Deutsches Institut für Bautechnik

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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-20/0529 of 14 December 2020

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 Bolda® Column Shoe
Product family to which the construction product belongs	Column Shoe
Manufacturer	PEIKKO GROUP CORPORATION Voimakatu 3 15101 Lahti FINNLAND
Manufacturing plant	Peikko Herstellwerke Peikko Manufacturing plants
This European Technical Assessment contains	12 pages including 8 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 200102-00-0302, Edition 06/2020

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Specific Part

1 Technical description of the product

The Peikko Bolda® column shoe consists of a base plate and a side plate of steel, which are welded together. Anchor bars made of reinforcing steel are welded to the side plate.

The product description is given in Annex A.

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

The column shoes serve as connectors of e.g. between a reinforced concrete column and a foundation or between two reinforced concrete columns or between two reinforced concrete beams.

The performances given in Section 3 are only valid if the column shoe 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 column shoe 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
Resistance to tension and shear loads	See Annex C

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire – steel temperature time table under fire exposure	See Annex C

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

In accordance with the European Assessment Document EAD 200102-00-0302 the applicable European legal act is Commission Decision 2000/606/EC.

The system to be applied is: 2+

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

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 14 December 2020 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock
Head of Section

beglaubigt:
Baderschneider

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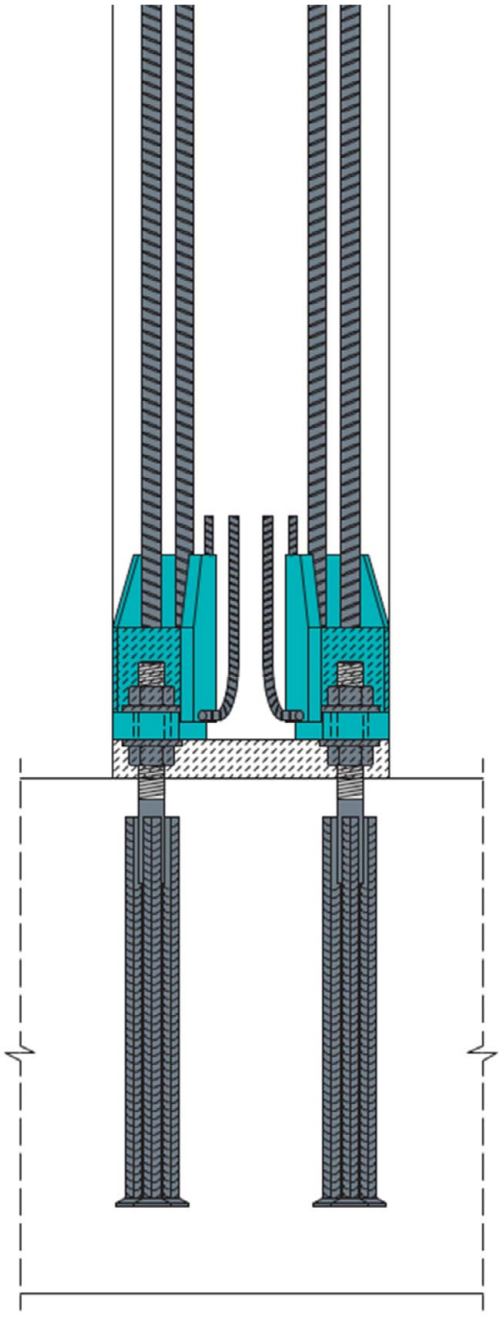

Figure A1. Application example

Figure A2. BOLDA® Column Shoe

Peikko Bolda® Column Shoe	Annex A1
Product description Application example	

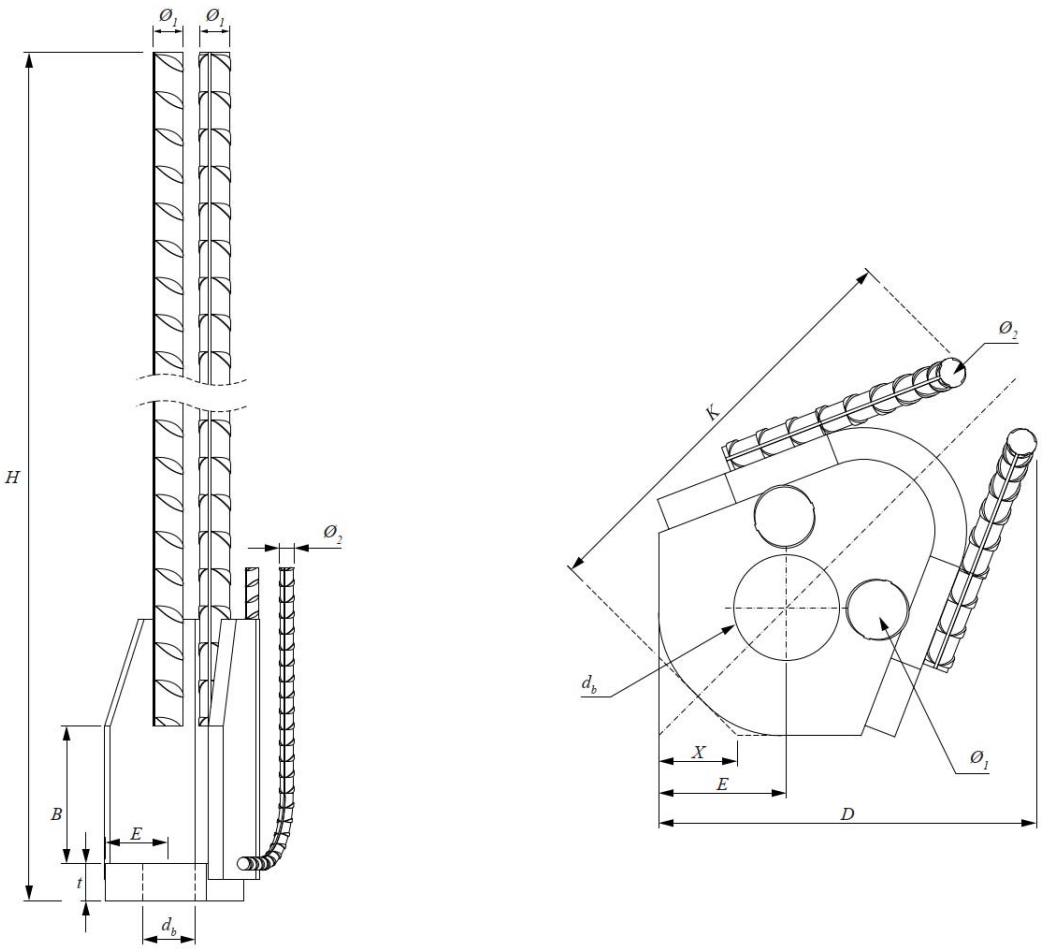

Figure A3. Dimensions of BOLDA® Column Shoes

Table A1: Dimensions *All values are specified in mm units.*

Column Shoe	BOLDA® 30	BOLDA® 36	BOLDA® 39	BOLDA® 45	BOLDA® 52
H	1058	1365	1600	1852	2190
t	30	35	40	50	55
B	100	130	130	140	170
E	50	60	60	60	70
d_b	40	50	55	60	70
f_1	25	28	28	32	40
f_2	10	12	14	16	16
X	30	37	37	37	42
D	153	178	195	217	245
K	173	200	220	250	269

Peikko Bolda® Column Shoe

Product description
Dimensions

Annex A2

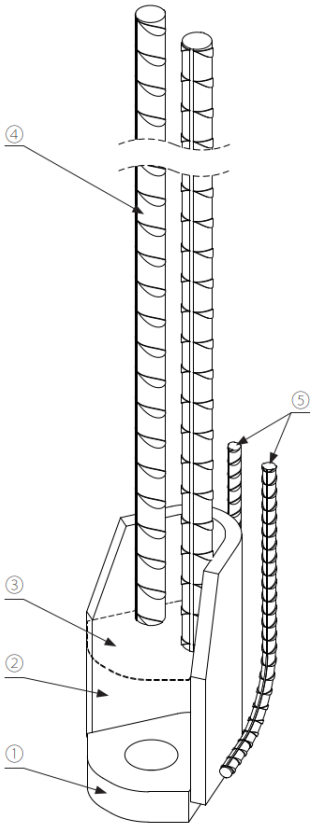

Figure A4. Materials of BOLDA® Column Shoes

Table A2: Materials *The steel plates and the the fillet material shall meet the requirements of EN 10025:2019*

Item	Component	Steel	Optional Steel	Standards
1	Base plate	S355J2+N	S355K2+N; S420J2+N	EN 10025:2019
2	Side plate	S355J2+N	S355K2+N; S420J2+N	EN 10025:2019
3	Top plate (option)	S235JR	DC01	EN 10025:2019, EN 10130:2006
4	Anchor bar	Table A3	B500C	EN 10080:2005 and EN 1992-1-1:2004+AC10, Annex C
5	Rear bar	Table A3	B500C	EN 10080:2005 and EN 1992-1-1:2004+AC10, Annex C

Table A3. *Minimum requirements for reinforcing steel.*

General	All requirements set in EN 10080:2005 and EN 1992-1-1:2004+AC10, Annex C for the reinforcing steel of Class B or Class C, strength class 500 MPa
Additional	The steel shall be weldable

Peikko Bolda® Column Shoe	Annex A3
Product description Materials	

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Specifications of intended use

Design value of loads

- Static and quasi-static load.
- Tension loads, compression loads and shear loads or any combination thereof.

Anchoring base material

- The grade of the reinforced concrete used for the column shall be in the range C35/45 to C70/85 according to EN 1992-1-1:2004 + AC:2010.
- In the region of the BOLDA® Column Shoes the concrete may be cracked or uncracked.

Use conditions (environmental conditions)

- Normal applications when BOLDA® Column Shoes are installed normally to the concrete surface without any additional measures or surface treatments and when applications fall within the scope of the EN 1992-1-1:2004+AC10 series. In applications where particular special aggressive considerations apply, e.g. marine environment or chemical exposure environment, modifications can be necessary.
- The European standard EN 1992-1-1:2004 + AC:2010, section 4 applies to BOLDA® Column Shoes, that are planned to be installed with concrete cover.
- The lowest temperature in use is -20°C

Design

- The dimensioning of column shoes is carried out under the responsibility of an engineer experienced in the field of structural design and concrete constructions.
- The design is based on the Technical Report TR 068: *Design of Structural Connections with Column Shoes*.
- Verifiable calculations and construction drawings shall be made by taking into account the actions to be transferred.
- The position of the column shoes including the reinforcement required according to Annex C has to be specified on the construction drawings and execution specifications.
- The splice laps between main reinforcement bars and anchor bars of BOLDA® Column Shoes are designed according to the EN 1992-1-1:2004 + AC:2010.
- The dimensioning and design of connected structural concrete members shall be done according to the EN 1992-1-1:2004 + AC:2010.
- The load bearing resistances of the column connections with BOLDA® Column Shoes under fire exposure is based on the Technical Report TR 068: *Design of Structural Connections with Column Shoes*.

Peikko Bolda® Column Shoe	Annex B1
Intended use Specifications	

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Installation

- Installation of the BOLDA® Column Shoes in accordance with Technical Manual of BOLDA® Column Shoes is carried out by appropriately qualified workers under the supervision of the person responsible for technical matters on site.
- Usage of the BOLDA® Column Shoes as supplied by the manufacturer without any manipulations, repositioning or exchanging of the components.
- Installation of the BOLDA® Column Shoes in accordance with the manufacturer's specifications given in Annex B3 and Technical Manual of BOLDA® Column Shoes
- BOLDA® Column Shoes have to be fixed to the formwork so that no movement occurs during the time of laying the main and supplementary reinforcement and casting and compacting the concrete.
- Correct and proper compaction of the concrete in the area of the BOLDA® Column Shoes.
- The BOLDA® Column Shoes have to be protected against penetration of concrete, water and oil.
- The spacing and clear distances between BOLDA® Column Shoes must be selected according to EN 1992-1-1:2004+AC10 and shall be such that the concrete can be placed and compacted satisfactorily for the development of adequate bond.
- Examples of spacings and arrangements of BOLDA® Column Shoes are given in Fig. B1 and Table B1.
- The BOLDA® Column Shoes may be used in any cross section of concrete columns, for example: square, rectangle, L-form, oval and circle.

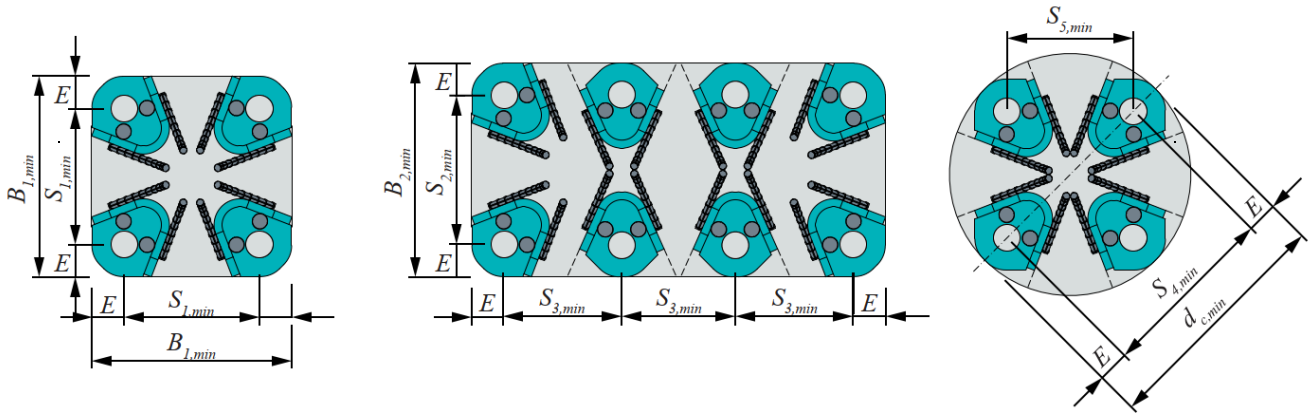

Figure B1. Examples of geometries and minimum spacings of BOLDA® Column Shoes

Table B1: Minimum distances *All values are specified in mm units.*

Column Shoe	BOLDA® 30	BOLDA® 36	BOLDA® 39	BOLDA® 45	BOLDA® 52
$B_{1,min}$	310	360	395	440	500
$B_{2,min}$	350	405	450	510	550
$S_{1,min}$	210	240	275	320	360
$S_{2,min}$	250	285	330	390	410
$S_{3,min}$	190	220	240	270	320
$S_{4,min}$	300	340	390	455	510
$S_{5,min}$	212	240	276	322	361
E	50	60	60	60	70
$d_{c,min}$	400	460	510	575	650

Peikko Bolda® Column Shoe

Intended use
Installation and spacing parameters

Annex B2

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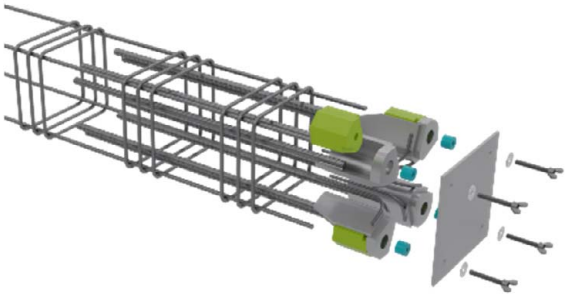
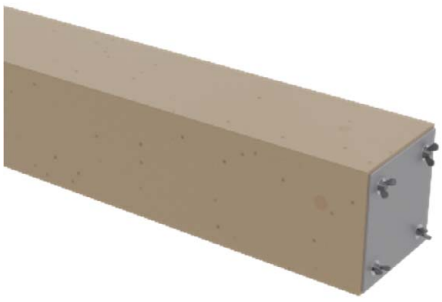
Installation instructions

1. Positioning



1. The BOLDA® Column Shoes are placed into the reinforcement of the column into planned location and fixed through the holes of their base plates to the end plate of the formwork with recess boxes and wing screws.
2. Supplementary reinforcement must be placed at the area of column base, according to drawings
3. Fasten and tie the anchor bars of the BOLDA® Column Shoes to the main reinforcement of column

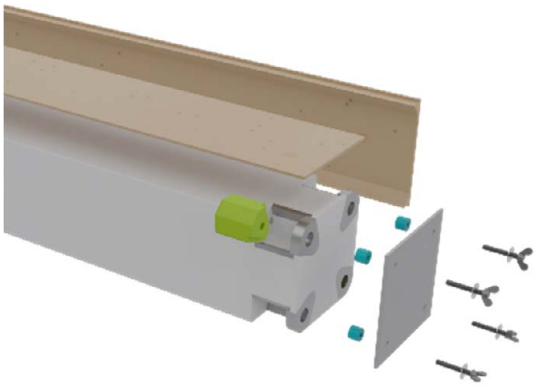
2. Casting and compacting



1. Carefully pour in concrete paying attention to built-in BOLDA® Column Shoes and reinforcements
2. Compact concrete properly, avoid contact between vibrating device and BOLDA® Column Shoes and reinforcements

   → Do not move or damage BOLDA® Column Shoes

3. Removal from formwork



1. Loosen the wing screws of the BOLDA® Column Shoes
2. Remove formwork
3. Check the adjacent concrete for gravel pockets etc.
4. Remove the concrete slurry on the column shoes.

Peikko Bolda® Column Shoe	Annex B3
Intended use Installation instructions	

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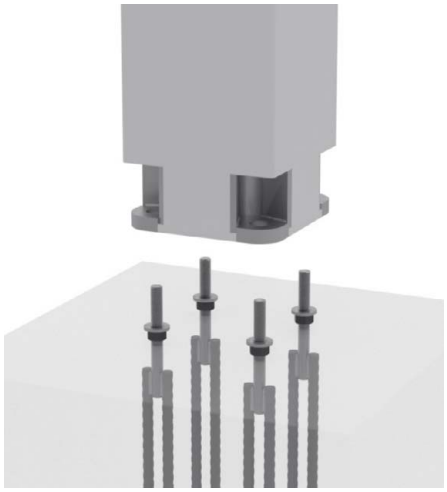
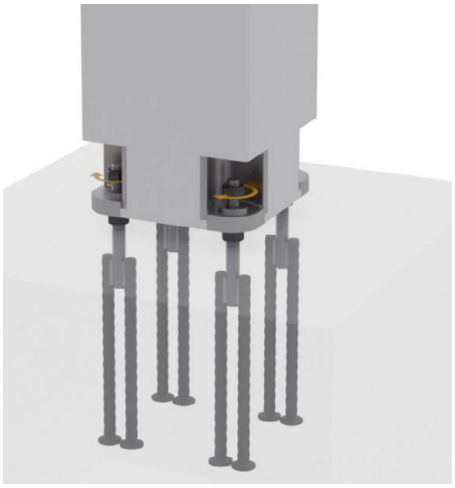
Installation instructions - precast element

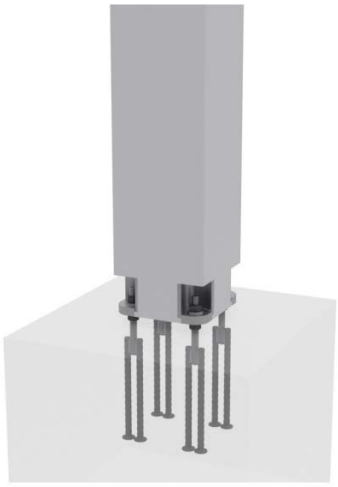
1. Column is installed directly on the pre-leveled washers and the lower nuts



2. Upper washers are installed on the base plate and upper nuts are screwed on the bolts

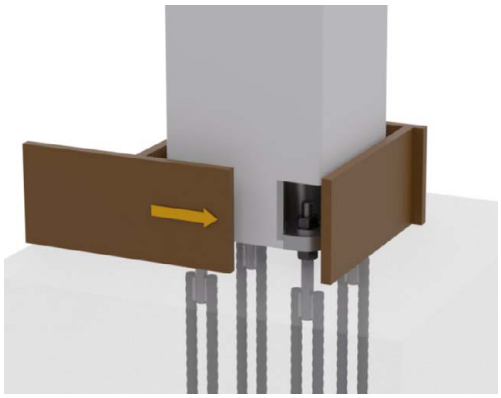


3. After the upper nuts are tightened, the crane hook and lifting slings can be released

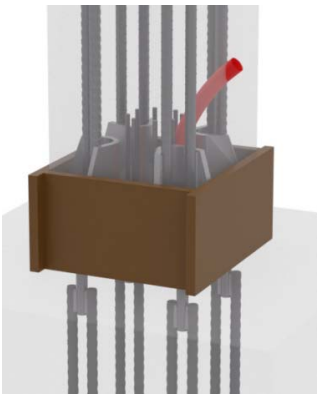


NOTE ! Joint has to be grouted with non-shrink mortar (grout) and grout has to reach the designed strength before the column is loaded by other structures.

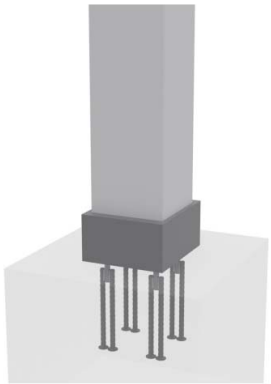
4. Install formwork for grouting joint and recesses, joint has to be grouted with non-shrink mortar (grout)



5. Alternative (filling pipe for grouting) where grouting is aligned with column face



6. The finalized connection after grouting has hardened



Peikko Bolda® Column Shoe	Annex B4
Intended use Installation instructions	

Table C1: Resistances to tension, compression, and shear loads under static and quasi-static loading

			BOLDA® 30	BOLDA® 36	BOLDA 39	BOLDA® 45	BOLDA® 52
Steel failure							
Resistance	$N_{Rd,s}$	[kN]	299	436	521	697	938
Bending resistance factor	η_d	[-]	1,0				
Bending stiffness factor	k_L	[-]	1,0				
Shear resistance factor	k_s	[-]	1,0				

Note:
Laps with the welded reinforcing steel bars (Pos. 4 according to Annex A3) are designed according EN 1992-1-1:2004+AC10.

Table C2: Steel temperature timetable under fire exposure - $T_{cr}(t_i)$ [°C]

Time	BOLDA® 30	BOLDA® 36	BOLDA® 39	BOLDA® 45	BOLDA® 52
t_i [min]	Minimum column size 310x310	Minimum column size 360x360	Minimum column size 395x395	Minimum column size 440x440	Minimum column size 500x500
30	206	171	182	178	147
60	387	336	349	340	293
90	530	475	488	470	412
120	641	588	594	571	508