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MAX FRANK Coupler

Threaded connection

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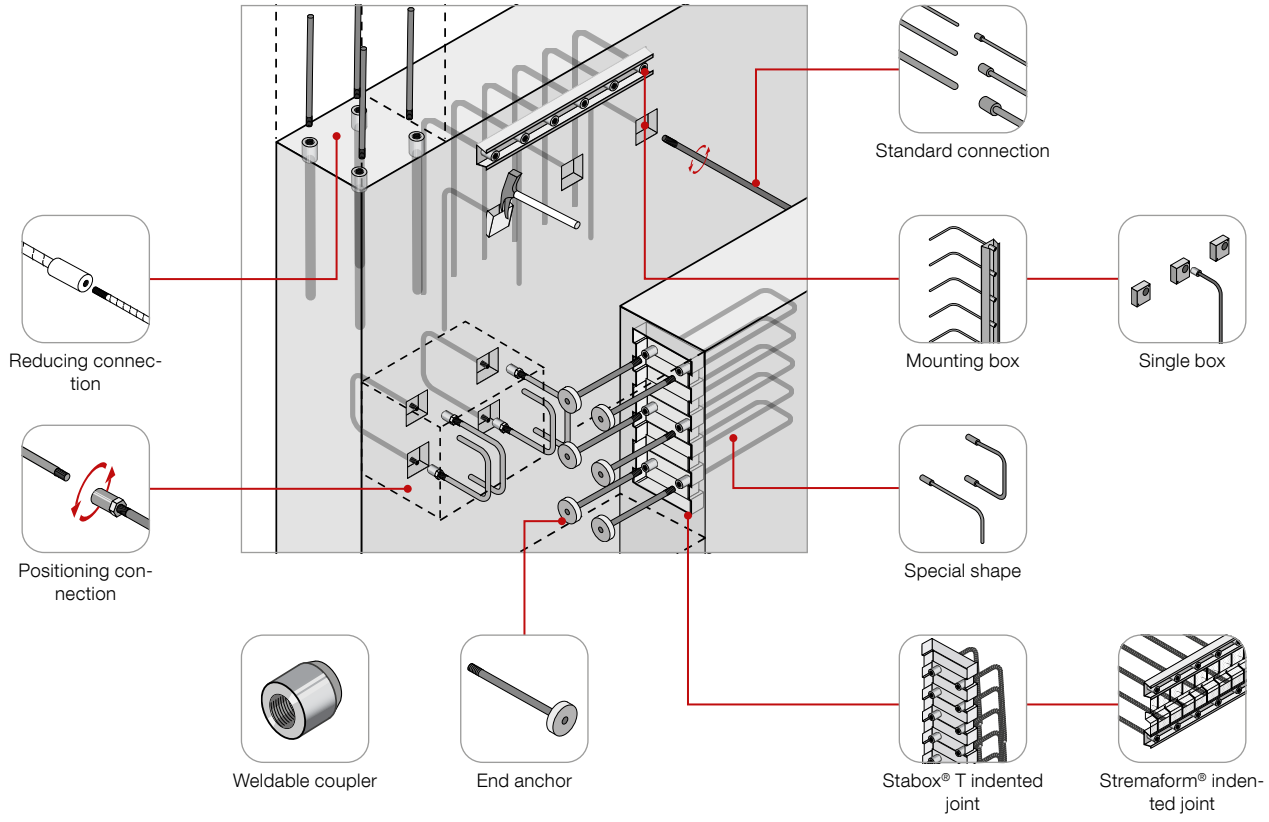
Mechanical connection and anchoring of rebars by means of threaded couplers for permanent and dynamic loading

Approval from the German Institute of Building Technology Berlin for rebar diameters 12 - 40 mm for standard, positioning and reducing connections as well as end anchors (Z-1.5-282). The newly developed MAX FRANK threaded socket connections are used where the conventional splice joint is not practicable or not allowed. They are also used where rebending is not possible due to the rebar diameter. The rebar connection usually consists of a threaded rod with a pre-mounted threaded coupler for the 1st construction phase as well as the continuation bar for screwing in during the 2nd construction phase. Threaded coupler connections offer an efficient and cost-effective way to connect with reinforcing bars under permanent and dynamic loads.

Advantages

- Easy and quick installation
- Available for all common rebar diameters (12 – 40 mm)
- 100 % force transmission – “bar break”
- No reduction in the rebar cross-section
- No positioning couplers required
- Designed to conform to international standards: Eurocode 2 (NEN/DIN/BS EN 1992-1-1), ACI 318 type 1-2, test standard ISO 15835

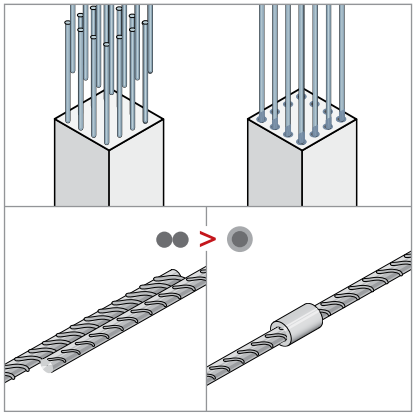


Technical Information

Density of reinforcement

The density of reinforcement in a reinforced concrete component is defined in the corresponding standards or reinforcement guidelines. In the case of highly reinforced components, the permissible density of reinforcement is often exceeded in the reinforcement lapping area and a splice joint has to be replaced by a mechanical connection.

Due to its extremely slender and short dimensions, the MAX FRANK Coupler offers convincing advantages here that make a 100% joint possible – even with a very congested reinforcement layout. All bars with the same cross-section may be joined (full joint).

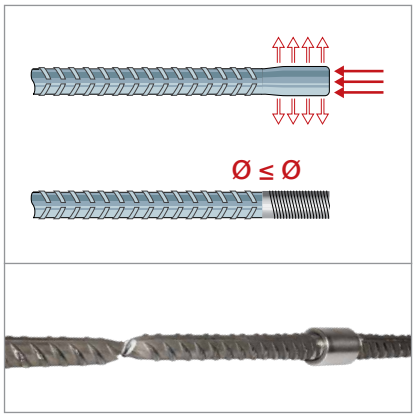


“Bar break”

“Bar break” means the failure of the rebar outside the socket connection.

Prior to rolling the threads, a light upsetting of the rebar ends is carried out. As a result of this, failure of the sample outside the socket connection is achieved during tensile tests (“bar break”).

The “soft cold forged” process guarantees gentle upsetting in the entire thread area and thus prevents fatigue or brittle fracture in the thread.



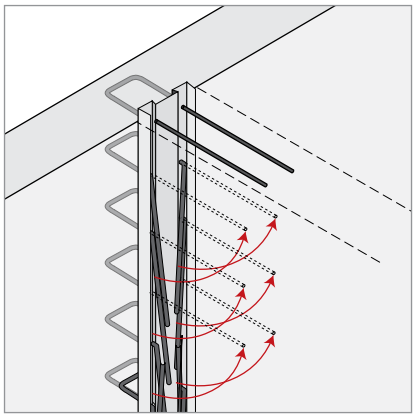
Splice joints or mechanical connection?

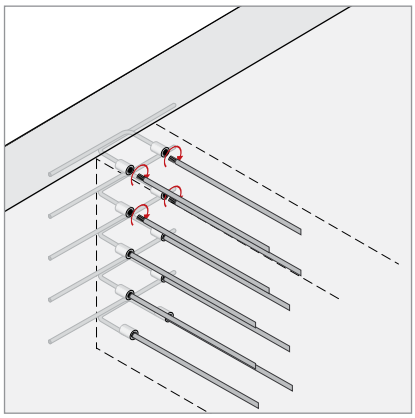
As a rule, the connection of two rebars is achieved with a splice joint, in which the ends of the bars are placed parallel to each other over a certain length. The force transmission is ensured by the bond with the concrete (indirect joint).

Mechanical connections are used where a splice joint is not possible or not purposeful. The mechanical connection represents a direct connection, i.e. the force transmission takes place irrespective of the bond, the concrete quality or the rebar diameter.

Examples of mechanical connections:

- Non-crossing formwork layout
- Congestion of reinforcement
- Large overlap lengths
- Protruding continuation bars interfere with the construction process
- Dimensioning rules do not permit overlaps



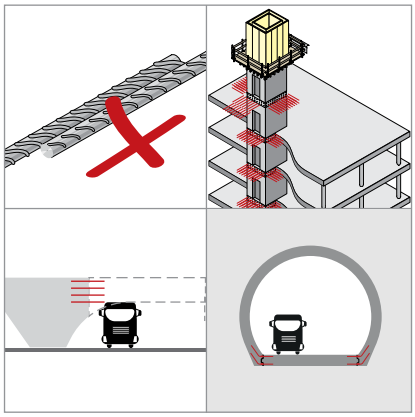


Reinforcing with mechanical connections

In many applications, indirect joints, i.e. overlaps, also pose a certain risk to stability.

For this reason, overlaps are either not allowed, only partly possible or not purposeful under certain conditions. For example, large rebar diameters, constructions in seismically active zones, reinforcements in tunnel construction or infrastructure projects can be reasons to opt for a mechanical rebar connection.

In general, the rules for large bar diameters according to EN 1992-1-1, point 8.8 and the corresponding national annexes must be observed.

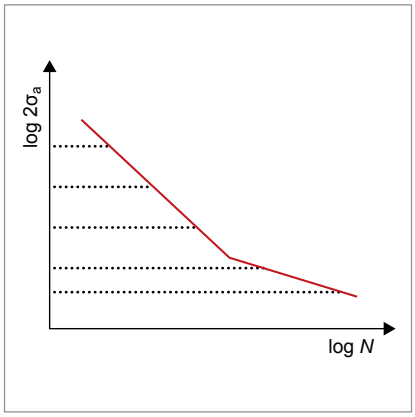


Dynamic load – high cycle fatigue

If mechanical rebar connections are used in dynamically stressed structures such as infrastructure projects, tunnels, bridges, tall buildings, etc., a mechanical rebar connection must have an adequate fatigue resistance.

The properties of the mechanical rebar threaded connections under a high-frequency cyclic load can be illustrated in an S-N diagram taking into account the specifications from ISO 15835:2009 (Wöhler line), see Fig. S-N diagram.

MAX FRANK Couplers have been tested in accordance with the specifications and test requirements for the verification of the fatigue properties of rebar connections in accordance with ISO 15835:2009 and can therefore also be used under dynamic loads.



S-N diagram

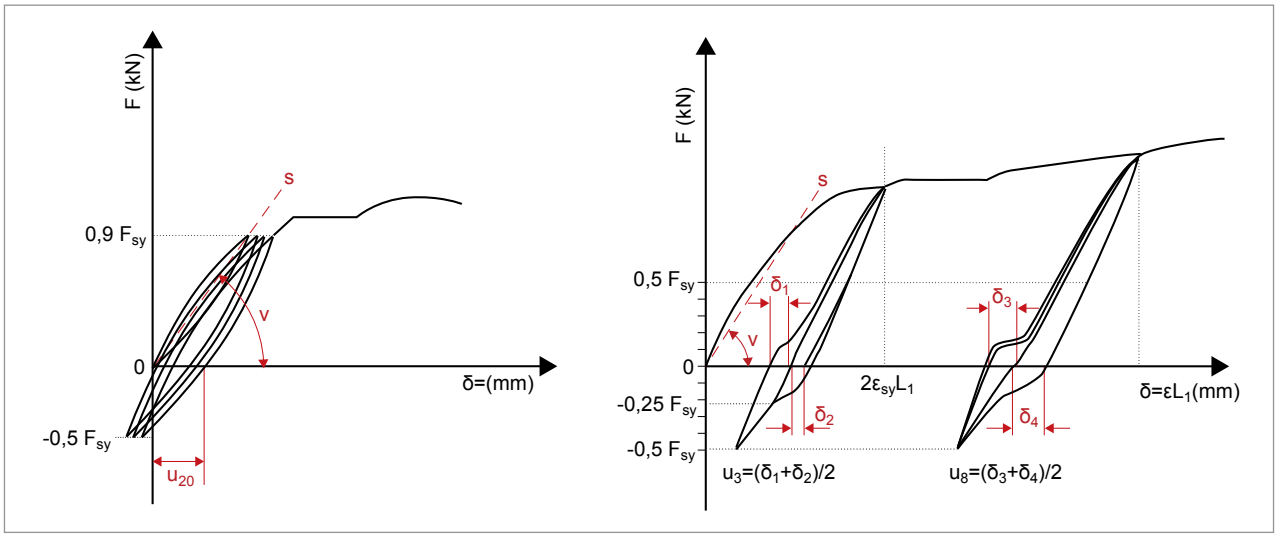
Low cycle fatigue

The performance of a mechanical connection for rebars is also demonstrated by its behaviour under an elastic reverse load (medium-sized earthquake of the category S1) and by its behaviour under elastic-plastic reverse stress (severe earthquake of the category S2); see graphs.

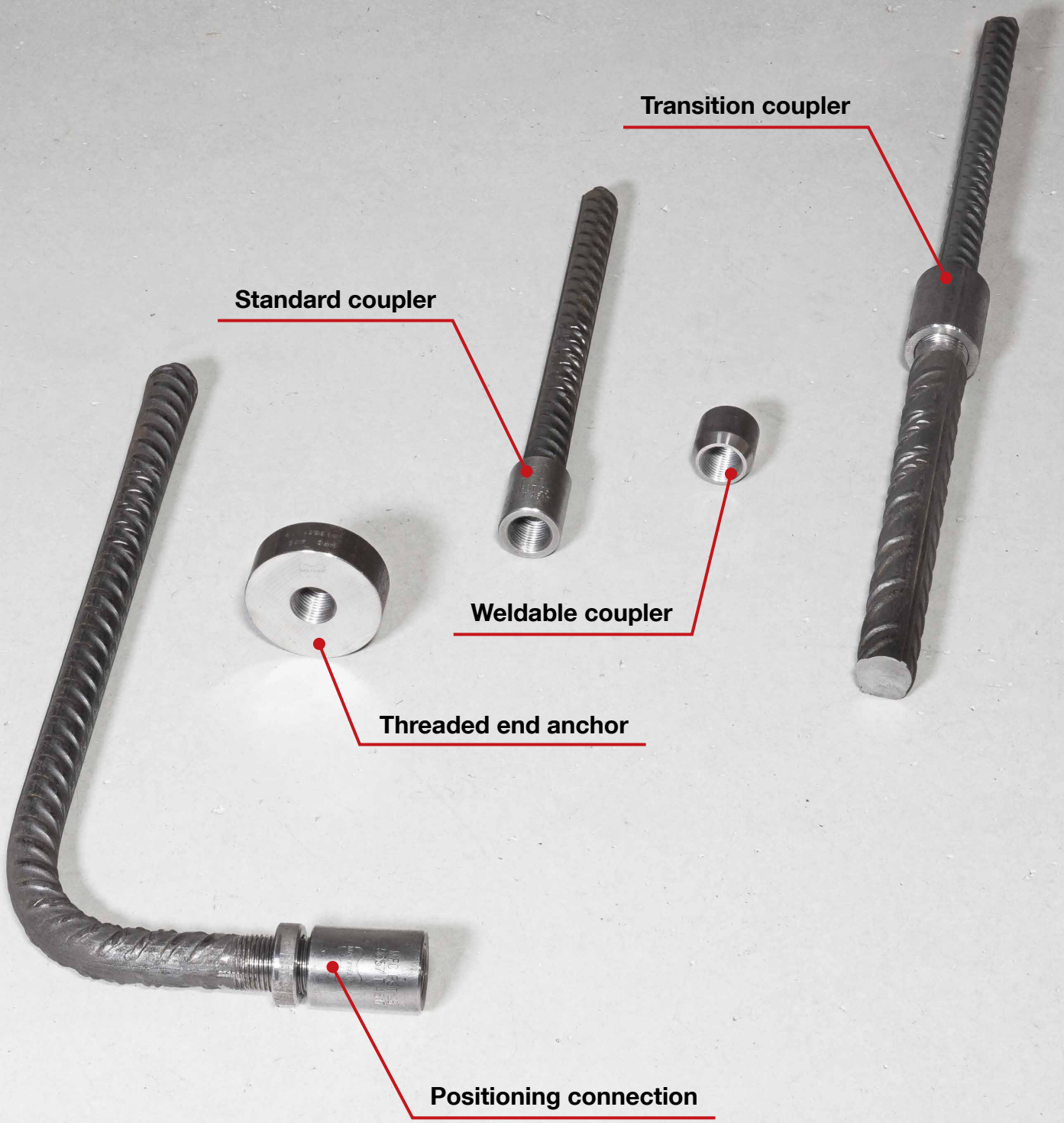
The behaviour of mechanical connections under cyclic stress is crucial in seismically active areas. The requirements for the seismic behaviour differs between Europe and other countries.

The guidelines and test requirements for mechanical connections can be found in the following standards: ISO 15835:2009, AC133:2010, EN 1998-1:2010-12, Eurocode 8, EN 1998-1/NA: 2011-01, national annex.

MAX FRANK Couplers conform to the aforementioned test requirements. Hence, they exhibit the required strength and ductility and meet the high performance requirements of categories S1 + S2 for the design of structures in seismically active regions.



Product versions of the MAX FRANK Coupler



Product variants

MAX FRANK Coupler standard and positioning connection

for freely rotatable and non-freely rotatable coupler connections

The same threaded couplers are used for standard and positioning connections.

With the **standard connection,** a threaded rod is installed in the 1st construction phase; in the 2nd construction phase, the continuation bar is longitudinally movable and freely rotatable.

With the **positioning connection,** the continuation bar is longitudinally movable, but not rotatable.

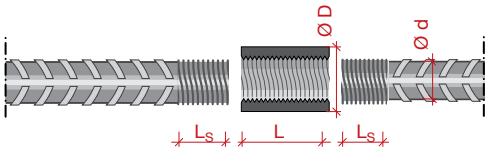
Therefore, a protected threaded rod is initially installed in the 1st construction phase. In the 2nd construction phase, a threaded rod with a loosely screwed-on lock nut and pre-mounted threaded coupler is connected according to the work instructions. Hence, only the workflow changes – a special positioning coupler is not required.

- National technical approval for Germany, DIBt Z-1.5-282
- Approval for Romania,
  Agrement Tehnic 001SB-01/417-2018

Standard coupler connection

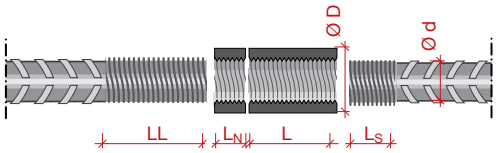
Positioning coupler connection

Threaded couplers for standard and positioning connections



Standard coupler connection

Article number Standard coupler	Reinforcing steel Ø d [mm]	Coupler Ø D [mm]	Coupler L [mm]	Screw-in depth L_S [mm]	Thread dimensions [mm]	Tightening torque [Nm]
CMPST12	12	20	28	14.0	M 14.0 x 2.0	40
CMPST14	14	22.5	32	16.0	M 16.0 x 2.0	80
CMPST16	16	26	36	18.0	M 18.5 x 2.0	120
CMPST18	18	28.5	40	20.0	M 20.5 x 2.0	150
CMPST20	20	32	44	22.0	M 22.5 x 2.0	180
CMPST22	22	34.5	48	24.0	M 24.5 x 2.0	220
CMPST25	24, 25, 26	38	54	27.0	M 27.5 x 2.5	270
CMPST28	28	42	60	30.0	M 30.5 x 2.5	270
CMPST32	32	48	68	34.0	M 34.5 x 2.5	300
CMPST36	36	56.5	78	39.0	M 39.5 x 3.0	300
CMPST40	40	61	85	42.5	M 43.5 x 3.0	350



Positioning coupler connection

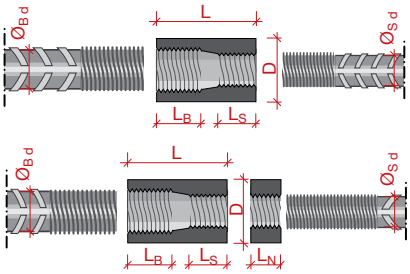
Article number Standard coupler	Article number Lock nut	Reinforcing steel Ø d [mm]	Coupler Ø D [mm]	Coupler L [mm]	Thread length min L_L [mm]	Length of lock nut L_N [mm]	Thread dimensions [mm]	Tightening torque [Nm]
CMPST12	CMLN12	12	20	28	37	9	M 14.0 x 2.0	40
CMPST14	CMLN14	14	22.5	32	41	9	M 16.0 x 2.0	80
CMPST16	CMLN16	16	26	36	45	9	M 18.5 x 2.0	120
CMPST18	CMLN18	18	28.5	40	49	9	M 20.5 x 2.0	150
CMPST20	CMLN20	20	32	44	53	9	M 22.5 x 2.0	180
CMPST22	CMLN22	22	34.5	48	57	9	M 24.5 x 2.0	220
CMPST25	CMLN25	24, 25, 26	38	54	67	13	M 27.5 x 2.5	270
CMPST28	CMLN28	28	42	60	73	13	M 30.5 x 2.5	270
CMPST32	CMLN32	32	48	68	81	13	M 34.5 x 2.5	300
CMPST36	CMLN36	36	56.5	78	91	13	M 39.5 x 3.0	300
CMPST40	CMLN40	40	61	85	98	13	M 43.5 x 3.0	350

MAX FRANK Coupler reducing connection

for force-locked connection of different steel diameters

Transition couplers are used to connect rebars with different diameters together. Transition threaded couplers are frequently used for columns and cross-storey connections. Positioning connections can also be manufactured using transition couplers.

The transition coupler has a building authority approval, DIBt Z-1.5-282.



Transition coupler

Article number Reducing coupler	Reinforcing steel		Coupler		Screw-in depth		Thread dimensions		Tightening torque
	$Ø_B$ d [mm]	$Ø_S$ d [mm]	Ø D [mm]	L [mm]	L_B [mm]	L_S [mm]	Bar_B	Bar_S	Bar_S [Nm]
CMPSTR1412	14	12	22.5	35	16	14	M 16.0 x 2.0	M 14.0 x 2.0	40
CMPSTR1614	16	14	26	39	18	16	M 18.5 x 2.0	M 16.0 x 2.0	80
CMPSTR2016	20	16	32	45	22	18	M 22.5 x 2.0	M 18.5 x 2.0	120
CMPSTR2520	25	20	38	54	27	22	M 27.5 x 2.5	M 22.5 x 2.0	180
CMPSTR2825	28	25	42	64	30	27	M 30.5 x 2.5	M 27.5 x 2.5	270
CMPSTR2820	28	20	42	59	30	22	M 30.5 x 2.5	M 22.5 x 2.0	180
CMPSTR3228	32	28	48	71	34	30	M 34.5 x 2.5	M 30.5 x 2.5	270
CMPSTR3225	32	25	48	68	34	27	M 34.5 x 2.5	M 27.5 x 2.5	270
CMPSTR4032	40	32	61	84	43	34	M 43.5 x 3.0	M 34.5 x 2.5	300
CMPSTR4028	40	28	61	80	43	30	M 43.5 x 3.0	M 30.5 x 2.5	270

MAX FRANK Coupler weldable coupler

Connection of rebars using steel components

The weldable coupler offers an effective solution for connecting rebars together using steel components. It is made of a weldable material and has a circumferential chamfer at one end for applying the welding seam.

Like the other couplers, the weldable coupler has a metric thread and is available for all common rebar diameters.

Weldable coupler

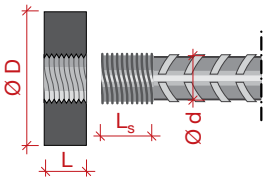
Article number Reducing coupler	Reinforcing steel Ø d [mm]	Coupler Ø D [mm]	Coupler L [mm]	Chamfer height h [mm]	Chamfer depth f [mm]	Screw-in depth L_S [mm]	Thread dimensions [mm]
CMPW12	12	20	19	4	4	14.0	M 14.0 x 2.0
CMPW14	14	24	21	4	5	16.0	M 16.0 x 2.0
CMPW16	16	26	24	5	5	18.0	M 18.5 x 2.0
CMPW18	18	30	26	5	6	20.0	M 20.5 x 2.0
CMPW20	20	32	29	7	6	22.0	M 22.5 x 2.0
CMPW22	22	34	31	7	6	24.0	M 24.5 x 2.0
CMPW25	24, 25, 26	38	35	8	7	27.0	M 27.5 x 2.5
CMPW28	28	42	38	8	7	30.0	M 30.5 x 2.5
CMPW32	32	49	43	10	8	34.0	M 34.5 x 2.5
CMPW36	36	61	48	13	13	39.0	M 39.5 x 3.0
CMPW40	40	66	53	10	12	42.5	M 43.5 x 3.0

MAX FRANK Coupler end anchor

Anchoring of rebars

End anchors or anchor plates are used for anchoring rebars. End anchors are used if the required anchoring length of the rebar cannot be installed in the structure and end hooks cannot be used due to excessively congested reinforcement or overly thin components.

End anchors are available for all diameters and also have a building authority approval from the DIBt, Z-1.5-282.



End anchor

Article number End anchor	Reinforcing steel Ø d [mm]	Anchor Ø D [mm]	Anchor length (thickness) L [mm]	Screw-in depth L_S [mm]	Thread dimensions Bar_S	Tightening torque [Nm]
CMPA12	12	45	14	14.0	M 14.0 x 2.0	40
CMPA14	14	45	16	16.0	M 16.0 x 2.0	80
CMPA16	16	55	18	18.0	M 18.5 x 2.0	120
CMPA18	18	55	20	20.0	M 20.5 x 2.0	150
CMPA20	20	65	22	22.0	M 22.5 x 2.0	180
CMPA22	22	70	24	24.0	M 24.5 x 2.0	220
CMPA25	24, 25, 26	80	27	27.0	M 27.5 x 2.5	270
CMPA28	28	95	30	30.0	M 30.5 x 2.5	270
CMPA32	32	105	34	34.0	M 34.5 x 2.5	300
CMPA36	36	110	39	39.0	M 39.5 x 3.0	300
CMPA40	40	130	42.5	42.5	M 43.5 x 3.0	350

Accessories

Mounting aids

MAX FRANK Coupler mounting box

- For simple in-line installation
- The bar spacing “s” can be selected as desired
- Mounting box with cover and two end stops
- Available for all diameters

MAX FRANK Coupler torque wrench

- Application of a defined tightening torque to the continuation bar according to the specifications in Z-1.5-282
- Special head pliers for the MAX FRANK Coupler rebar connections from 12 – 40 mm
- Infinite adjustment of the required torques possible

CMDMS730Q20MF14

ø	Nm
12	40
14	80
16	120
18	150
20	180
22	220
24	270
25	270
28	270

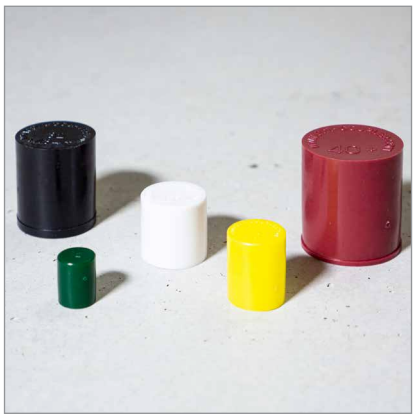
CMDMS721Q30MF18

ø	Nm
20	180
22	220
24 – 28	270
30 – 32	300
36	300
40	350

Protection caps

MAX FRANK Coupler thread-protection caps

- For protection of the thread between manufacture and installation
- Plastic thread-protection caps
- Colour-matched to the sockets
- Available for all diameters



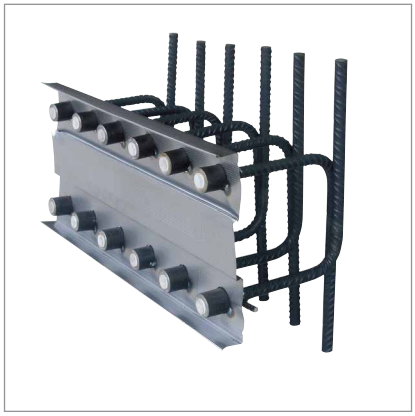
Product combinations

for high load-bearing capacity in the construction joint (indentation for shear force, indentation for thrust)

Product combinations with MAX FRANK Coupler threaded connections offer the advantage of the secure connection of rebars in a wide range of applications.

MAX FRANK Coupler connections are installed in prefabricated components in the factory for easy installation.

The product combinations offer the structural engineer a reliable and safe way to implement his design requirements (category and reinforcement) for the working joint in the actual construction.



Examples of product combinations

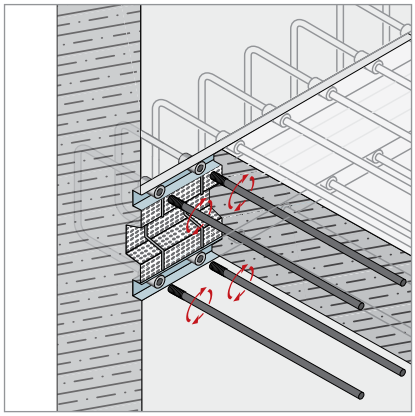
MAX FRANK Coupler threaded connection in combination with Stabox® standard boxes (shear force indentation)

The Stabox® standard boxes offer an indented joint according to EN 1992-1-1:2011 (/NA:2011-01) through the profile formation in the shear force direction.

This product combination provides the coupler with the highest concrete support area (indented joint) for the design of the construction joint with MAX FRANK Coupler threaded connections with large diameters from 12 to 40 mm.

This combination is possible up to a component thickness of 300 mm.

The product combination with Stremaform® is suitable for larger component thicknesses.

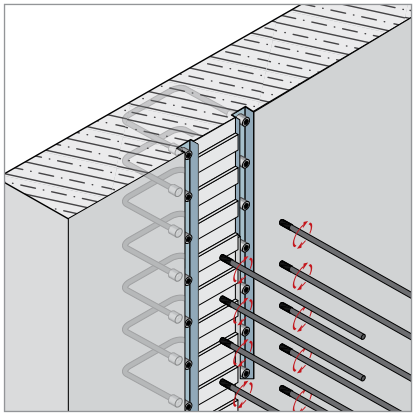


MAX FRANK Coupler threaded connection in combination with Stabox® T elements for shear indentation

MAX FRANK Coupler threaded connections are used to assemble prefabricated joint formwork elements ex works for highly stressed components with large rebar diameters from 12 to 40 mm.

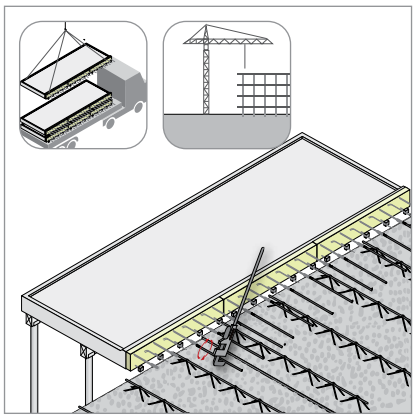
Due to the box profile, the variant with Stabox® T offers indentation in the longitudinal direction of the box for shear force absorption according to EN 1992-1-1:2011 (/NA:2011-01).

Hence, when dimensioning highly stressed construction joints, the highest dimensioning values for an indented joint can be applied to the concrete support area in the shear direction.



Egcobox® cantilever connector with multi-part MAX FRANK Coupler tensile bars

The thermally insulating Egcobox® cantilever connector can be adapted to suit the requirements of the structure or the building site situation. The tensile bars of the Egcobox® are manufactured in two or more parts for improved delivery and installation conditions with the help of MAX FRANK Coupler threaded connections.



MAX FRANK Coupler threaded connection in combination with Stremaform® formwork element

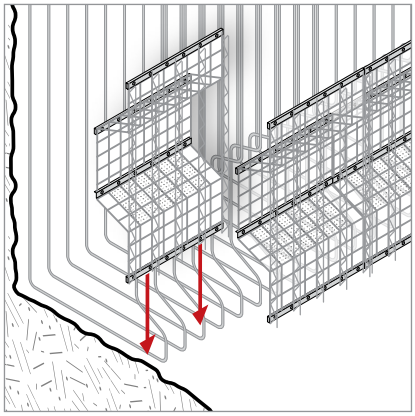
In addition to the combination of the MAX FRANK Coupler with the Stabox® standard boxes, the combination with Stremaform® formwork elements is also suitable for shear force indentation. This combination variant is used from component thicknesses of 300 mm.

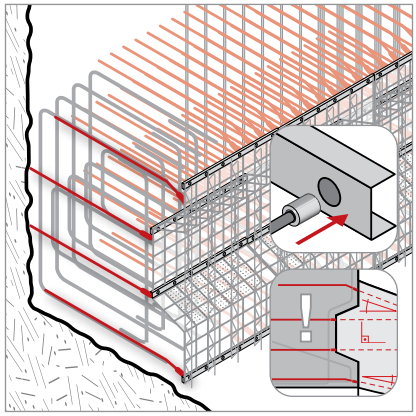
The indentation of the joint according to Eurocode 2 and the national annex is made possible by the Stremaform® formwork element.

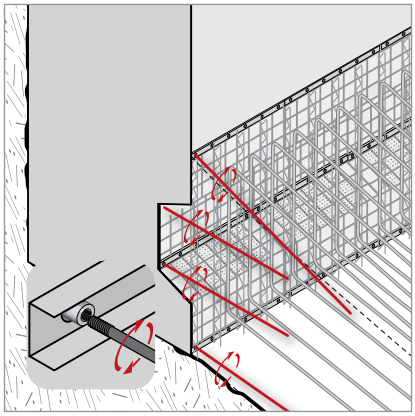
Both the formwork element and the threaded connections are manufactured in accordance with your requirements and conditions.

More information can be found online on our product pages at www.maxfrank.com or in our product brochures for the Stremaform® formwork elements, Stabox® reinforcement connection and Egcobox® cantilever connector.

Installation







References

Karlatornet, Gothenburg, Sweden

Once it is completed, the high-rise building in Gothenburg's Karlatornet district will comprise 73 storeys for apartments, offices and hotels. With a height of 245 metres, Karlatornet will be the tallest building in Scandinavia.

Type of building: High-rise building
Architect: SOM Architects
Construction company: Serneke
Completion: 2021

© www.serneke.se

Ayia Napa Marina, Cyprus

The Ayia Napa Marina project comprises two residential towers, 20 villas and commercial buildings. The towers are each over 100 metres high and will accommodate 27 and 28 floors respectively with luxury apartments.

Type of building: Exclusive residential and commercial buildings
Architect: SmithGroupJJR
Construction company: GEK TERNA Group
Completion: 2023

© www.marinaayianapa.com

The Terraced Tower, Rotterdam, The Netherlands

The “Terraced Tower” project is a residential high-rise building with a total living area of over 25,000 square metres and a height of 110 metres. All rooms in the apartments are connected to the terrace. Thus, the connection between the interior and exterior has been created along with a view over the city of Rotterdam.

Type of building: High-rise building
Client: First Sponsor Singapore Provast Den Haag
Architect: OZ Architects, The Netherlands
Completion: 2019

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PRODUCT FINDER

Simply filter by the application areas and product properties relevant for you and you will find the ideal product for your requirements.

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