

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

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European Technical Assessment

ETA-21/0804
of 11 April 2022

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

Peikko Modix Rebar Couplers

Product family
to which the construction product belongs

Couplers for mechanical splices of reinforcing steel bars

Manufacturer

Peikko Group OY
Voimakatu 3
15170 LAHTI
FINNLAND

Manufacturing plant

Peikko Manufacturing Plants

This European Technical Assessment
contains

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

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

EAD 160129-00-0301, Edition 01/2020

European Technical Assessment

ETA-21/0804

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Specific Part

1 Technical description of the product

The Peikko Modix Rebar Couplers are 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 Peikko Modix Rebar Couplers not indicated in Annexes A1 to A8 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 Peikko Modix Rebar Couplers are 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 Peikko Modix Rebar Couplers 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 – C6
Slip under static or quasi-static load	See Annex C1 – C6
Slip after static or quasi-static load	See Annex C1 – C3
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 – C5
Resistance to low cycle loading (seismic actions)	See Annex C1 – C3

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 17660-1:2006 Welding – Welding of reinforcing steel – Part 1: Load-bearing welded joints (ISO 17660-1:2006)
- EN ISO 9606-1:2013 Qualification testing of welders – Fusion welding – Part 1: Steels (ISO 9606-1:2012, including Cor 1:2012)
- EN ISO 12944-5:2019 Paints and varnishes – Corrosion protection of steel structures by protective paint systems – Part 5: Protective paint systems (ISO 12944-5:2019)
- 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)

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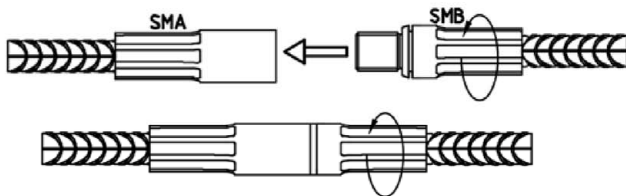
Dipl.-Ing. Beatrix Wittstock
Head of Section

beglaubigt:
Kisan

Connections

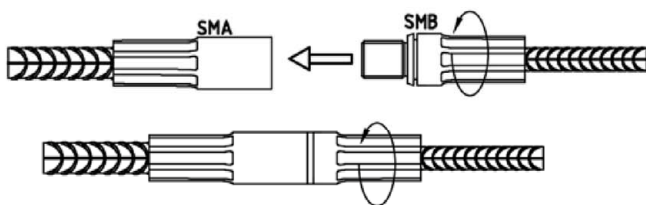
Standard connections

SMA+SMB

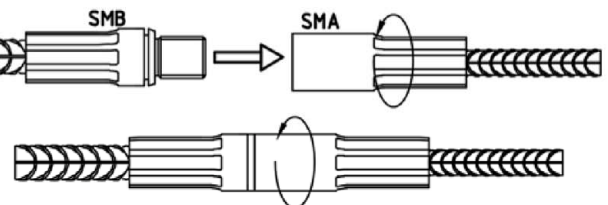


Reduction connections

Reduction SMA+SMB

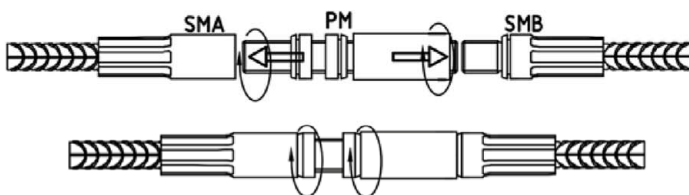


Reduction SMB+SMA



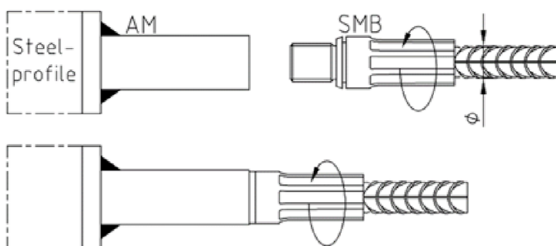
Position connections

Position SMA+PM+SMB



Welding connections

AM+SMB



Peikko Modix Rebar Couplers

Product description of connections

Annex A1

Table A1: Standard connection similar diameters – connections coupler SMA – coupler SMB

Combinations of couplers	Ø [mm]
SMA10 + SMB10	10
SMA12 + SMA12	12
SMA14 + SMB14	14
SMA16 + SMB16	16
SMA18 + SMB18	18
SMA20 + SMB20	20
SMA22 + SMB22	22
SMA25 + SMB25	25
SMA26 + SMB26	26
SMA28 + SMB28	28
SMA30 + SMB30	30
SMA32 + SMB32	32
SMA34 + SMB34	34
SMA40 + SMB40	40

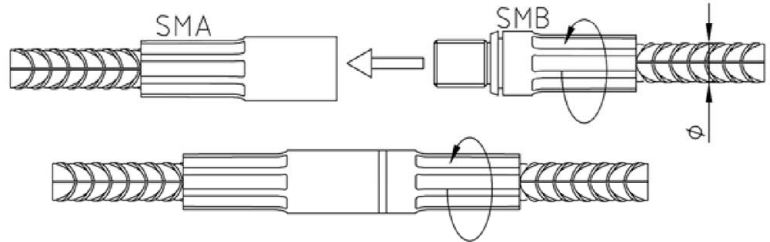


Figure A1: SMA + SMB

Table A2: Reduction connection different diameters – connections coupler SMA – coupler SMB

Combinations of couplers	Ø ₁ [mm]	Ø ₂ [mm]
SMA12 + SMB12	12	10
SMA14 + SMB14	14	12
SMA16 + SMB16	16	14
SMA20 + SMB20	20	16
SMA25 + SMB25	25	20
SMA28 + SMB28	28	25
SMA32 + SMB32	32	28
SMA40 + SMB40	40	32
SMA18 + SMB16	18	16
SMA22 + SMB18	22	18
SMA26 + SMB22	26	22
SMA30 + SMB26	30	26
SMA34 + SMB30	34	30
SMA40 + SMB40	40	34

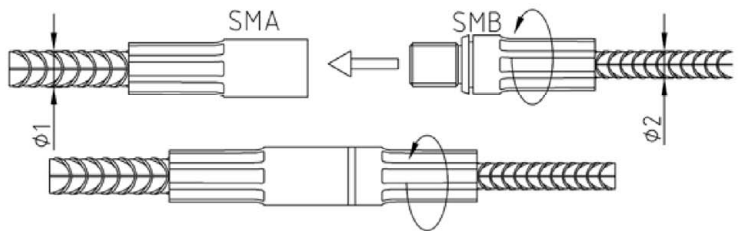


Figure A2: SMA + SMB

Peikko Modix Rebar Couplers

Product description Standard connections + Reduction connections

Annex A2

Table A3: Reduction connection of different diameters – connections coupler SMA – coupler SMB

Combinations of couplers	\varnothing_1 [mm]	\varnothing_2 [mm]
SMB12 + SMA12	12	10
SMB14 + SMA14	14	12
SMB16 + SMA16	16	14
SMB20 + SMA20	20	16
SMB25 + SMA25	25	20
SMB28 + SMA28	28	25
SMB32 + SMA32	32	28
SMB40 + SMA40	40	32
SMB18 + SMA16	18	16
SMB22 + SMA18	22	18
SMB26 + SMA22	26	22
SMB30 + SMA26	30	26
SMB34 + SMA30	34	30
SMB40 + SMA40	40	34

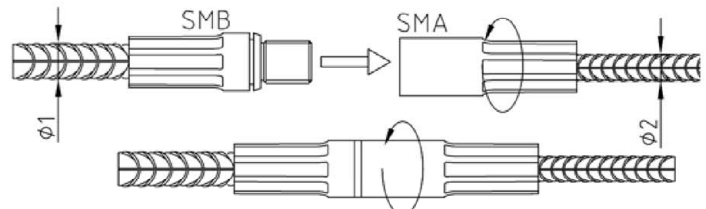


Figure A3: SMB + SMA

Table A4: Standard connection of similar diameters with position coupler – connections coupler SMA – position coupler PM – coupler SMB

Combinations of couplers	\varnothing [mm]
SMA10 + PM10 + SMB10	10
SMA12 + PM12 + SMB12	12
SMA14 + PM14 + SMB14	14
SMA16 + PM16 + SMB16	16
SMA18 + PM18 + SMB18	18
SMA20 + PM20 + SMB20	20
SMA22 + PM22 + SMB22	22
SMA25 + PM25 + SMB25	25
SMA26 + PM26 + SMB26	26
SMA28 + PM28 + SMB28	28
SMA30 + PM30 + SMB30	30
SMA32 + PM32 + SMB32	32
SMA34 + PM34 + SMB34	34
SMA40 + PM40 + SMB40	40

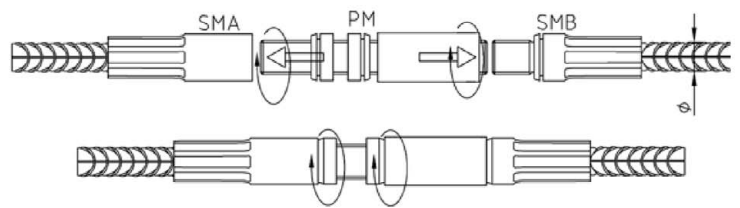


Figure A4: SMA + PM + SMB

Peikko Modix Rebar Couplers

Product description Reduction connections + Position connections

Annex A3

Table A5: Welding coupler and steel structure – connection welding coupler AM – SMB coupler

Combinations of couplers	Ø [mm]
AM10 + SMB10	10
AM12 + SMB12	12
AM14 + SMB14	14
AM16 + SMB16	16
AM18 + SMB18	18
AM20 + SMB20	20
AM22 + SMB22	22
AM25 + SMB25	25
AM26 + SMB26	26
AM28 + SMB28	28
AM30 + SMB30	30
AM32 + SMB32	32
AM34 + SMB34	34
AM40 + SMB40	40

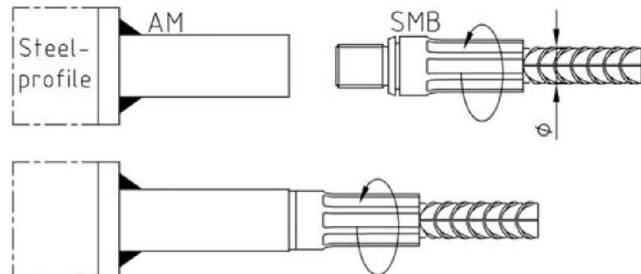


Figure A5: AM + SMB

Table A6: dimensions of Peikko Modix SMA couplers

couplers	Ø [mm]	Thread [mm]	ØD2 [mm]	l2 [mm]
SMA10	10	M12x1,75	18,0	21,0
SMA12	12	M16x2,00	21,0	26,0
SMA14	14	M18x2,50	24,0	30,0
SMA16	16	M20x2,50	27,0	33,0
SMA18	18	M22x2,50	29,0	34,0
SMA20	20	M24x3,00	33,0	37,0
SMA22	22	M27x3,00	36,0	43,0
SMA25	25	M30x3,50	41,0	44,0
SMA26	26	M33x3,50	44,0	51,0
SMA28	28	M36x4,00	47,0	51,0
SMA30	30	M39x4,00	50,0	59,0
SMA32	32	M42x4,50	53,0	59,0
SMA34	34	M45x4,50	57,0	62,0
SMA40	40	M48x5,00	63,5	65,0

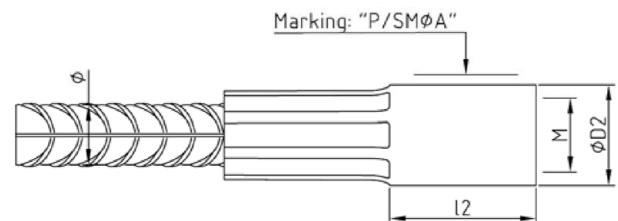


Figure A6: coupler SMA

Table A7: Material Peikko Modix couplers SMA

coupler	Precision tube according EN 10305-1 Material: according deposited properties
	Round bar according EN 10025-2 Material: according deposited properties
Rebar	B500B, B500C

Peikko Modix Rebar Couplers

Product description Welding couplers + couplers SMA

Annex A4

Table A8: dimensions Peikko Modix coupler SMB

couplers	Ø [mm]	Thread [mm]	ØD2 [mm]	l4 [mm]	y [mm]
SMB10	10	M12x1,75	18,0	13,0	1,5
SMB12	12	M16x2,00	21,0	18,0	2,0
SMB14	14	M18x2,50	24,0	20,0	2,0
SMB16	16	M20x2,50	27,0	23,0	2,0
SMB18	18	M22x2,50	29,0	23,0	2,0
SMB20	20	M24x3,00	33,0	26,0	2,0
SMB22	22	M27x3,00	36,0	43,0	2,0
SMB25	25	M30x3,50	41,0	32,0	2,0
SMB26	26	M33x3,50	44,0	35,0	2,0
SMB28	28	M36x4,00	47,0	38,0	2,0
SMB30	30	M39x4,00	50,0	41,0	2,0
SMB32	32	M42x4,50	53,0	44,5	2,0
SMB34	34	M45x4,50	57,0	45,0	2,0
SMB40	40	M48x5,00	63,5	50,0	2,0

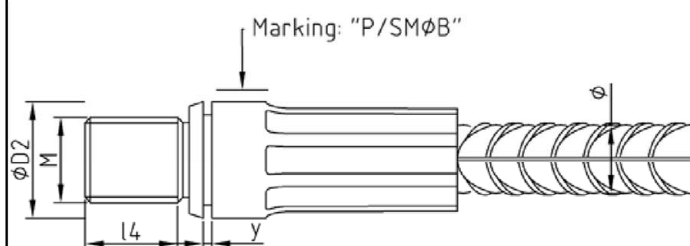


Figure A7: coupler SMB

Table A9: Material Peikko Modix couplers SMB

Coupler	Round bar according EN 10025-2 Material: according deposited properties
Rebar steel	B500B, B500C

Peikko Modix Rebar Couplers

Product description couplers SMB

Annex A5

Table A10: Dimensions Peikko Modix position bolt PMG

bolts	Ø [mm]	Thread [mm]	Min. l ₉ [mm]	Min. l ₁₀ [mm]
PM10G	10	M12x1,75	79	119
PM12G	12	M16x2,00	98	138
PM14G	14	M18x2,50	111	151
PM16G	16	M20x2,50	121	161
PM18G	18	M22x2,50	129	167
PM20G	20	M24x3,00	136	176
PM22G	22	M27x3,00	151	191
PM25G	25	M30x3,50	161	202
PM26G	26	M33x3,50	178	218
PM28G	28	M36x4,00	187	227
PM30G	30	M39x4,00	205	245
PM32G	32	M42x4,50	214	254
PM34G	34	M45x4,50	228	272
PM40G	40	M48x5,00	240	290

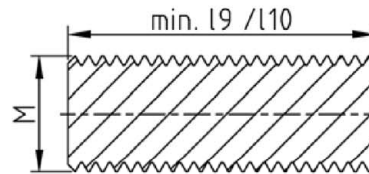
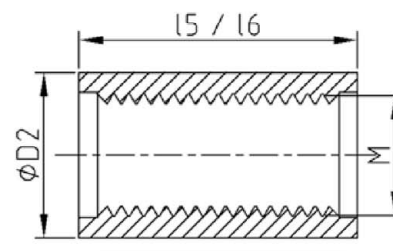


Figure A10: Position bolt PMG

l₉ minimum length for the application with position socket PMH, where applicable different length possible
l₁₀ minimum length for the application with position socket PML, where applicable different length possible

Table A11: Dimensions Peikko Modix Position socket PMH

sockets	Ø [mm]	Thread [mm]	l ₅ [mm]	l ₆ [mm]
PM10H/L	10	M12x1,75	37,0	77,0
PM12H/L	12	M16x2,00	48,0	88,0
PM14H/L	14	M18x2,50	54,5	94,5
PM16H/L	16	M20x2,50	60,5	100,5
PM18H/L	18	M22x2,50	66,0	104,0
PM20H/L	20	M24x3,00	68,5	108,5
PM22H/L	22	M27x3,00	75,0	115,0
PM25H/L	25	M30x3,50	83,0	123,0
PM26H/L	26	M33x3,50	90,0	130,0
PM28H/L	28	M36x4,00	97,0	137,0
PM30H/L	30	M39x4,00	105,0	145,0
PM32H/L	32	M42x4,50	112,0	152,0
PM34H/L	34	M45x4,50	120,0	165,0
PM40H/L	40	M48x5,00	127,0	178,0



Marking: "P/PMØH"
Marking: "P/PMØL"

Figure A11: Position socket PMH and PML

l₅ for the short type (PMH)

l₆ for the long type (PML)

Table A12: Material Peikko Modix position bolt PMG and position socket PMH

Position bolt	Alloyed steel, strength class min. 8.8
Position socket	Precision tube according EN 10305-1 Material: according deposited properties Round bar according EN 10025-2 Material: according deposited properties

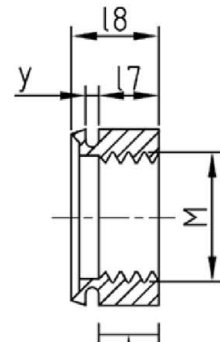
Peikko Modix Rebar Couplers

Product description Position bolt PMG and Position socket PMH

Annex A6

Table A13: Dimensions Peikko Modix counter nut PMF

Counter nut	Ø [mm]	Thread [mm]	l7 [mm]	l8 [mm]	y [mm]
PM10F	10	M12x1,75	7,0	10,2	1,5
PM12F	12	M16x2,00	8,0	11,9	2,0
PM14F	14	M18x2,50	9,0	13,0	2,0
PM16F	16	M20x2,50	9,0	13,5	2,0
PM18F	18	M22x2,50	9,0	14,0	2,0
PM20F	20	M24x3,00	10,0	15,0	2,0
PM22F	22	M27x3,00	11,0	16,0	2,0
PM25F	25	M30x3,50	12,0	17,0	2,0
PM26F	26	M33x3,50	13,0	18,0	2,0
PM28F	28	M36x4,00	14,0	19,1	2,0
PM30F	30	M39x4,00	15,0	20,0	2,0
PM32F	32	M42x4,50	16,0	21,2	2,0
PM34F	34	M45x4,50	17,0	22,0	2,0
PM40F	40	M48x5,00	18,0	23,3	2,0

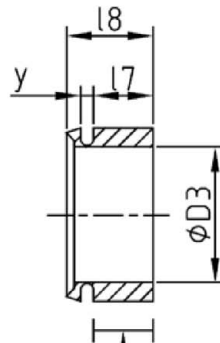


Marking: "P/PMØF"

Figure A12: counter nut PMF

Table A14: Dimensions Peikko Modix distance sleeve PMB

sleeve	Ø [mm]	ØD3 [mm]	l7 [mm]	l8 [mm]	y [mm]
PM10B	10	13,0	7,0	10,2	1,5
PM12B	12	17,0	8,0	11,9	2,0
PM14B	14	19,0	9,0	13,0	2,0
PM16B	16	21,0	9,0	13,5	2,0
PM18B	18	23,0	9,0	14,0	2,0
PM20B	20	25,0	10,0	15,0	2,0
PM22B	22	28,0	11,0	16,0	2,0
PM25B	25	31,0	12,0	17,0	2,0
PM26B	26	34,0	13,0	18,0	2,0
PM28B	28	37,0	14,0	19,1	2,0
PM30B	30	40,0	15,0	20,0	2,0
PM32B	32	43,0	16,0	21,2	2,0
PM34B	34	46,0	17,0	22,0	2,0
PM40B	40	49,0	18,0	23,3	2,0



Marking: "P/PMØB"

Figure A13: distance sleeve PMB

Table A15: Material Peikko Modix counter nut PMF and distance sleeve PMB

Counter nut	Precision tube according EN 10305-1
Distance sleeve	Material: according deposited properties
	Round bar according EN 10025-2
	Material: according deposited properties

Peikko Modix Rebar Couplers

Product description Counter nut PMF and Distance sleeve PMB

Annex A7

Table A16: Dimensions Peikko Modix welding coupler AM

couplers	Ø [mm]	Thread [mm]	ØD2 [mm]	l2 [mm]	l11 [mm]
AM10	10	M12x1,75	18,0	21,0	52,0
AM12	12	M16x2,00	21,0	26,0	63,0
AM14	14	M18x2,50	24,0	30,0	72,0
AM16	16	M20x2,50	27,0	33,0	80,0
AM18	18	M22x2,50	29,0	34,0	90,0
AM20	20	M24x3,00	33,0	37,0	98,0
AM22	22	M27x3,00	36,0	43,0	110,0
AM25	25	M30x3,50	41,0	44,0	122,0
AM26	26	M33x3,50	44,0	51,0	130,0
AM28	28	M36x4,00	47,0	51,0	141,0
AM30	30	M39x4,00	50,0	59,0	145,0
AM32	32	M42x4,50	53,0	59,0	156,0
AM34	34	M45x4,50	57,0	62,0	160,0
AM40	40	M48x5,00	63,5	65,0	165,0

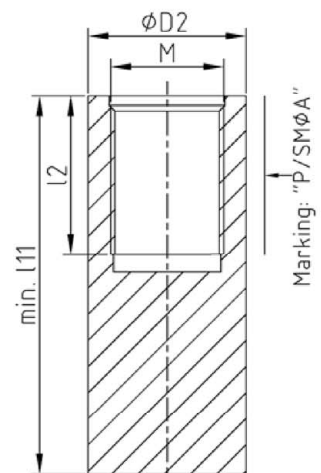


Figure A14: welding coupler AM

Table A17: Material Peikko Modix welding coupler AM

Welding coupler	Round bar according EN 10025-2 Material: according deposited properties
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Peikko Modix Rebar Couplers

Product description Welding coupler AM

Annex A8

Application conditions

Application as mechanical coupler according to EN 1992-1-1 and Annex C

- Transfer of static and quasi-static tension and pressure 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
- Transfer of fatigue loads with fatigue resistance according to EN 1992-1-1, section 6.8.4
- Resistance to low-cycle seismic loading according to EN 1998-1, section 5.6.3(2)
- Welding couplers AM are used for the connection of rebar steel with steel structures. The verification of the bar load transfer by the welds to the related steel structures, has to be ensured by the responsible designer.

Installation criteria

- Splices may be loaded under static and quasi static tensile and pressure loads with a maximum of 100% of the unspliced bar according to EN 1992-1-1, section 8.7.2 (4).
- For the concrete cover to the coupler surface and the spacing between the outer edges of adjacent couplers similar criteria as for unspliced bars according to EN 1992-1-1 has to be applied. The spacing for the installation remains untouched.
- Bended bars (pre-bended) shall have at least the 5 times nominal rebar diameter spacing to the coupler end before the planned bending starts. Will special equipment be used in the manufacturing plant for bending the couplers, then the spacing might be reduced to the 2 times of the nominal rebar diameter.
- Installation of the couplers by trained personnel under supervision of the responsible site manager
- Utilization of Peikko Modix coupler as delivered (or from steel partner), no modifications or replacement of individual parts
- Prior to installation the regular condition of the inner and outer thread has to be checked. Pollutions of any kind are to be removed.
- By adequate measures (e.g. plastic cap) it shall be ensured that no concrete deposition or other pollution is contaminating the couplers. Prior to joining the coupler connection all obstructions inside the couplers shall be removed.
- Installation of the couplers according to manufacturer criteria, see installation manual Annex B3 to Annex B4
- Rigid fixation of the Modix couplers on the formwork to avoid displacement during installation of reinforcement and placing of concrete
- All threads shall be protected against pollution from concrete, water and lubricants
- For the connection of the welding coupler AM with a steel structure an established WPS-welding instruction according to EN ISO 15609-1 shall be available which shall be considered from the welders. The producer of the welding shall have a welding certificate according EN 1090-1, Table B.1. The welders shall have valid test certificates according EN IS 9606-1. Welding coupler and steel structure shall be protected against corrosion following the individual application requirements, see EN ISO 12944-5.

Peikko Modix Rebar Couplers

Intended use
Application conditions and installation criteria

Annex B1

Installation criteria

- All Modix system parts are stored accordingly with protected thread (thread cap and thread plug), the threads are unpolluted, usable and undamaged (no mechanical damages or corrosion etc.)
- All couplers will be screwed together completely until the gap is closed (visual control of the correct assembling)
- Counter nuts and distance sleeves are screwed until the gap is closed (visual control of the correct assembling)

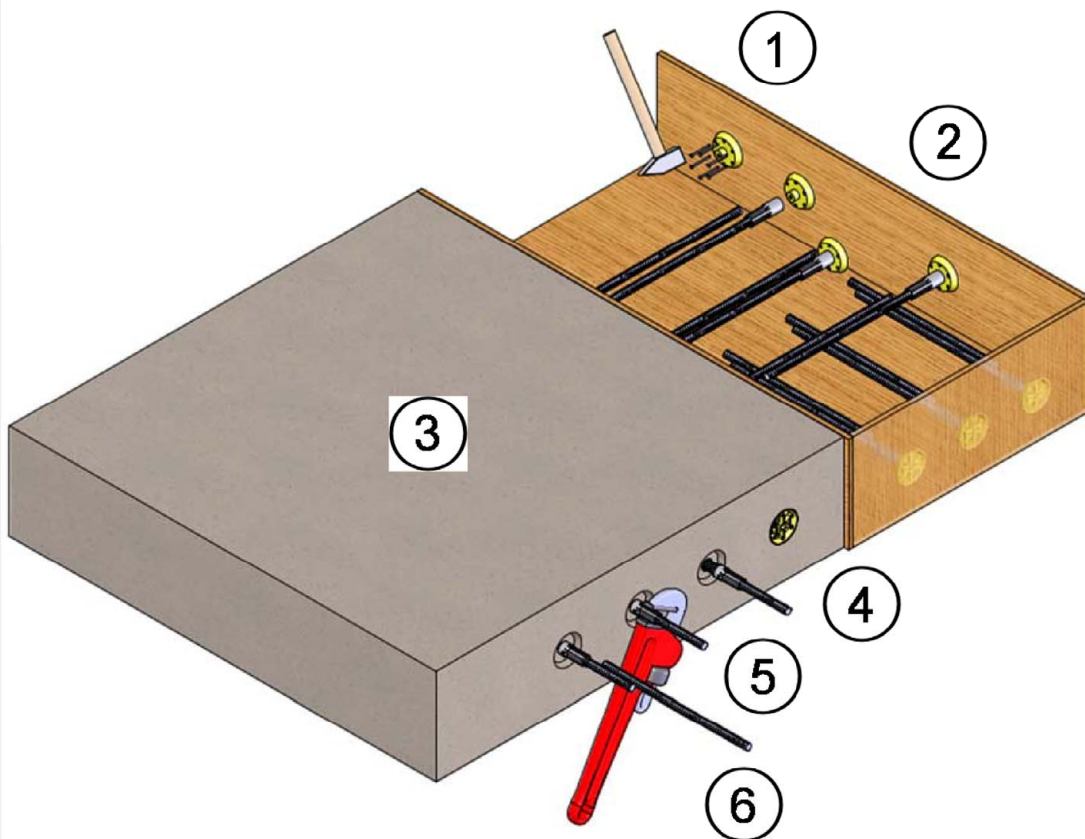
Peikko Modix Rebar Couplers

Intended use and installation criteria

Annex B2

Standard connection SMA+SMB
Reduction connection SMA+SMB

1. fix nailing plate and remove the protecting cap from the coupler
2. fix the coupler tight on the nailing plate (alternative nail combination of nailing plate and coupler to the formwork)
3. place element reinforcement and installations safely and resistant and concrete the element
4. remove the formwork and nailing plate, check the internal thread, remove the protecting cap from the coupler and screw coupler in
5. torque coupler until the gap is closed
6. continue with the following concrete section



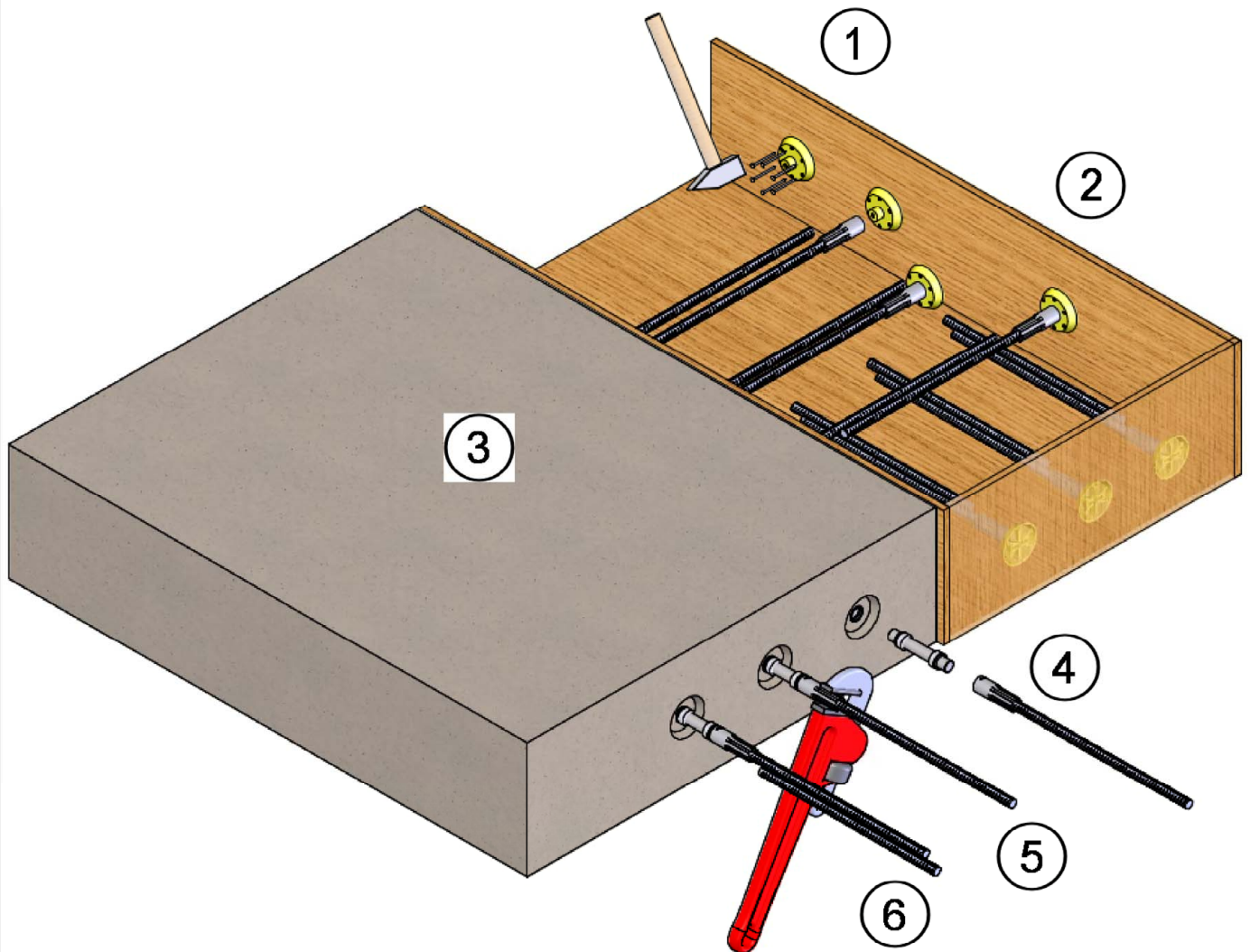
Peikko Modix Rebar Couplers

Intended use
Installation manual Standard- and Reduction connections

Annex B3

Position connections SMA+SMB+PM

1. fix nailing plate and remove the protecting cap from the coupler
2. fix the coupler tight on the nailing plate (alternative nail combination of nailing plate and coupler to the formwork)
3. place element reinforcement and installations safely and resistant and concrete the element
4. remove the formwork and nailing plate, check the internal thread, remove the protecting cap from the position coupler and screw coupler in
5. torque the counter nut until the gap is closed, adjust second counter nut and coupler and torque the counter nut until the gap is closed
6. continue with the following concrete section



Peikko Modix Rebar Couplers

Intended use
Installation manual Position connection

Annex B4

Table C1: Connection coupler SMA – coupler SMB

Combinations of couplers	Ø [mm]	Connection length A+B [mm]
SMA10 + SMB10	10	97
SMA12 + SMB12	12	114
SMA14 + SMB14	14	128
SMA16 + SMB16	16	142
SMA18 + SMB18	18	159
SMA20 + SMB20	20	174
SMA22 + SMB22	22	198
SMA25 + SMB25	25	219
SMA26 + SMB26	26	232
SMA28 + SMB28	28	252
SMA30 + SMB30	30	261
SMA32 + SMB32	32	278
SMA34 + SMB34	34	291
SMA40 + SMB40	40	297

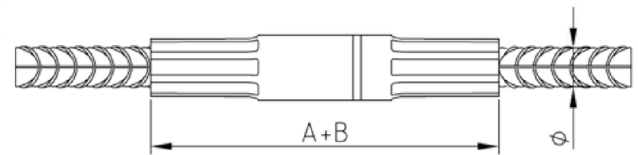


Figure C1: SMA + SMB

Table C2: Connection coupler SMA – coupler SMB – essential characteristics

Combinations of couplers	Resistance under static and quasi static loads		Elongation at connection failure $A_{gt,act}$ [%]	Slip under loading $s_1^{(3)}$ [mm]	Slip after loading $s_2^{(4)}$ [mm]	Fatigue resistance ⁵⁾ (S-N-curve with specific defined k_1 and k_2)			Resistance to low cycle loading (seismic action)	
	$f_{u,min,bar,outside}$	$f_{u,min,bar,inside}$				$\Delta\sigma_{Rsk}$ [N/mm ²]	k_1 [-]	k_2 [-]	u_{20} [mm]	$F_{u,min}^{(6)}$ [kN] B500B/B500C
	B500B ¹⁾	B500C ²⁾								
SMA10 + SMB10	540	575	3	0,10	0,10	85 ($N=2 \cdot 10^6$) 57 ($N^*=10^7$)	4	5	0,2	42,4/45,1
SMA12 + SMB12	540	575	3	0,11	0,10					61,1/65,1
SMA14 + SMB14	540	575	3	0,11	0,10					83,1/88,5
SMA16 + SMB16	540	575	3	0,12	0,10					108,6/115,6
SMA18 + SMB18	540	575	3	0,13	0,10					137,4/146,3
SMA20 + SMB20	540	575	3	0,14	0,10					169,6/180,6
SMA22 + SMB22	540	575	3	0,15	0,10					205,3/218,6
SMA25 + SMB25	540	575	3	0,16	0,10					265,1/282,3
SMA26 + SMB26	540	575	3	0,17	0,10	75 ($N=2 \cdot 10^6$) 50 ($N^*=10^7$)	4	5	-	-
SMA28 + SMB28	540	575	3	0,18	0,10					-
SMA30 + SMB30	540	575	3	0,18	0,10					-
SMA32 + SMB32	540	575	3	0,19	0,10					-
SMA34 + SMB34	540	575	3	0,19	0,10					-
SMA40 + SMB40	540	575	3	0,20	0,10					-

Connections according to Table C1

¹⁾ $f_{u,min,bar,outside} = f_{u,min,bar,inside} = 1,08 \cdot f_{yk}$, with $f_{yk} = 500 \text{ N/mm}^2$ at B500B

²⁾ $f_{u,min,bar,outside} = f_{u,min,bar,inside} = 1,15 \cdot f_{yk}$, with $f_{yk} = 500 \text{ N/mm}^2$ at B500C

³⁾ Slip inside the connection under loading with $0,6 \cdot f_{yk}$

⁴⁾ Slip inside the connection after loading at $0,02 \cdot f_{yk}$

⁵⁾ Fatigue resistance $\Delta\sigma_{Rsk}$, S-N-curve with specific defined k_1 , k_2

⁶⁾ $F_{u,min} = (\pi \cdot \varnothing^2 / 4) \cdot f_{u,min}$

Peikko Modix Rebar Couplers

Essential characteristics
Standard connections

Annex C1

Table C3: Reduction connection Coupler SMA – Coupler SMB

Combinations of couplers	Ø [mm]	Connection length A+B [mm]
SMA12 + SMB12/10	10	114
SMA14 + SMB14/12	12	128
SMA16 + SMB16/14	14	142
SMA18 + SMB18/16	16	159
SMA20 + SMB20/16	16	174
SMA22 + SMB22/18	18	198
SMA25 + SMB25/20	20	219
SMA26 + SMB26/22	22	232
SMA28 + SMB28/25	25	252
SMA30 + SMB30/26	26	261
SMA32 + SMB32/28	28	278
SMA34 + SMB34/30	30	291
SMA40 + SMB40/32	32	297
SMA40 + SMB40/34	34	297

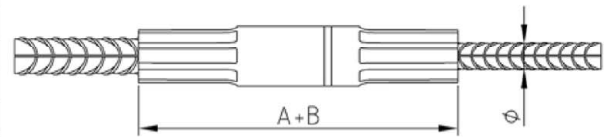


Figure C2: SMA + SMB

Table C4: Reduction connections Coupler SMA – Coupler SMB - Essential characteristics

Combinations of couplers	Resistance under static and quasi static loads		Elongation at connection failure $A_{gt,act}$ [%]	Slip under loading $s_1^{(3)}$ [mm]	Slip after loading $s_2^{(4)}$ [mm]	Fatigue resistance ⁵⁾ (S-N-curve with specific defined k_1 and k_2)			Resistance to low cycle loading (seismic action)	
	$f_{u,min,bar,outside}$	$f_{u,min,bar,inside}$				$\Delta\sigma_{Rsk}$ [N/mm ²]	k_1 [-]	k_2 [-]	u_{20} [mm]	$F_{u,min}^{(6)}$ [kN] B500B/B500C
	B500B ¹⁾	B500C ²⁾								
SMA12 + SMB12/10	540	575	3	0,10	0,10	85 ($N=2 \cdot 10^6$) 57 ($N^*=10^7$)	4	5	0,2	42,4/45,1
SMA14 + SMB14/12	540	575	3	0,11	0,10					61,1/65,1
SMA16 + SMB16/14	540	575	3	0,12	0,10					83,1/88,5
SMA18 + SMB18/16	540	575	3	0,12	0,10					108,6/115,6
SMA20 + SMB20/16	540	575	3	0,13	0,10					108,6/115,6
SMA22 + SMB22/18	540	575	3	0,14	0,10					137,4/146,3
SMA25 + SMB25/20	540	575	3	0,15	0,10					169,6/180,6
SMA26 + SMB26/22	540	575	3	0,16	0,10					-
SMA28 + SMB28/25	540	575	3	0,17	0,10					-
SMA30 + SMB30/26	540	575	3	0,18	0,10					-
SMA32 + SMB32/28	540	575	3	0,18	0,10	75 ($N=2 \cdot 10^6$) 50 ($N^*=10^7$)	4	5	-	-
SMA34 + SMB34/30	540	575	3	0,19	0,10					-
SMA40 + SMB40/32	540	575	3	0,20	0,10					-
SMA40 + SMB40/34	540	575	3	0,20	0,10					-

Connections according to Table C3

¹⁾ $f_{u,min,bar,outside} = f_{u,min,bar,inside} = 1,08 \cdot f_{yk}$, with $f_{yk} = 500$ N/mm² at B500B

²⁾ $f_{u,min,bar,outside} = f_{u,min,bar,inside} = 1,15 \cdot f_{yk}$, with $f_{yk} = 500$ N/mm² at B500C

³⁾ Slip inside the connection under loading with $0,6 \cdot f_{yk}$

⁴⁾ Slip inside the connection after loading at $0,02 \cdot f_{yk}$

⁵⁾ Fatigue resistance $\Delta\sigma_{Rsk}$, S-N-curve with specific defined k_1 , k_2

⁶⁾ $F_{u,min} = (\pi \cdot \varnothing^2 / 4) \cdot f_{u,min}$

Peikko Modix Rebar Couplers

Essential characteristics
Reduction connections

Annex C2

Table C5: Reduction connection Coupler SMB – Coupler SMA

Combinations of couplers	Ø [mm]	Connection length A+B [mm]
SMB12 + SMA12/10	10	114
SMB14 + SMA14/12	12	128
SMB16 + SMA16/14	14	142
SMB18 + SMA18/16	16	159
SMB20 + SMA20/16	16	174
SMB22 + SMA22/18	18	198
SMB25 + SMA25/20	20	219
SMB26 + SMA26/22	22	232
SMB28 + SMA28/25	25	252
SMB30 + SMA30/26	26	261
SMB32 + SMA32/28	28	279
SMB34 + SMA34/30	30	291
SMB40 + SMA40/32	32	296
SMB40 + SMA40/34	34	296

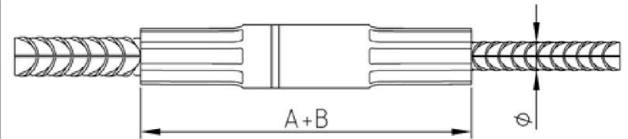


Figure C3: SMB + SMA

Table C6: Reduction connection Coupler SMB – Coupler SMA- Essential characteristics

Combinations of couplers	Resistance under static and quasi static loads $f_{u,min,bar,outside}$ $f_{u,min,bar,inside}$ [N/mm ²]		Elongation at connection failure $A_{gt,act}$ [%]	Slip under loading $s_1^{(3)}$ [mm]	Slip after loading $s_2^{(4)}$ [mm]	Fatigue resistance ⁵⁾ (S-N-curve with specific defined k_1 and k_2)			Resistance to low cycle loading (seismic action)	
	B500B ¹⁾	B500C ²⁾				$\Delta\sigma_{Rsk}$ [N/mm ²]	k_1 [-]	k_2 [-]	u_{20} [mm]	$F_{u,min}^{(6)}$ [kN]
SMB12 + SMA12/10	540	575	3	0,10	0,10	85 ($N=2 \cdot 10^6$) 57 ($N^*=10^7$)	4	5	0,2	42,4/45,1
SMB14 + SMA14/12	540	575	3	0,11	0,10					61,1/65,1
SMB16 + SMA16/14	540	575	3	0,12	0,10					83,1/88,5
SMB18 + SMA18/16	540	575	3	0,12	0,10					108,6/115,6
SMB20 + SMA20/16	540	575	3	0,13	0,10					108,6/115,6
SMB22 + SMA22/18	540	575	3	0,14	0,10					137,4/146,3
SMB25 + SMA25/20	540	575	3	0,15	0,10					169,6/180,6
SMB26 + SMA26/22	540	575	3	0,16	0,10					-
SMB28 + SMA28/25	540	575	3	0,17	0,10					-
SMB30 + SMA30/26	540	575	3	0,18	0,10					-
SMB32 + SMA32/28	540	575	3	0,18	0,10	75 ($N=2 \cdot 10^6$) 50 ($N^*=10^7$)	4	5		-
SMB34 + SMA34/30	540	575	3	0,19	0,10					-
SMB40 + SMA40/32	540	575	3	0,20	0,10					-
SMB40 + SMA40/34	540	575	3	0,20	0,10					-

Connections according to Table C5

¹⁾ $f_{u,min,bar,outside} = f_{u,min,bar,inside} = 1,08 \cdot f_{yk}$, with $f_{yk} = 500$ N/mm² at B500B

²⁾ $f_{u,min,bar,outside} = f_{u,min,bar,inside} = 1,15 \cdot f_{yk}$, with $f_{yk} = 500$ N/mm² at B500C

³⁾ Slip inside the connection under loading with $0,6 \cdot f_{yk}$

⁴⁾ Slip inside the connection after loading at $0,02 \cdot f_{yk}$

⁵⁾ Fatigue resistance $\Delta\sigma_{Rsk}$, S-N-curve with specific defined k_1 , k_2

⁶⁾ $F_{u,min} = (\pi \cdot \frac{\phi^2}{4}) \cdot f_{u,min}$

Peikko Modix Rebar Couplers

Essential characteristics
Reduction connections

Annex C3

Table C7: Position connection coupler SMA – position coupler PM – coupler SMB

Combinations of couplers	Ø [mm]	Connection length PMH Min. A+B+C [mm]*	Connection length PML Min. A+B+C [mm]*
SMA10 + PM10 + SMB10	10	174	214
SMA12 + PM12 + SMB12	12	211	250
SMA14 + PM14 + SMB14	14	237	277
SMA16 + PM16 + SMB16	16	261	301
SMA18 + PM18 + SMB18	18	286	324
SMA20 + PM20 + SMB20	20	308	348
SMA22 + PM22 + SMB22	22	344	384
SMA25 + PM25 + SMB25	25	378	419
SMA26 + PM26 + SMB26	26	404	444
SMA28 + PM28 + SMB28	28	438	477
SMA30 + PM30 + SMB30	30	458	498
SMA32 + PM32 + SMB32	32	491	531
SMA34 + PM34 + SMB34	34	517	561
SMA40 + PM40 + SMB40	40	536	586

*PMH short type, PML long type

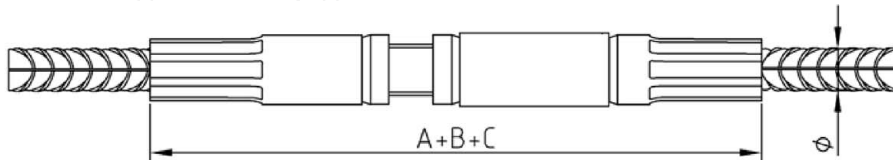


Figure C4: SMA + PM + SMB

Peikko Modix Rebar Couplers

Essential characteristics
Position connections

Annex C4

Table C8: Position connection Coupler SMA – Position coupler PM- Coupler SMB- Essential characteristics

Combinations of couplers	Resistance under static and quasi static loads $f_{u,min,bar,outside}$ $f_{u,min,bar,inside}$ [N/mm ²]		Elongation at connection failure $A_{gt,act}$ [%]	Slip under loading $s_1^{(3)}$ [mm]	Fatigue resistance ⁴⁾ (S-N-curve with specific defined k_1 and k_2)		
	B500B ¹⁾	B500C ²⁾			$\Delta\sigma_{Rsk}$ [N/mm ²]	k_1 [-]	k_2 [-]
SMA10 + PM10 + SMB10	540	575	3	0,14	85 ($N=2 \cdot 10^6$) 57 ($N^*=10^7$)	4	5
SMA12 + PM12 + SMB12	540	575	3	0,16			
SMA14 + PM14 + SMB14	540	575	3	0,17			
SMA16 + PM16 + SMB16	540	575	3	0,18			
SMA18 + PM18 + SMB18	540	575	3	0,19			
SMA20 + PM20 + SMB20	540	575	3	0,20			
SMA22 + PM22 + SMB22	540	575	3	0,20			
SMA25 + PM25 + SMB25	540	575	3	0,20			
SMA26 + PM26 + SMB26	540	575	3	0,20			
SMA28 + PM28 + SMB28	540	575	3	0,20			
SMA30 + PM30 + SMB30	540	575	3	0,20	75 ($N=2 \cdot 10^6$) 50 ($N^*=10^7$)	4	5
SMA32 + PM32 + SMB32	540	575	3	0,20			
SMA34 + PM34 + SMB34	540	575	3	0,20			
SMA40 + PM40 + SMB40	540	575	3	0,20			

Connections according to Table C7

¹⁾ $f_{u,min,bar,outside} = f_{u,min,bar,inside} = 1,08 \cdot f_{yk}$, with $f_{yk} = 500$ N/mm² at B500B

²⁾ $f_{u,min,bar,outside} = f_{u,min,bar,inside} = 1,15 \cdot f_{yk}$, with $f_{yk} = 500$ N/mm² at B500C

³⁾ Slip inside the connection under loading with $0,6 \cdot f_{yk}$

⁴⁾ Fatigue resistance $\Delta\sigma_{Rsk}$, S-N-curve with specific defined k_1 , k_2

Peikko Modix Rebar Couplers

Essential characteristics
Position connections

Annex C5

Table C9: Connection welding coupler AM - Coupler SMB

Combinations of couplers	Ø [mm]	Connection length A+B [mm]
AM10 + SMB10	10	97
AM12 + SMB12	12	114
AM14 + SMB14	14	128
AM16 + SMB16	16	142
AM18 + SMB18	18	160
AM20 + SMB20	20	174
AM22 + SMB22	22	197
AM25 + SMB25	25	219
AM26 + SMB26	26	231
AM28 + SMB28	28	252
AM30 + SMB30	30	260
AM32 + SMB32	32	279
AM34 + SMB34	34	292
AM40 + SMB40	40	299

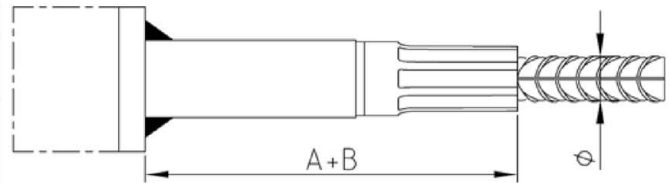


Figure C5: AM + SMB

Table C10: Connection welding coupler AM - Coupler SMB - Essential characteristics

Combinations of couplers	Resistance under static and quasi static loads		Elongation at connection failure	Slip under loading $s_1^{3)}$
	$f_{u,min,bar,outside}$ $f_{u,min,bar,inside}$ [N/mm ²] B500B ¹⁾	B500C ²⁾		
AM10 + SMB10	540	575	3	0,10
AM12 + SMB12	540	575	3	0,10
AM14 + SMB14	540	575	3	0,10
AM16 + SMB16	540	575	3	0,10
AM18 + SMB18	540	575	3	0,10
AM20 + SMB20	540	575	3	0,10
AM22 + SMB22	540	575	3	0,10
AM25 + SMB25	540	575	3	0,10
AM26 + SMB26	540	575	3	0,10
AM28 + SMB28	540	575	3	0,11
AM30 + SMB30	540	575	3	0,11
AM32 + SMB32	540	575	3	0,11
AM34 + SMB34	540	575	3	0,12
AM40 + SMB40	540	575	3	0,12

Connections according to Table C9

¹⁾ $f_{u,min,bar,outside} = f_{u,min,bar,inside} = 1,08 \cdot f_{yk}$, with $f_{yk} = 500 \text{ N/mm}^2$ at B500B

²⁾ $f_{u,min,bar,outside} = f_{u,min,bar,inside} = 1,15 \cdot f_{yk}$, with $f_{yk} = 500 \text{ N/mm}^2$ at B500C

³⁾Slip inside the connection under loading with $0,6 \cdot f_{yk}$

Peikko Modix Rebar Couplers

Essential characteristics
Welding connections

Annex C6