

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 13 May 2020

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

Deutsches Institut für Bautechnik

PFEIFER Rebar Coupler System PH

Couplers for mechanical splices of reinforcing bars

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

EAD 160129-00-0301

European Technical Assessment

ETA-20/0259

English translation prepared by DIBt

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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 A17 shall correspond to the respective values laid down in the technical documentation^[1] 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

^[1] 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:

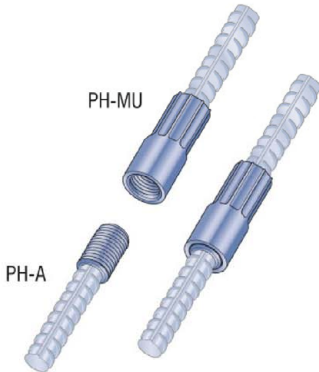
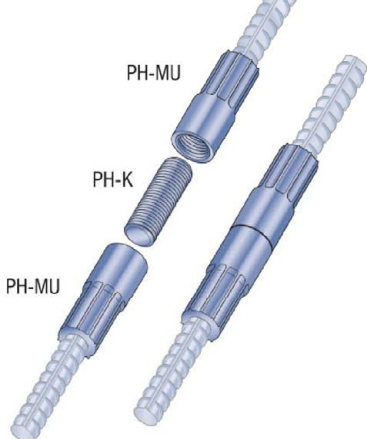
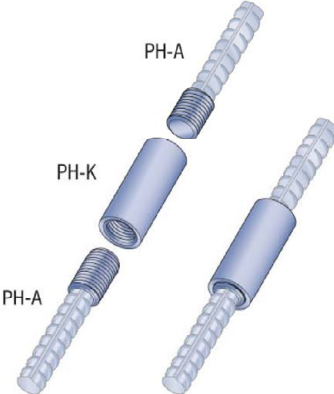
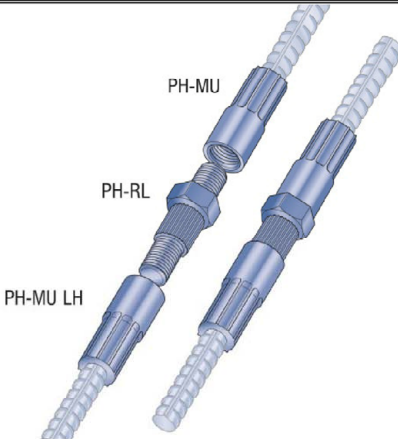
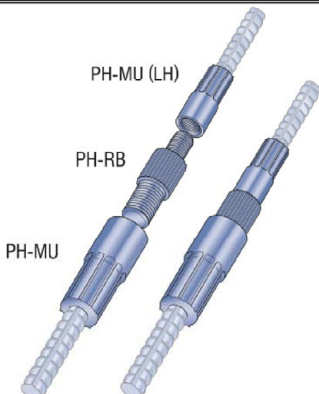
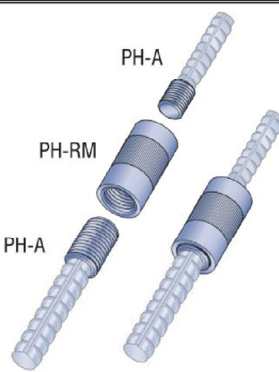
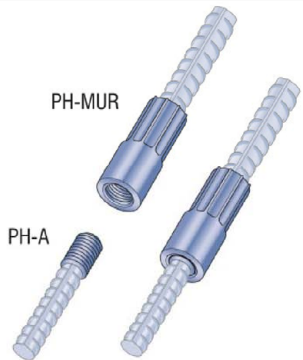
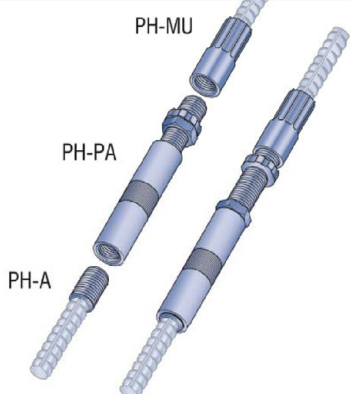
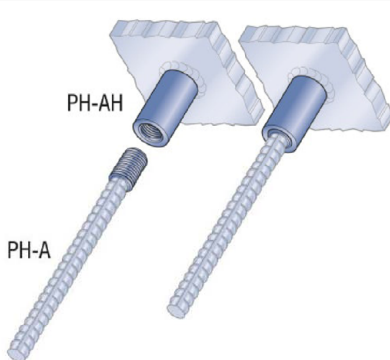
- EN 1090-1:2009 + A1:2011 Execution of steel structures and aluminium structures – Part 1: Requirements for conformity assessment of structural components
- EN 1992-1-1:2004 + AC:2010 + A1:2014 Eurocode 2: Design of concrete structures - Part 1-1: General rules and rules for buildings
- EN 1998-1:2004 + 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 9606-1:2013 Qualification testing of welders – Fusion welding – Part 1: Steels (ISO 9606-1:2012, including Cor 1:2012)
- 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 13 May 2020 by Deutsches Institut für Bautechnik

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Head of Department

beglaubigt:
Kisan

Combinations

PH-MU + PH-A 	PH-MU + PH-K + PH-MU 	PH-A + PH-KM + PH-A 
PH-MU + PH-RL + PH-MU 	PH-MU + PH-RB + PH-MU 	PH-A + PH-RM + PH-A 
PH-A + PH-MUR 	PH-A + PH-PA + PH-MU 	PH-AH + PH-A 

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

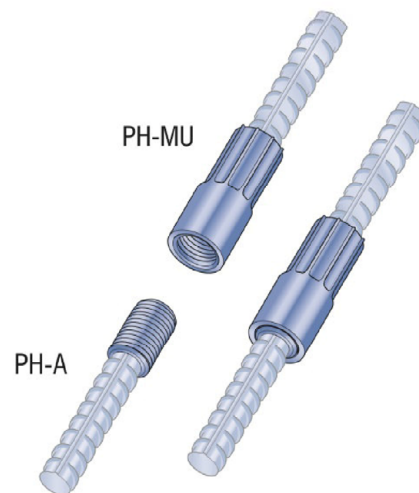


Fig. A1: PH-MU + PH-A

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

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

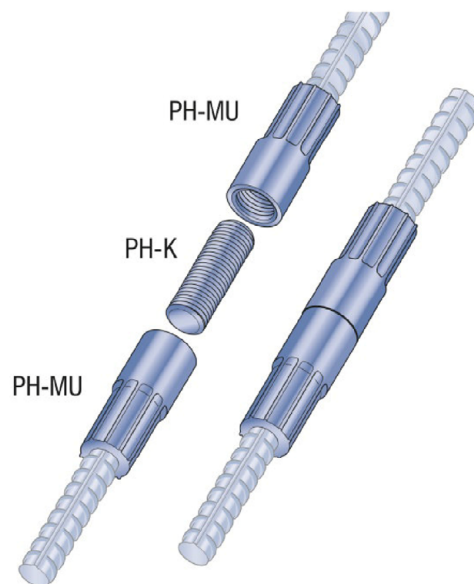


Fig. A2: PH-MU + PH-K + PH-MU

PFEIFER Rebar Coupler System PH

Product description

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

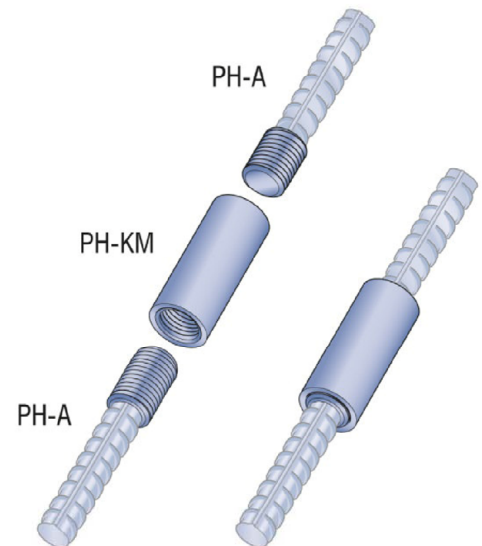


Fig. A3: PH-A + PH-KM + PH-A

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

¹⁾ Left-hand thread

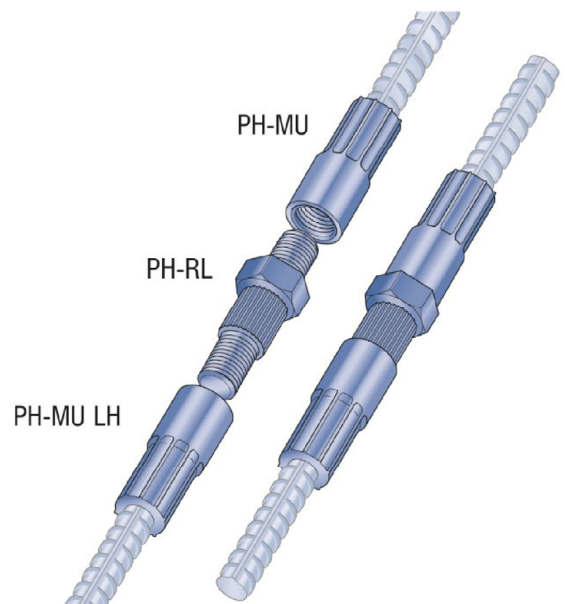


Fig. A4: PH-MU + PH-RL + PH-MU LH¹⁾

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 ¹⁾ + PH-MU 10	12	10
PH-MU 14 + PH-RB 14/12 ¹⁾ + PH-MU 12	14	12
PH-MU 16 + PH-RB 16/14 ¹⁾ + PH-MU 14	16	14
PH-MU 20 + PH-RB 20/16 ¹⁾ + PH-MU 16	20	16
PH-MU 25 + PH-RB 25/20 ¹⁾ + PH-MU 20	25	20
PH-MU 28 + PH-RB 28/25 ¹⁾ + PH-MU 25	28	25
PH-MU 32 + PH-RB 32/28 ¹⁾ + PH-MU 28	32	28
PH-MU 40 + PH-RB 40/32 ¹⁾ + PH-MU 32	40	32
PH-MU 16 + PH-RB 16/12 ¹⁾ + PH-MU 12	16	12
PH-MU 28 + PH-RB 28/20 ¹⁾ + PH-MU 20	28	20
PH-MU 32 + PH-RB 32/25 ¹⁾ + PH-MU 25	32	25

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

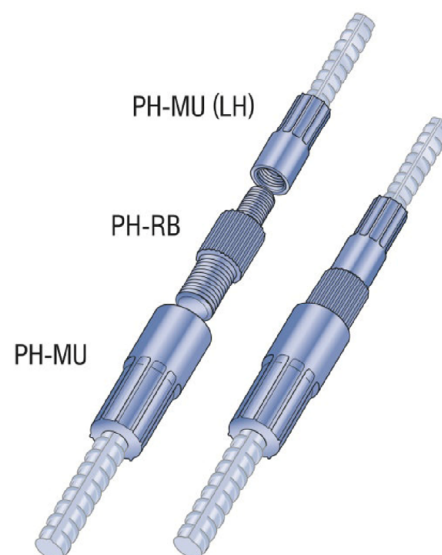


Fig. A5: PH-MU + PH-RB + PH-MU (LH)

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 ¹⁾	14	12
PH-A 16 + PH-RM 16/14 + PH-A 14 ¹⁾	16	14
PH-A 20 + PH-RM 20/16 + PH-A 16 ¹⁾	20	16
PH-A 25 + PH-RM 25/20 + PH-A 20 ¹⁾	25	20
PH-A 28 + PH-RM 28/25 + PH-A 25 ¹⁾	28	25
PH-A 32 + PH-RM 32/28 + PH-A 28 ¹⁾	32	28
PH-A 16 + PH-RM 16/12 + PH-A 12 ¹⁾	16	12
PH-A 28 + PH-RM 28/20 + PH-A 20 ¹⁾	28	20
PH-A 32 + PH-RM 32/25 + PH-A 25 ¹⁾	32	25

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

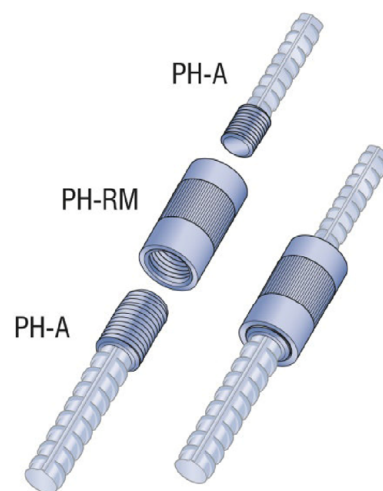


Fig. A6: PH-A + PH-RM + PH-A

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 ¹⁾	14	12
PH-MUR 16/14 + PH-A 14 ¹⁾	16	14
PH-MUR 20/16 + PH-A 16 ¹⁾	20	16
PH-MUR 25/20 + PH-A 20 ¹⁾	25	20
PH-MUR 28/25 + PH-A 25 ¹⁾	28	25
PH-MUR 32/28 + PH-A 28 ¹⁾	32	28
PH-MUR 40/32 + PH-A 32 ¹⁾	40	32

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

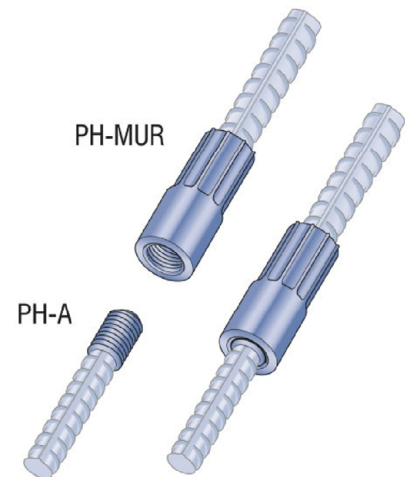


Fig. A7: PH-MUR + PH-A

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 ¹⁾	12
PH-MU 14 + PH-PA 14 + PH-A 14 ¹⁾	14
PH-MU 16 + PH-PA 16 + PH-A 16 ¹⁾	16
PH-MU 20 + PH-PA 20 + PH-A 20 ¹⁾	20
PH-MU 25 + PH-PA 25 + PH-A 25 ¹⁾	25
PH-MU 28 + PH-PA 28 + PH-A 28 ¹⁾	28
PH-MU 32 + PH-PA 32 + PH-A 32 ¹⁾	32
PH-MU 40 + PH-PA 40 + PH-K 40 + PH-MU 40	40

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

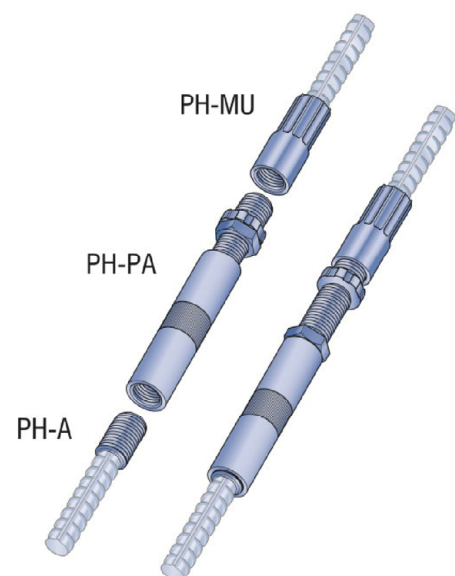


Fig. A8: PH-MU + PH-PA + PH-A

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 ¹⁾	12
PH-AH 14 + PH-A 14 ¹⁾	14
PH-AH 16 + PH-A 16 ¹⁾	16
PH-AH 20 + PH-A 20 ¹⁾	20
PH-AH 25 + PH-A 25 ¹⁾	25
PH-AH 28 + PH-A 28 ¹⁾	28
PH-AH 32 + PH-A 32 ¹⁾	32
PH-AH 40 + PH-K 40 + PH-MU 40	40

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

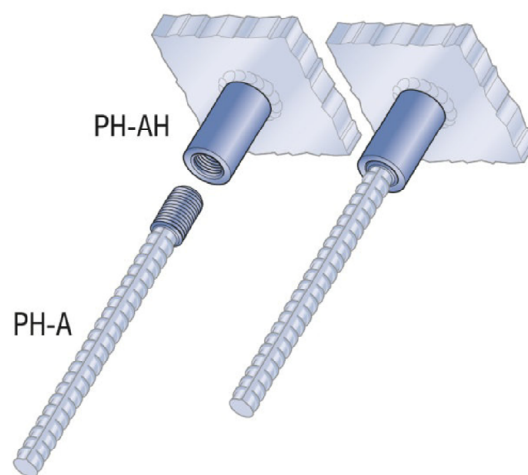


Fig. A9: PH-AH + PH-A

PFEIFER Rebar Coupler System PH

Product description
Connection system PH-AH + PH-A

Annex A6

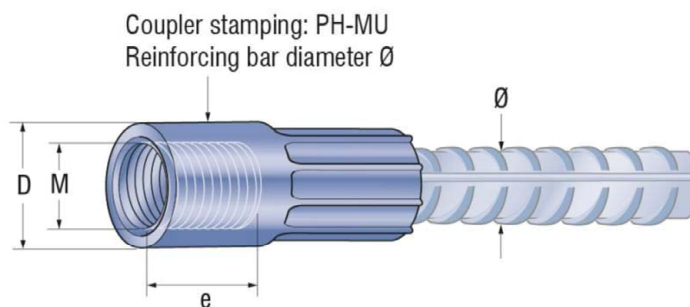


Fig. A10: PFEIFER Female Bar PH-MU (LH)¹⁾

Table A10: Dimensions PFEIFER Female Bar PH-MU

Type / Size	Reinforcing bar diameter Ø [mm]	Thread right-/ left handed (LH) M [mm]	Coupler external diameter D [mm]	Usable thread length e ≥ [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

¹⁾ 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

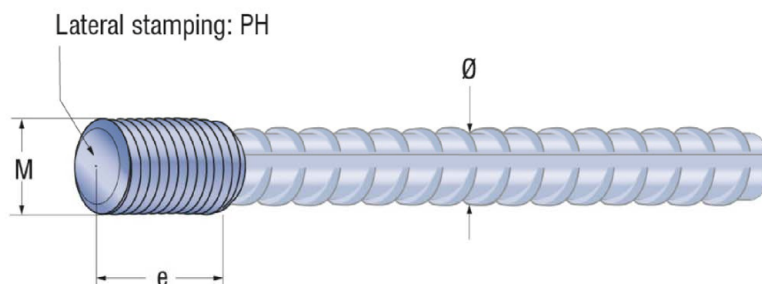


Fig. A11: PFEIFER Male Bar PH-A

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

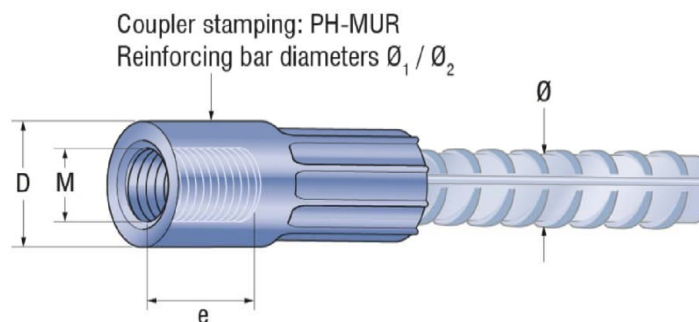


Fig. A12: PFEIFER Transition Female Bar PH-MUR

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 $\geq$ [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

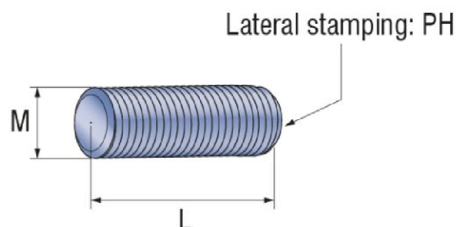


Fig. A13: PFEIFER Connecting Bolt PH-K

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 ≥ 8.8
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PFEIFER Rebar Coupler System PH

Product description

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

Annex A10

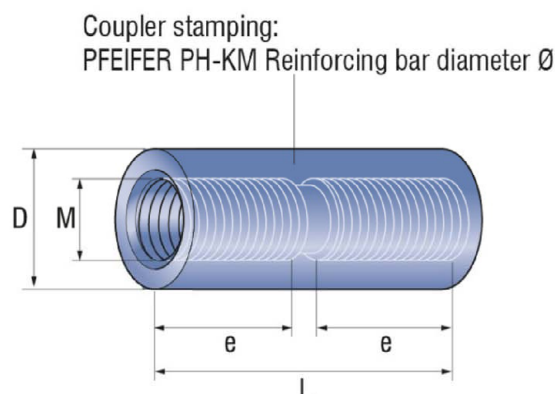


Fig. A14: PFEIFER Connecting Sleeve PH-KM

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

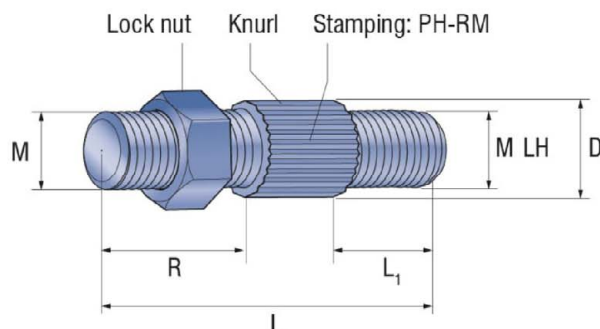


Fig. A15: PFEIFER Right-Left Connecting Bolt PH-RL

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 ₁ [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 ≥ 8.8
Lock nut	Nut according to EN ISO 4032, Strength Class ≥ 8

PFEIFER Rebar Coupler System PH

Product description

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

Annex A12

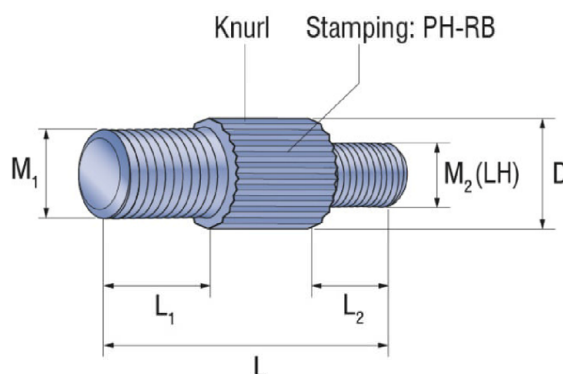


Fig. A16: PFEIFER Transition Bolt PH-RB

Table A22: Dimensions PFEIFER Transition Bolt PH-RB

Type / Size	Right-hand thread M ₁ [mm]	Thread right-/ left handed (LH) M ₂ [mm]	External diameter D [mm]	Thread length L ₁ [mm]	Thread length L ₂ [mm]	Total length 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 ≥ 8.8
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PFEIFER Rebar Coupler System PH

Product description

Transition Bolt PH-RB: Components, dimensions, materials

Annex A13

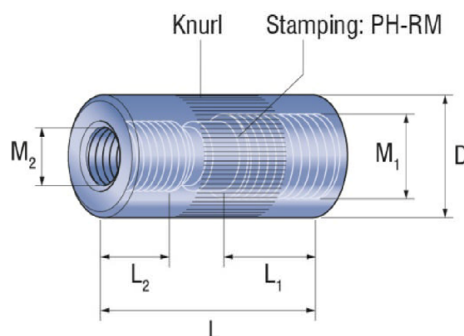


Fig. A17: PFEIFER Transition Coupler PH-RM

Table A24: Dimensions PFEIFER Transition Coupler PH-RM

Type / Size	Right-hand thread M ₁ [mm]	Right-hand thread M ₂ [mm]	External diameter D [mm]	Thread length L ₁ [mm]	Thread length L ₂ [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

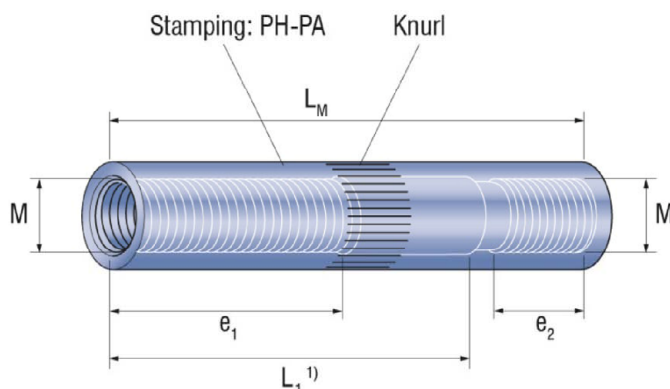


Fig. A18: Sleeve of PFEIFER Position Coupler PH-PA

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

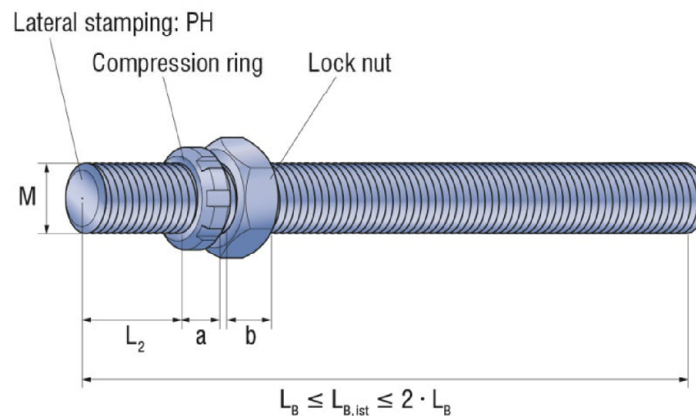


Fig. A19: Bolt of PFEIFER Position Coupler PH-PA

Table A28: Bolt dimensions PFEIFER Positioning Connector PH-PA

Type / Size	Right-hand thread M [mm]	Thread length L_2 [mm]	Total bolt length L_B [mm]	Compression ring thickness a [mm]	Lock nut thickness (thin) b [mm]	Lock nut thickness (regular) 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 ¹⁾	Nut (thin) according to EN ISO 4035, strength class ≥ 04
	Nut (regular) according to EN ISO 4032, strength class 8

¹⁾ 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

Product description

Position Coupler PH-PA: Components, dimensions, materials

Annex A16

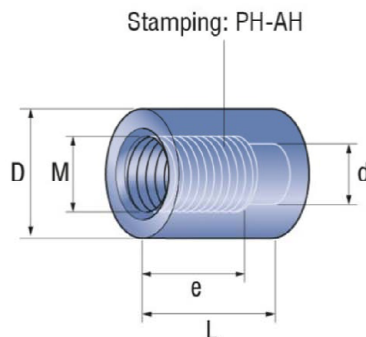


Fig A20: PFEIFER Welding Coupler PH-AH

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

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

Intended use
Specifications

Annex B1

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.

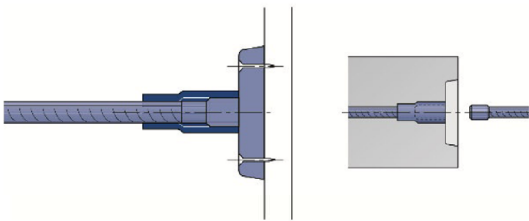
Table B1: Installation torque M_t

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

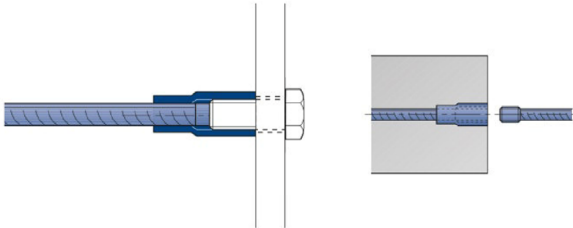
PFEIFER Rebar Coupler System PH

Intended use
Specifications, installation requirements

Annex B2

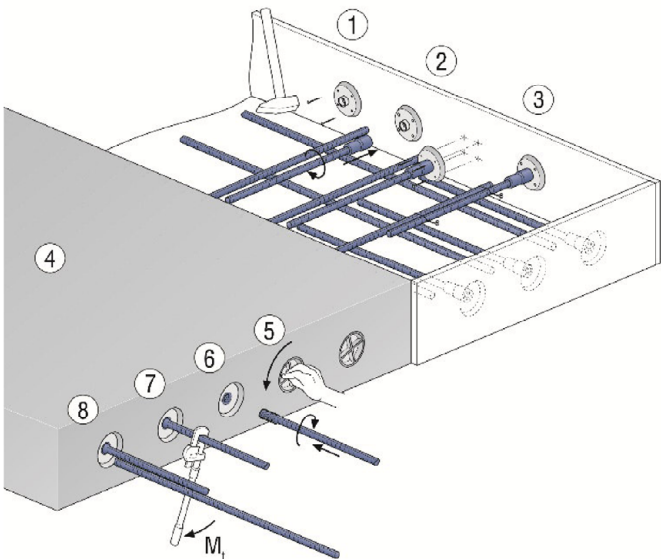


Fixing to wooden formwork with PVC Nail Plate



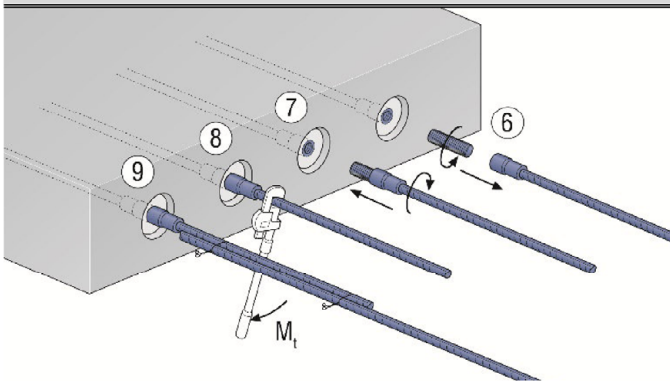
Fixing to wooden/plastic/steel formwork with screw

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-MU and PH-MU + PH-RB + 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 Apply installation torque M_t (use torque wrench)
- 9 Install reinforcement and fasten it securely
- 10 Fill in concrete

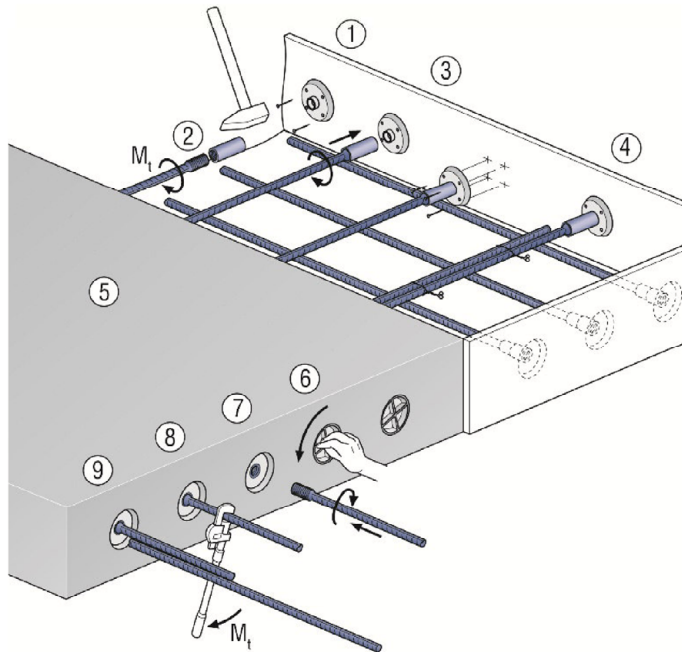
PFEIFER Rebar Coupler System PH

Intended use

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

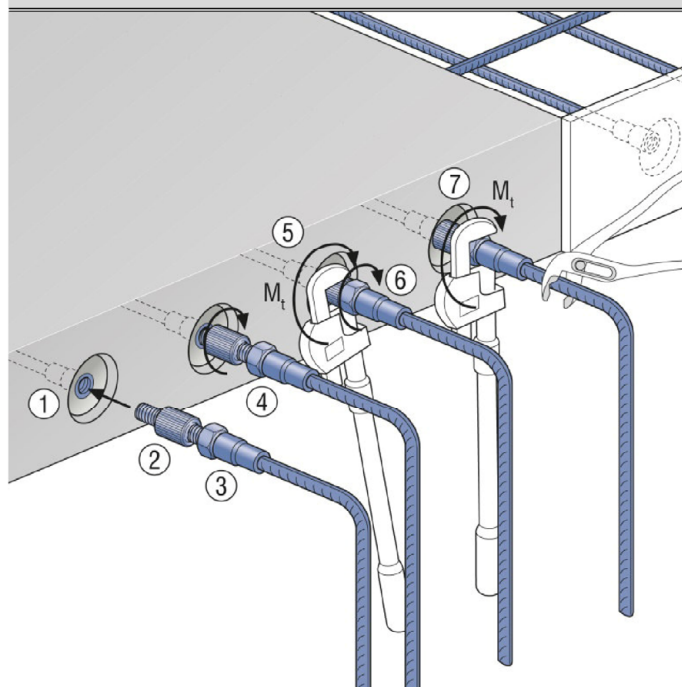
Annex B3

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 !

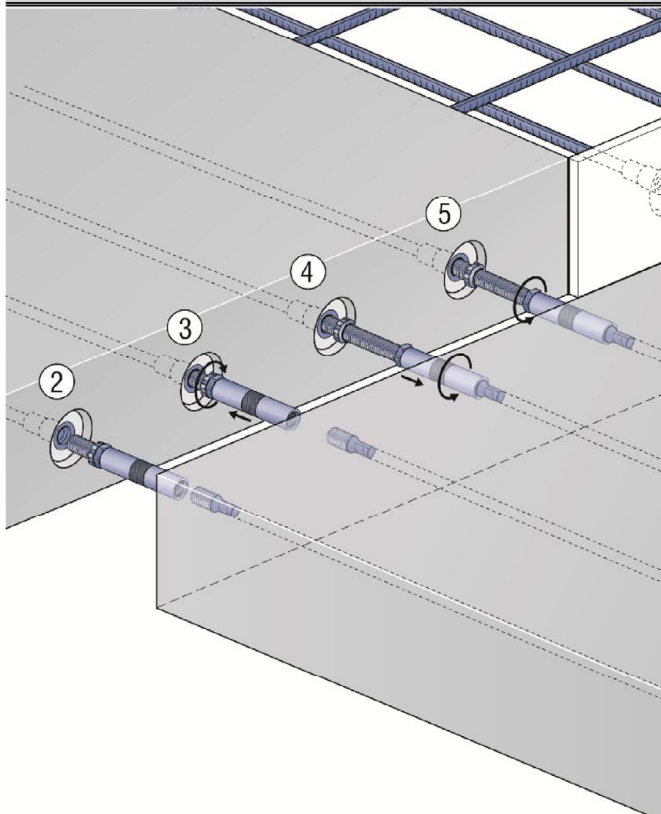
PFEIFER Rebar Coupler System PH

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 !

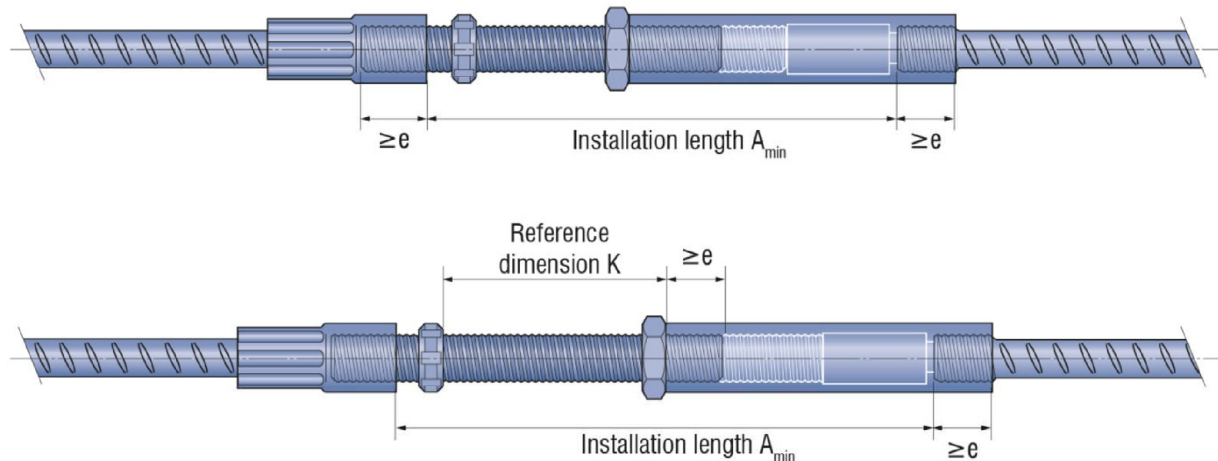
PFEIFER Rebar Coupler System PH

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

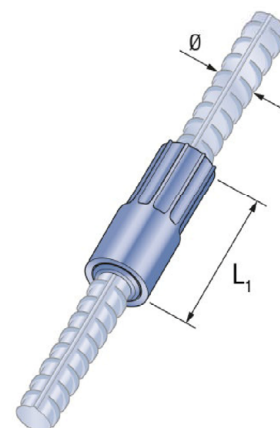


Fig. C1: PH-MU + PH-A

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 ²]	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 ²], 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-MU

Typ	Combination	Reinforcing bar diameter $\varnothing$ [mm]	Coupler length L_1 [mm]
PH 8	PH-MU 8 + PH-K 8 + PH-MU 8	8	80
PH 10	PH-MU 10 + PH-K 10 + PH-MU 10	10	90
PH 12	PH-MU 12 + PH-K 12 + PH-MU 12	12	118
PH 14	PH-MU 14 + PH-K 14 + PH-MU 14	14	122
PH 16	PH-MU 16 + PH-K 16 + PH-MU 16	16	140
PH 20	PH-MU 20 + PH-K 20 + PH-MU 20	20	170
PH 25	PH-MU 25 + PH-K 25 + PH-MU 25	25	220
PH 28	PH-MU 28 + PH-K 28 + PH-MU 28	28	260
PH 32	PH-MU 32 + PH-K 32 + PH-MU 32	32	275
PH 40	PH-MU 40 + PH-K 40 + PH-MU 40	40	340

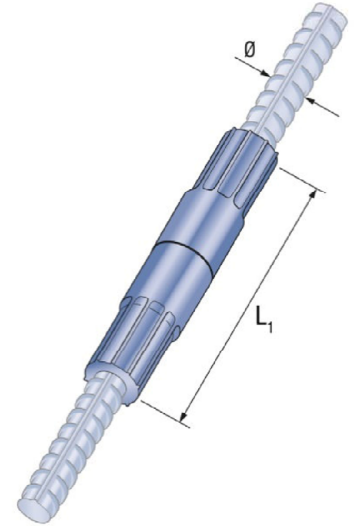


Fig. 2: PH-MU + PH-K + PH-MU

Table C4: 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 ²]	$A_{gt,act}$ [%]	3) s_1 [mm]	4) $\Delta\sigma_{Rsk}$ [N/mm ²]	k_1 [-]	k_2 [-]	5) u_{20} [mm]	$F_{u,min}$ [kN]
PH 8	540	3	0,10	70 ($N = 2 \cdot 10^6$)	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	40 ($N^* = 10^7$)	3	5	0,20	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					-

1) See the connection combinations in Table C3

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)

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

PFEIFER Rebar Coupler System PH

Performance

Essential characteristics: PH-MU + PH-K + 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

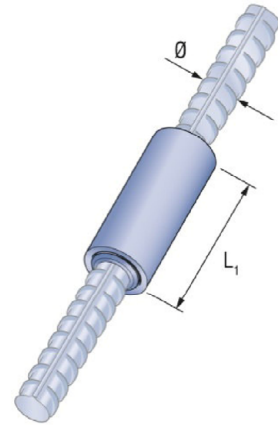


Fig. C3: PH-A + PH-KM + PH-A

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 ²]	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 ²], 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

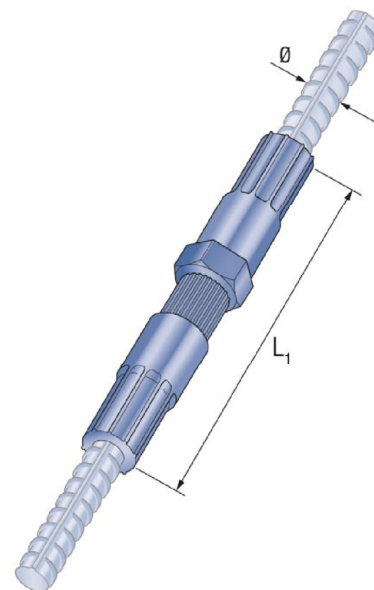


Fig. C4: PH-MU + PH-RL + PH-MU LH

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 ²]	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 ²], 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

Table C9: **PH-MU + PH-RB + PH-MU**

Typ	Combination	Reinforcing bar diameter $\varnothing$ [mm]	Coupler length L_1 [mm]
PH12/10	PH-MU 12 + PH-RB 12/10 + PH-MU 10	10	129
PH14/12	PH-MU 14 + PH-RB 14/12 + PH-MU 12	12	145
PH16/14	PH-MU 16 + PH-RB 16/14 + PH-MU 14	14	156
PH20/16	PH-MU 20 + PH-RB 20/16 + PH-MU 16	16	180
PH25/20	PH-MU 25 + PH-RB 25/20 + PH-MU 20	20	220
PH28/25	PH-MU 28 + PH-RB 28/25 + PH-MU 25	25	270
PH32/28	PH-MU 32 + PH-RB 32/28 + PH-MU 28	28	298
PH40/32	PH-MU 40 + PH-RB 40/32 + PH-MU 32	32	348
PH16/12	PH-MU 16 + PH-RB 16/12 + PH-MU 12	12	154
PH28/20	PH-MU 28 + PH-RB 28/20 + PH-MU 20	20	245
PH32/25	PH-MU 32 + PH-RB 32/25 + PH-MU 25	25	245

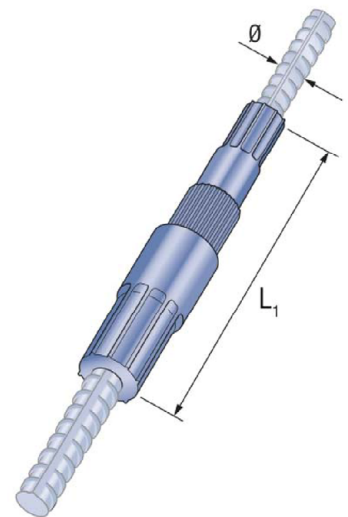


Fig. C5: PH-MU + PH-RB + PH-MU

Table C10: **Essential characteristics**

1) Typ	Resistance to static or quasi-static loading 2)	Elongation (connection failure)	Slip under static or quasi-static loading 3)	Fatigue strength for S-N curve with specific k_1 and k_2 4)		
	$f_{u,min,bar,outside}$ $f_{u,min,bar,inside}$ [N/mm ²]	$A_{gt,act}$ [%]	s_1 [mm]	$\Delta\sigma_{Rsk}$ [N/mm ²]	k_1 [-]	k_2 [-]
PH12/10	540	3	0,11	70 ($N = 2 \cdot 10^6$) 40 ($N^* = 10^7$)	3	5
PH14/12	540	3	0,12			
PH16/14	540	3	0,13			
PH20/16	540	3	0,14			
PH25/20	540	3	0,16			
PH28/25	540	3	0,19			
PH32/28	540	3	0,20			
PH40/32	540	3	0,20	-	-	-
PH16/12	540	3	0,13	70 ($N = 2 \cdot 10^6$) 40 ($N^* = 10^7$)	3	5
PH28/20	540	3	0,17			
PH32/25	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/mm²

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 $\varnothing$ [mm]	Coupler length L_1 [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

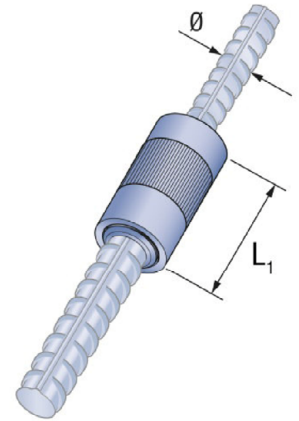


Fig. C6: PH-A + PH-RM + PH-A

Table C12: Essential characteristics

1)	Resistance to static or quasi-static loading 2)	Elongation (connection failure)	Slip under static or quasi-static loading 3)	Fatigue strength for S-N curve with specific k_1 and k_2 4)		
Typ	$f_{u,min,bar,outside}$ $f_{u,min,bar,inside}$ [N/mm ²]	$A_{gt,act}$ [%]	s_1 [mm]	$\Delta\sigma_{Rsk}$ [N/mm ²]	k_1 [-]	k_2 [-]
PH 12/10	540	3	0,10	70 ($N = 2 \cdot 10^6$) 40 ($N^* = 10^7$)	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) $f_{u,min,bar,inside} = f_{u,min,bar,outside} = 1,08 \cdot f_{yk}$, with $f_{yk} = 500$ N/mm²

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-RM + PH-A

Annex C6

Table C13: PH-MUR + PH- A

Typ	Combination	Reinforcing bar diameter $\varnothing$ [mm]	Coupler length L_1 [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

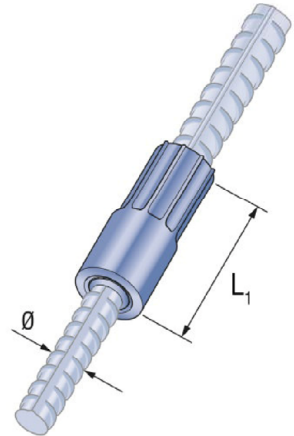


Fig. C7: PH-MUR + PH-A

Table C14: Essential characteristics

1) Typ	Resistance to static or quasi-static loading 2) $f_{u,min,bar,outside}$ $f_{u,min,bar,inside}$ [N/mm ²]	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 ²], k_1 [-], k_2 [-]		
PH 12/10	540	3	0,10	70 ($N = 2 \cdot 10^6$) 40 ($N^* = 10^7$)	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) $f_{u,min,bar,inside} = f_{u,min,bar,outside} = 1,08 \cdot f_{yk}$, 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-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

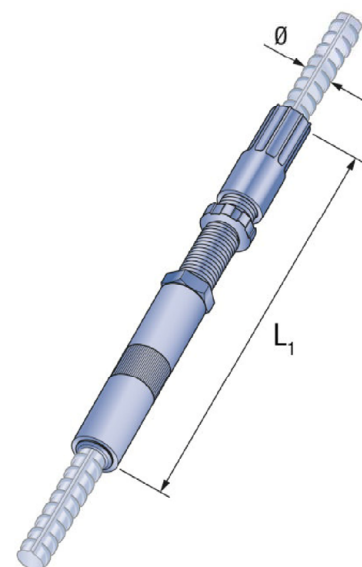


Fig. C8: PH-MU + PH-PA + PH-A

Table C16: Essential characteristics

1) Typ	Resistance to static or quasi-static loading 2) $f_{u,min,bar,outside}$ $f_{u,min,bar,inside}$ [N/mm ²]	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 ²]		
					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

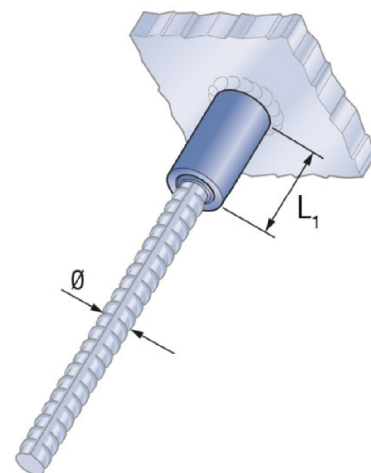


Fig. C9: PH-AH + PH-A

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 ²]	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