

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

**ETA-20/0259**  
**of 23 May 2023**

English translation prepared by DIBt - Original version in German language

### General Part

Technical Assessment Body issuing the  
European Technical Assessment:

Trade name of the construction product

Product family  
to which the construction product belongs

Manufacturer

Manufacturing plant

This European Technical Assessment  
contains

This European Technical Assessment is  
issued in accordance with Regulation (EU)  
No 305/2011, on the basis of

This version replaces

Deutsches Institut für Bautechnik

PFEIFER Rebar Coupler System PH

Couplers for mechanical splices of reinforcing bars

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37 pages including 3 annexes which form an integral part  
of this assessment

EAD 160129-00-0301

ETA-20/0259 issued on 13 May 2020

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## Specific Part

### 1 Technical description of the product

The PFEIFER Reinforcement Connection System PH is used as a mechanical, screwed system for connecting reinforcing bars in reinforced concrete components and for connecting to steel components under static or quasi-static, fatigue and low cycle loading.

The product description is given in Annex A.

The characteristic material values, dimensions and tolerances of the PFEIFER Reinforcement Connection System PH not indicated in Annexes A1 to A18 shall correspond to the respective values laid down in the technical documentation<sup>[1]</sup> of this European technical assessment.

### 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 PFEIFER Reinforcement Connection System PH 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 PFEIFER Reinforcement Connection System PH of at least 100 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 static or quasi-static loading	See Annex C1 – C9
Slip under static or quasi-static load	See Annex C1 – C9
Slip after static or quasi-static load	No performance assessed
Fatigue strength for $N = 2 \cdot 10^6$ load cycles	No performance assessed
Fatigue strength for S-N curve with $k_1$ and $k_2$ according to EN 1992-1-1	No performance assessed
Fatigue strength for S-N curve with specific $k_1$ and $k_2$	See Annex C1 – C8
Resistance to low cycle loading (seismic actions)	See Annex C2

#### 3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1

<sup>[1]</sup> The technical documentation of this European technical assessment is deposited at the 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.

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

In accordance with EAD 160129-00-0301 the applicable European legal act is: 2000/606/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.

The following standards are referred to in this European Technical Assessment:

- EN 1090-1:2009 + A1:2011 Execution of steel structures and aluminium structures – Part 1: Requirements for conformity assessment of structural components
- EN 1992-1-1:2004 + AC:2010 + A1:2014 Eurocode 2: Design of concrete structures - Part 1-1: General rules and rules for buildings
- EN 1998-1:2004 + AC:2009 + A1:2013 Eurocode 8: Design of structures for earthquake resistance – Part 1: General rules, seismic actions and rules for buildings
- EN 10025-2:2019 Hot rolled products for structural steels – Part 2: Technical delivery conditions for non-alloy structural steels
- EN 10305-1:2016 Steel tubes for precision applications - Technical delivery conditions – Part 1: Seamless cold drawn tubes
- EN ISO 4032:2012 Hexagon regular nuts (style 1) – Product grades A and B (ISO 4032:2012)
- EN ISO 4035:2012 Hexagon thin nuts chamfered (style 0) – Product grades A and B (ISO 4035:2012)
- EN ISO 9606-1:2017 Qualification testing of welders – Fusion welding – Part 1: Steels (ISO 9606-1:2012, including Cor 1:2012 and Cor 2:2013)
- EN ISO 15609-1:2019 Specification and qualification of welding procedures for metallic materials – Welding procedure specification– Part 1: Arc welding (ISO 15609-1:2019)

Issued in Berlin on 23 May 2023 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock  
Head of Section

*beglaubigt:*  
Kisan

Combinations

<p>PH-MU + PH-A</p>	<p>PH-MU + PH-K / PH-KD + PH-MU</p>	<p>PH-A + PH-KM + PH-A</p>
<p>PH-MU + PH-RL + PH-MU</p>	<p>PH-MU + PH-RB + PH-MU</p>	<p>PH-A + PH-RM + PH-A</p>
<p>PH-A + PH-MUR</p>	<p>PH-A + PH-PA + PH-MU</p>	<p>PH-AH + PH-A</p>

PFEIFER Rebar Coupler System PH

Product description  
Type overview

Annex A1

Table A1: **Combinations of same diameters  
PH-MU + PH-A**

Combinations Type designation	Reinforcement Ø [mm]
PH-MU 12 + PH-A 12	12
PH-MU 14 + PH-A 14	14
PH-MU 16 + PH-A 16	16
PH-MU 20 + PH-A 20	20
PH-MU 25 + PH-A 25	25
PH-MU 28 + PH-A 28	28
PH-MU 32 + PH-A 32	32

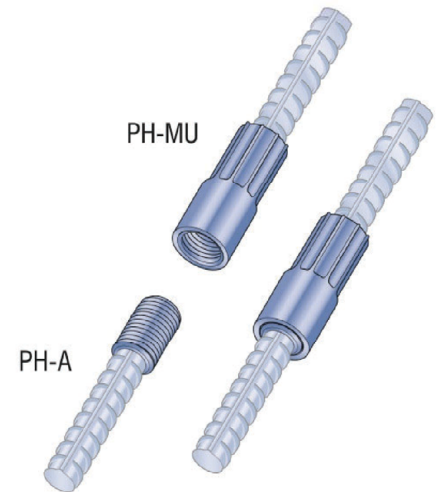


Fig. A1: PH-MU + PH-A

Table A2: **Combinations of same diameters using Threaded Connecting Bolts PH-K / PH-KD  
PH-MU + PH-K / PH-KD + PH-MU**

Combinations Type designation	Reinforcement Ø [mm]
PH-MU 8 + PH-K / PH-KD 8 + PH-MU 8	8
PH-MU 10 + PH-K / PH-KD 10 + PH-MU 10	10
PH-MU 12 + PH-K / PH-KD 12 + PH-MU 12	12
PH-MU 14 + PH-K / PH-KD 14 + PH-MU 14	14
PH-MU 16 + PH-K / PH-KD 16 + PH-MU 16	16
PH-MU 20 + PH-K / PH-KD 20 + PH-MU 20	20
PH-MU 25 + PH-K / PH-KD 25 + PH-MU 25	25
PH-MU 28 + PH-K / PH-KD 28 + PH-MU 28	28
PH-MU 32 + PH-K / PH-KD 32 + PH-MU 32	32
PH-MU 40 + PH-K / PH-KD 40 + PH-MU 40	40

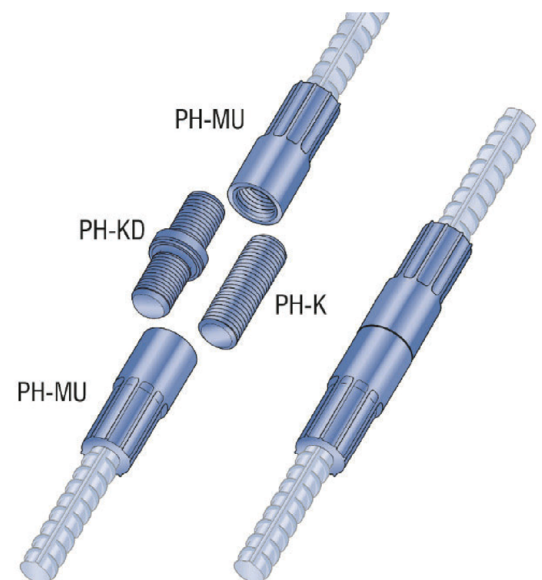


Fig. A2: PH-MU + PH-K / PH-KD + PH-MU

## PFEIFER Rebar Coupler System PH

### Product description

Connection systems PH-MU + PH-A, PH-MU + PH-K / PH-KD + PH-MU

## Annex A2

Table A3: **Combinations of same diameters using Coupling Sleeve PH-KM**  
**PH-A + PH-KM + PH-A**

Combinations Type designation	Reinforcement Ø [mm]
PH-A 12 + PH-KM 12 + PH-A 12	12
PH-A 14 + PH-KM 14 + PH-A 14	14
PH-A 16 + PH-KM 16 + PH-A 16	16
PH-A 20 + PH-KM 20 + PH-A 20	20
PH-A 25 + PH-KM 25 + PH-A 25	25
PH-A 28 + PH-KM 28 + PH-A 28	28
PH-A 32 + PH-KM 32 + PH-A 32	32

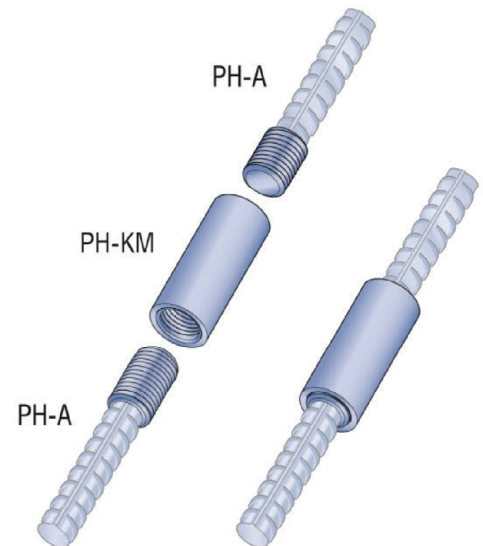


Fig. A3: PH-A + PH-KM + PH-A

Table A4: **Combinations of same diameters using Right-Left-Threaded Connecting Bolt PH-RL**  
**PH-MU + PH-RL + PH-MU LH**

Combinations Type designation	Reinforcement Ø [mm]
PH-MU 8 + PH-RL 8 + PH-MU 8 LH	8
PH-MU 10 + PH-RL 10 + PH-MU 10 LH	10
PH-MU 12 + PH-RL 12 + PH-MU 12 LH	12
PH-MU 14 + PH-RL 14 + PH-MU 14 LH	14
PH-MU 16 + PH-RL 16 + PH-MU 16 LH	16
PH-MU 20 + PH-RL 20 + PH-MU 20 LH	20
PH-MU 25 + PH-RL 25 + PH-MU 25 LH	25
PH-MU 28 + PH-RL 28 + PH-MU 28 LH	28
PH-MU 32 + PH-RL 32 + PH-MU 32 LH	32
PH-MU 40 + PH-RL 40 + PH-MU 40 LH	40

<sup>1)</sup> Left-hand thread

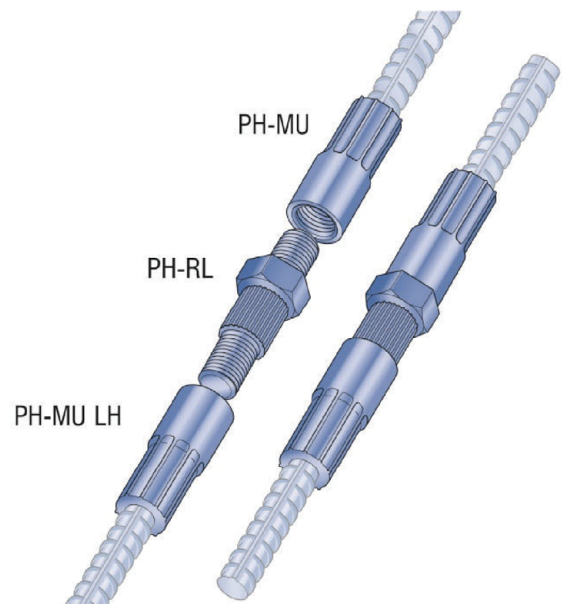


Fig. A4: PH-MU + PH-RL + PH-MU LH<sup>1)</sup>

## PFEIFER Rebar Coupler System PH

### Product description

Connection systems PH-A + PH-KM + PH-A, PH-MU + PH-RL + PH-MU LH

## Annex A3

Table A5: **Combinations of different diameters using Transition Bolt PH-RB**  
**PH-MU + PH-RB + PH-MU (LH)**

Combinations Type designation	Reinforcement	
	$\varnothing_1$ [mm]	$\varnothing_2$ [mm]
PH-MU 12 + PH-RB 12/10 <sup>1)</sup> + PH-MU 10	12	10
PH-MU 14 + PH-RB 14/12 <sup>1)</sup> + PH-MU 12	14	12
PH-MU 16 + PH-RB 16/14 <sup>1)</sup> + PH-MU 14	16	14
PH-MU 20 + PH-RB 20/16 <sup>1)</sup> + PH-MU 16	20	16
PH-MU 25 + PH-RB 25/20 <sup>1)</sup> + PH-MU 20	25	20
PH-MU 28 + PH-RB 28/25 <sup>1)</sup> + PH-MU 25	28	25
PH-MU 32 + PH-RB 32/28 <sup>1)</sup> + PH-MU 28	32	28
PH-MU 40 + PH-RB 40/32 <sup>1)</sup> + PH-MU 32	40	32
PH-MU 16 + PH-RB 16/12 <sup>1)</sup> + PH-MU 12	16	12
PH-MU 28 + PH-RB 28/20 <sup>1)</sup> + PH-MU 20	28	20
PH-MU 32 + PH-RB 32/25 <sup>1)</sup> + PH-MU 25	32	25

1) Alternatively the small thread of the Transition Bolt can be designed as left-hand thread LH

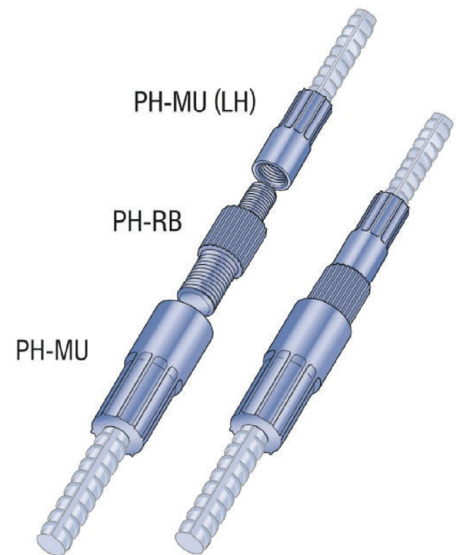


Fig. A5: PH-MU + PH-RB + PH-MU (LH)

Table A6: **Combinations of different diameters using Transition Coupler PH-RM**  
**PH-A + PH-RM + PH-A or**  
**PH-MU + PH-K + PH-RM + PH-A**

Combinations Type designation	Reinforcement	
	$\varnothing_1$ [mm]	$\varnothing_2$ [mm]
PH-A 12 + PH-RM 12/10 + PH-K 10 + PH-MU 10	12	10
PH-A 14 + PH-RM 14/12 + PH-A 12 <sup>1)</sup>	14	12
PH-A 16 + PH-RM 16/14 + PH-A 14 <sup>1)</sup>	16	14
PH-A 20 + PH-RM 20/16 + PH-A 16 <sup>1)</sup>	20	16
PH-A 25 + PH-RM 25/20 + PH-A 20 <sup>1)</sup>	25	20
PH-A 28 + PH-RM 28/25 + PH-A 25 <sup>1)</sup>	28	25
PH-A 32 + PH-RM 32/28 + PH-A 28 <sup>1)</sup>	32	28
PH-A 16 + PH-RM 16/12 + PH-A 12 <sup>1)</sup>	16	12
PH-A 28 + PH-RM 28/20 + PH-A 20 <sup>1)</sup>	28	20
PH-A 32 + PH-RM 32/25 + PH-A 25 <sup>1)</sup>	32	25

1) Either one of the two Male Bars can be replaced by a Female Bar PH-MU with Connecting Bolt

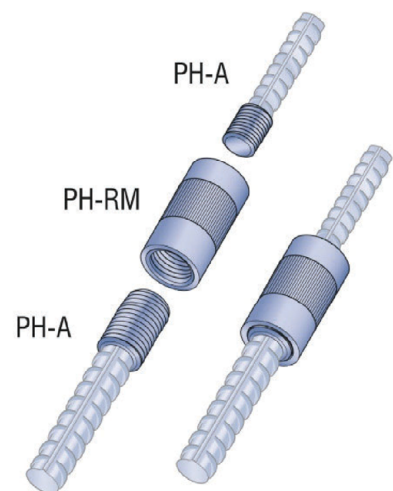


Fig. A6: PH-A + PH-RM + PH-A

## PFEIFER Rebar Coupler System PH

### Product description

Connection systems PH-MU + PH-RB + PH-MU, PH-A + PH-RM + PH-A

## Annex A4

Table A7: **Combinations of different diameters using Transition Female Bar PH-MUR**  
**PH-MUR + PH-A or**  
**PH-MUR + PH-K + PH-MU**

Combinations Type designation	Reinforcement	
	$\varnothing_1$ [mm]	$\varnothing_2$ [mm]
PH-MUR 12/10 + PH-K 10 + PH-MU 10	12	10
PH-MUR 14/12 + PH-A 12 <sup>1)</sup>	14	12
PH-MUR 16/14 + PH-A 14 <sup>1)</sup>	16	14
PH-MUR 20/16 + PH-A 16 <sup>1)</sup>	20	16
PH-MUR 25/20 + PH-A 20 <sup>1)</sup>	25	20
PH-MUR 28/25 + PH-A 25 <sup>1)</sup>	28	25
PH-MUR 32/28 + PH-A 28 <sup>1)</sup>	32	28
PH-MUR 40/32 + PH-A 32 <sup>1)</sup>	40	32

<sup>1)</sup> The Male Bar can be replaced  
by a Female Bar PH-MU with Connecting Bolt

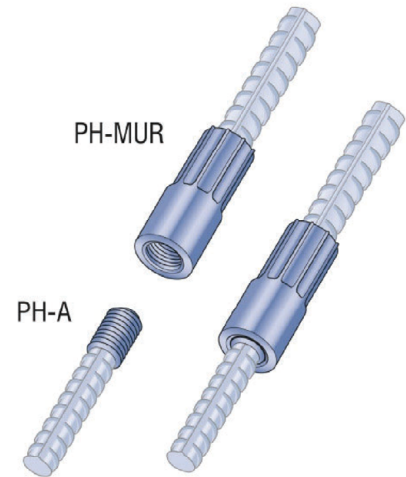


Fig. A7: PH-MUR + PH-A

Table A8: **Combinations of same diameters using Position Coupler PH-PA**  
**PH-MU + Bar PH-A or**  
**PH-MU + PH-K + PH-MU**

Combinations Type designation	Reinforcement $\varnothing$ [mm]
PH-MU 12 + PH-PA 12 + PH-A 12 <sup>1)</sup>	12
PH-MU 14 + PH-PA 14 + PH-A 14 <sup>1)</sup>	14
PH-MU 16 + PH-PA 16 + PH-A 16 <sup>1)</sup>	16
PH-MU 20 + PH-PA 20 + PH-A 20 <sup>1)</sup>	20
PH-MU 25 + PH-PA 25 + PH-A 25 <sup>1)</sup>	25
PH-MU 28 + PH-PA 28 + PH-A 28 <sup>1)</sup>	28
PH-MU 32 + PH-PA 32 + PH-A 32 <sup>1)</sup>	32
PH-MU 40 + PH-PA 40 + PH-K 40 + PH-MU 40	40

<sup>1)</sup> The Male Bar can be replaced  
by a Female Bar PH-MU with Connecting Bolt

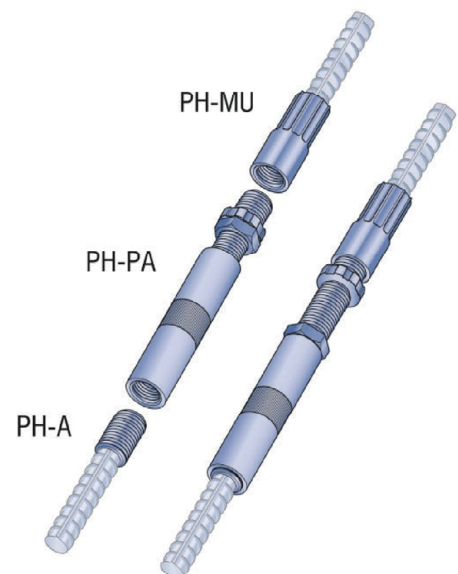


Fig. A8: PH-MU + PH-PA + PH-A

## PFEIFER Rebar Coupler System PH

### Product description

Connection systems PH-MUR + PH-A, PH-MU + PH-PA + PH-A

## Annex A5

Table A9: **Connection to steel component using Welding Coupler PH-AH**  
**PH-A + PH-AH or**  
**PH-MU + PH-K PH-AH**

Combinations Type designation	Reinforcement Ø [mm]
PH-AH 12 + PH-A 12 <sup>1)</sup>	12
PH-AH 14 + PH-A 14 <sup>1)</sup>	14
PH-AH 16 + PH-A 16 <sup>1)</sup>	16
PH-AH 20 + PH-A 20 <sup>1)</sup>	20
PH-AH 25 + PH-A 25 <sup>1)</sup>	25
PH-AH 28 + PH-A 28 <sup>1)</sup>	28
PH-AH 32 + PH-A 32 <sup>1)</sup>	32
PH-AH 40 + PH-K 40 + PH-MU 40	40

<sup>1)</sup> The Male Bar can be replaced  
by a Female Bar PH-MU with Connecting Bolt

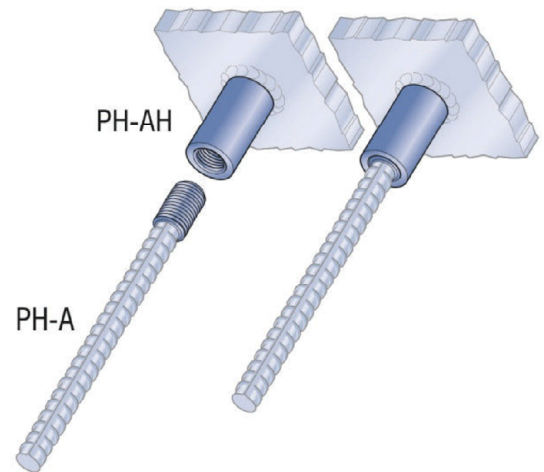


Fig. A9: PH-AH + PH-A

## PFEIFER Rebar Coupler System PH

**Product description**  
Connection system PH-AH + PH-A

**Annex A6**

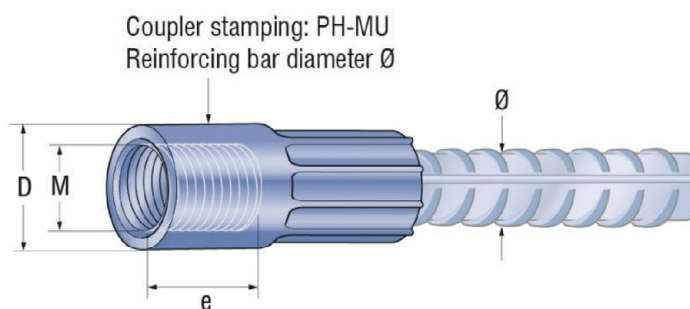


Fig. A10: PFEIFER Female Bar PH-MU (LH)<sup>1)</sup>

Table A10: Dimensions PFEIFER Female Bar PH-MU

Type / Size	Reinforcing bar diameter $\emptyset$ [mm]	Thread right-/ left handed (LH) M [mm]	Coupler external diameter D [mm]	Usable thread length e $\geq$ [mm]
PH-MU 8	8	M 12 x 1,75	16,0	15
PH-MU 10	10	M 14 x 2,00	19,2	17
PH-MU 12	12	M 16 x 2,00	22,3	20
PH-MU 14	14	M 18 x 2,50	25,5	22
PH-MU 16	16	M 20 x 2,50	28,8	24
PH-MU 20	20	M 24 x 3,00	35,3	32
PH-MU 25	25	M 30 x 3,50	44,1	40
PH-MU 28	28	M 36 x 4,00	51,0	42
PH-MU 32	32	M 42 x 4,50	55,8	52
PH-MU 40	40	M 52 x 5,00	70,0	70

<sup>1)</sup> Optionally with left-hand thread LH

Table A11: Materials PFEIFER Female Bar PH-MU

Sleeve	Steel tubes for precision applications according to EN 10305-1 Material: E 355 +N Material Nr.: 1.0580 +N
	Round material according to EN 10025-2 Material: S 355 J2 Material Nr.: 1.0577
Reinforcement	B500B, B500C

## PFEIFER Rebar Coupler System PH

### Product description

Female Bar PH-MU: Components, dimensions, materials

## Annex A7

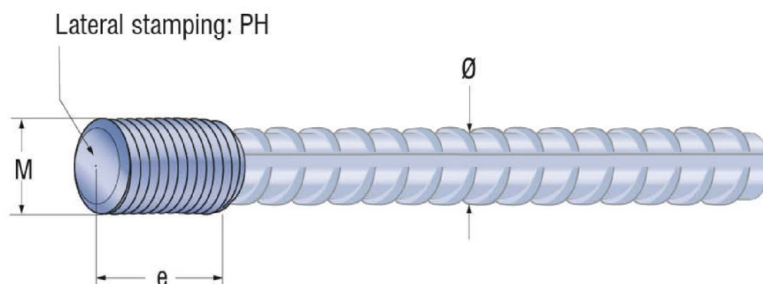


Fig. A11: PFEIFER Male Bar PH-A

Table A12: Dimensions PFEIFER Male Bar PH-A

Type / Size	Reinforcing bar diameter $\varnothing$ [mm]	Right-hand thread M [mm]	Usable thread length e $\geq$ [mm]
PH-A 12	12	M 16 x 2,00	17
PH-A 14	14	M 18 x 2,50	20
PH-A 16	16	M 20 x 2,50	23
PH-A 20	20	M 24 x 3,00	30
PH-A 25	25	M 30 x 3,50	38
PH-A 28	28	M 36 x 4,00	40
PH-A 32	32	M 32 x 4,50	50

Table A13: Materials Male Bar PH-A

Reinforcement	B500B
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## PFEIFER Rebar Coupler System PH

### Product description

Male Bar PH-A: Components, dimensions, materials

## Annex A8

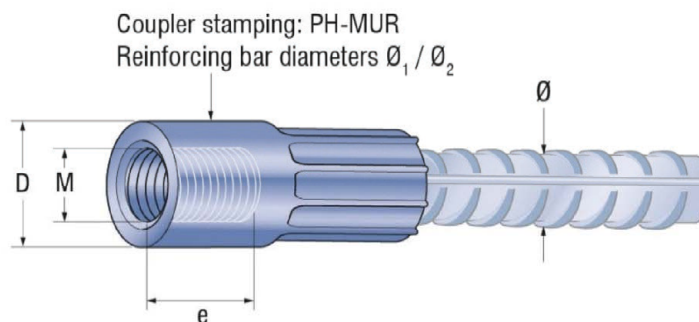


Fig. A12: PFEIFER Transition Female Bar PH-MUR

Table A14: Dimensions PFEIFER Transition Female Bar PH-MUR

Type / Size	Reinforcing bar diameter $\varnothing$ [mm]	Right-hand thread M [mm]	Coupler external diameter D [mm]	Usable thread length e ≥ [mm]
PH-MUR 12/10	12	M 14 x 2,00	22,3	17
PH-MUR 14/12	14	M 16 x 2,00	25,5	20
PH-MUR 16/14	16	M 18 x 2,50	28,8	22
PH-MUR 20/16	20	M 20 x 2,50	35,3	24
PH-MUR 25/20	25	M 24 x 3,00	44,1	32
PH-MUR 28/25	28	M 30 x 3,50	51,0	40
PH-MUR 32/28	32	M 36 x 4,00	55,8	42
PH-MUR 40/32	40	M 42 x 4,50	70,0	52

Table A15: Materials Transition Female Bar PH-MUR

Sleeve	Steel tubes for precision applications according to EN 10305-1 Material: E 355 +N Material Nr.: 1.0580 +N
	Round material according to EN 10025-2 Material: S 355 J2 Material Nr.: 1.0577
Reinforcement	B500B

## PFEIFER Rebar Coupler System PH

### Product description

Transition Female Bar PH-MUR: Components, dimensions, materials

## Annex A9

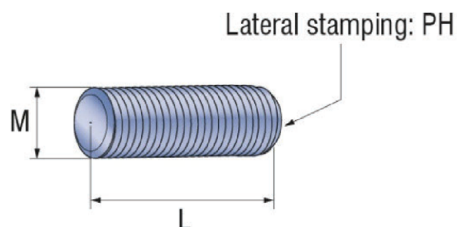


Fig. A13: PFEIFER Connecting Bolt PH-K

Table A16: **Dimensions PFEIFER Connecting Bolt PH-K**

Type / Size	Right-hand thread M [mm]	Total length L [mm]
PH-K 8	M 12 x 1,75	28
PH-K 10	M 14 x 2,00	34
PH-K 12	M 16 x 2,00	40
PH-K 14	M 18 x 2,50	43
PH-K 16	M 20 x 2,50	50
PH-K 20	M 24 x 3,00	65
PH-K 25	M 30 x 3,50	80
PH-K 28	M 36 x 4,00	85
PH-K 32	M 42 x 4,50	106
PH-K 40	M 52 x 5,00	145

Table A17: **Material PFEIFER Connecting Bolt PH-K**

Bolt	Steel for quenching and tempering, strength class $\geq 8.8$
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## PFEIFER Rebar Coupler System PH

### Product description

Threaded Connection Bolt PH-K: Components, dimensions, materials

## Annex A10

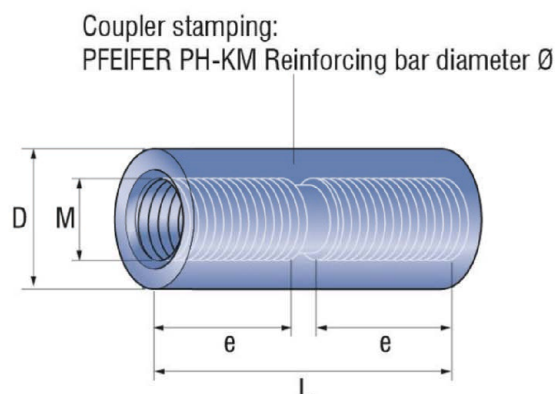


Fig. A14: PFEIFER Connecting Sleeve PH-KM

Table A18: Dimensions PFEIFER Connecting Sleeve PH-KM

Type / Size	Right-hand thread M [mm]	Coupler external diameter $D_{min}$ [mm]	Total length L [mm]	Usable thread length $e \geq$ [mm]
PH-KM 12	M 16 x 2,00	22,3	45	21
PH-KM 14	M 18 x 2,50	25,5	52	25
PH-KM 16	M 20 x 2,50	28,8	58	27
PH-KM 20	M 24 x 3,00	35,3	73	34
PH-KM 25	M 30 x 3,50	44,1	88	41
PH-KM 28	M 36 x 4,00	51,0	90	42
PH-KM 32	M 42 x 4,50	55,8	111	52

Table A19: Materials PFEIFER Connecting Socket PH-KM

Sleeve	Steel tubes for precision applications according to EN 10305-1 Material: E 355 +N Material Nr.: 1.0580 +N
	Round material according to EN 10025-2 Material: S 355 J2 Material Nr.: 1.0577

## PFEIFER Rebar Coupler System PH

### Product description

Connection Sleeve PH-KM: Components, dimensions, materials

## Annex A11

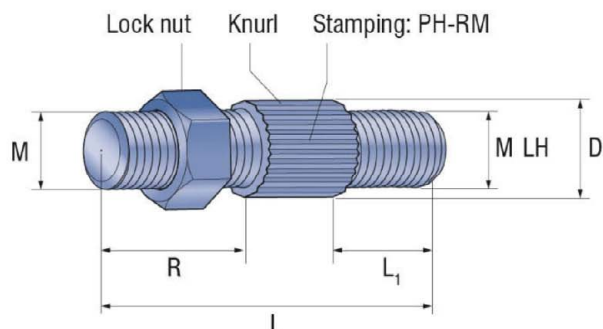


Fig. A15: PFEIFER Right-Left Connecting Bolt PH-RL

Table A20: Dimensions PFEIFER Right-Left-Threaded Connecting Bolt PH-RL

Type / Size	Thread right/ left handed (LH) M [mm]	External diameter D [mm]	Length left- hand thread L <sub>1</sub> [mm]	Length right- hand thread R [mm]	Total length L [mm]
PH-RL 8	M 12 x 1,75	16,5	12	24	61
PH-RL 10	M 14 x 2,00	18,5	16	30	71
PH-RL 12	M 16 x 2,00	20,5	19	35	79
PH-RL 14	M 18 x 2,50	24,0	21	39	85
PH-RL 16	M 20 x 2,50	27,2	23	42	90
PH-RL 20	M 24 x 3,00	33,4	31	53	109
PH-RL 25	M 30 x 3,50	41,8	39	67	131
PH-RL 28	M 36 x 4,00	48,5	41	74	145
PH-RL 32	M 42 x 4,50	50,5	50	90	170
PH-RL 40	M 52 x 5,00	70,5	70	120	230

Table A21: Materials PFEIFER Right-Left-Threaded Connecting Bolt PH-RL

Bolt	Steel for quenching and tempering, strength class $\geq 8.8$
Lock nut	Nut according to EN ISO 4032, Strength Class $\geq 8$

## PFEIFER Rebar Coupler System PH

### Product description

Right-Left-Threaded Connection Bolt: PH-RL: Components, dimensions, materials

## Annex A12

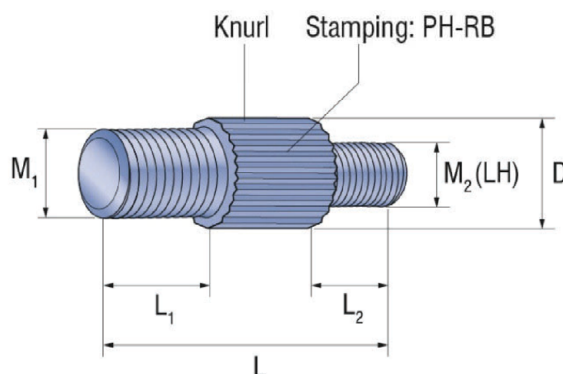


Fig. A16: PFEIFER Transition Bolt PH-RB

Table A22: Dimensions PFEIFER Transition Bolt PH-RB

Type / Size	Right-hand thread	Thread right-/ left handed (LH)	External diameter	Thread length	Thread length	Total length
	M <sub>1</sub> [mm]	M <sub>2</sub> [mm]	D [mm]	L <sub>1</sub> [mm]	L <sub>2</sub> [mm]	L [mm]
PH-RB 12/10	M 16 x 2,00	M 14 x 2,00	20,5	19	16	60
PH-RB 14/12	M 18 x 2,50	M 16 x 2,00	24,0	21	19	65
PH-RB 16/14	M 20 x 2,50	M 18 x 2,50	27,0	23	21	69
PH-RB 20/16	M 24 x 3,00	M 20 x 2,50	33,5	31	23	79
PH-RB 25/20	M 30 x 3,50	M 24 x 3,00	42,0	39	31	95
PH-RB 28/25	M 36 x 4,00	M 30 x 3,50	48,5	41	39	110
PH-RB 32/28	M 42 x 4,50	M 36 x 4,00	50,5	50	41	121
PH-RB 40/32	M 52 x 5,00	M 42 x 4,50	70,5	70	50	160
PH-RB 16/12	M 20 x 2,50	M 16 x 2,00	27,0	23	19	67
PH-RB 28/20	M 36 x 4,00	M 24 x 3,00	48,5	41	31	102
PH-RB 32/25	M 42 x 4,50	M 30 x 3,50	50,5	50	39	119

Table A23: Materials PFEIFER Transition bolt PH-RB

Bolt	Steel for quenching and tempering, strength class $\geq 8.8$
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## PFEIFER Rebar Coupler System PH

### Product description

Transition Bolt PH-RB: Components, dimensions, materials

## Annex A13

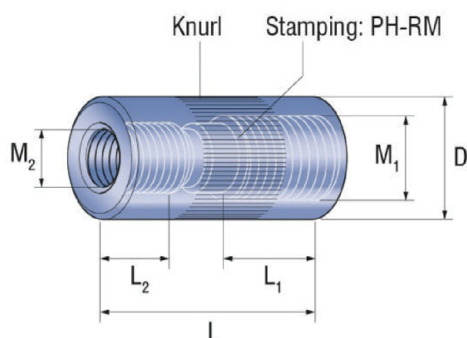


Fig. A17: PFEIFER Transition Coupler PH-RM

Table A24: Dimensions PFEIFER Transition Coupler PH-RM

Type / Size	Right-hand thread M <sub>1</sub> [mm]	Right-hand thread M <sub>2</sub> [mm]	External diameter D [mm]	Thread length L <sub>1</sub> [mm]	Thread length L <sub>2</sub> [mm]	Total length L [mm]
PH-RM 12/10	M 16 x 2,00	M 14 x 2,00	22	20	17	50
PH-RM 14/12	M 18 x 2,50	M 16 x 2,00	25	22	20	55
PH-RM 16/14	M 20 x 2,50	M 18 x 2,50	30	24	22	60
PH-RM 20/16	M 24 x 3,00	M 20 x 2,50	35	32	24	75
PH-RM 25/20	M 30 x 3,50	M 24 x 3,00	45	40	32	90
PH-RM 28/25	M 36 x 4,00	M 30 x 3,50	50	42	40	105
PH-RM 32/28	M 42 x 4,50	M 36 x 4,00	55	52	42	115
PH-RM 16/12	M 20 x 2,50	M 16 x 2,00	30	24	20	60
PH-RM 28/20	M 36 x 4,00	M 24 x 3,00	50	42	32	95
PH-RM 32/25	M 42 x 4,50	M 30 x 3,50	55	52	40	115

Table A25: Materials PFEIFER Transition Coupler PH-RM

Socket	Steel tubes for precision applications according to EN 10305-1 Material: E 355 +N Material Nr.: 1.0580 +N
	Round material according to EN 10025-2 Material: S 355 J2 Material Nr.: 1.0577

## PFEIFER Rebar Coupler System PH

### Product description

Transition Coupler PH-RM: Components, dimensions, materials

## Annex A14

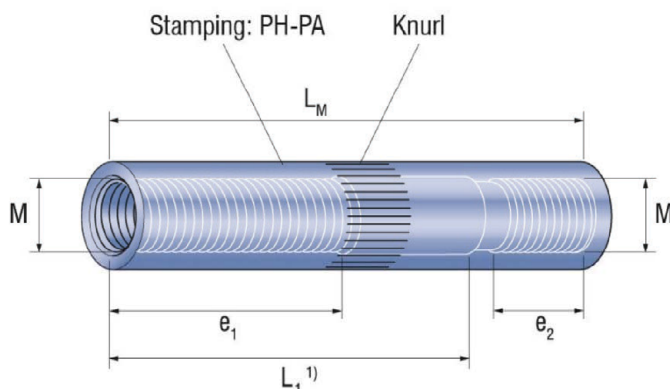


Fig. A18: Sleeve of PFEIFER Position Coupler PH-PA

Table A26: Sleeve dimensions PFEIFER Position Coupler PH-PA

Type / Size	Right-hand thread M [mm]	External diameter $D_{min}$ [mm]	Sleeve total length $L_M$ [mm]	max. Screw-in length $L_1$ [mm]	Thread length $e_1 \geq$ [mm]	Usable thread length $e_2 \geq$ [mm]
PH-PA 12	M 16 x 2,00	22,3	115	90	70	20
PH-PA 14	M 18 x 2,50	25,5	125	98	78	22
PH-PA 16	M 20 x 2,50	28,8	130	101	81	24
PH-PA 20	M 24 x 3,00	35,3	180	143	103	32
PH-PA 25	M 30 x 3,50	44,1	210	160	120	40
PH-PA 28	M 36 x 4,00	51,0	220	168	128	42
PH-PA 32	M 42 x 4,50	55,8	260	198	98	52
PH-PA 40	M 52 x 5,00	70,0	320	240	100	70

Table A27: Materials PFEIFER Position Coupler PH-PA

Sleeve	Steel tube for precision applications EN 10305-1 Material: E 355 +N Material Nr.: 1.0580 +N
	Round material according to EN 10025-2 Material: S 355 J2 Material Nr.: 1.0577

## PFEIFER Rebar Coupler System PH

### Product description

Position Coupler PH-PA: Components, dimensions, materials

## Annex A15

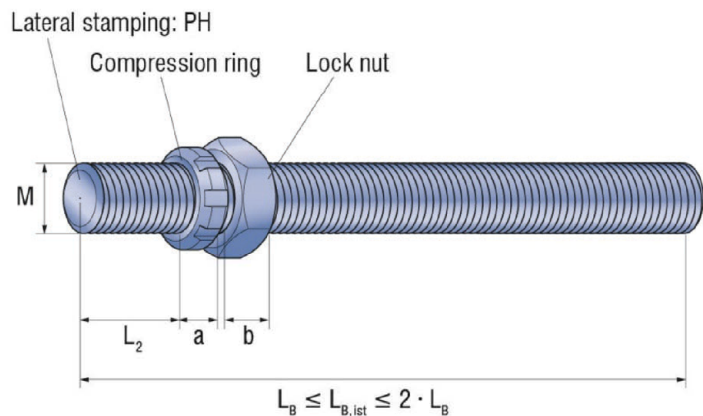


Fig. A19: Bolt of PFEIFER Position Coupler PH-PA

Table A28: Bolt dimensions PFEIFER Positioning Connector PH-PA

Type / Size	Right-hand thread	Thread length	Total bolt length	Compression ring thickness	Lock nut thickness (thin)	Lock nut thickness (regular)
	M [mm]	L <sub>2</sub> [mm]	L <sub>B</sub> [mm]	a [mm]	b [mm]	b [mm]
PH-PA 12	M 16 x 2,00	30	135	10	8	15
PH-PA 14	M 18 x 2,50	32	150	10	9	16
PH-PA 16	M 20 x 2,50	36	160	14	10	18
PH-PA 20	M 24 x 3,00	44	210	14	12	22
PH-PA 25	M 30 x 3,50	58	250	16	15	26
PH-PA 28	M 36 x 4,00	60	260	16	18	31
PH-PA 32	M 42 x 4,50	72	310	20	21	34
PH-PA 40	M 52 x 5,00	90	375	20	26	42

Table A29: Materials PFEIFER Position Coupler PH-PA

Bolt	Steel for quenching and tempering, strength class ≥ 8.8
Lock nut <sup>1)</sup>	Nut (thin) according to EN ISO 4035, strength class ≥ 04
	Nut (regular) according to EN ISO 4032, strength class 8

<sup>1)</sup> In case of compression or alternating loads, the lock nut (regular) shall be used!  
 Lock nut (thin) only for tensile loads!

PFEIFER Rebar Coupler System PH	Annex A16
<b>Product description</b> Position Coupler PH-PA: Components, dimensions, materials	

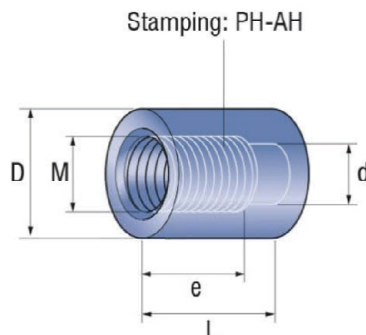


Fig A20: PFEIFER Welding Coupler PH-AH

Table A30: Dimensions PFEIFER Welding Coupler PH-AH

Type / Size	Right-hand thread M [mm]	External diameter D ≥ [mm]	Internal diameter (thread core) d ≤ [mm]	Usable thread length e ≥ [mm]	Total length L ≥ [mm]
PH-AH 12	M 16 x 2,00	22,3	14,6	20	35
PH-AH 14	M 18 x 2,50	25,5	16,6	22	40
PH-AH 16	M 20 x 2,50	28,8	18,5	24	40
PH-AH 20	M 24 x 3,00	35,3	22,4	32	50
PH-AH 25	M 30 x 3,50	44,1	28,5	40	55
PH-AH 28	M 36 x 4,00	51,0	34,0	42	65
PH-AH 32	M 42 x 4,50	55,8	39,0	52	75
PH-AH 40	M 52 x 5,00	70,0	48,0	70	90

Table A31: Materials PFEIFER Welding Coupler PH-AH

Socket	Steel tube for precision applications according to EN 10305-1 Material: E 355 +N Material Nr.: 1.0580 +N
	Round material according to EN 10025-2 Material: S 355 J2 Material Nr.: 1.0577

## PFEIFER Rebar Coupler System PH

### Product description

Welding Coupler PH-AH: Components, dimensions, materials

## Annex A17

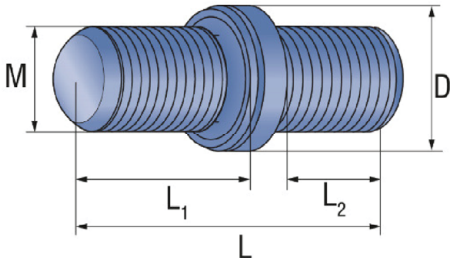


Fig A21: PFEIFER Threaded Connecting Bolt PH-KD with Torque Control

Table A32: Dimensions PFEIFER Threaded Connecting Bolt PH-KD with Torque Control

Type / Size	Right-hand thread	External diameter	Thread length	Thread length	Total length
	M [mm]	D [mm]	L <sub>1</sub> [mm]	L <sub>2</sub> [mm]	L [mm]
PH-KD 8	M 12 x 1,75	16,0	12,0	12,0	36
PH-KD 10	M 14 x 2,00	19,0	16,0	16,0	44
PH-KD 12	M 16 x 2,00	21,5	19,0	19,0	50
PH-KD 14	M 18 x 2,50	24,0	20,5	21,0	55
PH-KD 16	M 20 x 2,50	27,5	22,5	23,0	59
PH-KD 20	M 24 x 3,00	34,0	30,5	31,0	75
PH-KD 25	M 30 x 3,50	43,0	38,0	39,0	92
PH-KD 28	M 36 x 4,00	50,0	40,0	41,0	96
PH-KD 32	M 42 x 4,50	53,5	50,0	50,0	115
PH-KD 40	M 52 x 5,00	68,0	68,0	70,0	153

Table A33: Materials PFEIFER Threaded Connecting Bolt PH-KD with Torque Control

Bolt	Steel for quenching and tempering, strength class ≥ 8.8
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PFEIFER Rebar Coupler System PH	Annex A18
<b>Product description</b> Threaded Connecting Bolt PH-KD with Torque Control: Components, dimensions, materials	

**Intended use**

- As mechanical splices according to the EN 1992-1-1 and the EN 1998-1 and Annex C
  - Transmission of static or quasi static tensile and compression loads according to EN 1992-1-1, Section 8.7 and 8.8(4).
  - Slip limitation according to EN 1992-1-1, Section 7.3.
  - Transmission of high-cycle fatigue loads with fatigue strength according to the EN 1992-1-1, Section 6.8.4.
  - Resistance to low-cycle seismic loading according to the EN 1998-1, Section 5.6.3(2).
  - The Welding Couplers PH-AH are used to connect reinforcing steel bars with steel components. The load transmission from the steel reinforcing bar to the steel component via the welds has to be verified for each case by the responsible engineer.

PFEIFER Rebar Coupler System PH		Annex B1
Intended use Specifications		

## Specifications, installation requirements

- All bars may be coupled in one cross section (full joint).
- Position Couplers PH-PA have to be used with regular lock nuts in case of compression or alternating loading. In case of tensile loads, they may be used with either a regular or thin lock nut.
- With regard to the concrete cover to the outer edge of a coupler and the clear distance between two adjacent coupler surfaces, the same values apply as for non-lapped bars according to the EN 1992-1-1.
- In case of bent (pre-bent) bars, the planned bending shall not begin at a distance of at least 5 times the nominal diameter of the rebar from the end of the coupler. If the Female Bars are bent at the manufacturing plant using a special device, the distance may be reduced to twice the nominal diameter of the bar.
- Installation of the splices by appropriately trained personnel under the supervision of the responsible site manager.
- Use of PFEIFER Rebar Coupler System PH as supplied by the manufacturer, without changing or replacing individual parts.
- Before installation, the proper condition of the internal and external thread shall be checked.
- Suitable measures (e.g. plastic caps) shall be used to avoid the penetration of concrete or other contaminants in the couplers. Impurities in the coupler shall be removed before screwing in the Male Bars.
- Installation of Rebar Coupler System according to manufacturer's instructions, see assembly instructions Annex B3 to B6.
- Secure fixing of the Rebar Couplers PH to the formwork, so that they do not move while laying the reinforcement or pouring and compacting the concrete.
- All threads shall be protected against penetration of water and oil.
- In order to connect the Welding Coupler PH-AH to a steel component, a welding procedure specification WPS in accordance with the EN ISO 15609-1 shall be available and shall be observed by the welding personnel. The welding manufacturer shall submit a welding certificate in accordance with the EN 1090-1, Table B.1. The welders must have valid welder's test certificates in accordance with EN ISO 9606-1. The Welding Coupler and the steel component shall be protected against corrosion in accordance with the applicable provisions, see EN ISO 12944-5.
- After the individual threaded parts have been screwed on, each connection must be secured with the associated installation torque in accordance with Table B1 using torque wrench.
- When using Threaded Connecting Bolt PH-KD with Torque Control, the connection must be tightened until the annular gap on the connecting bolt is closed. The use of special tools (e.g. torque wrench) is **not** required. The installation torques  $M_t$  according to Table B1 are **not** to be observed.

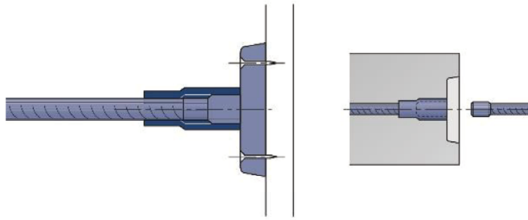
Table B1: Installation torque  $M_t$

Size	Reinforcing bar diameter $\varnothing$ [mm]	Installation torque moment $M_t$ [Nm]
PH 8	8	20
PH 10	10	25
PH 12	12	30
PH 14	14	40
PH 16	16	60
PH 20	20	80
PH 25	25	100
PH 28	28	140
PH 32	32	180
PH 40	40	200

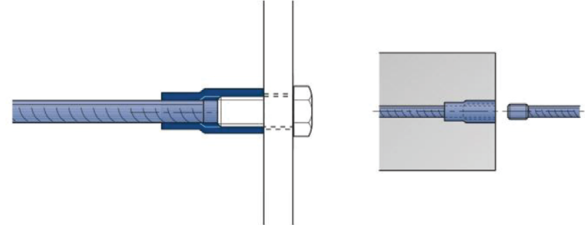
### PFEIFER Rebar Coupler System PH

Intended use  
Specifications, installation requirements

**Annex B2**

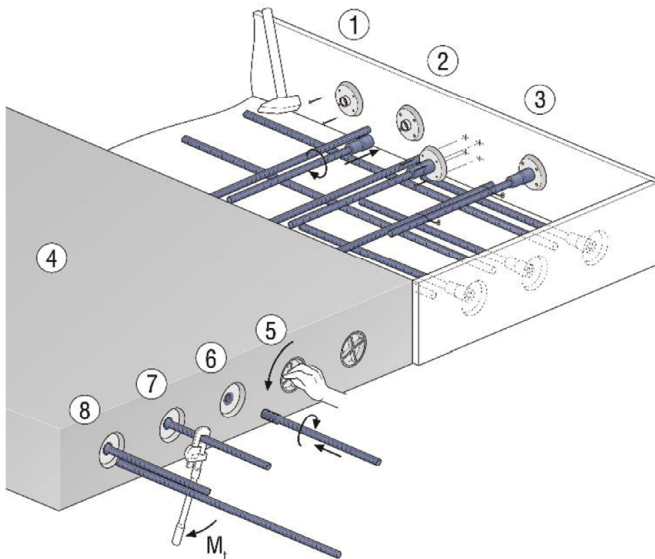


Fixing to wooden formwork with PVC Nail Plate



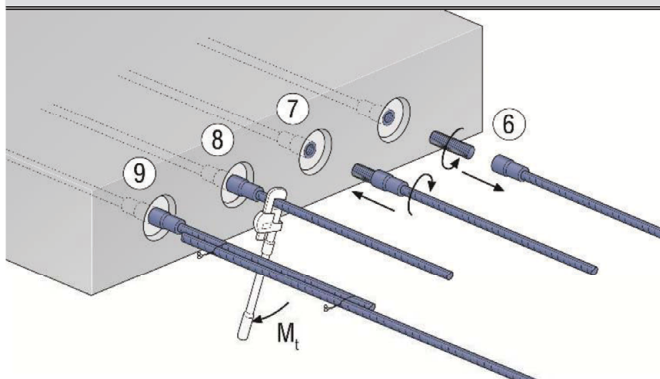
Fixing to wooden/plastic/steel formwork with screw

#### PH-MU + PH-A and PH-MUR + PH-A



- 1 Nail on Nail Plate onto formwork
- 2 Connect and lock Female Bar  
Alternatively: plug Nail Plate onto Female Bar and nail it onto formwork
- 3 Install reinforcement and fasten it securely
- 4 Fill in concrete
- 5 Remove formwork, then Nail Plate and check internal thread of coupler
- 6 Remove threaded cap from Male Bar and screw in Male Bar into Female Bar
- 7 Apply installation torque  $M_t$  (use torque wrench)
- 8 Install reinforcement and fasten it securely
- 9 Fill in concrete

#### PH-MU + PH-K / PH-RB + PH-MU and PH-MU + PH-KD + PH-MU



- 1 - 5 as above
- 6 Screw Connecting Bolt into Female Bar
- 7 Screw Female Bar and Connecting Bolt into embedded Female Bar
- 8 PH-K or PH-RB: Apply installation torque  $M_t$  (use torque wrench)  
or  
PH-KD: Tighten the connection until the annular gap on the connecting bolt is closed.  
The use of special tools (e.g. torque wrench) is **not** necessary, assembly torques  $M_t$  do **not** have to be taken into account.
- 9 Install reinforcement and fasten it securely
- 10 Fill in concrete

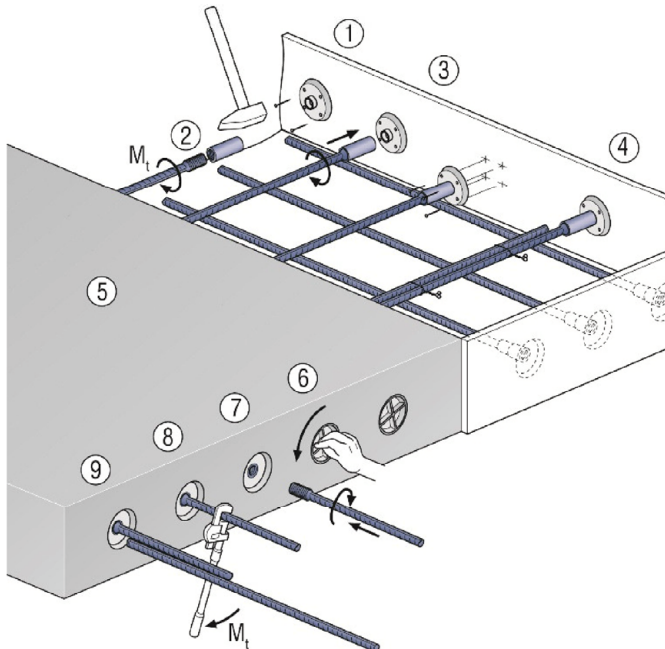
#### PFEIFER Rebar Coupler System PH

##### Intended use

Installation manual: PH-MU + PH-A, PH-MUR + PH-A,  
PH-MU + PH-K / PH-RB + PH-MU, PH-MU + PH-KD + PH-MU

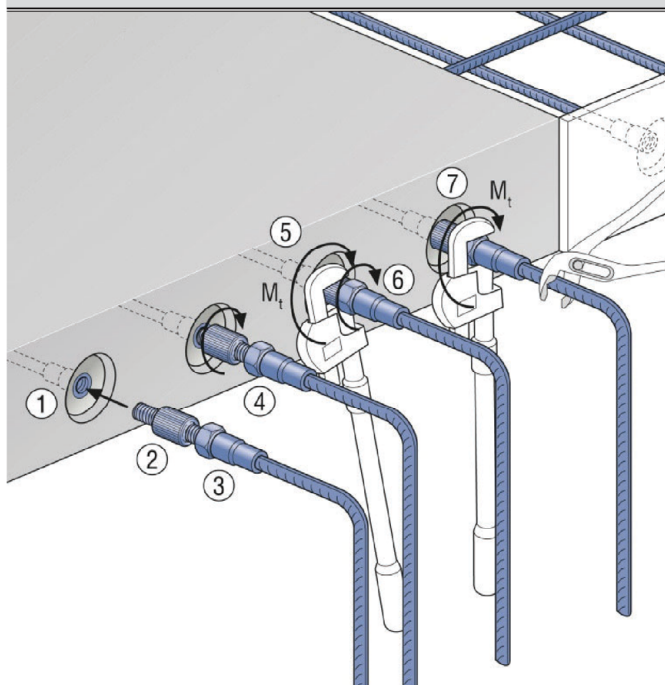
#### Annex B3

PH-A + PH-KM + PH-A and PH-A + PH-RM + PH-A



- 1 Nail on Nail Plate onto formwork
- 2 Screw Coupling Sleeve onto Male Bar, tighten hand-tight
- 3 Connect and lock Coupling Sleeve with screwed-in Male Bar onto Nail Plate  
Alternatively: Plug Nail Plate onto Coupling Sleeve with screwed-in Male Bar and nail it onto formwork
- 4 Install reinforcement and fasten it securely
- 5 Fill in concrete
- 6 Remove formwork, then Nail Plate and check internal thread of coupler
- 7 Remove threaded cap from Male Bar, screw Male Bar into Coupling Sleeve
- 8 Apply installation torque  $M_t$  (use torque wrench)
- 9 Install reinforcement and fasten it securely
- 10 Fill in concrete

PH-MU + PH-RL + PH-MU



- 1 Cast-in Female Bar with left-hand thread
- 2 Turn slightly lock nut onto coupler to prevent it from thickening
- 3 Turn Right-Left-Threaded Connecting Bolt into Female Bar with right-hand thread
- 4 Move Right-Left-Threaded Connecting Bolt with Female Bar with right-hand thread to embedded Female Bar with left-hand thread, turn knurling anti-clockwise
- 5 Tighten Right-Left-Threaded Connecting Bolt with installation torque  
Note the assembly torque  $M_t$ !
- 6 Screw lock nut against Coupler
- 7 Secure Female Bar with right-hand thread with a wrench and tighten lock nut with installation torque!  
Note assembly torque  $M_t$ !

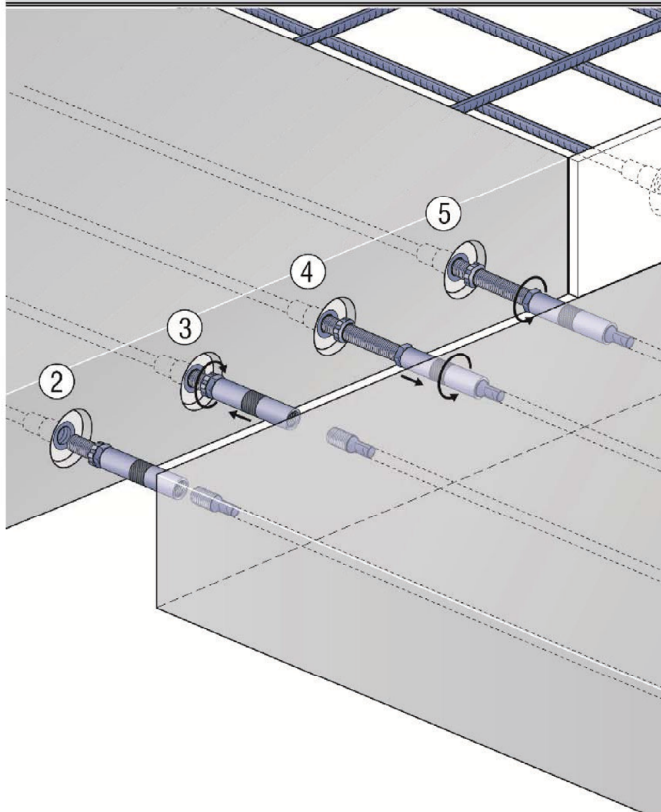
**PFEIFER Rebar Coupler System PH**

**Intended use**

Installation manual: PH-A + PH-KM + PH-A, PH-A + PH-RM + PH-A  
PH-MU + PH-RL + PH-MU

**Anhang B4**

# PH-MU + PH-PA + PH-A



PFEIFER Position Couplers are used when neither the reinforcing steel bar to be connected can be freely rotated nor axial displacement is possible.

## Requirements

Correctly installed Female Bars with right-hand thread

## Please note

Position Coupler can only be used with right-hand threaded Female or Male Bars!

- 1 Place Coupler with bolt fully screwed between two rods to be connected  
Note: Male Bar conditionally displaceable
- 2 Screw Position Coupler with threaded bolt in embedded Female Bar and tighten  
Note assembly installation torque  $M_t$ !
- 3 Unscrew sleeve of Position Coupler until Male Bar is completely screwed in  
Observe tolerances, see Annex B6
- 4 Secure connection by tightening Coupler and lock nut  
Note assembly installation torque  $M_t$ !

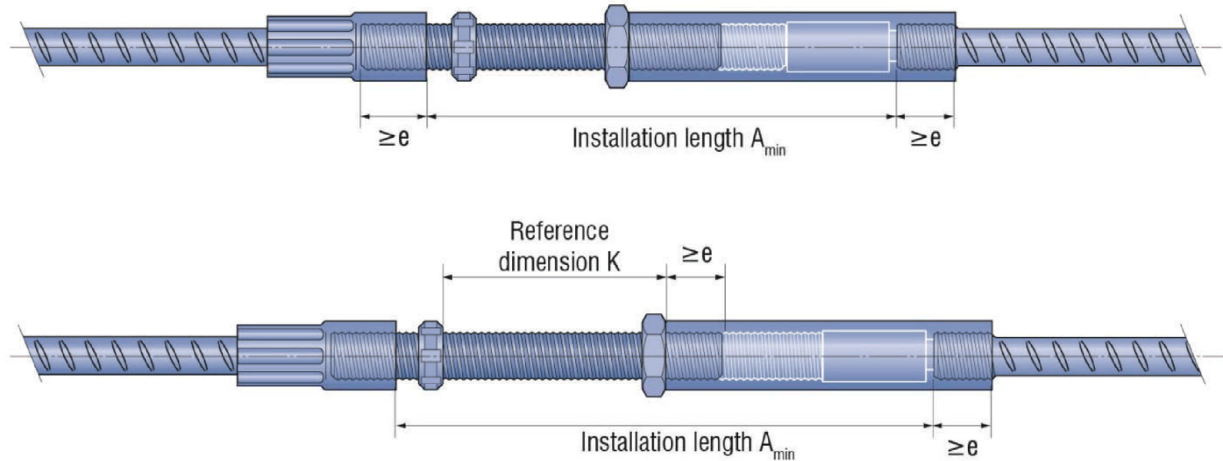
## PFEIFER Rebar Coupler System PH

### Intended use

Installation manual: PH-MU + PH-PA + PH-A

## Annex B5

PH-MU + PH-PA + PH-A



$$A_{\min} = L_M + a + b + L_2$$

$$A_{\max} = L_M + L_B - 3 \cdot e - 10 \text{ mm}$$

The distances between the rebar sections to be connected shall not be greater or smaller than the bar distances specified in Table B2.

Table B2: **Installation parameters**

Typ	Installation length $A^{1)}$ [mm]	Min. installation length $A_{\min}^{1) 2)}$ [mm]	Max. installation length $A_{\max}$ [mm]	Min. screw-in depth $e$ [mm]	Reference dimension $K$ [mm]
PH-PA 12	163	163	180	20	75
PH-PA 14	176	176	199	22	86
PH-PA 16	190	190	208	24	86
PH-PA 20	250	250	284	32	120
PH-PA 25	299	299	330	40	136
PH-PA 28	314	314	344	42	142
PH-PA 32	373	373	404	52	166
PH-PA 40	456	456	475	70	195

1) In case of compression or alternating loads the lock nut (regular) in accordance with Annex A16 shall be used!  
The dimensions shown here refer to the use of lock nut (thin). The dimensions shall be adjusted accordingly!

2) If the Male Bar or the Female Bar is longitudinally displaceable, the minimum installation length can be reduced by a dimension  $e$ .

**PFEIFER Rebar Coupler System PH**

**Intended use**

Installation parameters: PH-MU + PH-PA + PH-A

**Annex B6**

Table C1: PH-MU + PH-A

Typ	Combination	Reinforcing bar diameter $\varnothing$ [mm]	Coupler length $L_1$ [mm]
PH 12	PH-A 12 + PH-KM 12 + PH-A 12	12	59
PH 14	PH-A 14 + PH-KM 14 + PH-A 14	14	61
PH 16	PH-A 16 + PH-KM 16 + PH-A 16	16	70
PH 20	PH-A 20 + PH-KM 20 + PH-A 20	20	85
PH 25	PH-A 25 + PH-KM 25 + PH-A 25	25	110
PH 28	PH-A 28 + PH-KM 28 + PH-A 28	28	130
PH 32	PH-A 32 + PH-KM 32 + PH-A 32	32	138

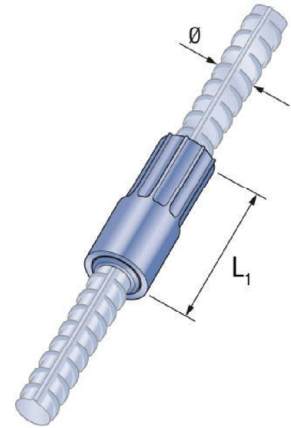


Fig. C1: PH-MU + PH-A

Table C2: Essential characteristics

1) Typ	Resistance to static or quasi-static loading 2) $f_{u,min,bar,outside}$ $f_{u,min,bar,inside}$ [N/mm <sup>2</sup> ]	Elongation (connection failure) $A_{gt,act}$ [%]	Slip under static or quasi-static loading 3) $s_1$ [mm]	Fatigue strength for S-N curve with specific $k_1$ and $k_2$ 4) $\Delta\sigma_{Rsk}$ [N/mm <sup>2</sup> ]		
					$k_1$ [-]	$k_2$ [-]
PH 12	540	3	0,10	70 ( $N = 2 \cdot 10^6$ )  40 ( $N^* = 10^7$ )	3	5
PH 14	540	3	0,10			
PH 16	540	3	0,10			
PH 20	540	3	0,10			
PH 25	540	3	0,11			
PH 28	540	3	0,12			
PH 32	540	3	0,12			

1) See the connection combinations in Table C1

2)  $f_{u,min,bar,inside} = f_{u,min,bar,outside} = 1,08 \cdot f_{yk}$ , with  $f_{yk} = 500 \text{ N/mm}^2$

3) Slip in connection under initial loading at  $0,6 \cdot R_{e,nom,bar}$

4) Fatigue strength  $\Delta\sigma_{Rsk}$ ,  $k_1$ ,  $k_2$  (S-N Curve determined by 24 tests on the most unfavourable diameter)

## PFEIFER Rebar Coupler System PH

### Performance

Essential characteristics: PH-MU + PH-A

## Annex C1

Table C3: PH-MU + PH-K / PH-KD + PH-MU

Typ	Combination	Reinforcing bar diameter $\emptyset$ [mm]	Coupler length $L_1$ [mm]
PH 8	PH-MU 8 + PH-K / PH-KD 8 + PH-MU 8	8	80 <sup>1)</sup> / 91 <sup>2)</sup>
PH 10	PH-MU 10 + PH-K / PH-KD 10 + PH-MU 10	10	90 <sup>1)</sup> / 101 <sup>2)</sup>
PH 12	PH-MU 12 + PH-K / PH-KD 12 + PH-MU 12	12	118 <sup>1)</sup> / 129 <sup>2)</sup>
PH 14	PH-MU 14 + PH-K / PH-KD 14 + PH-MU 14	14	122 <sup>1)</sup> / 134 <sup>2)</sup>
PH 16	PH-MU 16 + PH-K / PH-KD 16 + PH-MU 16	16	140 <sup>1)</sup> / 152 <sup>2)</sup>
PH 20	PH-MU 20 + PH-K / PH-KD 20 + PH-MU 20	20	170 <sup>1)</sup> / 182 <sup>2)</sup>
PH 25	PH-MU 25 + PH-K / PH-KD 25 + PH-MU 25	25	220 <sup>1)</sup> / 133 <sup>2)</sup>
PH 28	PH-MU 28 + PH-K / PH-KD 28 + PH-MU 28	28	260 <sup>1)</sup> / 273 <sup>2)</sup>
PH 32	PH-MU 32 + PH-K / PH-KD 32 + PH-MU 32	32	275 <sup>1)</sup> / 288 <sup>2)</sup>
PH 40	PH-MU 40 + PH-K / PH-KD 40 + PH-MU 40	40	340 <sup>1)</sup> / 353 <sup>2)</sup>

1) Connection PH-MU + PH-K + PH-MU

2) Connection PH-MU + PH-KD + PH-MU

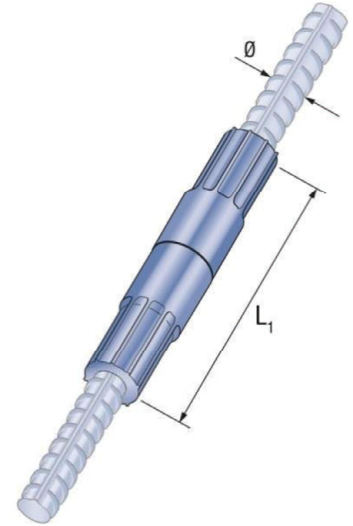


Fig. 2: PH-MU + PH-K / PH-KD + PH-MU

Table C4: PH-MU + PH-K / PH-KD + PH-MU: Essential characteristics

1) Typ	Resistance to static or quasi-static loading	Elongation (connection failure)	Slip under static or quasi-static loading	Fatigue strength for S-N curve with specific $k_1$ and $k_2$			Resistance to low cycle loading (seismic action)	
	2) $f_{u,min,bar,outside}$ $f_{u,min,bar,inside}$ [N/mm <sup>2</sup> ]	$A_{gt,act}$ [%]	3) $s_1$ [mm]	4) $\Delta\sigma_{Rsk}$ [N/mm <sup>2</sup> ]	$k_1$ [-]	$k_2$ [-]	5) $u_{20}$ [mm]	$F_{u,min}$ [kN]
PH 8	540	3	0,10	70 ( $N = 2 \cdot 10^6$ )  40 ( $N^* = 10^7$ )	3	5	0,20	27,1
PH 10	540	3	0,10					42,4
PH 12	540	3	0,11					61,1
PH 14	540	3	0,11					83,1
PH 16	540	3	0,12					108,6
PH 20	540	3	0,14					169,6
PH 25	540	3	0,16					265,1
PH 28	540	3	0,18					332,5
PH 32	540	3	0,19	-	-	-	-	-
PH 40	540	3	0,20				-	-

3) See the connection combinations in Table C3

4)  $f_{u,min,bar,inside} = f_{u,min,bar,outside} = 1,08 \cdot f_{yk}$ , with  $f_{yk} = 500 \text{ N/mm}^2$

5) Slip in connection under initial loading at  $0,6 \cdot R_{e,nom,bar}$

6) Fatigue strength  $\Delta\sigma_{Rsk}$ ,  $k_1$ ,  $k_2$  (S-N Curve determined by 24 tests on the most unfavourable diameter)

7)  $F_{u,min} = (\emptyset^2 \cdot \pi / 4) \cdot f_{u,min}$

## PFEIFER Rebar Coupler System PH

### Performance

Essential characteristics: PH-MU + PH-K / PH-KD + PH-MU

## Annex C2

Table C5: PH-A + PH-KM + PH-A

Typ	Combination	Reinforcing bar diameter $\emptyset$ [mm]	Coupler length $L_1$ [mm]
PH 12	PH-A 12 + PH-KM 12 + PH-A 12	12	45
PH 14	PH-A 14 + PH-KM 14 + PH-A 14	14	52
PH 16	PH-A 16 + PH-KM 16 + PH-A 16	16	58
PH 20	PH-A 20 + PH-KM 20 + PH-A 20	20	73
PH 25	PH-A 25 + PH-KM 25 + PH-A 25	25	88
PH 28	PH-A 28 + PH-KM 28 + PH-A 28	28	90
PH 32	PH-A 32 + PH-KM 32 + PH-A 32	32	111

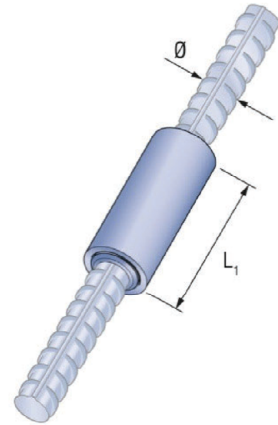


Fig. C3: PH-A + PH-KM + PH-A

Table C6: Essential characteristics

1) Typ	Resistance to static or quasi-static loading 2) $f_{u,min,bar,outside}$ $f_{u,min,bar,inside}$ [N/mm <sup>2</sup> ]	Elongation (connection failure) $A_{gt,act}$ [%]	Slip under static or quasi-static loading 3) $s_1$ [mm]	Fatigue strength for S-N curve with specific $k_1$ and $k_2$ 4) $\Delta\sigma_{Rsk}$ [N/mm <sup>2</sup> ], $k_1$ [-], $k_2$ [-]		
PH 12	540	3	0,10	125 ( $N = 2 \cdot 10^6$ )  85 ( $N^* = 10^7$ )	4	5
PH 14	540	3	0,10			
PH 16	540	3	0,10			
PH 20	540	3	0,10			
PH 25	540	3	0,10			
PH 28	540	3	0,10			
PH 32	540	3	0,11			

1) See the connection combination in Table C5

2)  $f_{u,min,bar,inside} = f_{u,min,bar,outside} = 1,08 \cdot f_{yk}$ , with  $f_{yk} = 500 \text{ N/mm}^2$

3) Slip in connection under initial loading at  $0,6 \cdot R_{e,nom,bar}$

4) Fatigue strength  $\Delta\sigma_{Rsk}$ ,  $k_1$ ,  $k_2$  (S-N Curve determined by 24 tests on the most unfavourable diameter)

## PFEIFER Rebar Coupler System PH

### Performance

Essential characteristics: PH-A + PH-KM + PH-A

## Annex C3

Table C7: PH-MU + PH-RL + PH-MU LH

Typ	Combination	Reinforcing bar diameter $\varnothing$ [mm]	Coupler length $L_1$ [mm]
PH 8	PH-MU 8 + PH-RL 8 + PH-MU 8 LH	8	117
PH 10	PH-MU 10 + PH-RL 10 + PH-MU 10 LH	10	129
PH 12	PH-MU 12 + PH-RL 12 + PH-MU 12 LH	12	159
PH 14	PH-MU 14 + PH-RL 14 + PH-MU 14 LH	14	165
PH 16	PH-MU 16 + PH-RL 16 + PH-MU 16 LH	16	184
PH 20	PH-MU 20 + PH-RL 20 + PH-MU 20 LH	20	217
PH 25	PH-MU 25 + PH-RL 25 + PH-MU 25 LH	25	273
PH 28	PH-MU 28 + PH-RL 28 + PH-MU 28 LH	28	323
PH 32	PH-MU 32 + PH-RL 32 + PH-MU 32 LH	32	345
PH 40	PH-MU 40 + PH-RL 40 + PH-MU 40 LH	40	430

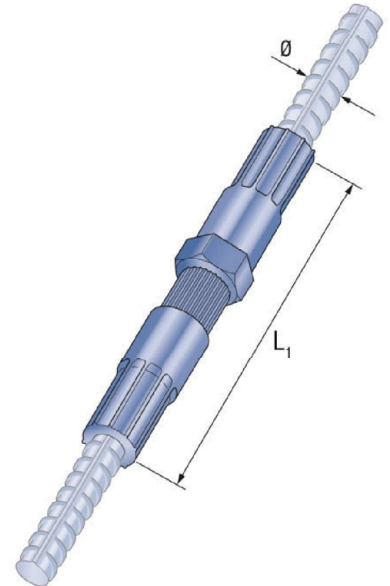


Fig. C4: PH-MU + PH-RL + PH-MU LH

Table C8: Essential characteristics

1) Typ	Resistance to static or quasi-static loading 2) $f_{u,min,bar,outside}$ $f_{u,min,bar,inside}$ [N/mm <sup>2</sup> ]	Elongation (connection failure) $A_{gt,act}$ [%]	Slip under static or quasi-static loading 3) $s_1$ [mm]	Fatigue strength for S-N curve with specific $k_1$ and $k_2$ 4) $\Delta\sigma_{Rsk}$ [N/mm <sup>2</sup> ], $k_1$ [-], $k_2$ [-]		
PH 8	540	3	0,11	70 ( $N = 2 \cdot 10^6$ )  40 ( $N^* = 10^7$ )	3	5
PH 10	540	3	0,11			
PH 12	540	3	0,13			
PH 14	540	3	0,13			
PH 16	540	3	0,14			
PH 20	540	3	0,16			
PH 25	540	3	0,19			
PH 28	540	3	0,20			
PH 32	540	3	0,20	-	-	-
PH 40	540	3	0,20			

1) See the connection combinations in Table C7

2)  $f_{u,min,bar,inside} = f_{u,min,bar,outside} = 1,08 \cdot f_{yk}$ , with  $f_{yk} = 500 \text{ N/mm}^2$

3) Slip in connection under initial loading at  $0,6 \cdot R_{e,nom,bar}$

4) Fatigue strength  $\Delta\sigma_{Rsk}$ ,  $k_1$ ,  $k_2$  (S-N Curve determined by 24 tests on the most unfavourable diameter)

## PFEIFER Rebar Coupler System PH

### Performance

Essential characteristics: PH-MU + PH-RL + PH-MU LH

## Annex C4

Tabelle C9: PH-MU + PH-RB + PH-MU

Typ	Combination	Reinforcing bar diameter $\emptyset$ [mm]	Coupler length $L_1$ [mm]
PH 12/10	PH-MU 12 + PH-RB 12/10 + PH-MU 10	10	129
PH 14/12	PH-MU 14 + PH-RB 14/12 + PH-MU 12	12	145
PH 16/14	PH-MU 16 + PH-RB 16/14 + PH-MU 14	14	156
PH 20/16	PH-MU 20 + PH-RB 20/16 + PH-MU 16	16	180
PH 25/20	PH-MU 25 + PH-RB 25/20 + PH-MU 20	20	220
PH 28/25	PH-MU 28 + PH-RB 28/25 + PH-MU 25	25	270
PH 32/28	PH-MU 32 + PH-RB 32/28 + PH-MU 28	28	298
PH 40/32	PH-MU 40 + PH-RB 40/32 + PH-MU 32	32	348
PH 16/12	PH-MU 16 + PH-RB 16/12 + PH-MU 12	12	154
PH 28/20	PH-MU 28 + PH-RB 28/20 + PH-MU 20	20	245
PH 32/25	PH-MU 32 + PH-RB 32/25 + PH-MU 25	25	245

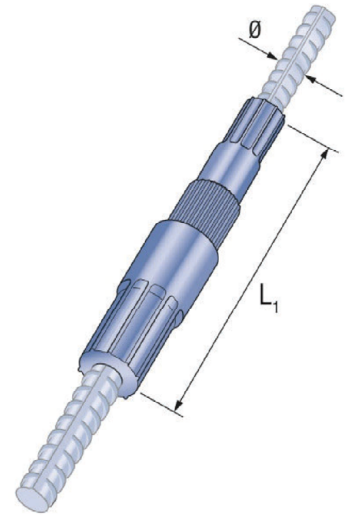


Fig. C5: PH-MU + PH-RB + PH-MU

Tabelle C10: Essential characteristics

1) Typ	Resistance to static or quasi-static loading	Elongation (connection failure)	Slip under static or quasi-static loading	Fatigue strength for S-N curve with specific $k_1$ and $k_2$		
	2) $f_{u,min,bar,outside}$ $f_{u,min,bar,inside}$ [N/mm <sup>2</sup> ]	$A_{gt,act}$ [%]	3) $s_1$ [mm]	4) $\Delta\sigma_{Rsk}$ [N/mm <sup>2</sup> ]	$k_1$ [-]	$k_2$ [-]
PH 12/10	540	3	0,11	70 ( $N = 2 \cdot 10^6$ )  40 ( $N^* = 10^7$ )	3	5
PH 14/12	540	3	0,12			
PH 16/14	540	3	0,13			
PH 20/16	540	3	0,14			
PH 25/20	540	3	0,16			
PH 28/25	540	3	0,19			
PH 32/28	540	3	0,20			
PH 40/32	540	3	0,20	-	-	-
PH 16/12	540	3	0,13	70 ( $N = 2 \cdot 10^6$ )  40 ( $N^* = 10^7$ )	3	5
PH 28/20	540	3	0,17			
PH 32/25	540	3	0,19			

1) See the connection combinations in Table C9

2)  $f_{u,min,bar,inside} = f_{u,min,bar,outside} = 1,08 \cdot f_{yk}$ , with  $f_{yk} = 500$  N/mm<sup>2</sup>

3) Slip in connection under initial loading at  $0,6 \cdot R_{e,nom,bar}$

4) Fatigue strength  $\Delta\sigma_{Rsk}$ ,  $k_1$ ,  $k_2$  (S-N Curve determined by 24 tests on the most unfavourable diameter)

## PFEIFER Rebar Coupler System PH

### Performance

Essential characteristics: PH-MU + PH-RB + PH-MU

## Annex C5

Table C11: PH-A + PH-RM + PH-A

Typ	Combination	Reinforcing bar diameter	Coupler length
		Ø [mm]	L <sub>1</sub> [mm]
PH 12/10	PH-A 12 + PH-RM 12/10 + PH-K 10 + PH-MU 10	10	50
PH 14/12	PH-A 14 + PH-RM 14/12 + PH-A 12	12	55
PH 16/14	PH-A 16 + PH-RM 16/14 + PH-A 14	14	60
PH 20/16	PH-A 20 + PH-RM 20/16 + PH-A 16	16	75
PH 25/20	PH-A 25 + PH-RM 25/20 + PH-A 20	20	90
PH 28/25	PH-A 28 + PH-RM 28/25 + PH-A 25	25	105
PH 32/28	PH-A 32 + PH-RM 32/28 + PH-A 28	28	115
PH 16/12	PH-A 16 + PH-RM 16/12 + PH-A 12	12	60
PH 28/20	PH-A 28 + PH-RM 28/20 + PH-A 20	20	95
PH 32/25	PH-A 32 + PH-RM 32/25 + PH-A 25	25	115

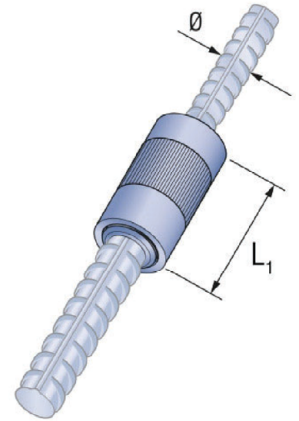


Fig. C6: PH-A + PH-RM + PH-A

Table C12: Essential characteristics

1) Typ	Resistance to static or quasi-static loading	Elongation (connection failure)	Slip under static or quasi-static loading	Fatigue strength for S-N curve with specific k <sub>1</sub> and k <sub>2</sub>		
	2) f <sub>u,min,bar,outside</sub> f <sub>u,min,bar,inside</sub> [N/mm <sup>2</sup> ]	A <sub>gt,act</sub> [%]	3) s <sub>1</sub> [mm]	4) Δσ <sub>Rsk</sub> [N/mm <sup>2</sup> ]	k <sub>1</sub> [-]	k <sub>2</sub> [-]
PH 12/10	540	3	0,10	70 (N = 2 · 10 <sup>6</sup> )  40 (N* = 10 <sup>7</sup> )	3	5
PH 14/12	540	3	0,10			
PH 16/14	540	3	0,10			
PH 20/16	540	3	0,10			
PH 25/20	540	3	0,10			
PH 28/25	540	3	0,10			
PH 32/28	540	3	0,11			
PH 16/12	540	3	0,10			
PH 28/20	540	3	0,10			
PH 32/25	540	3	0,11			

1) See the connection combinations in Table C11

2) f<sub>u,min,bar,inside</sub> = f<sub>u,min,bar,outside</sub> = 1,08 · f<sub>yk</sub>, with f<sub>yk</sub> = 500 N/mm<sup>2</sup>

3) Slip in connection under initial loading at 0,6 · R<sub>e, nom, bar</sub>

4) Fatigue strength Δσ<sub>Rsk</sub>, k<sub>1</sub>, k<sub>2</sub> (S-N Curve determined by 24 tests on the most unfavourable diameter)

## PFEIFER Rebar Coupler System PH

### Performance

Essential characteristics: PH-A + PH-RM + PH-A

## Annex C6

Table C13: PH-MUR + PH- A

		Reinforcing bar diameter	Coupler length
Typ	Combination	Ø [mm]	L <sub>1</sub> [mm]
PH 12/10	PH-MUR 12/10 + PH-K 10 + PH-MU 10	10	56
PH 14/12	PH-MUR 14/12 + PH-A 12	12	59
PH 16/14	PH-MUR 16/14 + PH-A 14	14	67
PH 20/16	PH-MUR 20/16 + PH-A 16	16	77
PH 25/20	PH-MUR 25/20 + PH-A 20	20	104
PH 28/25	PH-MUR 28/25 + PH-A 25	25	127
PH 32/28	PH-MUR 32/28 + PH-A 28	28	122
PH 40/32	PH-MUR 40/32 + PH-A 32	12	152

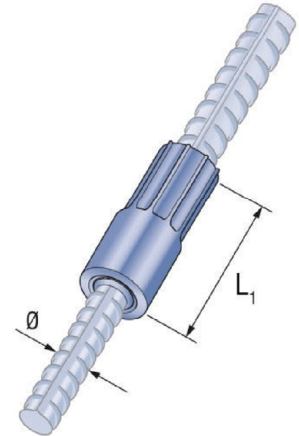


Fig. C7: PH-MUR + PH-A

Table C14: Essential characteristics

	Resistance to static or quasi-static loading	Elongation (connection failure)	Slip under static or quasi-static loading	Fatigue strength for S-N curve with specific k <sub>1</sub> and k <sub>2</sub>		
1) Typ	2) f <sub>u,min,bar,outside</sub> f <sub>u,min,bar,inside</sub> [N/mm <sup>2</sup> ]	A <sub>gt,act</sub> [%]	3) s <sub>1</sub> [mm]	4) Δσ <sub>Rsk</sub> [N/mm <sup>2</sup> ]	k <sub>1</sub> [-]	k <sub>2</sub> [-]
PH 12/10	540	3	0,10	70 (N = 2 · 10 <sup>6</sup> )  40 (N* = 10 <sup>7</sup> )	3	5
PH 14/12	540	3	0,10			
PH 16/14	540	3	0,10			
PH 20/16	540	3	0,10			
PH 25/20	540	3	0,10			
PH 28/25	540	3	0,11			
PH 32/28	540	3	0,11	-	-	-
PH 40/32	540	3	0,13			

1) See the connection combinations in Table C13

2) f<sub>u,min,bar,inside</sub> = f<sub>u,min,bar,outside</sub> = 1,08 · f<sub>yk</sub>, with f<sub>yk</sub> = 500 N/mm<sup>2</sup>

3) Slip in connection under initial loading at 0,6 · R<sub>e,nom,bar</sub>

4) Fatigue strength Δσ<sub>Rsk</sub>, k<sub>1</sub>, k<sub>2</sub> (S-N Curve determined by 24 tests on the most unfavourable diameter)

## PFEIFER Rebar Coupler System PH

### Performance

Essential characteristics: PH-MUR + PH-A

## Annex C7

Table C15: PH-MU + PH-PA + PH-A

Typ	Combination	Reinforcing bar diameter $\varnothing$ [mm]	Coupler length $L_1$ [mm]
PH 12	PH-MU 12 + PH-PA 12 + PH-A 12	12	259
PH 14	PH-MU 14 + PH-PA 14 + PH-A 14	14	282
PH 16	PH-MU 16 + PH-PA 16 + PH-A 16	16	302
PH 20	PH-MU 20 + PH-PA 20 + PH-A 20	20	401
PH 25	PH-MU 25 + PH-PA 25 + PH-A 25	25	480
PH 28	PH-MU 28 + PH-PA 28 + PH-A 28	28	516
PH 32	PH-MU 32 + PH-PA 32 + PH-A 32	32	594
PH 40	PH-MU 40 + PH-PA 40 + PH-K 40 + PH-MU 40	40	715

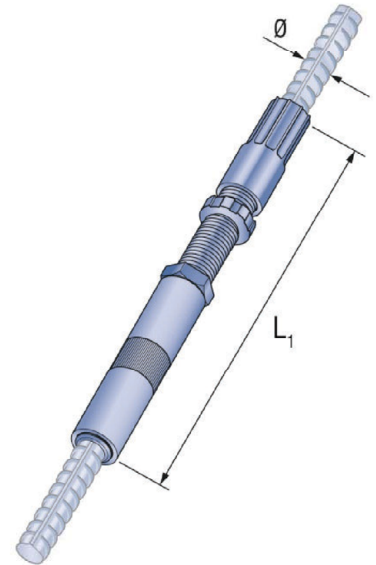


Fig. C8: PH-MU + PH-PA + PH-A

Table C16: Essential characteristics

	Resistance to static or quasi-static loading	Elongation (connection failure)	Slip under static or quasi-static loading	Fatigue strength for S-N curve with specific $k_1$ and $k_2$		
1)  Typ	2)  $f_{u,min,bar,outside}$ $f_{u,min,bar,inside}$  [N/mm <sup>2</sup> ]	$A_{gt,act}$  [%]	3)  $s_1$  [mm]	4)  $\Delta\sigma_{Rsk}$  [N/mm <sup>2</sup> ]	$k_1$  [-]	$k_2$  [-]
PH 12	540	3	0,18	70 ( $N = 2 \cdot 10^6$ )  40 ( $N^* = 10^7$ )	3	5
PH 14	540	3	0,19			
PH 16	540	3	0,20			
PH 20	540	3	0,20			
PH 25	540	3	0,20			
PH 28	540	3	0,20			
PH 32	540	3	0,20			
PH 40	540	3	0,20	-	-	-

1) See the connection combinations in Table C15

2)  $f_{u,min,bar,inside} = f_{u,min,bar,outside} = 1,08 \cdot f_{yk}$ , with  $f_{yk} = 500 \text{ N/mm}^2$

3) Slip in connection under initial loading at  $0,6 \cdot R_{e,nom,bar}$

4) Fatigue strength  $\Delta\sigma_{Rsk}$ ,  $k_1$ ,  $k_2$  (S-N Curve determined by 24 tests on the most unfavourable diameter)

## PFEIFER Rebar Coupler System PH

### Performance

Essential characteristics: PH-MU + PH-PA + PH-A

## Annex C8

Table C17: PH-AH + PH-A

Typ	Combination	Reinforcing bar diameter $\varnothing$ [mm]	Coupler length $L_1$ [mm]
PH 12	PH-AH 12 + PH-A 12	12	35
PH 14	PH-AH 14 + PH-A 14	14	40
PH 16	PH-AH 16 + PH-A 16	16	40
PH 20	PH-AH 20 + PH-A 20	20	50
PH 25	PH-AH 25 + PH-A 25	25	55
PH 28	PH-AH 28 + PH-A 28	28	65
PH 32	PH-AH 32 + PH-A 32	32	75
PH 40	PH-AH 40 + PH-K 40 + PH-MU 40	40	260

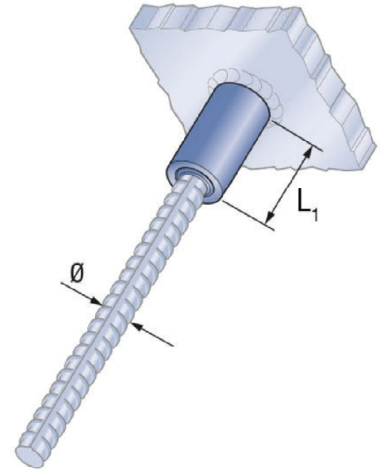


Fig. C9: PH-AH + PH-A

Table C18: Essential characteristics

1) Typ	Resistance to static or quasi-static loading 2) $f_{u,min,bar,outside}$ $f_{u,min,bar,inside}$ [N/mm <sup>2</sup> ]	Elongation (connection failure) $A_{gt,act}$ [%]	Slip under static or quasi-static loading 3) $s_1$ [mm]
PH 12	540	3	0,10
PH 14	540	3	0,10
PH 16	540	3	0,10
PH 20	540	3	0,10
PH 25	540	3	0,10
PH 28	540	3	0,10
PH 32	540	3	0,10
PH 40	540	3	0,18

1) See the connection combinations in Table C17

2)  $f_{u,min,bar,inside} = f_{u,min,bar,outside} = 1,08 \cdot f_{yk}$ , with  $f_{yk} = 500 \text{ N/mm}^2$

3) Slip in connection under initial loading at  $0,6 \cdot R_{e,nom,bar}$

## PFEIFER Rebar Coupler System PH

### Performance

Essential characteristics: PH-AH + PH-A

## Annex C9