Mc} ¹⁾	1.5							

1) In absence of other national regulations

2) In case of supplementary reinforcement the factor k_3 should be multiplied with 0.75

3) For simple anchor-bolts (For doubled anchor-bolts resp. short anchor-bolts see Fig. 2 resp. Fig. 3, Annex 2)

Table 8: Displacements under shear load

Type	Nominal size	SBKL, PKL					JPL		
		12	13	16	19	20	16	20	25
Displacements ²⁾ to 1.5 mm under following loads in [kN]		10	20	29	40	45	30	45	72
²⁾ 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 according CEN/TS 1992-4-2:2009, section 6.4 with $k_7 = \frac{2}{3}$.

Cast-in steel plate with welded on Peikko anchor bolts made of steel and stainless steel

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

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