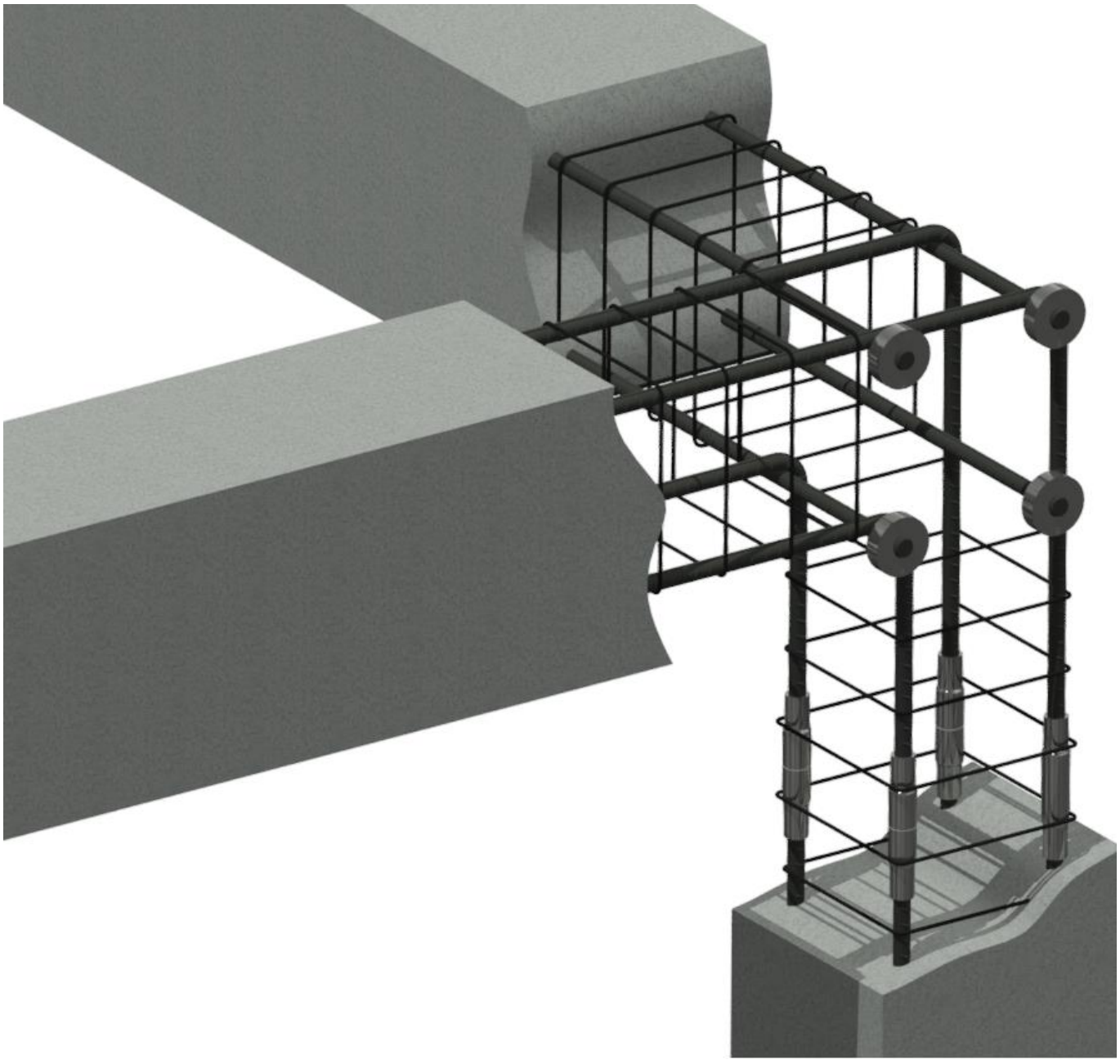
REBAR CONNECTION SYSTEM



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PRODUCTS RANGE

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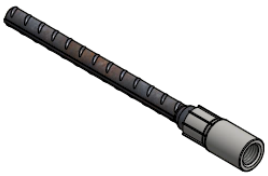
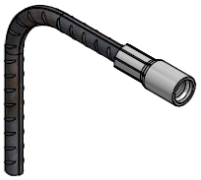
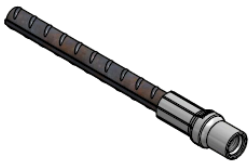
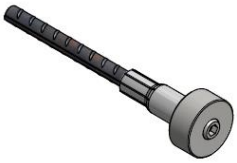
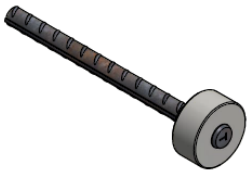
PSA  Page 6	**PSA-PSC**  Page 7	**TSE**  Page 8	**PSA-SS**  Page 8
PSAD  Page 9	**TSED**  Page 10	**PSAG**  Page 10	**TSEG**  Page 11
PSAGGD  Page 12	**PSA-T – TRANSITION COUPLER**  Page 13	**PSA – END COUPLER**  Page 15	**TSE – END COUPLER**  Page 15
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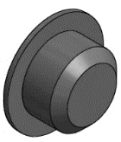
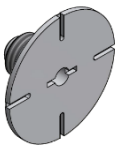
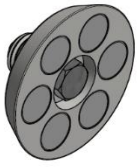
AP  Page 24	**KU-02**  Page 25	**KU-10**  Page 25	**TPM**  Page 26

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INTRODUCTION

Terwa Rebar Connection System is high quality and economic connection of reinforcement. Rebar Connection System is a simple and efficient method to connect the reinforcement steel which eliminates the disadvantages of the traditional procedure of lapped joints. The lapped joints can provide a long-time consumption, a greater rebar congestion and unsafe usage in the seismic zones. The design of the couplers allows a connection of the reinforcement steel, where the characteristics are equal with an uninterrupted rebar and the transfer of loads is made in the bar, not in the concrete like lapped joints case. The shape and the metric thread allow an easy mounting on the construction site or in the prefab factory by using standard tools.

The characteristics and advantages of the Terwa Rebar Connection System are:

- It is used for reinforcement steel with a diameter from 10 mm to 40 mm;
- The full diameter or cross-section of the bar can be used;
- Full connection of the reinforcement;
- Suited for dynamic and seismic loads;
- Slip value of the system below 0.1 mm;
- Additional preparation for the reinforcement steel is not necessary;
- Suitable for all types of reinforcement steel according to the European and American norms;
- The couplers are designed for reinforcement steel B450C, B500B or B500C acc. to EN 10080 and BS 4449 with a yield strength ≥ 500 MPa and a tensile strength ≥ 550 MPa;
- The shape, height and the type of the ribs of the reinforcement steel have no influence on the connection;
- Because the outside diameter has minimal dimension a better concrete cover is generated, and a congestion of reinforcement steel can be prevented;
- The contact surfaces of the couplers exclude the usage of lock-nuts;
- Every diameter and length of the reinforcement steel, straight or bended, can be fitted with a coupler and can be easily connected on sites.

Installation:

- It is no need for a nut-wrench to tighten the coupling. It has to be used a pipe-wrench or a torque wrench for the couplers tightening and to prevent the thread movement;
- Special tools, power sources or special training of the personnel are not necessary;
- The metric thread and the way of connection allow a fast and easy control of the connection;
- The mounting time is reduced to minimum.

Characteristics:

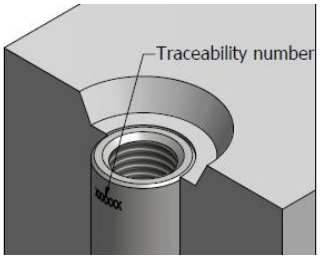
- The couplers are delivered standard, electrolytic galvanized preventing the rust;
- The couplers can be made from stainless steel if the client request.

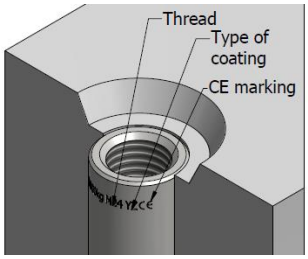
Terwa Rebar Connection System is composed of:

- Reinforcement steel B450C, B500B or B500C acc. to EN 10080 and BS4449;
- A sleeve with interior thread type PKB, pressed at one or two ends on the reinforcement steel;
- Forged and threaded reinforcement steel, TSE coupler;
- Position coupler TWSK;
- Transition couplers, PSA-T;
- Welding coupler KB-W;
- Fixing connectors KB or KBL;
- Accessories.

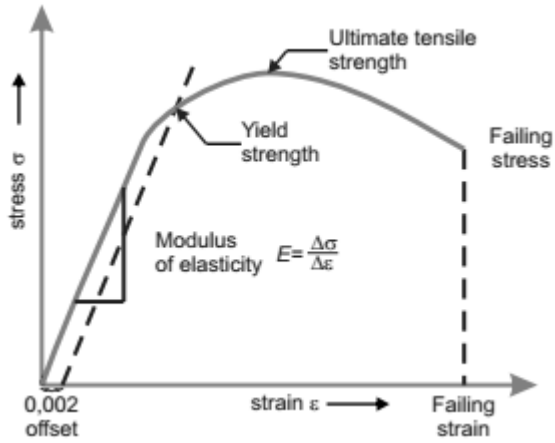
Quality
Terwa control all the time the production process for the connection from strength, dimensional, material quality point of views and all the required inspections for a superior quality system. All the products are tracked starting from the material acquisition to the final product, ready to be used.

Marking and traceability
All systems are CE marked and haves all necessary dates for traceability, thread type and type of coating.





Coupler testing
Terwa rebar couplers are designed to ensure the full transfer of the load to the reinforcement steel and a slip value bellow 0.1 mm. For that, Terwa is periodically testing the system in the factory, according to the European standards.



CE MARKING

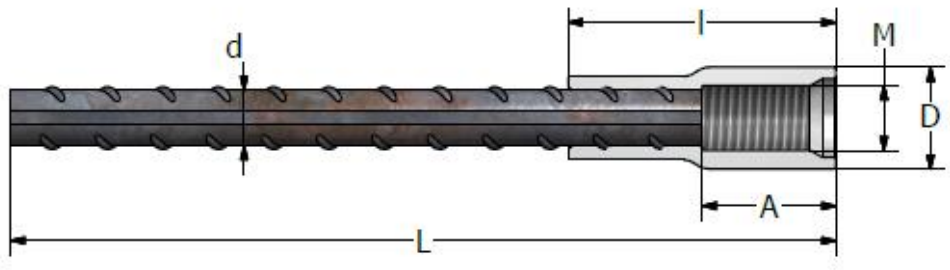
CE marking means that a product is produced and controlled in accordance with a harmonized European standard (hEN) or a European Technical Approval (ETA). ETA can be used as basis for CE marking in cases where no harmonized EN standard is available. However, ETA is voluntary and not required by EU directives or legislation.

Manufacturers may use CE marking to declare that their construction products meet harmonized European standards or have been granted ETA Approvals. These documents define properties the products must have to be granted the right to use CE marking and describe how the manufacture of these products is supervised and tested.

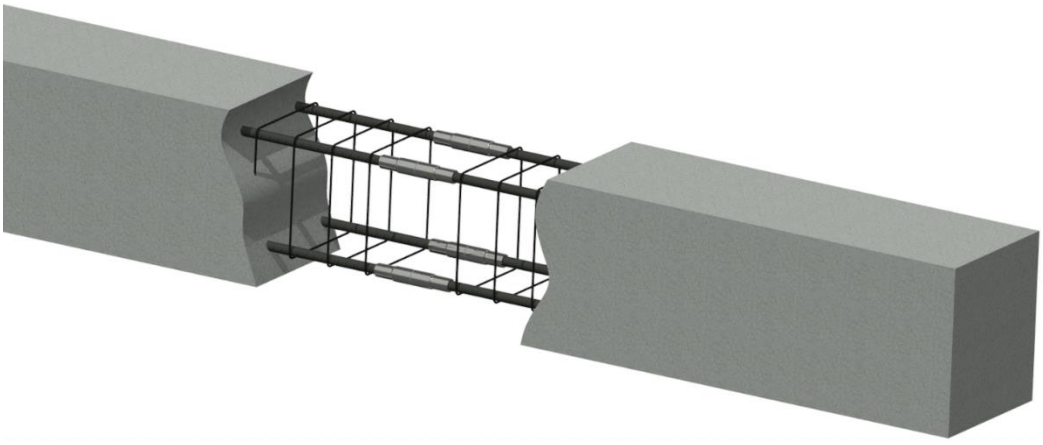
EU's Construction Products Regulation takes effect in full on 1 July 2013. Detailed building parts, such as connections used in concrete constructions, do not have any harmonized EN standards, excluding lifting items and devices, which are regulated in the EU Machinery Directive. For steel constructions CE marking, will become mandatory as of 1 July 2014, as regulated in the EU Construction Products Directive.

PSA REINFORCEMENT COUPLER

The reinforcement coupler PSA is composed of a reinforcement steel and a sleeve with interior metric thread pressed at one end. In connection with a reinforcement coupler TSE or PSA-PSC, the coupler PSA ensures an uninterrupted reinforcement for all types of precast concrete units. These couplers can be made at different dimensions.
These reinforcement couplers can also be used to lift and move the precast concrete elements.
The PKB couplers are made of steel 20CrMo5 or equivalent, electrolytic galvanized. These couplers are marked with the company logo and the thread type. The reinforcement steel is standard B500B or B500C acc. to EN 10080 and BS4449.
On request the PKB couplers can be produced of stainless steel or hot zinc coating.

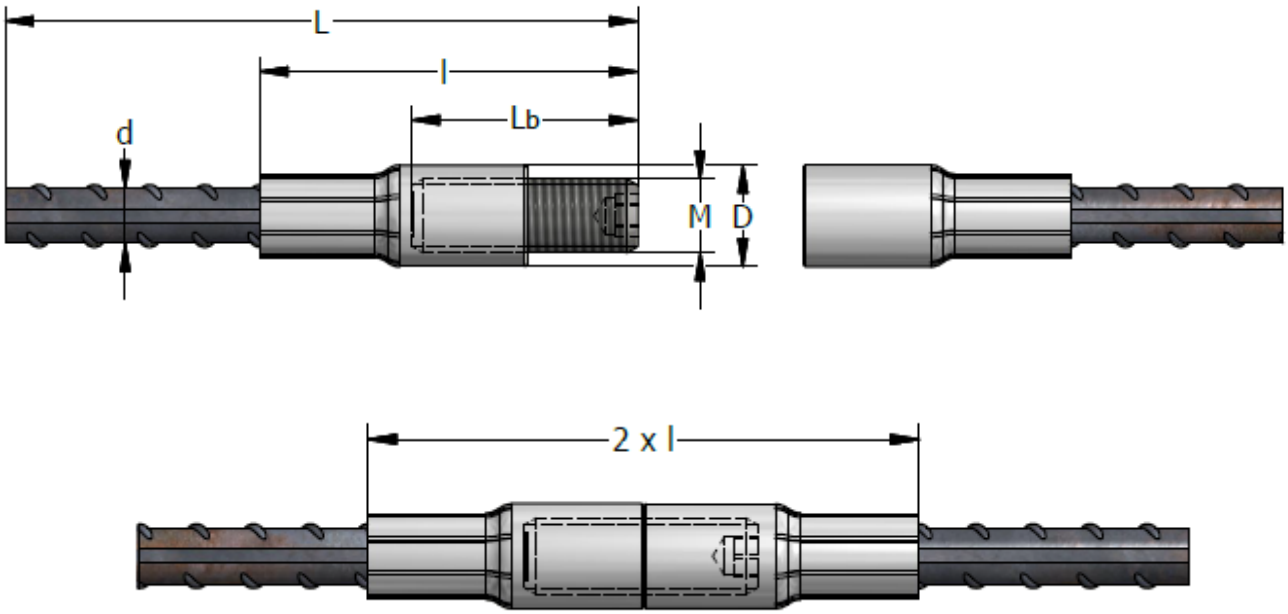


PSA		Bush diameter	Bush length	Rebar diameter	Thread	
Description	Product range no.	D	l	d	Metric	A
		[mm]	[mm]	[mm]	M	[mm]
PSA 10 - M12 - L	90117	17.5	50	10	12	18
PSA 12 - M16 - L	90012	22	62	12	16	25
PSA 14 - M18 - L	90638	26	74	14	18	32
PSA 16 - M20 - L	90013	28	86	16	20	38
PSA 18 - M22 - L	91248	31	92	18	22	40
PSA 20 - M24 - L	90014	34	99	20	24	42
PSA 22 - M27 - L	91246	36	107	22	27	45
PSA 25 - M30 - L	90015	40	117	25	30	52
PSA 28 - M36 - L	90572	50	130	28	36	55
PSA 32 - M42 - L	90016	54	153	32	42	65
PSA 40 - M48 - L	90175	65	188	40	48	72



Different length available on request: **PSA – diam. d - thread x length (L) in mm.**

PSA-PSC REINFORCEMENT COUPLER



The reinforcement coupler PSA-PSC is composed of a reinforcement coupler PSA and a PSC metric bolt threaded inside the PSA. Two PSA couplers and a threaded PSC bolt ensure the connection of two reinforcements for all types of precast concrete units. The PSC bolts are made of alloyed steel 34CrMo4 (W1.7220) or equivalent.

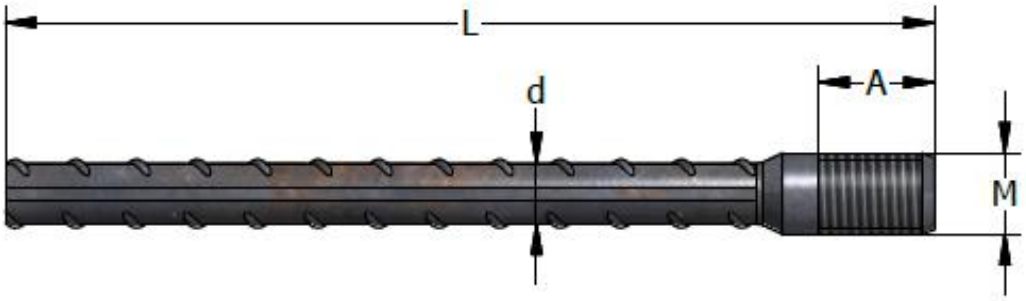
The relevant dimensions for PSC-BOLT are shown in the following table.

PSA-PSC Description	Product no.	D	l	d	M	L_b
		[mm]	[mm]	[mm]	[mm]	[mm]
PSA-PSC 10 - M12	**90954**	17.5	50	10	12	35
PSA-PSC 12 - M16	**90955**	22	62	12	16	49
PSA-PSC 14 - M18	**90956**	26	74	14	18	63
PSA-PSC 16 - M20	**90957**	28	86	16	20	75
PSA-PSC 18 - M22	**91321**	31	92	18	22	79
PSA-PSC 20 - M24	**90924**	34	99	20	24	83
PSA-PSC 22 - M27	**91141**	36	107	22	27	89
PSA-PSC 25 - M30	**90925**	40	117	25	30	103
PSA-PSC 28 - M36	**90926**	50	130	28	36	109
PSA-PSC 32 - M42	**90927**	54	153	32	42	129
PSA-PSC 40 - M48	**91142**	65	188	40	48	143

Different length available on request: **PSA-PSC– diam. d x length (L) in mm.**

TSE REINFORCEMENT COUPLER

The reinforcement coupler TSE is produced of reinforcement steel standard B450C, B500B or B500C acc. to EN 10080 and BS4449, forged at one end and then metric thread rolled. The end diameter is increased more than the rebar diameter to grow the strength of the thread for tensile and shear loads.



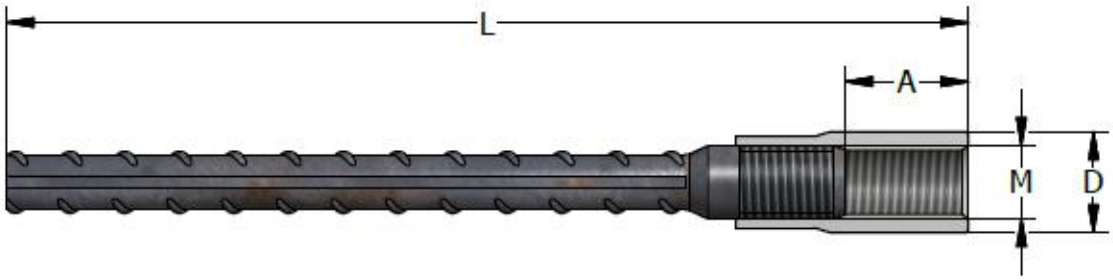
TSE Description	Product range no.	d	THREAD Metric	A
		[mm]		[mm]
TSE 12 - M16 - L	90006	12	16	min 23
TSE 16 - M20 - L	90007	16	20	min 30
TSE 20 - M24 - L	90008	20	24	min 38
TSE 25 - M30 - L	90009	25	30	min 44
TSE 28 – M36 - L	91068	28	36	min 48
TSE 32 - M42 - L	90010	32	42	min 54

To connect with a reinforcement coupler PSA, the TSE coupler is screwed in PKB coupler on the entire length of thread. Different length available on request: TSE**– diam. d – thread x length (L) in mm.**

SPECIAL REINFORCEMENT COUPLERS

PSA-SS REINFORCEMENT COUPLER

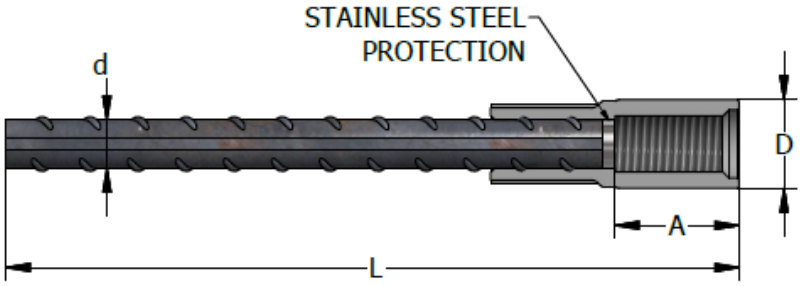
The reinforcement coupler PSA-SS is composed of a reinforcement coupler TSE and a stainless-steel KB bush.



PSA - SS Description	Product no.	Coupler Thread	A	D
		M	[mm]	[mm]
PSA - SS - M16 - L	45823	16	27	22
PSA - SS - M20 - L	45813	20	32	26
PSA - SS - M24 - L	45803	24	37	32
PSA - SS - M30 - L	45797	30	47	40

PSA – REINFORCEMENT COUPLER WITH PROTECTION DISK

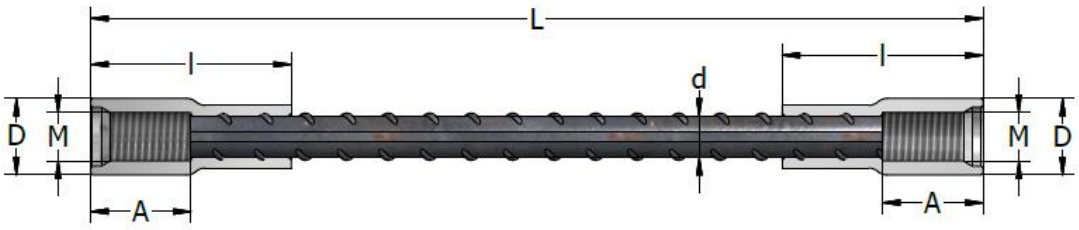
The reinforcement coupler PSA-WITH PROTECTION DISK is composed of a reinforcement coupler PSA and a stainless-steel disk pressed inside used to prevention of corrosion.



PSA - St sheet		Coupler		
Description	Product no.	Thread	A	D
		M	[mm]	[mm]
PSA - St sheet 16 - M20 - L	91157	20	32	28
PSA - St sheet 20 - M27 - L	91158	27	37	36
PSA - St sheet 22 - M30 - L	91159	30	47	40
PSA - St sheet 28 - M36 - L	91187	36	47	50

Different length available on request: **PSA-St sheet – diam. d - thread x length (L) in mm.**

PSAD - DOUBLE REINFORCEMENT COUPLERS



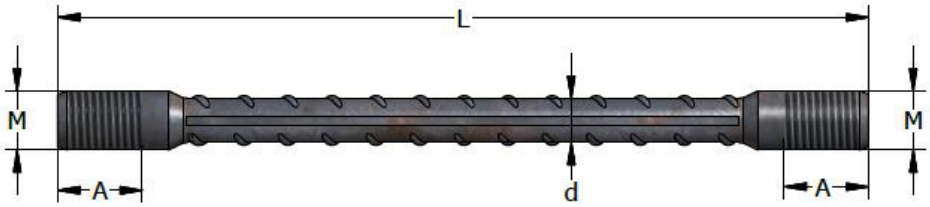
The double reinforcement coupler PSAD is composed of reinforcement steel with two sleeves pressed at both ends. The reinforcement steel is standard B450C, B500B or B500C acc. to EN 10080 and BS4449.
In table are presented some examples of these products.

PSAD		Bush diameter	Bush length	Rebar diameter	Thread	
Description	Product range no.	D	l	d	Metric	A
		[mm]	[mm]	[mm]	[mm]	[mm]
PSAD 10 - M12 - L	91132	17.5	50	10	12	18
PSAD 12 - M16 - L	90518	22	62	12	16	25
PSAD 14 - M18 - L	90651	26	74	14	18	32
PSAD 16 – M20 - L	90519	28	86	16	20	38
PSAD 20 – M24 - L	90520	34	99	20	24	42
PSAD 25 – M30 - L	90620	40	117	25	30	52
PSAD 28 – M36 - L	91131	50	130	28	36	55
PSAD 32 – M42 - L	90764	54	153	32	42	65

Different length available on request: **PSAD – diam. d - thread x length (L) in mm.**

TSED REINFORCEMENT COUPLER

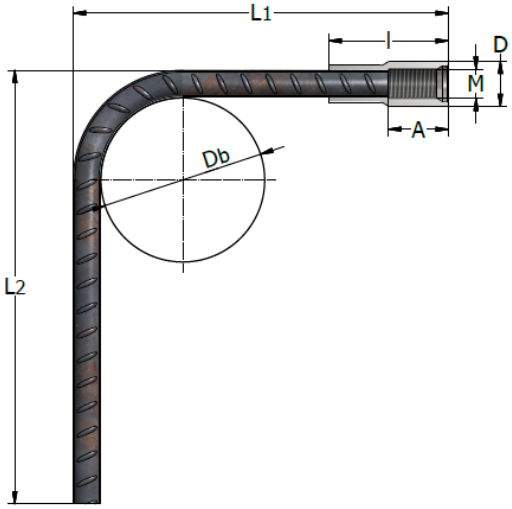
The reinforcement coupler TSED is produced of reinforcement steel standard B450C, B500B or B500C acc. to EN 10080 and BS4449, forged at both end and then metric thread rolled.



TSED		d	THREAD	
Description	Product range no.		Metric	A
		[mm]		[mm]
TSED 12 - M16 - L	90773	12	16	min 23
TSED 16 - M20 - L	90653	16	20	min 30
TSED 20 - M24 - L	90810	20	24	min 38
TSED 25 - M30 - L	90813	25	30	min 44
TSED 32 - M42 - L	91292	32	42	min 54

PSAG - BENDED REINFORCEMENT COUPLERS

The bended reinforcement coupler PSAG is composed of reinforcement steel bended with a sleeve pressed at one end.



PSAG		Bush diameter	Bush length	Rebar diameter	Thread	
Description	Product range no.	D	l	d	Metric	A
		[mm]	[mm]	[mm]	[mm]	[mm]
PSAG 10 - M12 – L1xL2	91206	17.5	50	10	12	18
PSAG 12 - M16 - L1xL2	90708	22	62	12	16	25
PSAG 16 – M20 - L1xL2	90709	28	86	16	20	38
PSAG 20 – M24 - L1xL2	91207	34	99	20	24	42
PSAG 25 – M30 - L1xL2	90707	40	117	25	30	52
PSAG 28 – M36 - L1xL2	91235	50	130	28	36	55
PSAG 32 – M42 - L1xL2	91208	54	153	32	42	65

The PSAG coupler, generally have the bend diameter D_B= 10 x d, but this can be produced on request with D_B= 15 x d or D_B= 20 x d. Also, other length L_1 and L_2 available on request: **PSAG d x Length L_1x L_2 in mm.** For choosing dimensions L_1 and L_2 should take into account the minimum size according with the table below. L_1 is the length measured from the front of coupler to the back of the reinforcing bar.
The minimum dimensions for bending are presented in the following table. The diameter to which a bar is bent should be such as to avoid damage to the reinforcement and crushing of concrete inside the bend of the bar. According to Eurocode 2 minimum bending diameter should be:

- **D_{Bmin} = 4 x d for bar diameter d ≤ 16mm**
- **D_{Bmin} = 7 x d for bar diameter d > 16mm**

Reinforcing diameter "d"	Thread	L_1 min	L_2 min	Bending diameter D_B min	
[mm]	M	[mm]	[mm]	[mm]	
12	M16	160	125	48	**4 x d**
16	M20	210	130	64	
20	M24	230	190	140	**7 x d**
25	M30	300	240	175	
32	M42	370	325	224	

The length for the bended reinforcement coupler can be calculated with the formula:

$L = L_1 + L_2 - x$, **for a single bend**

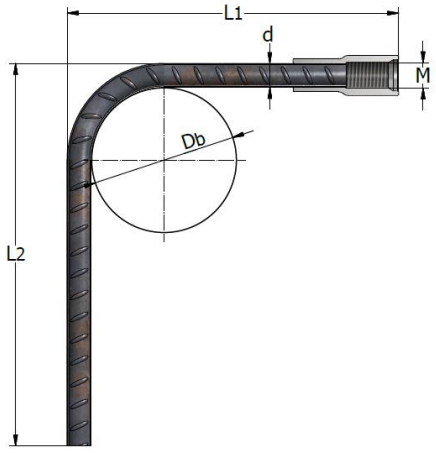
$L = L_1 + L_2 + L_1 - 2x$ **for double bends**

$x = (D_B + 2d) - y$ **"y" is the length in bending area, ''x'' deduction of the bar length due to bending**

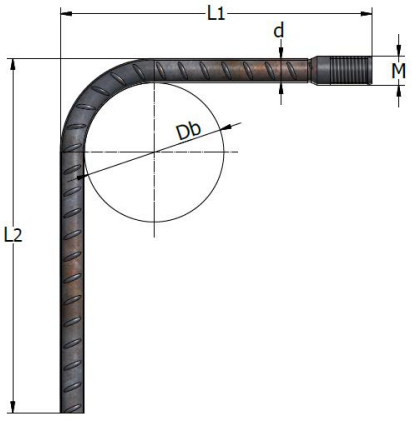
"x" deduction of the bar length due to bending		Reinforcing bar diameter d (mm)				
		12	16	20	25	32
Bending diameter D_B mm	4 x d	25	33	-	-	-
	7 x d	33	44	54	68	87
	10 x d	40	54	67	84	108
	15 x d	53	71	89	111	142
	20 x d	66	88	110	138	176

Bending angle = 90°

PSAG – d x L_1 x L_2 - TYPE 1

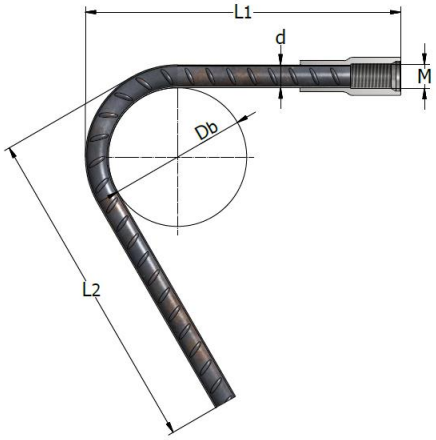


TSEG – d x L_1 x L_2 - TYPE 1

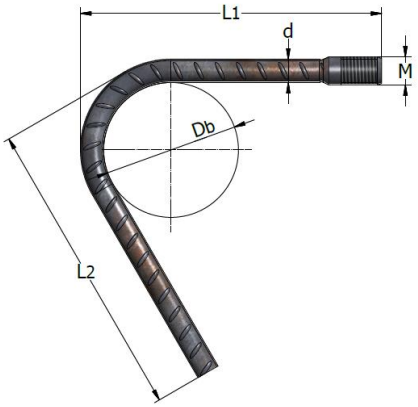


Bending angle 45° - 90°

PSAG – d x L_1 x L_2 – TYPE 2

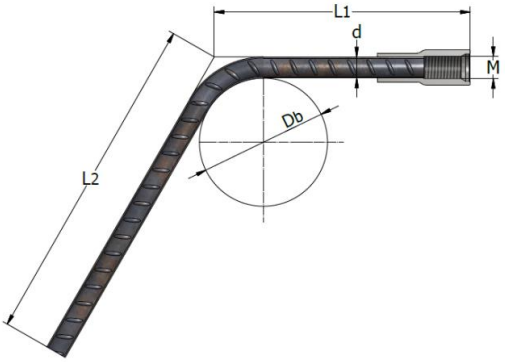


TSEG – d x L_1 x L_2 – TYPE 2

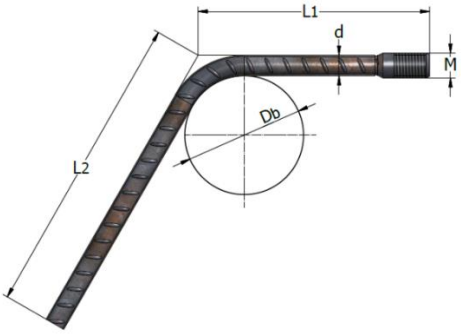


Bending angle 90° - 180°

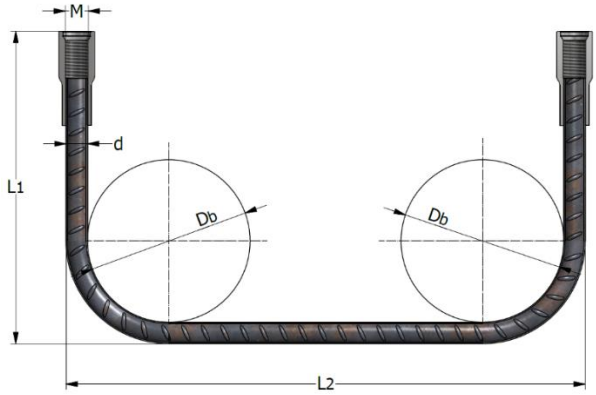
PSAG – d x L_1 x L_2 – TYPE 3



TSEG – d x L_1 x L_2 – TYPE 3



DOUBLE BENDED COUPLER PSAGGD



Different length available on request **PSAGGD – d x L_1 x L_2 in mm**

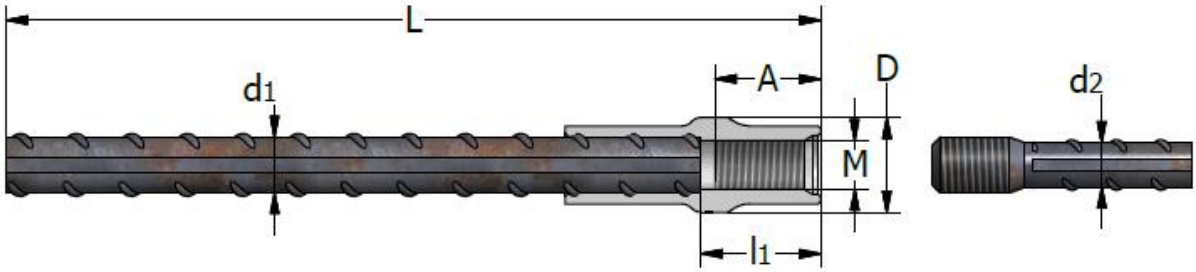
An example for an order is shown in the next table. An order for Rebar connections must include the following:

Reinforcing bar diameter d mm	Thread M	Rebar coupler type	Bending form 1.2.3 or 4	Bending angle	L_A	L_B	Quantity
12	M16	PSAG	Type 2	60	250	600	200
16	M20	TSEG	Type 1	90	300	1200	400
16	M20	TSEG	Type 1	90	800	400	200
20	M24	PSAGGD	Type 4	90	400	600	500

PSA-T TRANSITION COUPLERS

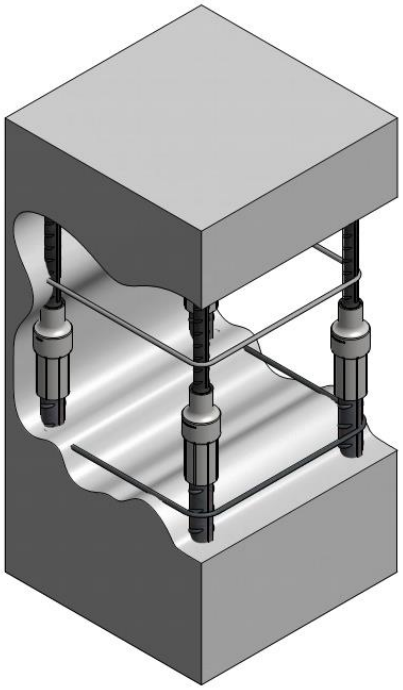
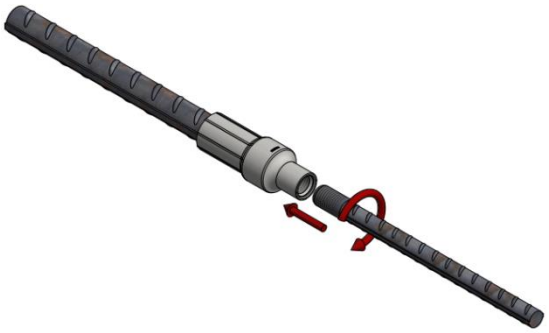
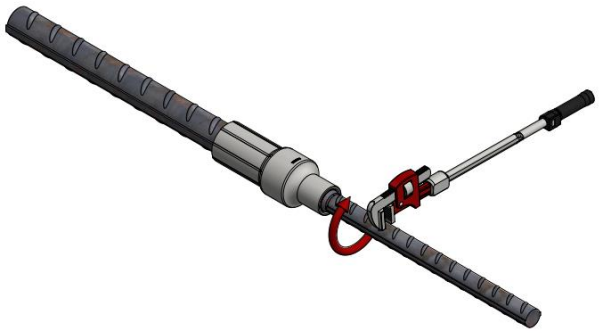
The reinforcement coupler PSA-T is composed of a reinforcement steel and a special sleeve with interior metric thread pressed at one end. The connection is realized between two rebar with different diameter, second rebar can be rotated and is not restricted in its axial direction. The connection with a reinforcement coupler TSE or a PSC bolt and a PSA the coupler PSA-T ensures an uninterrupted reinforcement for all types of precast concrete units.

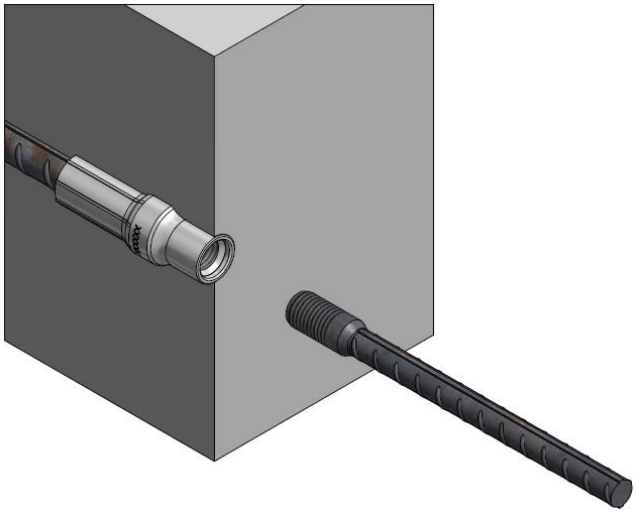
Different length available on request: **PSA-T – diam. d1/d2 – thread x length (L) in mm.**



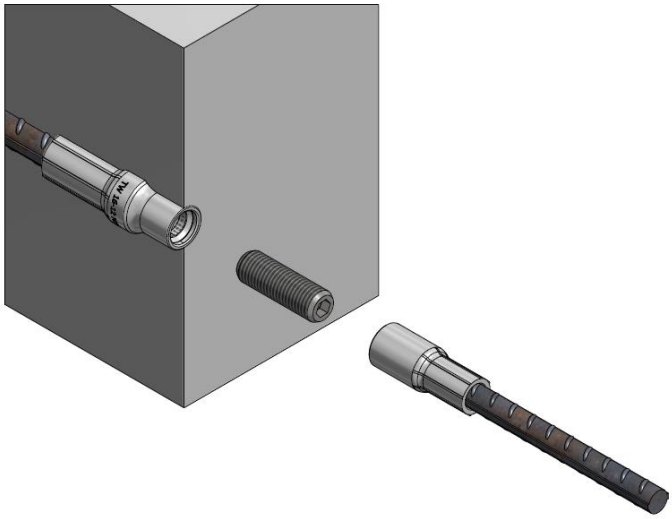
PSA-T		Rebar diameter		Sleeve dimensions		
Description	Product range no.	First rebar d1	Second rebar d2	D	l_1	A
		[mm]	[mm]	[mm]	[mm]	[mm]
PSA-T 16/12 - M16 - L	91299	16	12	28	39	25
PSA-T 16/14 - M18 - L	91300	16	14	28	39	32
PSA-T 18/14 - M18 - L	91301	18	14	31	41	32
PSA-T 18/16 - M20 - L	91302	18	16	31	41	38
PSA-T 20/16 - M20 - L	91303	20	16	34	43	38
PSA-T 20/18 - M22 - L	91304	20	18	34	43	40
PSA-T 22/14 - M18 - L	91305	22	14	36	49	32
PSA-T 22/16 - M20 - L	91306	22	16	36	49	38
PSA-T 22/20 - M24 - L	91307	22	20	36	49	42
PSA-T 25/14 - M18 - L	91308	25	14	40	53	32
PSA-T 25/16 - M20 - L	91309	25	16	40	53	38
PSA-T 25/20 - M24 - L	91310	25	20	40	53	42
PSA-T 28/16 - M20 - L	91311	28	16	50	56	38
PSA-T 28/20 - M24 - L	91312	28	20	50	56	42
PSA-T 28/22 - M27 - L	91382	28	22	50	56	45
PSA-T 28/25 - M30 - L	91313	28	25	50	56	52
PSA-T 32/20 - M24 - L	91314	32	20	54	75	42
PSA-T 32/25 - M30 - L	91315	32	25	54	75	52
PSA-T 32/28 - M36 - L	91316	32	28	54	75	56
PSA-T 40/25 - M30 - L	91317	40	25	65	97	52
PSA-T 40/28 - M36 - L	91318	40	28	65	97	56
PSA-T 40/32 - M42 - L	91319	40	32	65	97	65

INSTRUCTIONS FOR INSTALLING PSA-T COUPLER

<table>
<tr>
<td rowspan="2">  </td>
<td>  </td>
<td>Place in and rotate the TSE or PSA-PSC coupler into the PSA-T cupler.</td>
</tr>
<tr>
<td>  </td>
<td>The connection is finished by using a special torque wrench made by TERWA to tighten the connection. The connection must be sufficiently tight to prevent movement during concrete placement. The necessary torque for each type of rebar is shown in table at page 23.</td>
</tr>
</table>



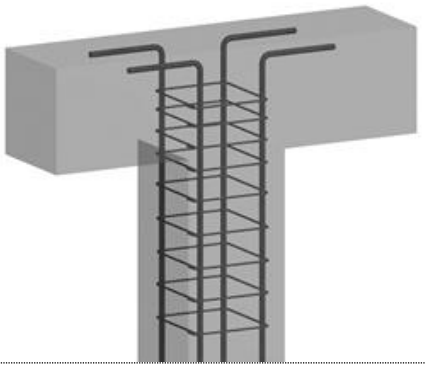
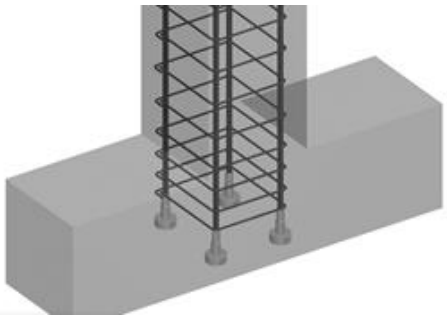
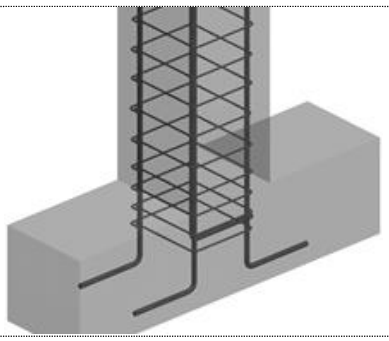
PSA-T – TSE connection



PSA-T – PSA-PSC connection

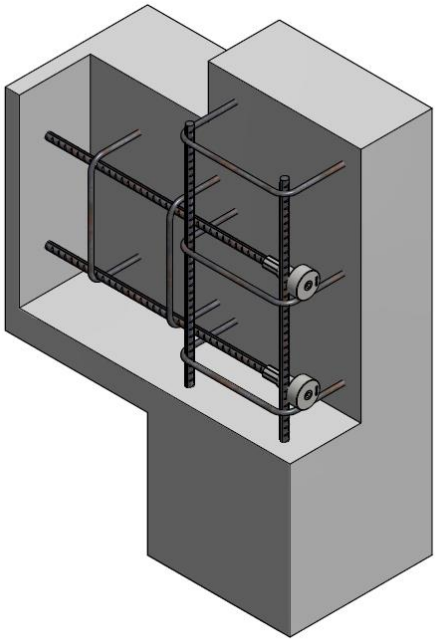
TERWA END COUPLERS

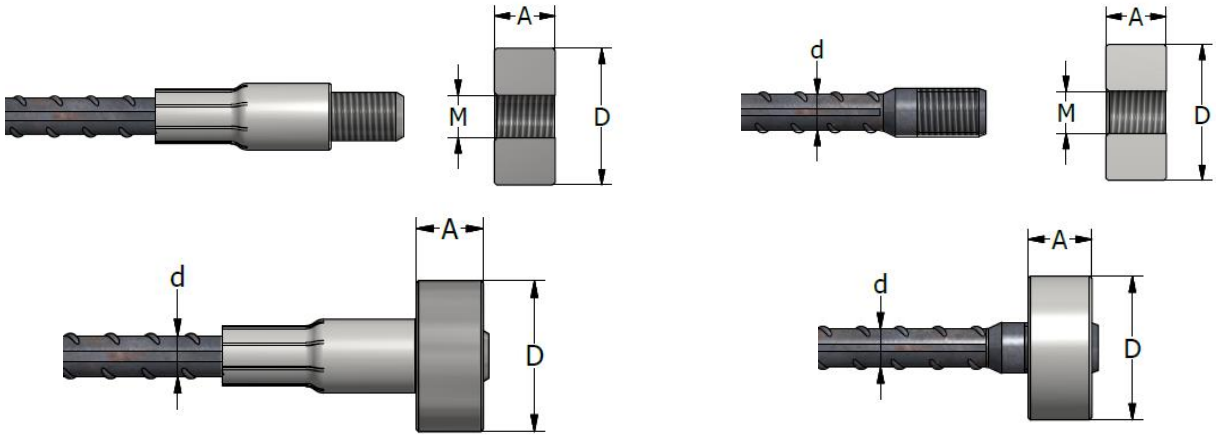
The Terwa End Coupler represents an efficient alternative for the traditional connections roof-column, beam-column or foundation-column.

TERWA END COUPLER	CLASSIC SOLUTION
The End Coupler it is highlighted by the next advantages: • Minimize the length of the rebar and reduce the congestion inside the concrete element; • Eliminate the hooks; • Faster and simple installation; • Simplifies the structural design; • Better anchorage in the concrete element.	The traditional method consists in a hooked rebar anchorage who comes with a series of disadvantages: • Requires longer lengths of anchorage which increase rebar congestion; • More labor for the installation; • Longer time for execution; • Hidden costs, especially for bigger diameters (the lap length grow proportional with the reinforcement steel diameter); • Lower safety on construction sites.
Column Connection	
	
Foundation Connection	
	

Terwa End Coupler consists in a threaded round steel plate which fits with PSA-PSC connection or with TSE connection.
Terwa End Couplers meets the ACI 318 and Eurocode 2 regarding the embedding lengths for reinforcement steel. The End Coupler is designed and tested to assure a good embedding in concrete having a contact area equal with 9 times the rebar cross section area, or a minimum diameter 3 times the rebar diameter.

Beam – Column Connection





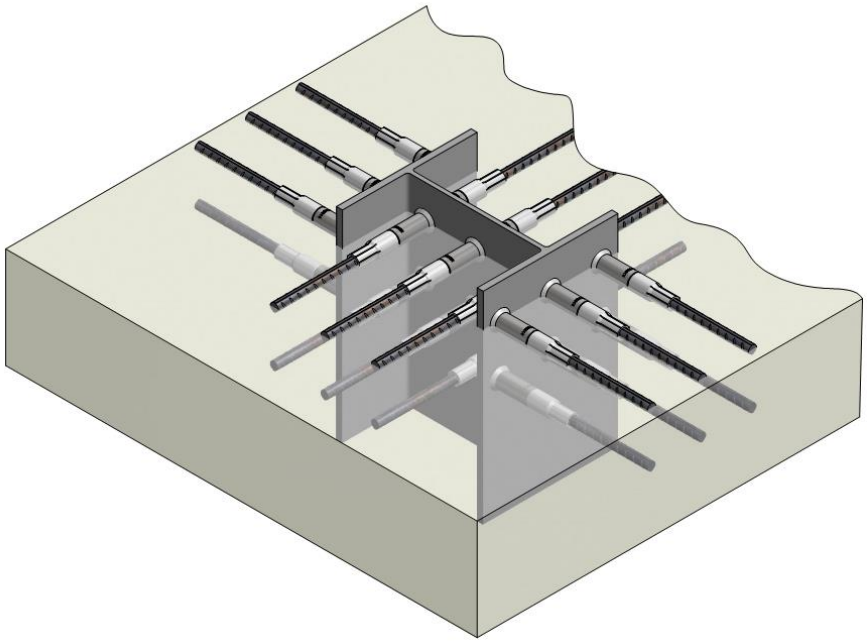
PSA END COUPLER **TSE END COUPLER**

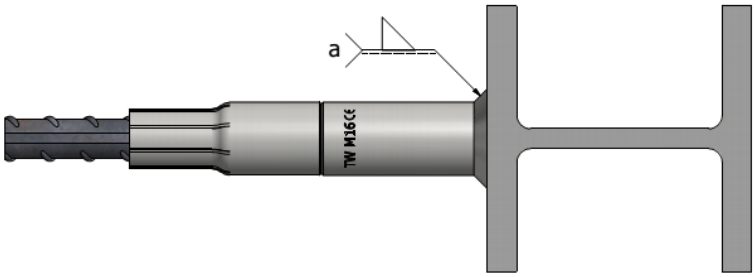
Terwa End Couplers are available electrolytic galvanized or without coating.

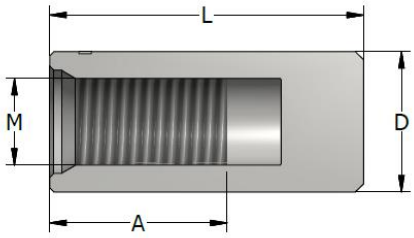
End Coupler	Product no.		Thread	Thickness A	D	Rebar diameter (d)	Weight
	Electrolytic galvanised EV	Without coating	Metric	[mm]	[mm]	[mm]	[kg/pc]
End coupler M12	61614	61556	M12	10	38	10	0.084
End coupler M16	61615	61557	M16	12	45	12	0.137
End coupler M20	61616	61558	M20	18	60	16	0.369
End coupler M24	61617	61613	M24	20	75	20	0.644
End coupler M30	61618	61560	M30	27	90	25	1.231
End coupler M36	61619	61561	M36	30	105	28	1.850
End coupler M42	61620	61562	M42	35	120	32	2.804
End coupler M48	61621	61563	M48	40	145	40	4.729

KB-W THREAD WELDABLE COUPLER

KB-W – is a KB bush used to connect reinforcing bars to structural steel plates or sections. The KB-W bush has a thread at one end. The other end is welded directly to the structural steel. The KB-W couplers are made of steel S355 or equivalent. The type and size of weld must be determined by the designer. Welders should be qualified for the type of weld required.

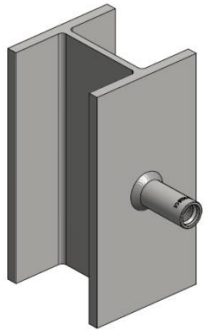
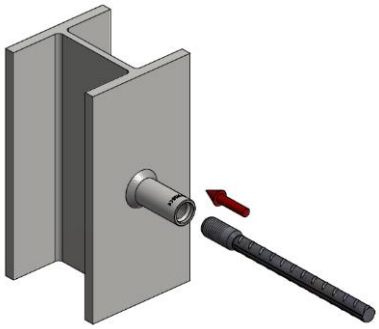
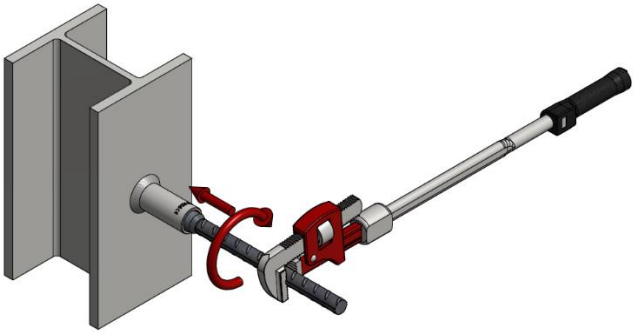
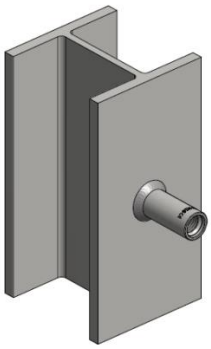
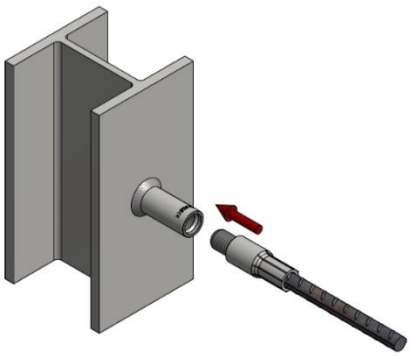
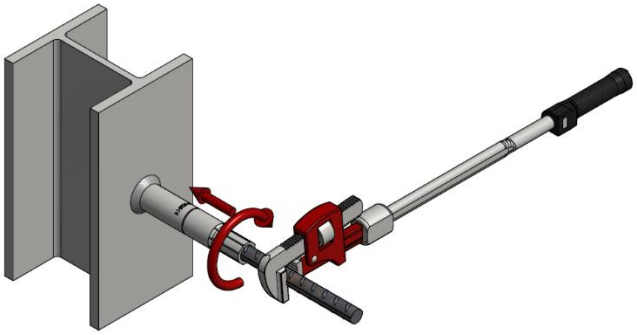




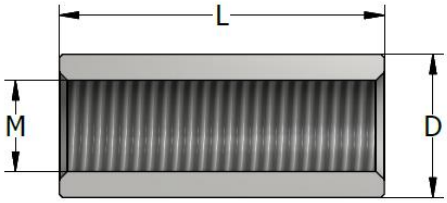


KB-W Weldable Coupler	Product no.	Thread	L	D	A	Weight
		Metric	[mm]	[mm]	[mm]	[kg/pc]
KB-W M12	61792	M12	41	17.5	18	0.059
KB-W M16	61793	M16	50	22	26	0.104
KB-W M20	61794	M20	65	28	39	0.214
KB-W M24	61795	M24	76	34	43	0.382
KB-W M30	61796	M30	88	40	53	0.561
KB-W M36	61797	M36	94	50	56	0.963
KB-W M42	61798	M42	103	54	65	1.100
KB-W M48	61799	M48	115	65	74	1.854

INSTRUCTIONS FOR INSTALLING KB-W WELDABLE COUPLER

CONNECTION WITH TSE REINFORCEMENT COUPLER		
		
Weld the KB-W coupler to the steel structure.	*Position the TSE bar into the coupler.*	*Rotate the TSE bar into the KB-W coupler until tight. To ensure the quality of connection tight the TSE bar with a wrench. The necessary torque for each type of rebar is shown in the table at* ***page 23****.*
CONNECTION WITH PSA-PSC REINFORCEMENT COUPLER		
		
Weld the KB-W coupler to the steel structure.	*Position the PSA-PSC bar into the coupler.*	*Rotate the PSA-PSC bar into the KB-W coupler until tight. To ensure the quality of connection tight the PSA-PSC bar with a wrench. The necessary torque for each type of rebar is shown in the table at* ***page 23****.*

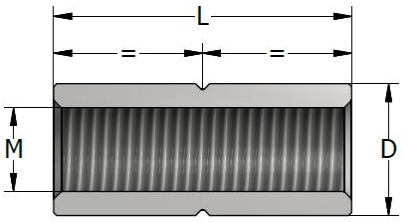
FIXING CONNECTOR – KB



Fixing connectors KB are manufactured of steel S355JO galvanized (EV), hot dipped galvanized (TV) or of stainless steel 304 / W 1.4301 (SS2) or W 1.4571 –AISI 316Ti (SS4).

KB	Product number				Thread	Overall length L	D	Weight
	Zinc galvanizing	Hot dipped galvanized	Stainless steel SS4	Stainless steel SS2	M	[mm]	[mm]	[kg/pc]
KB M12x36	45662	45679	44342	44331	12	36	16	0.033
KB M16x48	45668	45678	44343	44653	16	48	22	0.085
KB M16x45	45902	45905	45904	45903	16	45	22	0.079
KB M20x55	45898	45901	45900	45899	20	55	26	0.124
KB M20x60	45663	45677	44345	44655	20	60	26	0.135
KB M24x72	45664	45676	44347	44335	24	72	32	0.257
KB M30x90	45665	45675	44471	44338	30	90	40	0.493
KB M36x110	45666	45674	44802	45542	36	110	47.5	0.830
KB M42x126	44468	44470	45537	44340	42	126	54	1.166

FIXING CONNECTOR – KBL

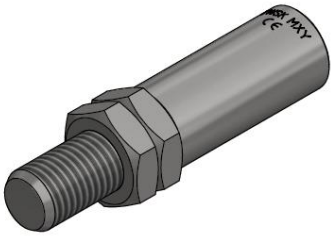


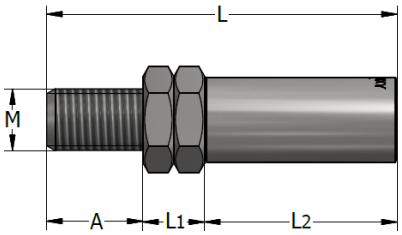
Fixing connectors KBL are manufactured of steel S355JO (EN 10025) galvanized (EV) or of stainless steel W 1.4571 –AISI 316Ti (SS4).

KBL	Product number		Thread	Overall length L	D	Weight
	Zinc galvanizing	Stainless steel SS4	M	[mm]	[mm]	[kg/pc]
KBL M12x45	45835	45840	12	36	16	0.042
KBL M16x45	60863	47668	16	48	22	0.081
KBL M16x60	45836	45841	16	45	22	0.108
KBL M20x55		47669	20	55	26	0.127
KBL M20x75	45837	45842	20	60	26	0.173
KBL M24x90	45838	45843	24	72	32	0.329
KBL M30x90	45839	45844	30	90	40	0.506

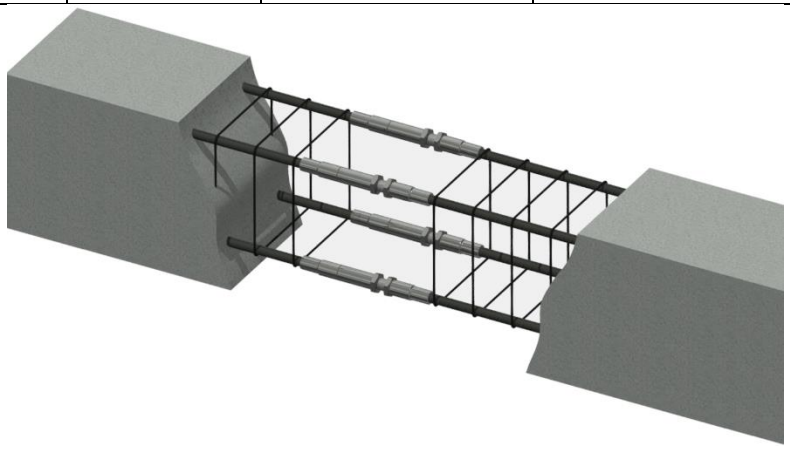
TWSK POSITION COUPLER

TWSK position couplers can be used in combination with the Terwa couplers, and are available for steel reinforcement bars with diameters ranging from 10 to 40 mm.
It is a perfect solution for connecting two rebars when it is not possible to rotate one or both of the bars.
They also provide a solution for the connection between the steel reinforcement carcass of the monolith and precast concrete elements.
A TWSK position coupler consists of a threaded bolt (SK), two nuts to secure the system, and a threaded bush (BK). The couplers have CE marking, are being tested for certification, and are manufactured in accordance with technical standards.



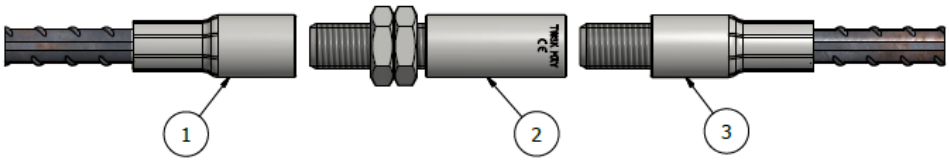


TWSK		Rebar diameter	Thread		Coupler			
Description	Product no.	d	M	Length A	L	L1	L2	D
		[mm]		[mm]	[mm]	[mm]	[mm]	[mm]
TWSK M12	60839	10	12	18	66	12	36	16
TWSK M16	60840	12	16	25	91	16	50	22
TWSK M20	60841	16	20	38	134	20	76	26
TWSK M24	60842	20	24	42	150	24	84	32
TWSK M30	60843	25	30	52	186	30	104	40
TWSK M36	60844	28	36	55	201	36	110	47
TWSK M42	60845	32	42	65	237	42	130	54
TWSK M48	60846	40	48	72	264	48	144	63

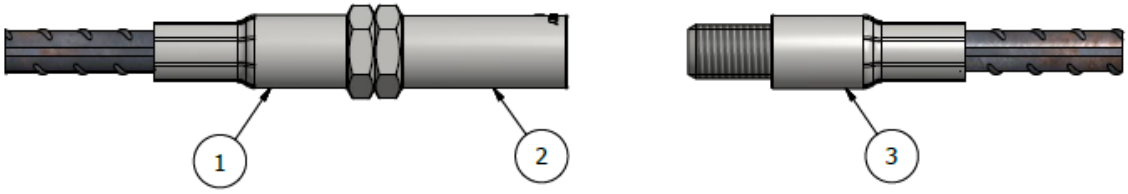


INSTRUCTIONS FOR CONNECTING STRAIGHT OR BENT BARS WITH TWSK POSITION COUPLERS

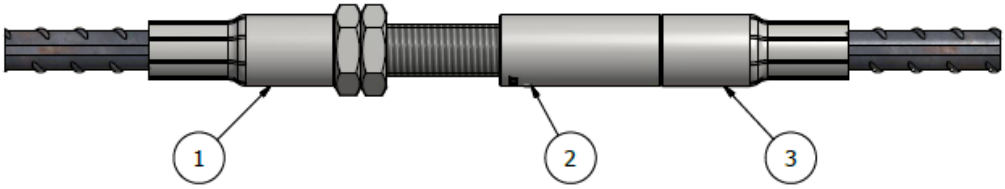
- First bar cannot move axially or rotate
- Second bar can move only axially



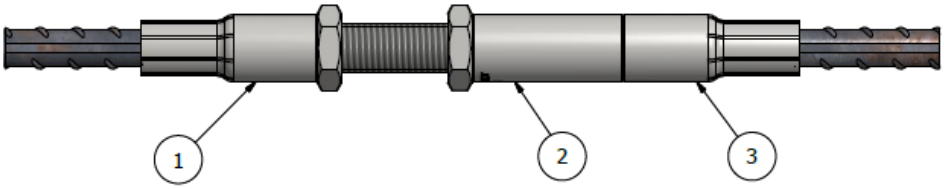
Screw the TWSK position coupler **2** onto the PSA reinforcement coupler **1** that is cast in concrete. Tighten the coupler with a wrench



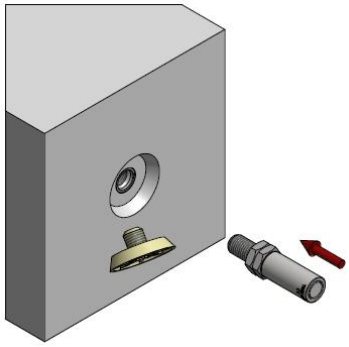
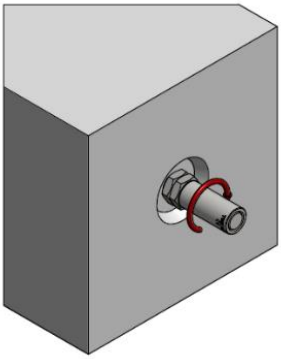
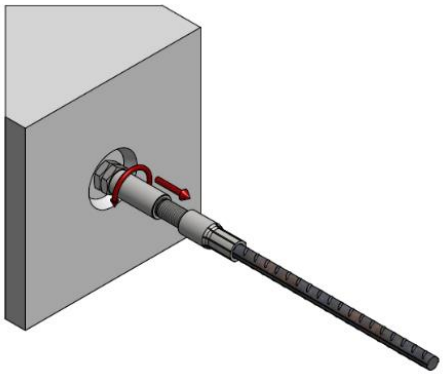
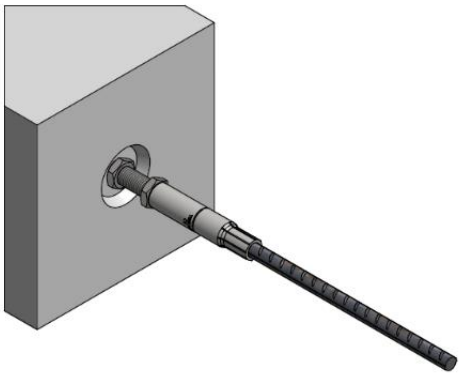
After the TWSK coupler **2** has been fixed onto the first PSA coupler **1**, tighten the first locknut.



Arrange the second reinforcement coupler **3** (TSEG, TSE, or PSAG, PSA-PSC) for coupling with the TWSK coupler **2**. Screw the threaded bush onto the reinforcement coupler.



Tighten the locknut with a wrench to ensure the connection is secure.

	
1. Remove nailing plate from PSA coupler in the concrete element	**2.** Hand-tighten the threaded bar in coupler PSA. Tighten first nut of TWSK against PSA coupler.
	
3. Align the thread of PSA-PSC coupler. Turn the TWSK bush.	**4.** Tighten the second nut against the TWSK bush. *The necessary torque for each type of rebar is shown at* ***page 23****.*

INSTRUCTIONS FOR INSTALLING TERWA REBAR COUPLER

INSTALLED PSA COUPLER AND CONNECT WITH PSA-PSC COUPLER

<table>
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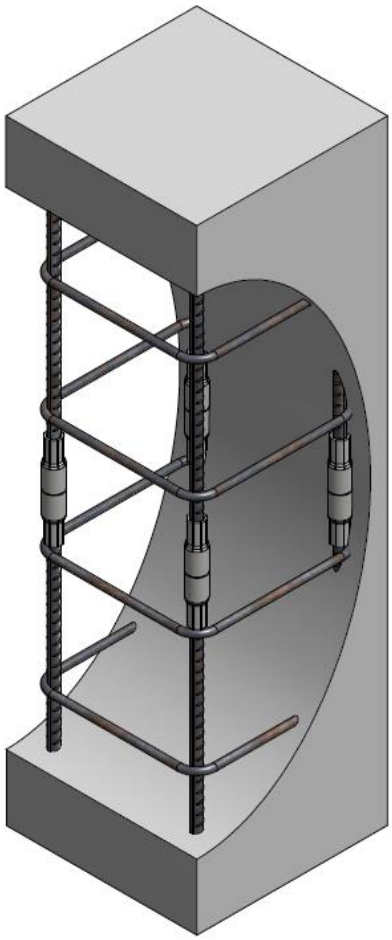
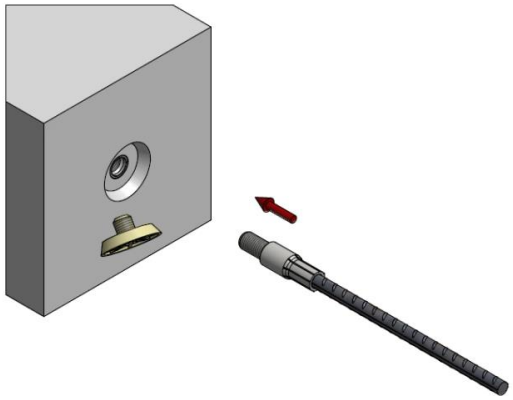
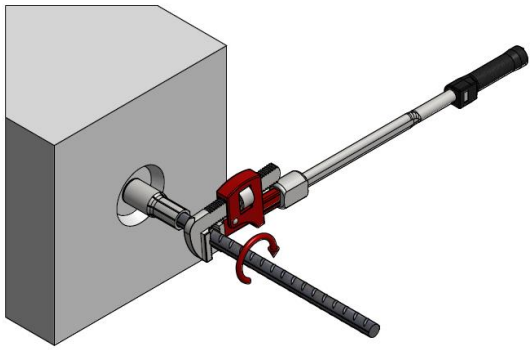
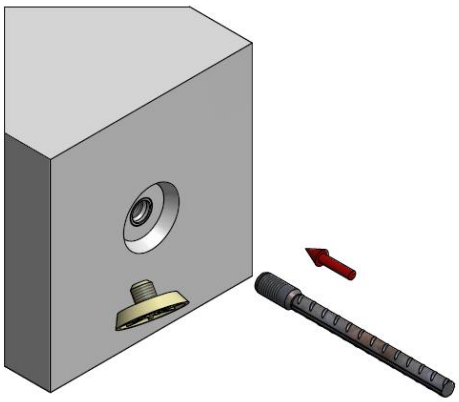
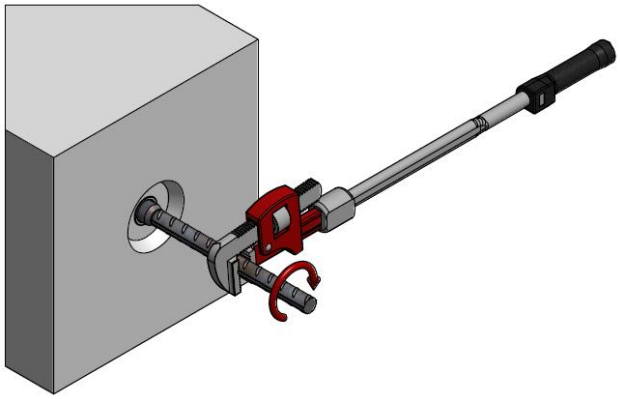
<td rowspan="3">  </td>
<td>  </td>
<td>Place in and rotated the threaded PSC BOLT onto the second PSA coupler. Screw the threaded PSC bolt using an allen key.</td>
</tr>
<tr>
<td>  </td>
<td>Place and rotate by hands the second PSA coupler until the couplers are fastened.</td>
</tr>
<tr>
<td>  </td>
<td>The connection is finished by using a special torque wrench made by TERWA to tighten the connection. The connection must be sufficiently tight to prevent movement during concrete placement. The necessary torque for each type of rebar is shown in table at page 23.</td>
</tr>
</table>

INSTALLED PSA COUPLER AND CONNECT WITH TSE COUPLER

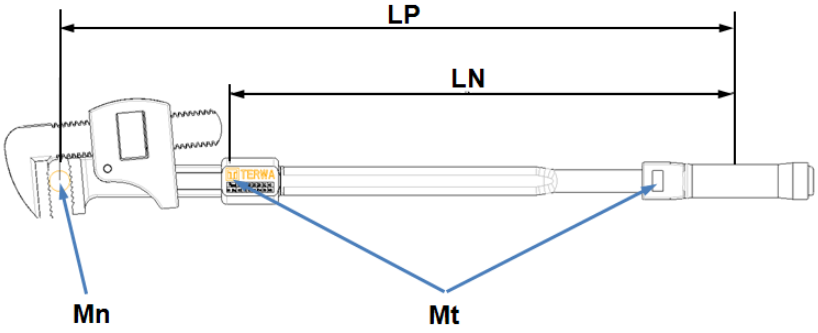
<table>
<tr>
<td>  </td>
<td>  </td>
</tr>
<tr>
<td>Place and rotate by hands the TSE coupler until the couplers are fastened.</td>
<td>The connection is finished by using a special torque wrench made by TERWA to tighten the connection. The connection must be sufficiently tight to prevent movement during concrete placement. The necessary torque for each type of rebar is shown at page 23.</td>
</tr>
</table>

TERWA TORQUE WRENCH

Terwa Torque wrench is specially designed for a correct mounting of the Terwa coupler on site and in the factories. All Terwa wrenches are delivered together with a calibration report and work instructions.
The torque values are marked on the wrench for all diameters of rebar. The torque values for all Terwa couplers are highlighted bellow.

Reinforcement diameter [mm]	Necessary Torque for each type of rebar [Nm]	Setting torque by wrench Mt [Nm]
10	50	60
12	60	60
14	70	60
16	80	60
18	90	70
20	100	75
22	110	82
25	125	93
28	140	104
32	160	119
40	200	148

TERWA torque wrench

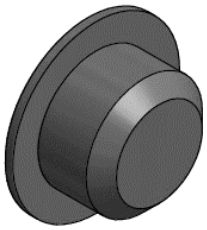


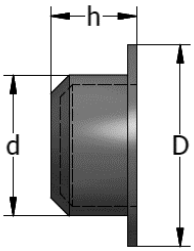
Mn – needed torque
Mt – Torque setting by wrench
LP – length until each middle reinforcement steel
LN – standard length wrench

Mt = Mn x LN/LP

TERWA wrench dimensions

PLASTIC COVER - AP – WITHOUT THREAD

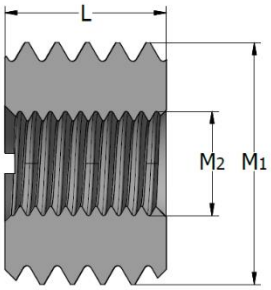




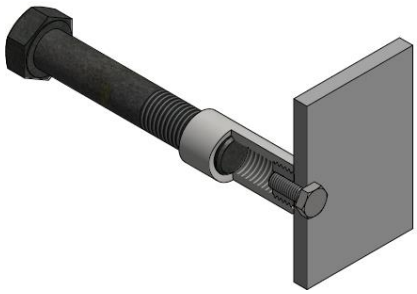
The Plastic Cover – AP prevents the entry of dirt and concrete water inside the bush in the thread zone of PSA or PSAD. This Plastic Cover is made from plastic material (PVC or LDPE).

AP	Product no.	Thread	D	d	h
		M	[mm]	[mm]	[mm]
AP-12	43617	12	15.0	10.0	9.5
AP-16	43618	16	19.0	13.6	11.2
AP-18	46697	18	20.6	14.7	12.7
AP-20	43579	20	22.2	17.7	12.7
AP-24	43620	24	27.3	21.2	12.3
AP-27	46698	27	29.3	23.4	17.5
AP-30	43621	30	32.0	24.7	19.0
AP-33	46816	33	36.7	30.0	15.2
AP-36	46817	36	38.1	31.1	18.3
AP-42	43622	42	44.1	35.9	24.5
AP-48	46699	48	49.2	41.4	19.0

DOUBLE THREAD SCREW PLUG SN

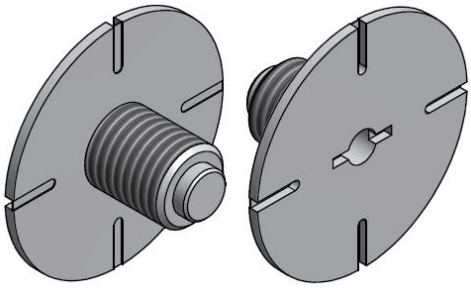


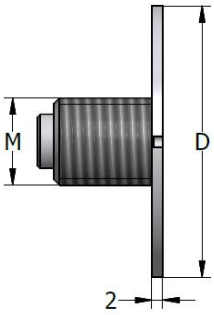
SN	Product no.	Thread	Thread	L
		M1	M2	[mm]
SN M12-M6	45214	12	6	16
SN M16-M8	45215	16	8	16
SN M20-M8	45216	20	8	16
SN M24-M8	46303	24	8	16
SN M24-M10	45217	24	10	16
SN M30-M10	45218	30	10	16
SN M30-M8	46079	30	8	16
SN M36-M10	45219	36	10	25
SN M42-M10	45220	42	10	30
SN M48-M10	45464	48	10	36
SN M48-M12	46525	48	12	36
SN M48-M16	46524	48	16	36



The SN screw plug is used to attach the PSA or PSAD reinforcement coupler to the formwork with a standard screw

PLASTIC NAILING PLATE KU-2



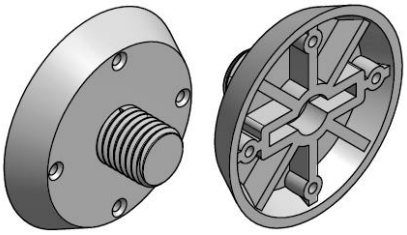


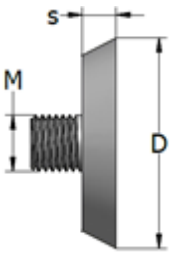
KU-02	Product no.	Thread	Diam. D	Thickness
		M	[mm]	[mm]
KU-02-M12	46050	M12	50	2
KU-02-M16	47113	M16	50	2
KU-02-M20	47114	M20	50	2
KU-02-M24	47115	M24	50	2

The nailing plates KU-02 are made of plastic and used for fixing the PSA or PSAD reinforcement coupler to the formwork with nails. These are suitable for fixing the PSA reinforcement coupler at the surface of the concrete units.

PLASTIC NAILING PLATE KU-10

The nailing plates KU-10 are used for fixing the anchors and the lifting sockets to the formwork with nails. The fixing flange ensures a minimal recess around the head of the anchor. The recess is filled with fine concrete for protection against corrosion.

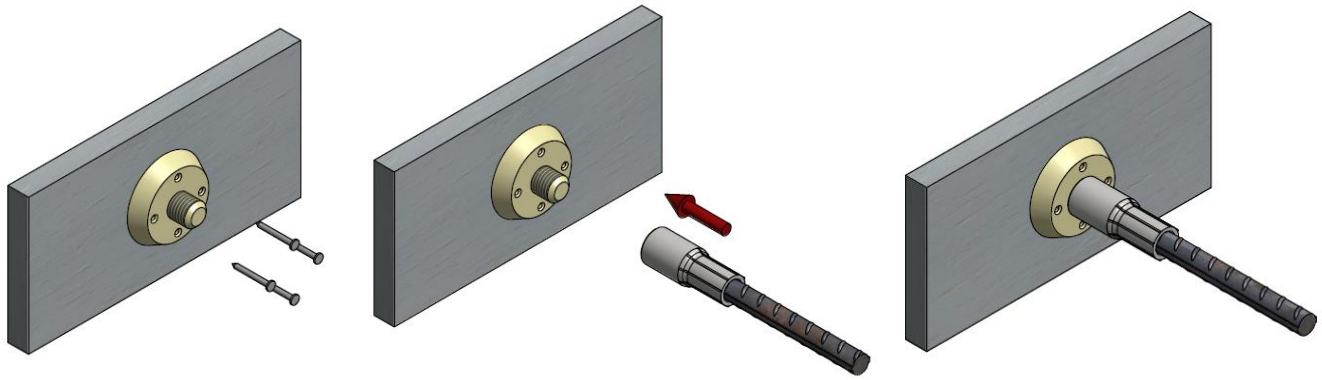




KU-10	Product no.	Thread	Diam. D	Diam. d	s	Color
		M	[mm]	[mm]	[mm]	
KU-10-M12	63246	12	47	37	10	Red RAL 3020
KU-10-M16	63256	16	47	37	10	Grey RAL 7043
KU-10-M20	63257	20	60	50	10	Green RAL 6024
KU-10-M24	63258	24	60	50	10	Blue RAL 5017
KU-10-M30	63259	30	73	63	10	Night blue RAL 5022
KU-10-M36	63260	36	73	63	10	Orange RAL 2009
KU-10-M42	63261	42	96	86	12	Brown RAL 8001
KU-10-M52	63262	52	96	86	12	Black RAL 9017

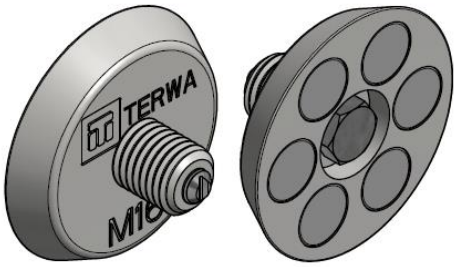
The plastic nailing plates KU-10 are nailed to formwork. Using forming wax on the nailing plate makes it easier to remove and screw on anchor or fixing insert. The anchor must be fastened to the reinforcement by suitable means so that it does not move during concreting. After stripping, unscrew.

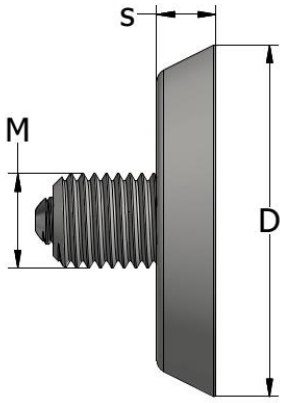
INSTRUCTIONS FOR INSTALLING KU-10



STEEL MAGNETIC PLATE - TPM

The plates with magnets TPM are used for fixing the anchors and the lifting sockets to the steel formwork. The fixing flange ensures a minimal recess around the head of the anchor. When using this magnetic recess former, it is very important that the surface of the formwork is clean. The recess is filled with fine concrete for protection against corrosion.





TPM-10	Product no.	Thread	Diam. D	s
		M	[mm]	[mm]
TPM-10-M12	47246	12	47	10
TPM-10-M16	48160	16	47	10
TPM-10-M20	48161	20	56	10
TPM-10-M24	48162	24	56	10
TPM-10-M30	47380	30	71	10
TPM-10-M36	48163	36	71	10
TPM-10-M42	48164	42	96	12
TPM-10-M52	48165	52	96	12

Note: the magnets have high strength so, please be careful with your hands when you mount it on the steel formwork.

ALL SPECIFICATIONS CAN BE CHANGED WITHOUT PREVIOUS NOTICE.

DISCLAIMER