BUILDING
COMMON GROUND

MAX FRANK®

Egcobox® FB

Steel-to-concrete thermal break

Edition International

www.maxfrank.com

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COMMON GROUND

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Contents

Egcobox® FB
Structural thermal breaks for steel-to-concrete connection

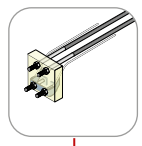
When connection is made between a steel structure and a reinforced concrete supporting structure, it is important to minimise thermal bridges. Due to the high thermal conductivity of steel, heat losses can occur where connections are uninsulated. This is not economical where heating costs, a healthy indoor climate and environmental protection are concerned.

The Egcobox® FB steel-to-concrete thermal break offers the optimal solution for the thermal separation of steel elements and reinforced concrete structures while reliably transferring high loads.

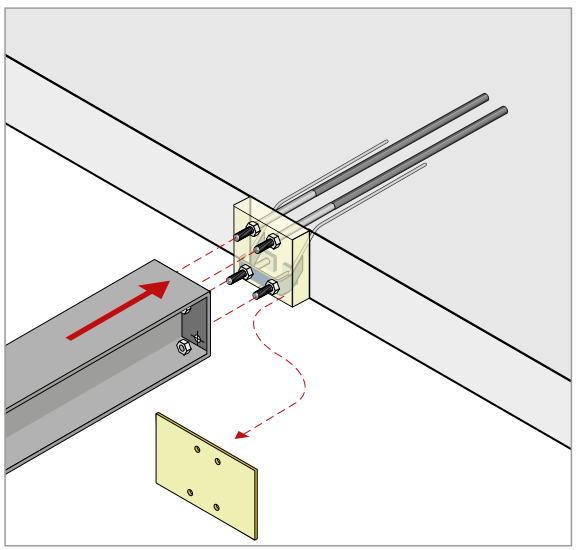
Together, with the service provided by MAX FRANK, Egcobox® simplifies balcony design and speeds up construction.

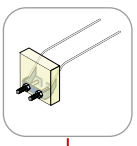
Advantages

- Minimises thermal bridges and heat loss
- High performance and corrosion resistance
- Certified system
- Insulation material; rockwool or polystyrene
- Rockwool A1 non-combustible insulation as standard
- Reliable service – from specification, through to design and on-site support

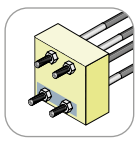


Egcobox® FB-CB with compression bearing

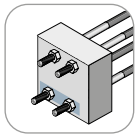




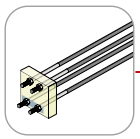
Egcobox® FBV with compression bearing

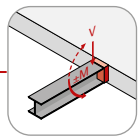


Insulation material Rockwool



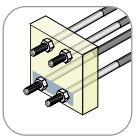
Insulation material Polystyrene



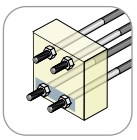


Egcobox® FB±S with compression bar

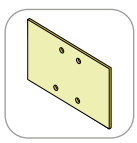
Unit height 180 - 280 mm



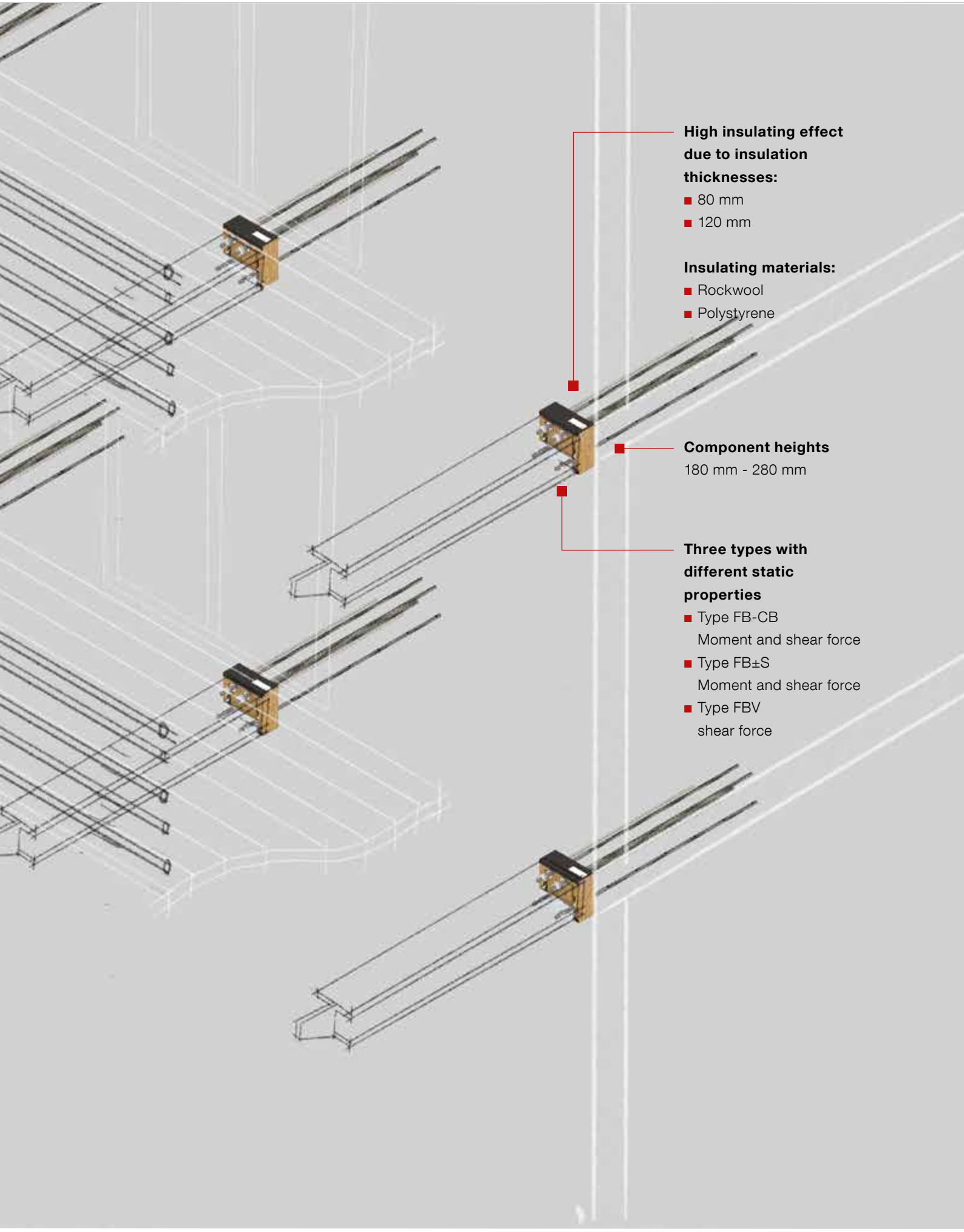
Joint thickness M d = 80 mm



Joint thickness XL d = 120 mm



Mounting template



High insulating effect due to insulation thicknesses:
- 80 mm
- 120 mm

Insulating materials:
- Rockwool
- Polystyrene

Component heights
180 mm - 280 mm

Three types with different static properties
- Type FB-CB
  Moment and shear force
- Type FB±S
  Moment and shear force
- Type FBV
  shear force

Product types

Egcobox® Type FB-CB

- For transmitting moments and shear forces
- Type FB-CB with compression bearing

Egcobox® Type FB±S

- For the transfer of positive and negative moments and shear forces
- Type FB±S with compression bar

Egcobox® Type FBV

- For the transmission of shear forces
- Type FBV with compression bearing

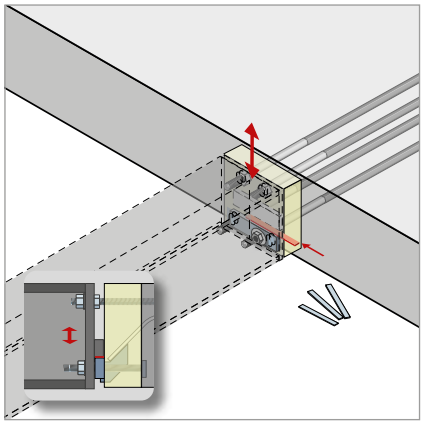
Mounting template

Each Egcobox® FB unit comes with a wooden mounting template. This can be used in conjunction with on-site timber for exact positioning of the installation distances as well as to allow for adjustment.

Height adjustment

The height adjustment can be carried out via the supplied stainless steel shims.

- 2 x 2 mm
- 1 x 3 mm



Egcobox® FB Type Identification

Example: **FBM20± - 10 - S - h200 - SW**

Type	Description
FB-CB	Moment / Shear force unit
FB±S	Moment ± / Shear force unit
FBV	Shear force unit

Insulation thickness [mm]	
M	80
XL	120

Moment support [mm]
Ø 14
Ø 20

Diameter shear force bar [mm]
Ø 8
Ø 10
Ø 12

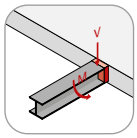
Compression bearings Ø [mm]	
CB	Compr. bearing
S	Compr. bar

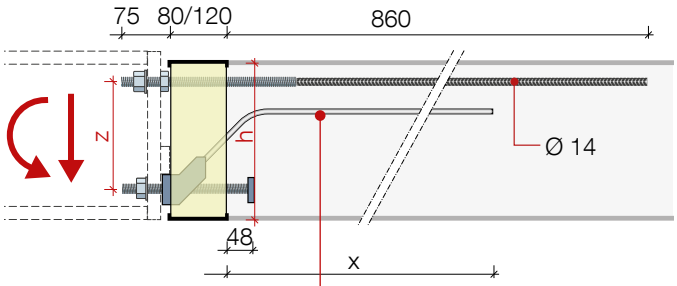
Unit height [mm] (10 mm each)
180
190
200
...
270
280

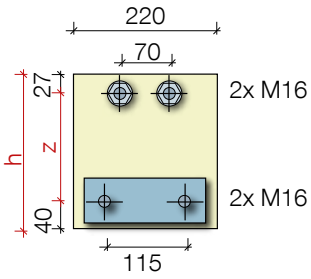
Insulation material	
SW	Rockwool
PS	Polystyrene

Egcobox® Type FB-CB

- For carriers for the transmission of negative moments and positive shear forces
- For freely cantilevered steel structures
- Type with compression bearing







All dimensions in [mm]

FBM = x = 556
FBXL = x = 533

Shear force bar Ø 8

FBM = x = 659
FBXL = x = 625

Shear force bar Ø 10

Type FBM14-8-CB

Tension bar Ø 14 mm, shear force bar Ø 8 mm, insulation thickness 80 mm

Unit height h	V_{Rd} [kN]			
	≤ 8.9	20	30	34.4
[mm]	M_{Rd} [kNm]			
180	-12.4	-11.1	-9.9	-9.5
190	-13.5	-12.1	-10.8	-10.3
200	-14.6	-13.1	-11.7	-11.2
210	-15.7	-14.1	-12.5	-12.0
220	-16.8	-15.1	-13.4	-12.9
230	-17.9	-16.1	-14.3	-13.7
240	-19.0	-17.1	-15.2	-14.6
250	-20.1	-18.0	-16.1	-15.4
260	-21.2	-19.0	-16.9	-16.3
270	-22.3	-20.0	-17.8	-17.1
280	-23.4	-21.0	-18.7	-17.9

Type FBM14-10-CB

Tension bar Ø 14 mm, shear force bar Ø 10 mm, insulation thickness 80 mm

	V_{Rd} [kN]			
	≤ 8.9	25	40	52.6
	M_{Rd} [kNm]			
180	-12.4	-10.0	-7.9	-7.5
190	-13.5	-10.9	-8.6	-8.2
200	-14.6	-11.8	-9.4	-8.8
210	-15.7	-12.7	-10.0	-9.5
220	-16.8	-13.6	-10.8	-10.1
230	-17.9	-14.5	-11.5	-10.8
240	-19.0	-15.3	-12.2	-11.4
250	-20.1	-16.2	-12.9	-12.1
260	-21.2	-17.1	-13.6	-12.7
270	-22.3	-18.0	-14.3	-13.4
280	-23.4	-18.9	-15.0	-14.1

Concrete ≥ C25/30, all specifications on forces apply to one unit at a time

Type FBXL14-8-CB

Tension bar Ø 14 mm, shear force bar Ø 8 mm, insulation thickness 120 mm

Unit height h	V_{Rd} [kN]			
	≤ 5.5	10	20	29.1
[mm]	M_{Rd} [kNm]			
180	-12.6	-12.0	-10.5	-9.2
190	-13.7	-13.1	-11.4	-10.0
200	-14.8	-14.1	-12.4	-10.8
210	-16.0	-15.2	-13.3	-11.6
220	-17.1	-16.2	-14.2	-12.4
230	-18.2	-17.3	-15.2	-13.3
240	-19.3	-18.3	-16.1	-14.1
250	-20.4	-19.4	-17.0	-14.9
260	-21.5	-20.4	-18.0	-15.7
270	-22.7	-21.5	-18.9	-16.5
280	-23.8	-22.5	-19.8	-17.3

Type FBXL14-10-CB

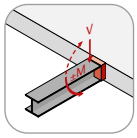
Tension bar Ø 14 mm, shear force bar Ø 10 mm, insulation thickness 120 mm

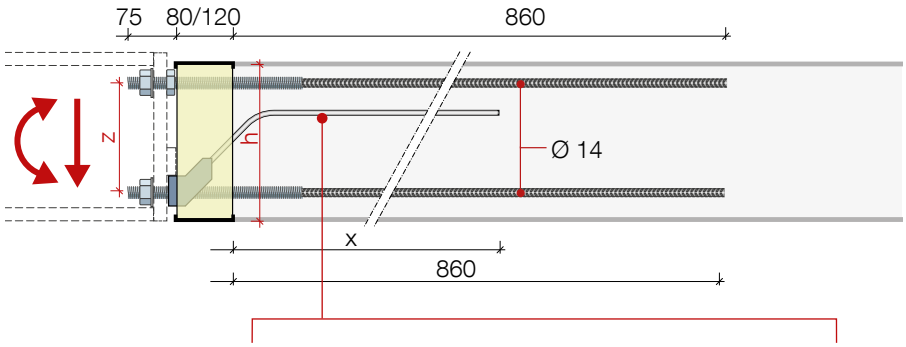
	V_{Rd} [kN			
	≤ 8.2	20	30	45.8
	M_{Rd} [kNm]			
180	-12.2	-10.5	-9.1	-6.8
190	-13.3	-11.4	-9.9	-7.4
200	-14.4	-12.4	-10.7	-8.0
210	-15.4	-13.3	-11.5	-8.6
220	-16.5	-14.2	-12.3	-9.2
230	-17.6	-15.2	-13.1	-9.8
240	-18.7	-16.1	-13.9	-10.4
250	-19.8	-17.0	-14.7	-11.0
260	-20.9	-18.0	-15.5	-11.6
270	-21.9	-18.9	-16.3	-12.2
280	-23.0	-19.8	-17.1	-12.8

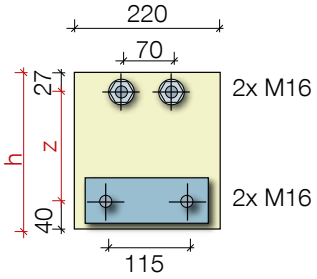
Concrete ≥ C25/30, all specifications on forces apply to one unit at a time

Egcobox® FB±S

- For beams for transmitting negative and positive moments and positive shear forces
- For freely cantilevered steel structures
- Type with compression bar







All dimensions in [mm]

FBM = x = 556
FBXL = x = 533

Shear force bar Ø 8

FBM = x = 659
FBXL = x = 625

Shear force bar Ø 10

Type FBM14±-8-S

Tension/compression bar Ø 14 mm,
shear force bar Ø 8 mm, insulation thickness 80 mm

Unit height h	V_{Rd} [kN]				
	≤ 17.4	20	30	34.4	≤ 34.4
[mm]	M_{Rd} [kNm]				
180	-13.2	-12.9	-11.7	-11.2	14.3
190	-14.4	-14.0	-12.7	-12.2	15.6
200	-15.5	-15.1	-13.8	-13.2	16.9
210	-16.7	-16.3	-14.8	-14.2	18.1
220	-17.8	-17.4	-15.9	-15.2	19.4
230	-19.0	-18.6	-16.9	-16.2	20.7
240	-20.2	-19.7	-18.0	-17.2	21.9
250	-21.3	-20.9	-19.0	-18.2	23.2
260	-22.5	-22.0	-20.0	-19.2	24.4
270	-23.6	-23.2	-21.1	-20.2	25.7
280	-24.8	-24.3	-22.1	-21.2	27.0

Type FBM14±-10-S

Tension/compression bar Ø 14 mm,
shear force bar Ø 10 mm, insulation thickness 80 mm

	V_{Rd} [kN]				
	≤ 35.8	40	45	52.6	≤ 52.6
	M_{Rd} [kNm]				
	-11.1	-10.6	-10.0	-9.2	14.3
	-12.1	-11.5	-10.9	-10.0	15.6
	-13.0	-12.5	-11.8	-10.8	16.9
	-14.0	-13.4	-12.7	-11.6	18.1
	-15.0	-14.4	-13.6	-12.4	19.4
	-16.0	-15.3	-14.5	-13.3	20.7
	-17.0	-16.2	-15.4	-14.1	21.9
	-18.0	-17.2	-16.2	-14.9	23.2
	-18.9	-18.1	-17.1	-15.7	24.5
	-19.9	-19.1	-18.0	-16.5	25.7
	-20.9	-20.0	-18.9	-17.3	27.0

Concrete ≥ C25/30, all specifications on forces apply to one unit at a time

Type FBXL14±-8-S

Tension/compression bar Ø 14 mm,
shear force bar Ø 8 mm, insulation thickness 120 mm

Unit height h	V_{Rd} [kN]				
	≤ 17.4	20	25	29.1	≤ 29.1
[mm]	M_{Rd} [kNm]				
180	-12.6	-12.2	-11.5	-10.9	13.6
190	-13.7	-13.3	-12.5	-11.9	14.8
200	-14.8	-14.4	-13.5	-12.8	16.0
210	-16.0	-15.5	-14.6	-13.8	17.2
220	-17.1	-16.6	-15.6	-14.8	18.4
230	-18.2	-17.7	-16.6	-15.8	19.6
240	-19.3	-18.7	-17.6	-16.7	20.8
250	-20.4	-19.8	-18.6	-17.7	22.0
260	-21.5	-20.9	-19.7	-18.6	23.2
270	-22.7	-22.0	-20.7	-19.6	24.4
280	-23.8	-23.1	-21.7	-20.6	25.6

Type FBXL14±-10-S

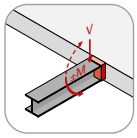
Tension/compression bar Ø 14 mm,
shear force bar Ø 10 mm, insulation thickness 120 mm

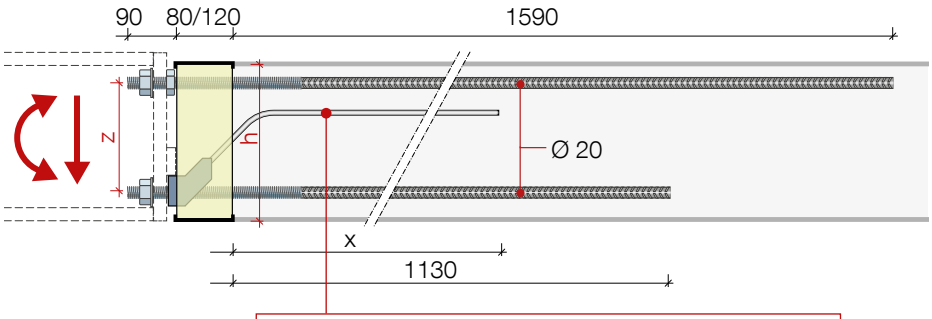
	V_{Rd} [kN]				
	≤ 35.9	40	42	45.8	≤ 45.8
	M_{Rd} [kNm]				
	-9.9	-9.3	-9.1	-8.5	13.6
	-10.8	-10.1	-9.9	-9.3	14.8
	-11.7	-11.0	-10.7	-10.0	16.0
	-12.5	-11.8	-11.5	-10.8	17.2
	-13.4	-12.6	-12.3	-11.5	18.4
	-14.3	-13.5	-13.1	-12.3	19.6
	-15.2	-14.3	-13.9	-13.0	20.8
	-16.1	-15.1	-14.7	-13.8	22.0
	-17.0	-16	-15.5	-14.5	23.2
	-17.8	-16.8	-16.3	-15.3	24.4
	-18.7	-17.6	-17.1	-16.0	25.6

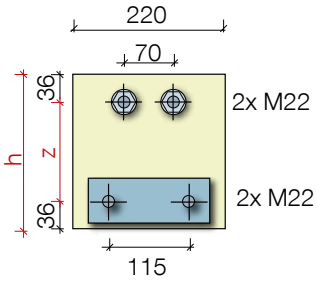
Concrete ≥ C25/30, all specifications on forces apply to one unit at a time

Egcobox® FB±S

- For beams for transmitting negative and positive moments and positive shear forces
- For freely cantilevered steel structures
- Type with compression bar







All dimensions in [mm]

FBM = x = 659
FBXL = x = 625

Shear force bar Ø 10

FBM = x = 714
FBXL = x = 688

Shear force bar Ø 12

Type FBM20±-10-S

Tension/compression bar Ø 20 mm,
shear force bar Ø 10 mm, insulation thickness 80 mm

Unit height h	V_{Rd} [kN]				
	≤ 34.7	40	50	52.6	≤ 52.6
[mm]	M_{Rd} [kNm]				
180	-25.7	-25.2	-24.1	-23.8	18.8
190	-28.1	-27.5	-26.3	-26.0	20.5
200	-30.5	-29.8	-28.6	-28.2	22.3
210	-32.9	-32.2	-30.8	-30.4	24.0
220	-35.3	-34.5	-33.0	-32.6	25.8
230	-37.7	-36.9	-35.3	-34.9	27.5
240	-40.0	-39.2	-37.5	-37.1	29.2
250	-42.4	-41.5	-39.7	-39.3	31.0
260	-44.8	-43.8	-42.0	-41.5	32.7
270	-47.2	-46.2	-44.2	-43.7	34.5
280	-49.6	-48.5	-46.4	-45.9	36.2

Type FBM20±-12-S

Tension/compression bar Ø 20 mm,
shear force bar Ø 12 mm, insulation thickness 80 mm

Unit height h	V_{Rd} [kN]				
	≤ 56.7	60	65	70.3	≤ 70.3
[mm]	M_{Rd} [kNm]				
180	-23.4	-23.0	-22.5	-21.9	18.8
190	-25.6	-25.1	-24.6	-23.9	20.5
200	-27.7	-27.3	-26.6	-26.0	22.3
210	-29.9	-29.4	-28.7	-28.0	24.0
220	-32.0	-31.6	-30.8	-30.0	25.8
230	-34.2	-33.7	-32.9	-32.1	27.5
240	-36.3	-35.8	-35.0	-34.1	29.2
250	-38.5	-37.9	-37.1	-36.1	31.0
260	-40.7	-40.1	-39.1	-38.1	32.7
270	-42.8	-42.2	-41.2	-40.2	34.5
280	-45.0	-44.3	-43.3	-42.2	36.2

Concrete ≥ C25/30, all specifications on forces apply to one unit at a time

Type FBXL20±-10-S

Tension/compression bar Ø 20 mm,
shear force bar Ø 10 mm, insulation thickness 120 mm

Unit height h	V_{Rd} [kN				
	≤ 29.9	35	40	45.8	≤ 45.8
[mm]	M_{Rd} [kNm]				
180	-25.4	-24.7	-24.0	-23.2	18.8
190	-27.8	-27.0	-26.2	-25.3	20.5
200	-30.1	-29.2	-28.4	-27.5	22.3
210	-32.5	-31.5	-30.7	-29.6	24.0
220	-34.8	-33.8	-32.9	-31.8	25.8
230	-37.2	-36.1	-35.1	-33.9	27.5
240	-39.5	-38.4	-37.3	-36.0	29.2
250	-41.9	-40.7	-39.5	-38.2	31.0
260	-44.2	-42.9	-41.7	-40.3	32.7
270	-46.6	-45.2	-44.0	-42.5	34.5
280	-48.9	-47.5	-46.2	-44.6	36.2

Type FBXL20±-12-S

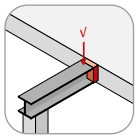
Tension/compression bar Ø 20 mm,
shear force bar Ø 12 mm, insulation thickness 120 mm

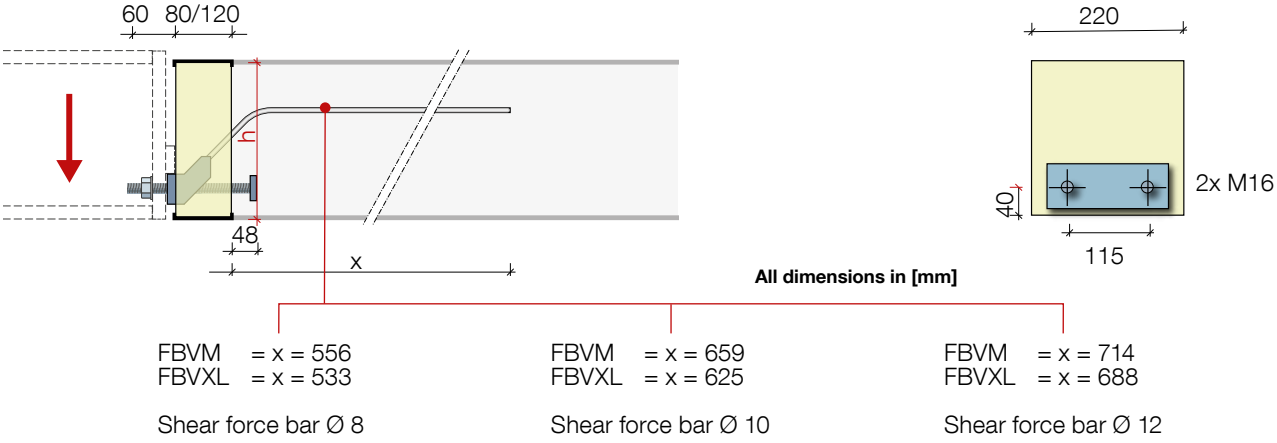
Unit height h	V_{Rd} [kN]				
	≤ 20.6	30	40	59.9	≤ 59.9
[mm]	M_{Rd} [kNm]				
180	-26.7	-25.4	-24.0	-21.2	18.8
190	-29.2	-27.7	-26.2	-23.2	20.5
200	-31.6	-30.1	-28.4	-25.1	22.3
210	-34.1	-32.4	-30.7	-27.1	24.0
220	-36.5	-34.7	-32.9	-29.1	25.8
230	-39.0	-37.1	-35.1	-31.1	27.5
240	-41.5	-39.4	-37.3	-33.0	29.2
250	-43.9	-41.8	-39.5	-35.0	31.0
260	-46.4	-44.1	-41.7	-36.9	32.7
270	-48.8	-46.5	-44.0	-38.9	34.5
280	-51.3	-48.8	-46.2	-40.9	36.2

Concrete ≥ C25/30, all specifications on forces apply to one unit at a time

Egcobox® FBV

- For beams for the transmission of positive shear forces
- For supported steel structures,
- Type with compression bearing





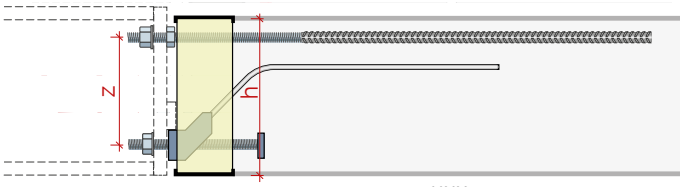
	Type FBVM8 Shear force bar Ø 8 mm Insulation thickness 80 mm		**Type FBVM10** Shear force bar Ø 10 mm Insulation thickness 80 mm		**Type FBVM12** Shear force bar Ø 12 mm Insulation thickness 80 mm
Unit height h [mm]	**V_{Rd} [kN]**		**V_{Rd} [kN]**		**V_{Rd} [kN]**
180	34.4		52.6		70.3
190					
200					
210					
220					
230					
240					
250					
260					
270					
280					

Concrete ≥ C25/30, all specifications on forces apply to one unit at a time

	Type FBVXL8 Shear force bar Ø 8 mm Insulation thickness 120 mm		**Type FBVXL10** Shear force bar Ø 10 mm Insulation thickness 120 mm		**Type FBVXL12** Shear force bar Ø 12 mm Insulation thickness 120 mm
Unit height h [mm]	**V_{Rd} [kN]**		**V_{Rd} [kN]**		**V_{Rd} [kN]**
180	29.1		45.8		58.7
190					
200					
210					
220					
230					
240					
250					
260					
270					
280					

Concrete ≥ C25/30, all specifications on forces apply to one unit at a time

The lever arm distance (z) depends on the unit height (h)



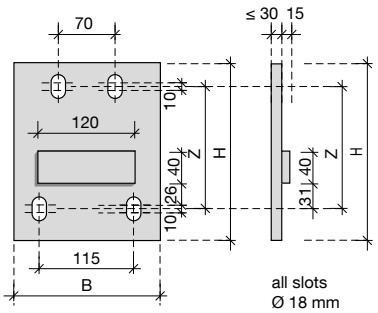
Unit height h [mm]	Lever arm (z) FBM/XL14-CB FBM/XL14±-S [mm]	Lever arm between z FBM/XL20±-S [mm]
180	113	108
190	123	118
200	133	128
210	143	138
220	153	148
230	163	158
240	173	168
250	183	178
260	193	188
270	203	198
280	213	208

Head plates for steel connection to Egcobox®

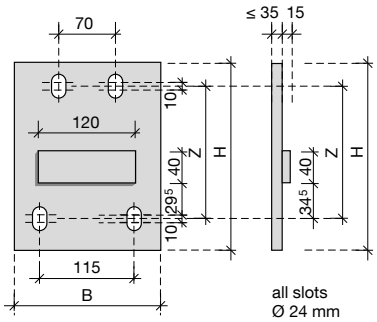
The head plates are not included in the scope of delivery and must be provided by the customer. The design is identical and applies to joint thicknesses 80 mm (M) and 120 mm (XL).

Due to the specified thread lengths, the head plate thickness should be ≤ 30 mm (FB14/FBV) ≤ 35 mm (FB20).

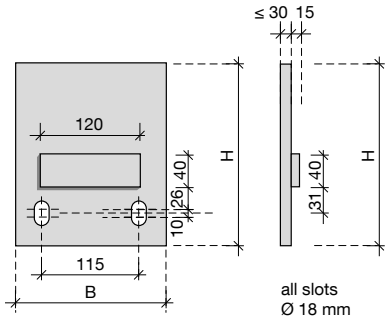
Head plate dimensions for FB14CB and FB14±-S variants



Head plate dimensions for FB20±-S variants

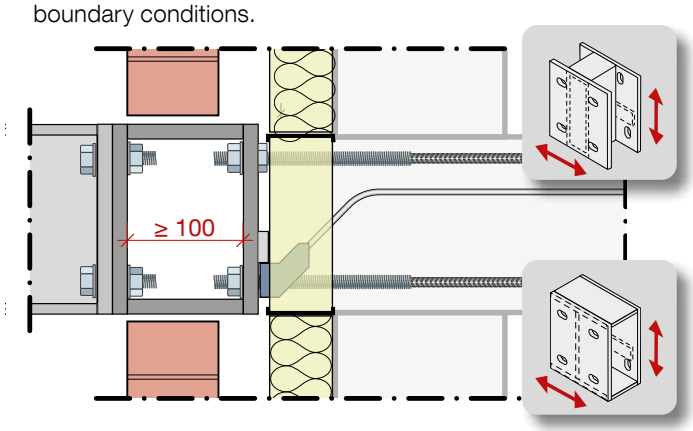


Head plate dimensions for FBV variants



Spacer bracket

In the case of superior Façades, a spacer bracket may be required to extend the connection face beyond the outer cladding. Exact layout depends on individual boundary conditions.



Egcobox® FB Torsional stiffness / deformation

Unit height h [mm]	Insulation thickness 80 mm: Torsional spring stiffness C [kNm/rad]			Insulation thickness 120 mm: Torsional spring stiffness C [kNm/rad]		
	Type FBM14-CB	Type FBM14±-S	Type FBM20±-S	Type FBXL14-CB	Type FBXL14±-S	Type FBXL20±-S
180	1615	1129	1748	1357	997	1566
190	1914	1338	2087	1608	1181	1869
200	2238	1565	2455	1880	1381	2200
210	2587	1809	2854	2174	1597	2557
220	2961	2071	3282	2488	1828	2941
230	3361	2350	3741	2824	2074	3352
240	3786	2647	4230	3181	2337	3789
250	4236	2962	4748	3560	2615	4254
260	4712	3295	5297	3960	2908	4745
270	5213	3645	5875	4380	3218	5263
280	5739	4013	6483	4823	3542	5808

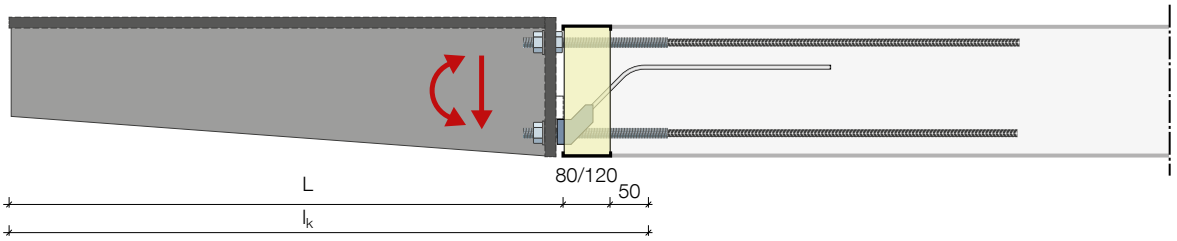
From the torsional spring stiffness of the connection, the elastic torsion of the cantilever as a result of the acting moment can be determined. The lowering at the end of the cantilever arm as a result of this torsional stiffness can be determined as follows:

$$u = \frac{1000}{C} \cdot l_K \cdot M_{Ed}$$

with:

u [mm]	***Lowering at the end of the cantilever arm***
C [kNm/rad]	***Torsional spring stiffness per unit according to table***
l_k [m]	***Cantilever length***
M_{Ed} [kNm]	***Acting moment per unit at serviceability limit state***

For the determination of the total lowering at the end of the cantilever arm, the deformations of the supporting structure must also be taken into account.

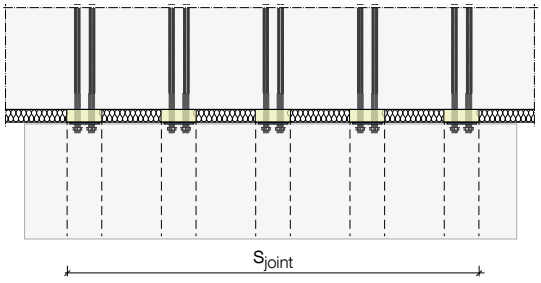


Egcobox® FB expansion joint spacing

Varying temperature expansions and contractions of internal and external components can lead to construction stresses.
If rigid exterior components (e.g. reinforced concrete slabs) are connected in a non-displaceable manner using Egcobox® FB to interior components, the expansion joint spacings (according to the table) should not be exceeded.
It is possible to dispense with the arrangement of expansion joints in the exterior component if sufficient displaceability can be guaranteed.

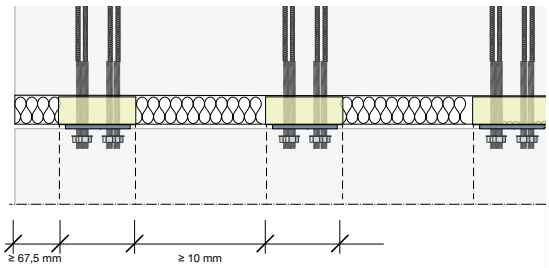
Egcobox® FB minimum distances

The specified minimum distances must be taken into account during design.



Insulation thickness [mm]	Expansion joint spacing s_{joint} [m]
80	6,0
120	10,0

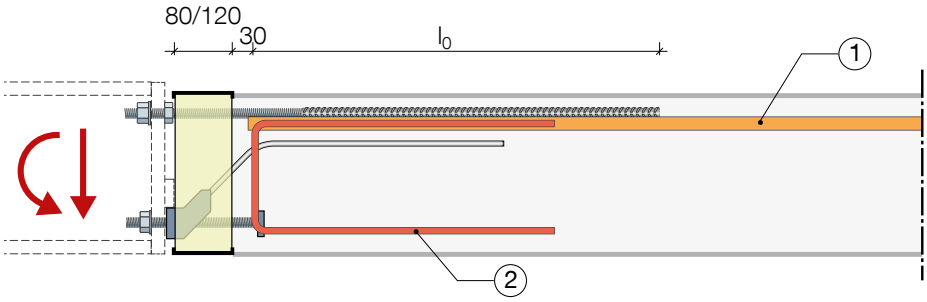
* For corner connections, it is recommended to reduce the expansion joint spacing to 0.5 s_{joint}.



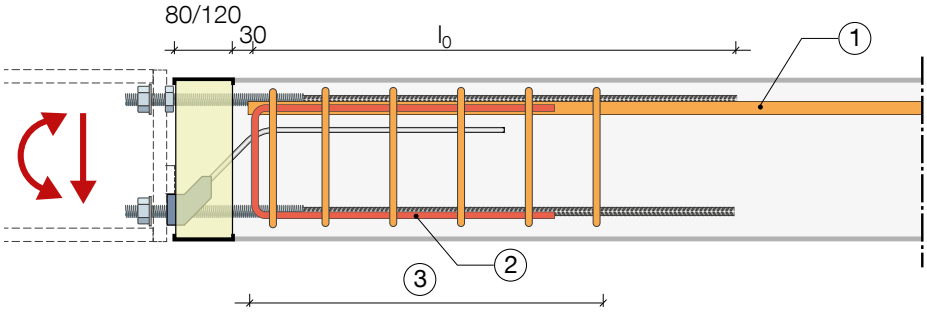
Egcobox® FB On-site reinforcement

Egcobox® Type	FBM14-8-CB FBM14-10-CB FBXL14-8-CB FBXL14-10-CB	FBM14±-8-S FBM14±-10-S FBXL14±-8-S FBXL14±-10-S	FBM20±-8-S FBM20±-10-S FBXL20±-8-S FBXL20±-10-S	FBVM8 FBVM10 FBVM12 FBVXL8 FBVXL10 FBVXL12
Egcobox® tension bars Existing l_0 tension reinforcement [mm]	2 ø 14 830	2 ø 14 830	2 ø 20 1560	- -
Egcobox® compression bars Existing l_{bd} compression reinforcement [mm]	- -	2 ø 14 860	2 ø 20 1130	- -
Pos. ① – Overlap bending tensile reinforcement / unit	2 ø 14	2 ø 14	2 ø 20	-
Pos. ② – Suspension reinforcement shear force / unit	Design of overlap joint according to DIN EN 1992-1-1 Edge reinforcement according to static requirements, recommendation plug-in stirrup 3 ø 10			
Pos. ③ – Shear reinforcement / unit	according to static requirements; specification by the structural engineer			

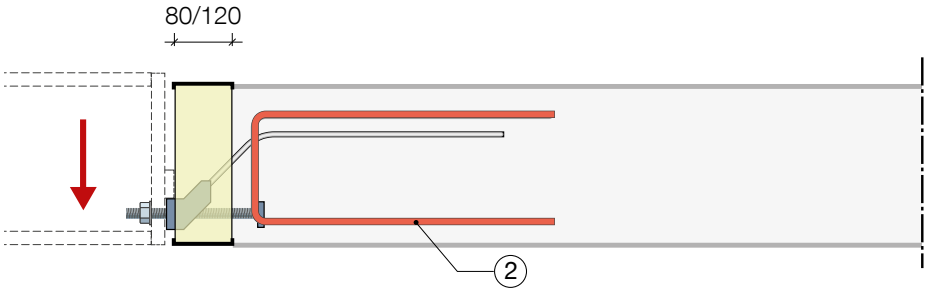
Egcobox® Type FB-CB



Egcobox® Type FB±S



Egcobox® Type FBV



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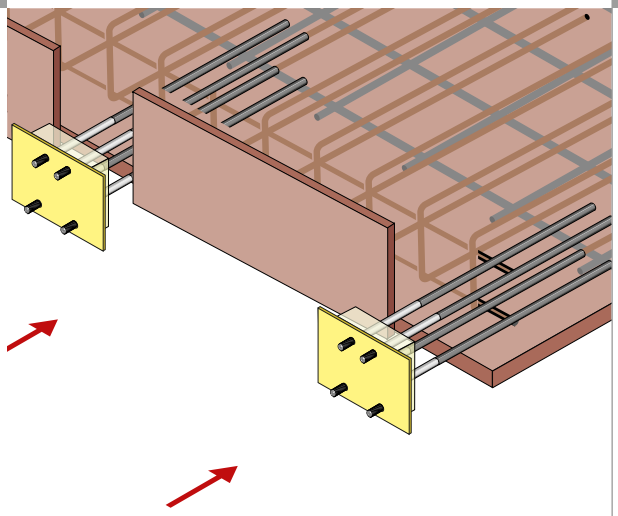

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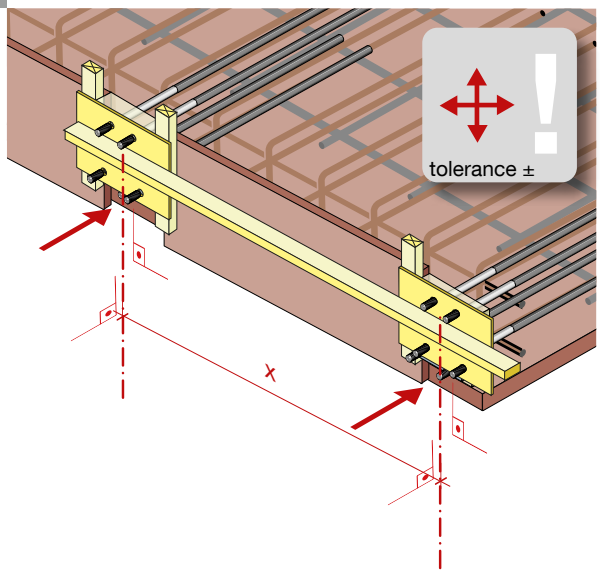

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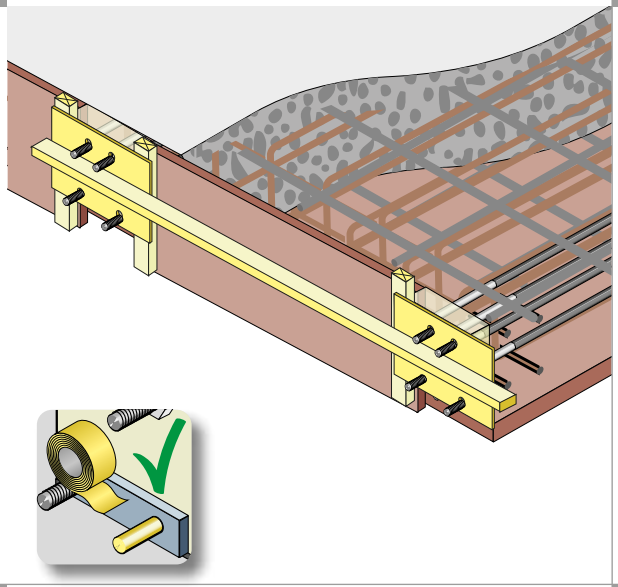

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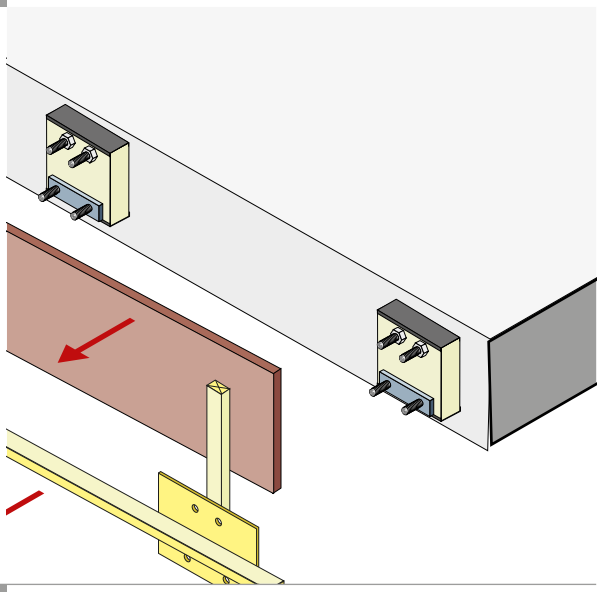

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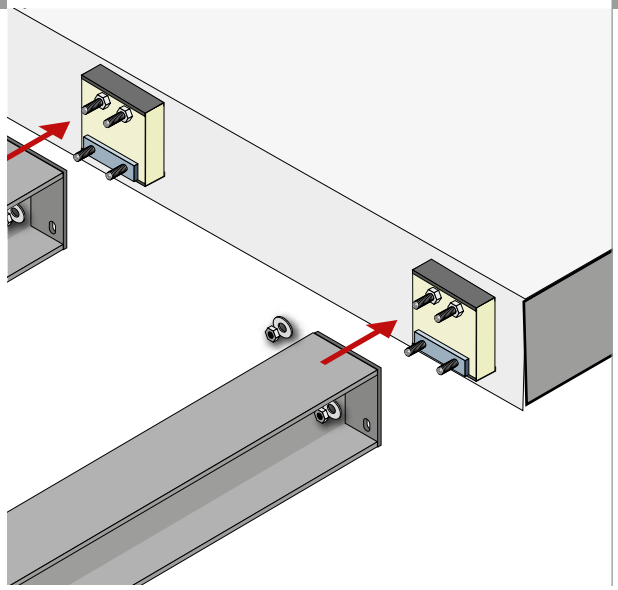

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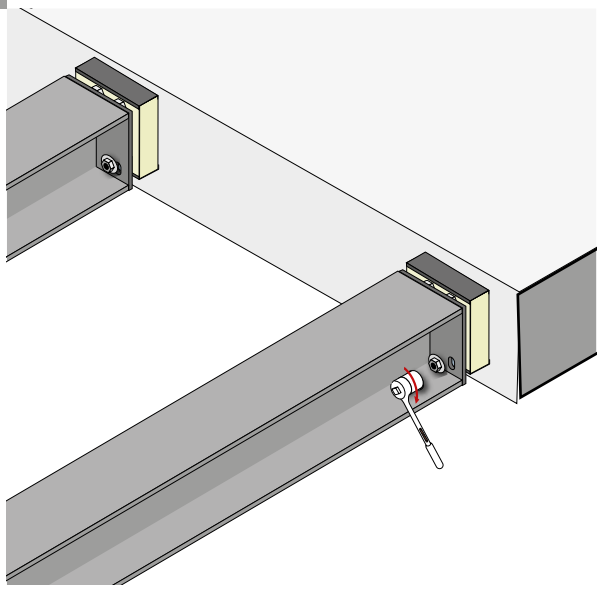
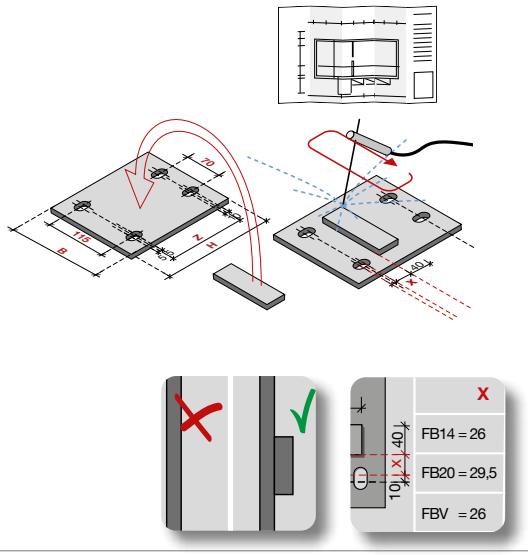


These installation instructions can only be used as a recommendation. They do not replace the expertise required for assembly. The notes are always kept up to date with the latest technology and are constantly updated. Technical changes are expressly reserved – even without prior information to the customer. The currently valid version can be found on our website at: www.maxfrank.com. In addition, our General Terms and Conditions of Sale apply.

1



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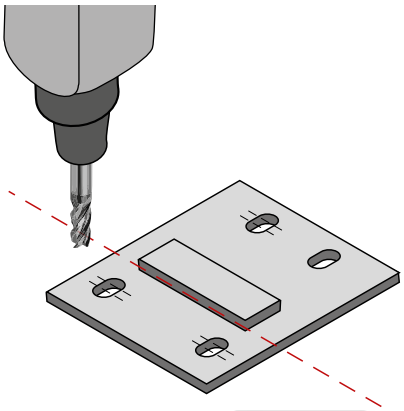

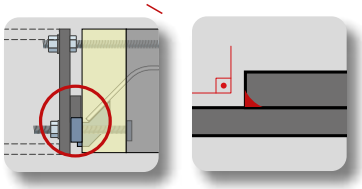

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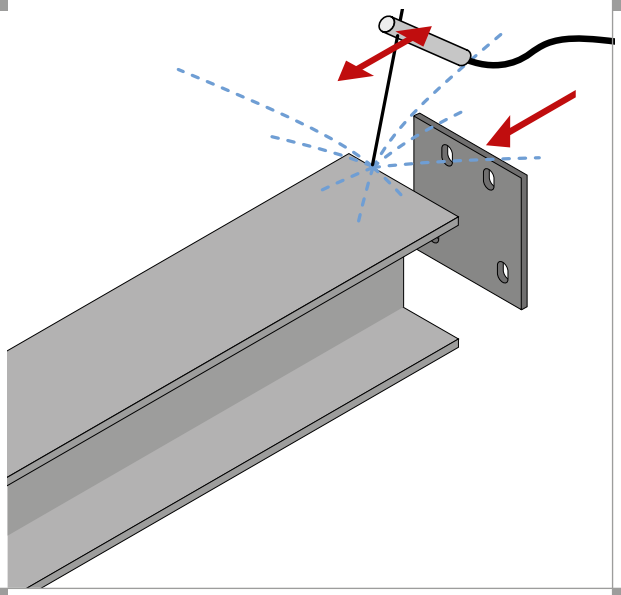

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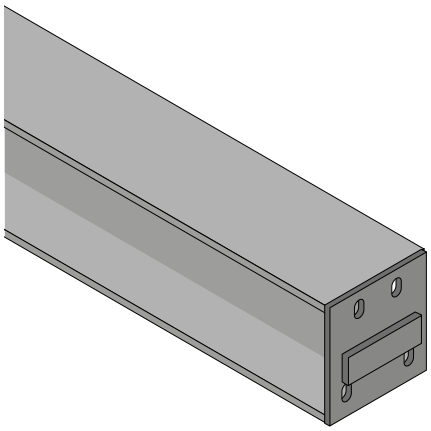

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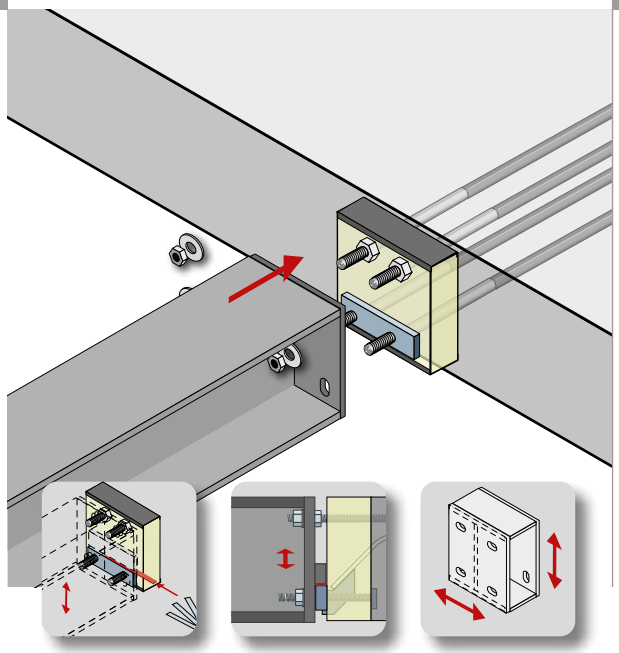

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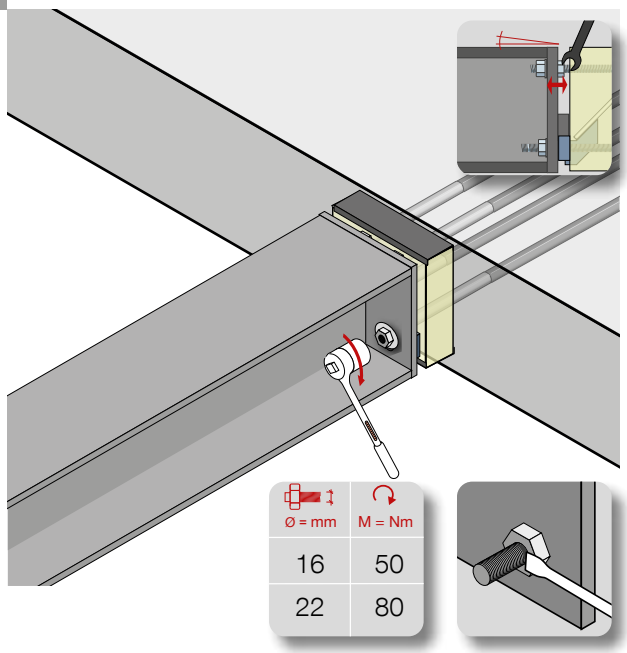

Egcobox® Cantilever Plate Connector

Thermal separation of reinforced concrete cantilever slabs

With the heat-insulating cantilever plate connection Egcobox®, heat bridges can be reduced. The static connecting element Egcobox® thermally separates an external component and an internal component.

Steel connection Egcobox® FST

Thermal separation of steel structures

The Egcobox® FST steel connection represents an optimal solution for thermal separation of steel structures and thus reduces thermal bridges. The static effectiveness of the tragsystem is not restricted.

Egcodorn® shear force dowel

Thermal separation of steel structures

For high static loads, the Egcodorn® shear force dowel offers safety throughout planning and execution. If the dynamic bean tests occur – as in the case of busy joints – the Egcodorn® DND represents the optimum solution. Constructive connections can be made most economically with the Egcodübel.

MAX FRANK Coupler screw connection

Mechanical connection and anchoring of reinforcing bars by means of screw sleeves for static and dynamic load

Screw socket connections offer an efficient and cost-effective way to connect or anchor reinforcing bars under static and dynamic loads.

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COMMON GROUND

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