

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-18/0785
of 19 January 2023

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

PFEIFER-Column shoe PCC

Product family
to which the construction product belongs

Column Shoe

Manufacturer

Pfeifer Seil- und Hebetechnik GmbH
Dr.-Karl-Lenz-Str. 66
87700 Memmingen
DEUTSCHLAND

Manufacturing plant

Production Plants A/B/C/D/E

This European Technical Assessment
contains

13 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 200102-00-0302, Edition: 09/2021

This version replaces

ETA-18/0785 issued on 17 June 2020

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Specific Part

1 Technical description of the product

The PFEIFER Column shoe PCC 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 C1

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 C2

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 19 January 2023 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock
Head of Section

beglaubigt:
Schüler

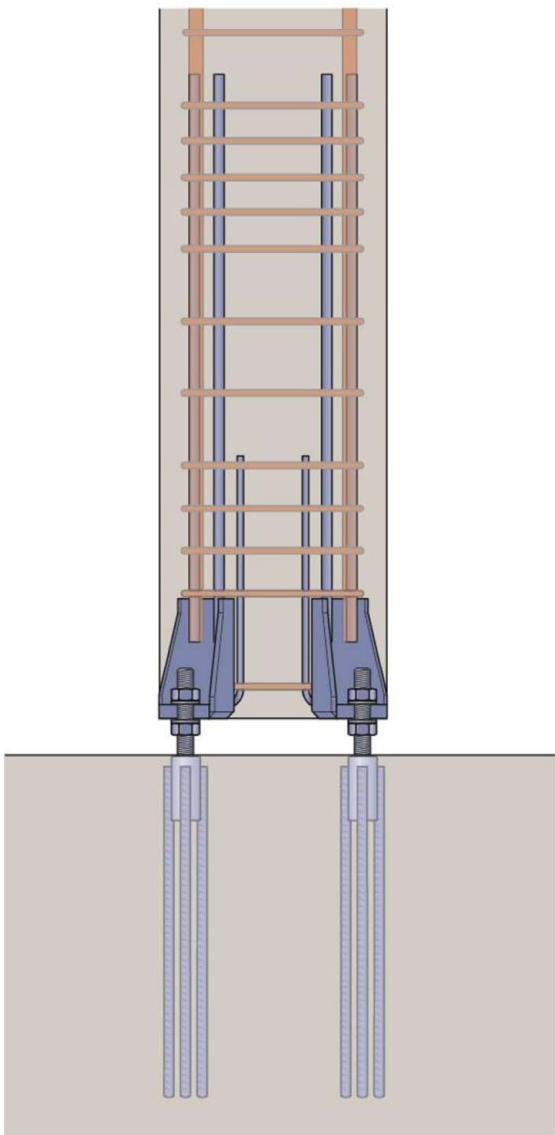


Fig. A1: Application example



Fig. A2: Column shoe

PFEIFER Column Shoe PCC		Annex A1
Product description Intended use, installed condition		

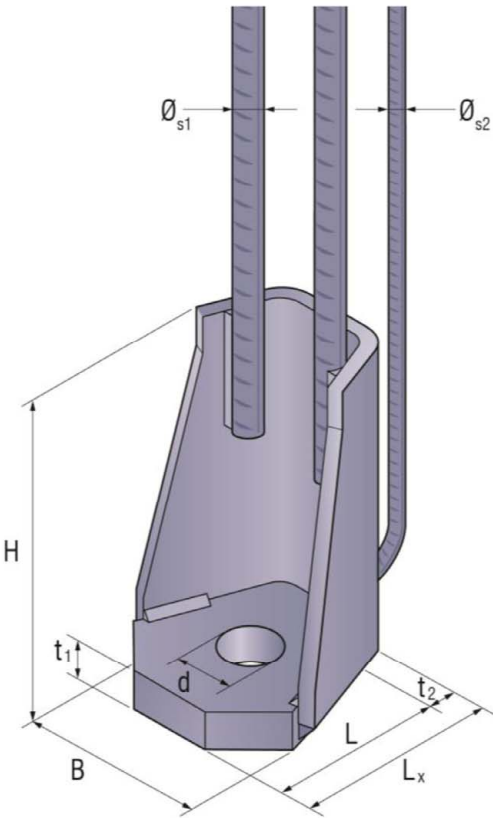


Fig. A3: Dimensions

Table A1: Dimensions

Column shoe PCC	d	L _x	L	B	t ₁	t ₂	H	Ø _{s1}	Ø _{s2}
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
16	28	95	90	89	15	5	145	12	8
20	30	103	95	97	20	8	170	14	8
24	35	110	100	100	25	10	190	16	10
27	40	116	106	110	25	10	220	20	10
30-1	40	127	112	119	30	15	230	20	12
30-2	45	137	121	119	35	16	250	25	16
36	53	139	119	132	40	20	285	28	20
39-1	55	141	125	136	35	16	285	28	14

PFEIFER Column Shoe PCC	Annex A2
Product description Dimensions	

Table A2: **Specifications, materials**

Reinforcing steel	Reinforcement B500B / B500C (heat-treated from rolling heat) According to EN 1992-1-1:2004 + AC:2010, Annex C
Steel parts	S355 and S460 according to EN 10025-2:2004, EN 10025-3:2004 and EN 10025-4:2005

PFEIFER Column Shoe PCC

Product description
Materials

Annex A3

Specifications of intended use

Loading

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

Anchoring base material

- Reinforced normal weight concrete of strength class C30/37 to C70/85 according to EN 1992-1-1:2004 + AC:2010.
- Cracked or uncracked concrete.

Use conditions (environmental conditions)

- Without additional measures, column shoes made of blank steel and arranged flush with the concrete surface are intended to be used for dry internal conditions only.
- EN 1992-1-1:2004 + AC:2010, section 4 applies to column shoes, that are planned to be installed with concrete cover.
- The lowest temperature in use is -20°C.

Design

- The design of the column shoe connections 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 TR 068.
- Verifiable calculations and construction drawings are made considering the actions to be transferred.
- The position of the column shoe including the additional reinforcement specified in this ETA is specified in the construction drawings.
- The column shoe connections are used where the column is horizontally supported by foundation, columns, floor or a set of beams (sway frames included).
- Laps with the welded reinforcing steel bars are designed according to EN 1992-1-1:2004 + AC:2010.
- The design of the connected concrete members is done according to EN 1992-1-1:2004 + AC:2010.
- The load bearing capacity of the column shoe connections under fire is verified in accordance with the TR 068, considering the reduction factors according to Annex C2.

PFEIFER Column Shoe PCC

Intended use
Specifications

Annex B1

Installation

- Installation of the column shoes is carried out by appropriately qualified workers under the supervision of the person responsible for technical matters on site.
- Usage of the column shoes as supplied by the manufacturer without any manipulation and exchanging of the components.
- Installation of the column shoes in accordance with the manufacturer's specifications given in Annex B3.
- Column shoes have to be fixed to the formwork so that no movement occurs during the time of laying the reinforcement and of placing and compacting the concrete.
- Correct compaction of the concrete in the area of the column shoes.
- The column shoes have to be protected against penetration of concrete, water and oil.
- The spacing between column shoes must be selected so that concreting is possible.
- Examples of distances and arrangements are given in Fig. B1 and Table B1.
- The column shoes may be used in any cross-section form, for example: square, rectangle, L-form.

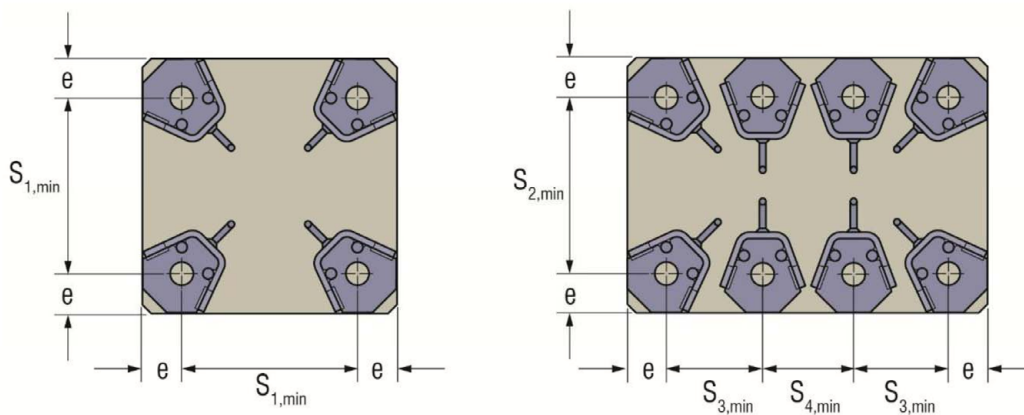


Fig. B1: Example geometries – Minimum distances

Table B1: Minimum distances

Column shoe					
PCC	e	S _{1,min}	S _{2,min}	S _{3,min}	S _{4,min}
	[mm]	[mm]	[mm]	[mm]	[mm]
16	50	145	190	85	100
20	50	155	205	105	115
24	50	180	240	110	120
27	50	205	275	125	130
30-1	50	220	295	150	145
30-2	50	265	355	155	145
36	60	275	370	165	165
39-1	60	255	345	165	165

PFEIFER Column Shoe PCC

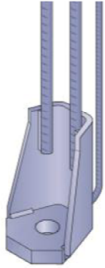
Intended use

Specifications, installation parameters

Annex B2

Installation instructions

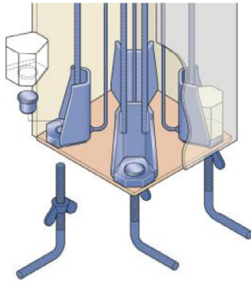
1. Components



Column Shoe PCC consisting of:

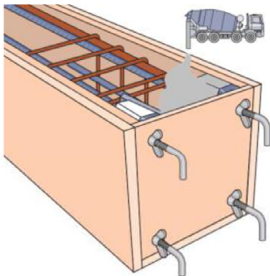
1. Base plate with side plate
2. Reinforcing steel bars

2. Positioning



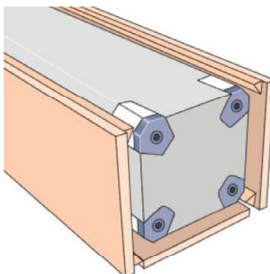
1. Securely fix the column shoes to the formwork
2. Fix the reinforcement of the column shoes to the existing reinforcement
3. Install the recess bodies

3. Pouring and compacting



1. Carefully pour in concrete paying attention to built-in parts
2. Compact concrete properly, avoid contact between vibrating device and column shoes
→ Do not move or damage columns shoes

4. Removal of formwork



1. Loosen the screws of the column shoes
2. Remove the formwork
3. Check the adjacent concrete for gravel pockets etc.
4. Remove the concrete slurry on the column shoes. Steel parts must be shiny metallic

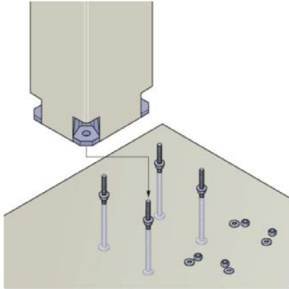
PFEIFER Column Shoe PCC

Intended use
Installation instructions

Annex B3

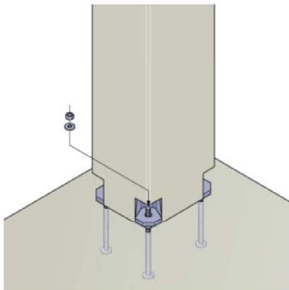
Installation instructions precast element (included column shoe)

5. Mount the column on the prepared bolts



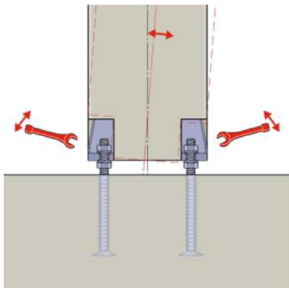
1. Provide bolts with nuts and washers
2. Set all the nuts at the same height
3. Lift the column on the bolts

6. Screw the column shoes to the bolts



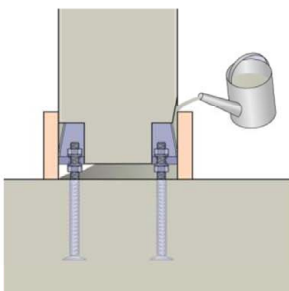
1. Screw the nuts and washers provided on the bolts in the mounting recess of the column base
2. Tighten the nuts hand-tight

7. Align the support and tighten the nuts



1. Bring the column in the intended position
2. Tighten the nuts with hammer wrench (10 beats, 2 kg hammer weight)
3. Only now the component can be removed from the lifting device

8. Casting the connection



1. Form a support in the casting area
2. Fill with grout according to the manufacturer's instructions
The grout must have the following properties:
 - Maximum grain size: 5 mm
 - Non-flammable A1
 - Swelling
 - Minimum strength \geq Strength class of the column

PFEIFER Column Shoe PCC

Intended use
Installation instructions

Annex B4

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

Column shoe PCC			16	20	24	27	30-1	30-2	36	39-1
Steel failure										
Design resistance	$N_{Rd,s}$	[kN]	68	97	139	180	220	299	436	384
Bending resistance factor	η_d	[-]	1,0							
Bending stiffness factor	k_L	[-]								
Shear resistance factor	k_s	[-]								

Note:

Laps with the welded reinforcing steel bars (Pos. S1 according to Annex A2) are designed according to EN 1992-1-1:2004 + AC 2010.

PFEIFER Column Shoe PCC

Performances

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

Annex C1

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

Typ	Bolt temperature respectively μ_{fi} ¹⁾ (ETK)					
	30 min	60 min	90 min	120 min	180 min	240 min
PCC 16 (minimum column cross-section: 245 mm × 245 mm)						
	190°C	400°C	550°C	690°C	910°C	1070°C
$\mu_{fi, \text{reinforcing steel anchor}}^{2)}$ [-]	1,00	1,00	0,62	0,25	0,06	0,03
$\mu_{fi, \text{screw}}^{3)}$ [-]	0,94	0,78	0,35	0,11	0,03	0,00
PCC 16, PCC 20 (minimum column cross-section: 255 mm × 255 mm)						
	190°C	400°C	550°C	690°C	900°C	1070°C
$\mu_{fi, \text{reinforcing steel anchor}}^{2)}$ [-]	1,00	1,00	0,62	0,25	0,06	0,03
$\mu_{fi, \text{screw}}^{3)}$ [-]	0,94	0,78	0,35	0,11	0,03	0,00
PCC 16 bis PCC 24 (minimum column cross-section: 280 mm × 280 mm)						
	190°C	400°C	550°C	680°C	880°C	1040°C
$\mu_{fi, \text{reinforcing steel anchor}}^{2)}$ [-]	1,00	1,00	0,62	0,27	0,07	0,04
$\mu_{fi, \text{screw}}^{3)}$ [-]	0,94	0,78	0,35	0,12	0,04	0,00
PCC 16 bis PCC 30-1 (minimum column cross-section: 320 mm × 320 mm)						
	180°C	350°C	490°C	600°C	760°C	900°C
$\mu_{fi, \text{reinforcing steel anchor}}^{2)}$ [-]	1,00	1,00	0,81	0,47	0,15	0,06
$\mu_{fi, \text{screw}}^{3)}$ [-]	0,94	0,85	0,57	0,22	0,08	0,03
PCC 16 bis PCC 30-2 (minimum column cross-section: 365 mm × 365 mm)						
	180°C	340°C	480°C	560°C	710°C	840°C
$\mu_{fi, \text{reinforcing steel anchor}}^{2)}$ [-]	1,00	1,00	0,84	0,59	0,22	0,08
$\mu_{fi, \text{screw}}^{3)}$ [-]	0,94	0,87	0,60	0,32	0,10	0,05
PCC 16 bis PCC 36 (minimum column cross-section: 395 mm × 395 mm)						
	140°C	290°C	430°C	520°C	690°C	820°C
$\mu_{fi, \text{reinforcing steel anchor}}^{2)}$ [-]	1,00	1,00	0,96	0,72	0,25	0,09
$\mu_{fi, \text{screw}}^{3)}$ [-]	0,95	0,91	0,71	0,46	0,11	0,06
PCC 16 bis PCC 39-1 (minimum column cross-section: 395 mm × 395 mm)						
	140°C	290°C	430°C	520°C	690°C	820°C
$\mu_{fi, \text{reinforcing steel anchor}}^{2)}$ [-]	1,00	1,00	0,96	0,72	0,25	0,09
$\mu_{fi, \text{screw}}^{3)}$ [-]	0,95	0,91	0,71	0,46	0,11	0,06

1) μ_{fi} = reduction factor (hot loading capacity / cold loading capacity)

2) $\mu_{fi, \text{reinforcing steel anchor}}$ nach 1992-1-2

3) $\mu_{fi, \text{screw}}$ nach 1993-1-2

PFEIFER Column Shoe PCC

Performances

Fire resistance – Temperature behaviour of column shoes

Annex C2