BUILDING COMMON GROUND

MAX FRANK®

Egcobox®

The individual cantilever connector
Types in accordance with EN1992 (EC2)

BBA APPROVAL INSPECTION TESTING CERTIFICATION
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Edition International

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BBQ

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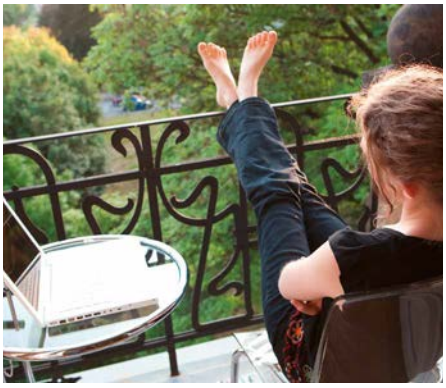
Enjoy the sun

Peace and quiet



Throwing parties

Feeling alive

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Plan your balcony according to your demands!

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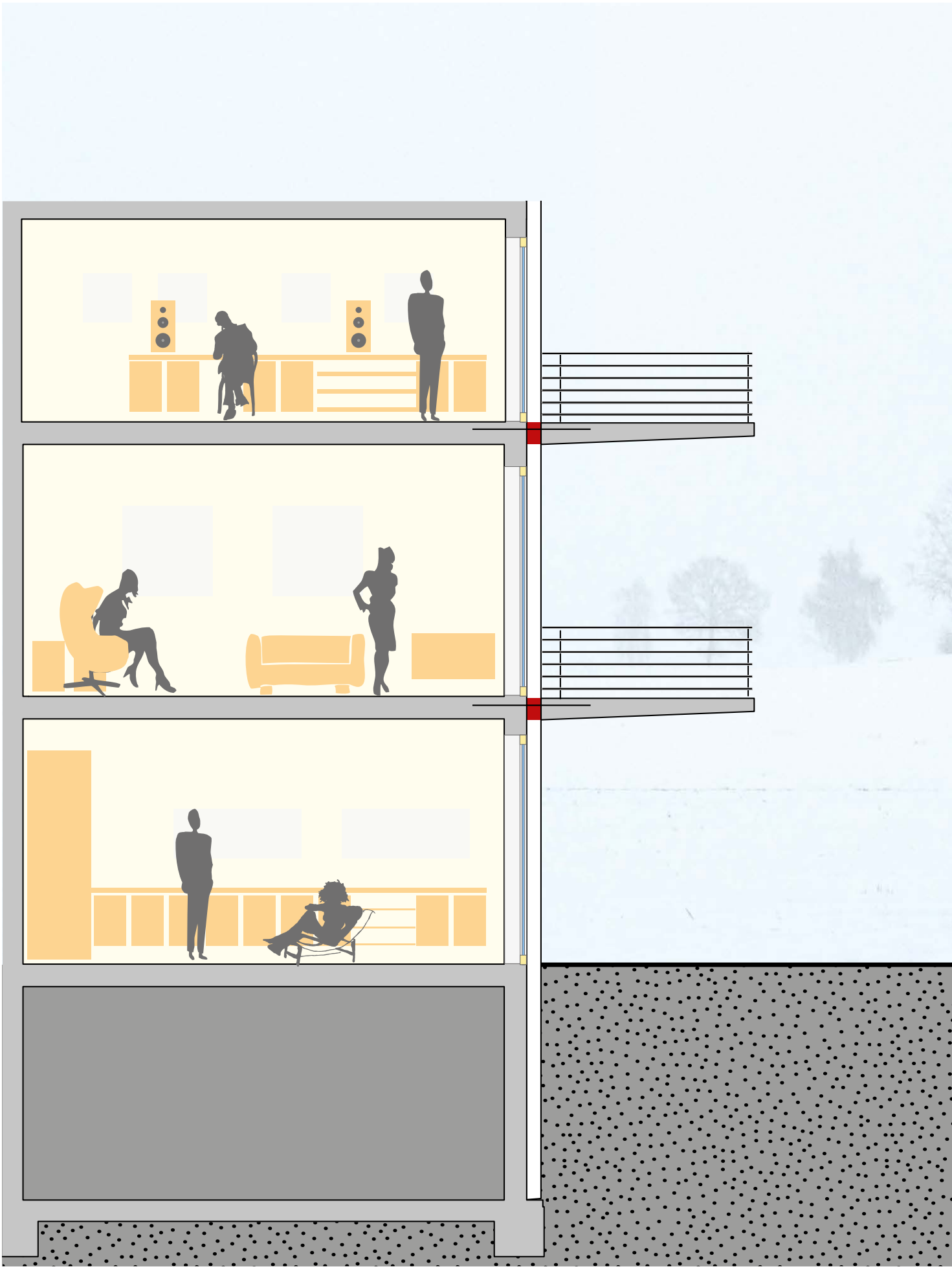


The Egcobox® cantilever connector

Balconies and loggias are small havens in your own home. In order to enjoy your balcony over as long a period as possible, you should take care from the planning phase to select appropriate components. Careful attention should be paid to the transition from the building perimeter to the protruding section.

The Egcobox® heat-insulating balcony connector is always a safe choice:

- Minimises thermal bridges
- Can be adjusted exactly to your requirements
- Type approved by several European Approval bodies (e. g. BBA)
- Qualified consultation by our applications engineering team
- Free calculation and dimensioning software

Egcobox® cantilever connectors combine structural safety and ideal heat insulation

Structural stability of the Egcobox® is provided by a framework of steel reinforcements passing through the 60 to 120 mm thick thermal insulation material, thus connecting components such as balconies with the building.

The low maximum heat conductivity of the insulation of **0.031 W/mK** and the structural components adjusted to the situation minimise thermal bridging on the building shell along with associated negative side effects such as higher energy consumption, damage to the structure and mould build-up due to condensation.

Since 1997, Egcobox® has been accredited for use in Germany by the DIBt. The current accreditation meets the requirements of the EN 1992-1-1 (EC2) norms.
Beyond that, Egcobox® is approved for building construction in the following countries:

- Austria
- Czech Republic
- Hungary
- Netherlands
- Poland
- United Kingdom

Individual cantilever connections for individual buildings

Demands on a cantilever connector are as different as the buildings themselves. Select the Egcobox® that is appropriate for your demands. Vary the...

- insulation material *(polystyrene, rock wool, foam glass, phenolic foam)*
- insulation thickness (60-120 mm)
- length of element
- concrete cover
- reinforcement
- fire protection

...and match the element shape to the building and/or the component that is to be connected – for example, radial elements for concave or convex balconies or diagonal elements for angular balconies.

Egcobox software

The intuitive operation saves time-consuming familiarisation for the engineer and enables fast and simple design of the thermally insulating cantilever slab connections.
In addition to the project management contents, the selection of various languages and country-specific building codes of practice, the version 4.0 software is exceedingly impressive due to its enhanced and extended functions.

Better planning: Egcobox software

- Graphical 3D view of the input Parameters
- Free input of the balcony geometry as well as the support situation and loads
- Accounts for upstands or recesses in the balcony slab
- Free input and positioning of balustrade, surface, linear and points loads
- Calculation and 3D visualisation of the support loads, deformations and Egcobox® cantilever slab connections by means of the finite element method

Result output:

- Includes calculation documents in form of a basic or detailed report
- Output of parts or ordering lists
- 3D-DXF export of the Egcobox® elements as an installation plan

www.egcobox-software.com

Egcobox® customised to requirements

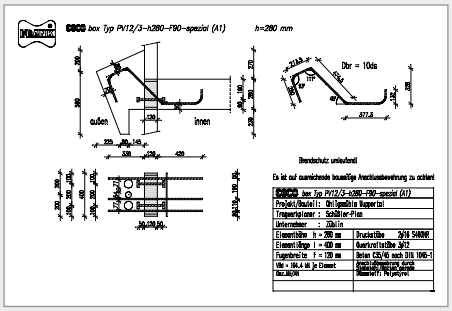
Apart from its extensive range of standard elements, Egcobox® can be adjusted and optimised for specific situations. In order to do so, you can also vary the following parameters:

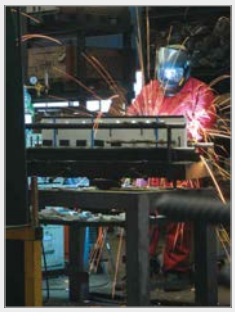
- Insulation thickness and material
- Framework material and dimensions
- Layout of the individual rebars (direction and position)
- Adaptation of the framework to the gradient of the reinforcement on the building itself
- Concrete cover and/or projecting insulation
- Shape of element

Our experienced engineers will be glad to generate solutions for your individual requirements. Thanks to our site-specific manufacturing, we are equipped to process tailored solutions at low cost.

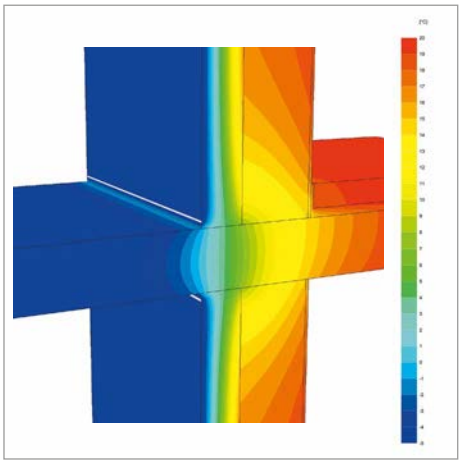
Please do not hesitate to contact our Technical Services department via:

Tel: +49 9265 951-14
Fax: +49 9265 951-30
e-mail: egcobox@maxfrank.de





Egcobox® structural physics



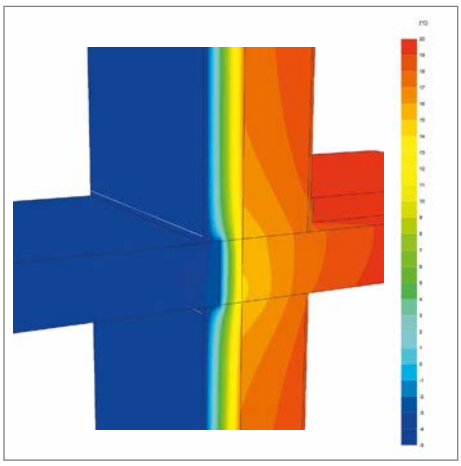
Thermal transfer without Egcobox®

Thermal Bridging

Legal regulations are constantly increasing alongside expectations for energy efficiency in our homes. This is not only focussed on environmental protection and saving heating costs but also on a healthy indoor climate and the prevention of condensation and mould. Attention is paid in particular minimising thermal bridging; a protruding balcony plate would be such a thermal bridge.
In conventionally designed protrusions, such as balconies entirely made of concrete, two adverse thermal bridge factors are combined:

Geometric thermal bridges
They arise where the outer surface is much larger than the inner surface.

Material-related thermal bridges
These are a consequence of the different heat conductivity of the materials used such as brickwork and concrete. Egcobox® is an answer to this precise effect.



Reduced thermal transfer due to the installation of Egcobox®

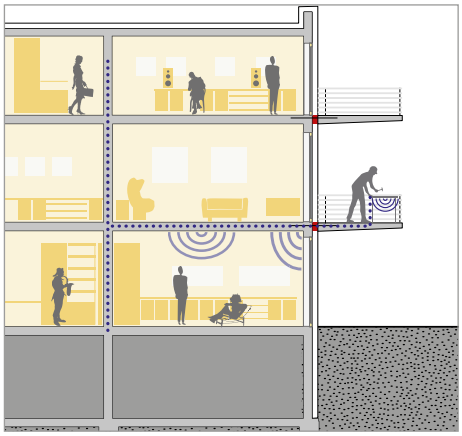
The German standard (DIN 4108) provides three different scenarios for thermal bridging evaluation:

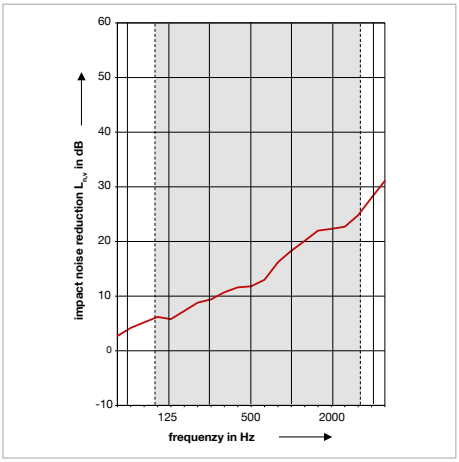
Scenario 1:
If no special actions are taken to prevent heat loss in thermal bridge areas, the overall U-value of the building envelope must be increased by ΔU_{WB} = 0.10 W/(m²*K). This scenario is not up-to-date. It will usually not be possible to meet the requirements of the relevant heat insulation regulations.

Scenario 2:
If specifically designed regulatory details in accordance with DIN 4108 supplementary sheet 2 are used in the thermal bridge areas, the overall U-value of the building envelope must be increased by ΔU_{WB} = 0.05 W/(m²*K). The Egcobox® meets this demand at least.

Scenario 3:
For buildings with increased heat protection demands, calculation with a standardized addition (scenario 2) is not sufficient. Thus, providing a U-value calculation for every single heat bridge according to DIN 4108 and/or DIN V 18599 is required. The Psi value is used for calculation of protruding components connected via Egcobox®.

Egcobox® structural physics





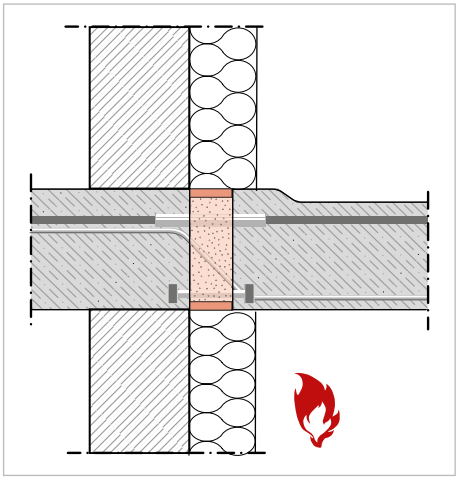
Impact noise protection

By walking, hopping, or moving chairs on balconies / pergolas, vibrations are created that travel into the outside wall and thus into adjacent apartments.

Noises that can be heard in adjacent rooms are considered as falling under the standardised impact noise index. The smaller the value, the smaller the induced noise and the stress for the dwellers.

The effectiveness of the Egcobox® elements to reduce the impact noise level has been tested and approved by independent testing institutes.

The DIN 4109 states the limit for loggias and pergolas where living quarters are in need of protection with $L'_{n,W}$ 53 dB. There are, however, no regulations on balcony perimeters. Noise protection demands are advancing permanently. The requirements stated in the relevant edition of the DIN 4109, issued in 1989 are no longer state of the art.

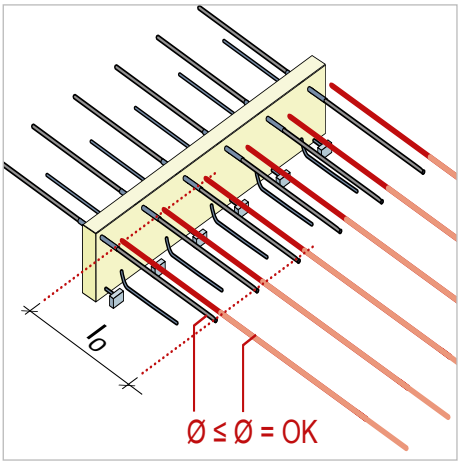


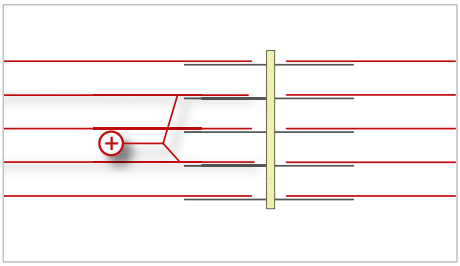
Fire protection

The fire protection requirements for balconies and/or the fire resistance rating of cantilevering components are stated in the local construction regulations. For balconies and pergolas, a maximum of F120 and/or REI120 is necessary.

If required, each Egcobox® unit can be manufactured to fire rating REI120.

Egcobox® technical advice



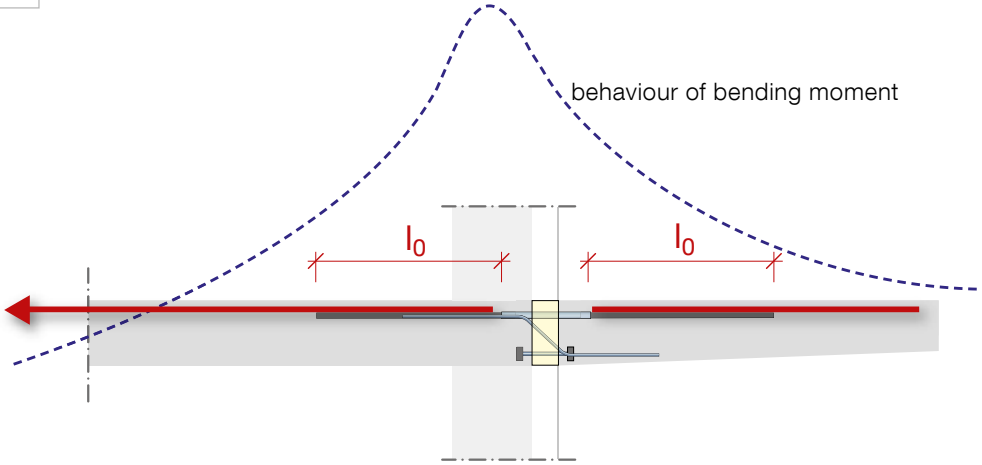


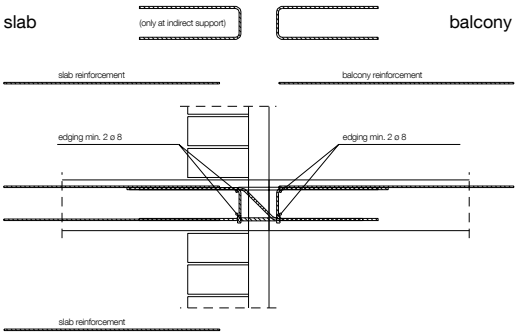
Starter bars

1. The Egcobox® projecting rebar in the area of regular tension should be overlapped with the on-site reinforcement (marked red in the drawings). This usually applies for the tension bars of the element at the side of the balcony and the floor slab and the shear force bars at the internal slab side. Starter bars can be lapped by a bar with the same diameter for each bar of the element. For alternatives, please refer to the tables on page 19. Please ensure that the distance between element and starter bars on the building side does not exceed 4 d_S.

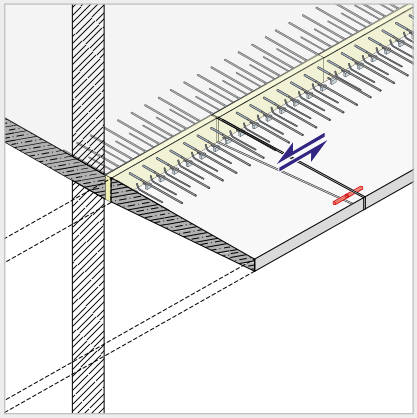
2. For compressive loads, i.e. usually at the shear force bars on the balcony side, the bars do not require to be lapped. No additional on-site reinforcement is required.

3. At each of the edges towards the Egcobox®, there must be one marginal strip provided in accordance with EN 1992 (min. dim. stirrup Ø 6 / 250 mm plus 2 x 8 mm bars parallel to joint). At indirect support the marginal strip needs to be calculated to the required shear load with $A_s = V_{E,d} / f_{yd} \geq$ Ø 6 / 250 mm.





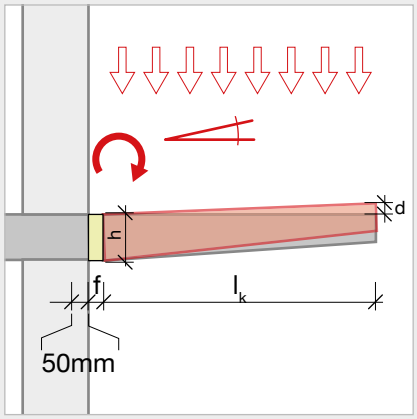
Egcobox® technical advice



Expansion joint distances

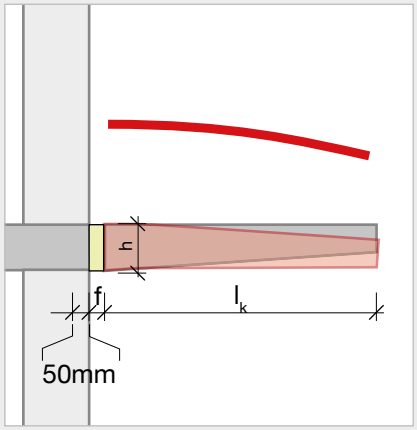
Due to different temperature expansion between outdoor balcony and indoor floor slab, in certain distances, expansion joints must be placed. The applicable maximum distances between expansion joints are listed in the calculation table (from page 18). If other distances are required please do not hesitate to contact our Technical Support.
In order to ensure an even flexure of the adjacent balconies created in this way, additional dowels (marked red in the drawing) are fitted.

For more information on dowels, please refer to our Egcodorn®/Egcodubel brochures. They can also be found on the internet at **www.maxfrank.com**



Deflection of the balcony in the connection

The deformation (d) at the edge of the cantilever is caused by a rotation at the connection and the flexure of the entire balcony. A calculation example and the banking factors required for calculating the rotation can be found on page 26.
The following calculation is recommended for this bending moment M_{vorh}:
$M_{E,k}$ (permanent load) + $M_{E,k}$ (50 % variable load)
When calculating the balcony with a FE-program the following spring stiffnesses are recommended:
rotation: 10.000 kNm/rad/m
vertical: 250.000 kN/m/m

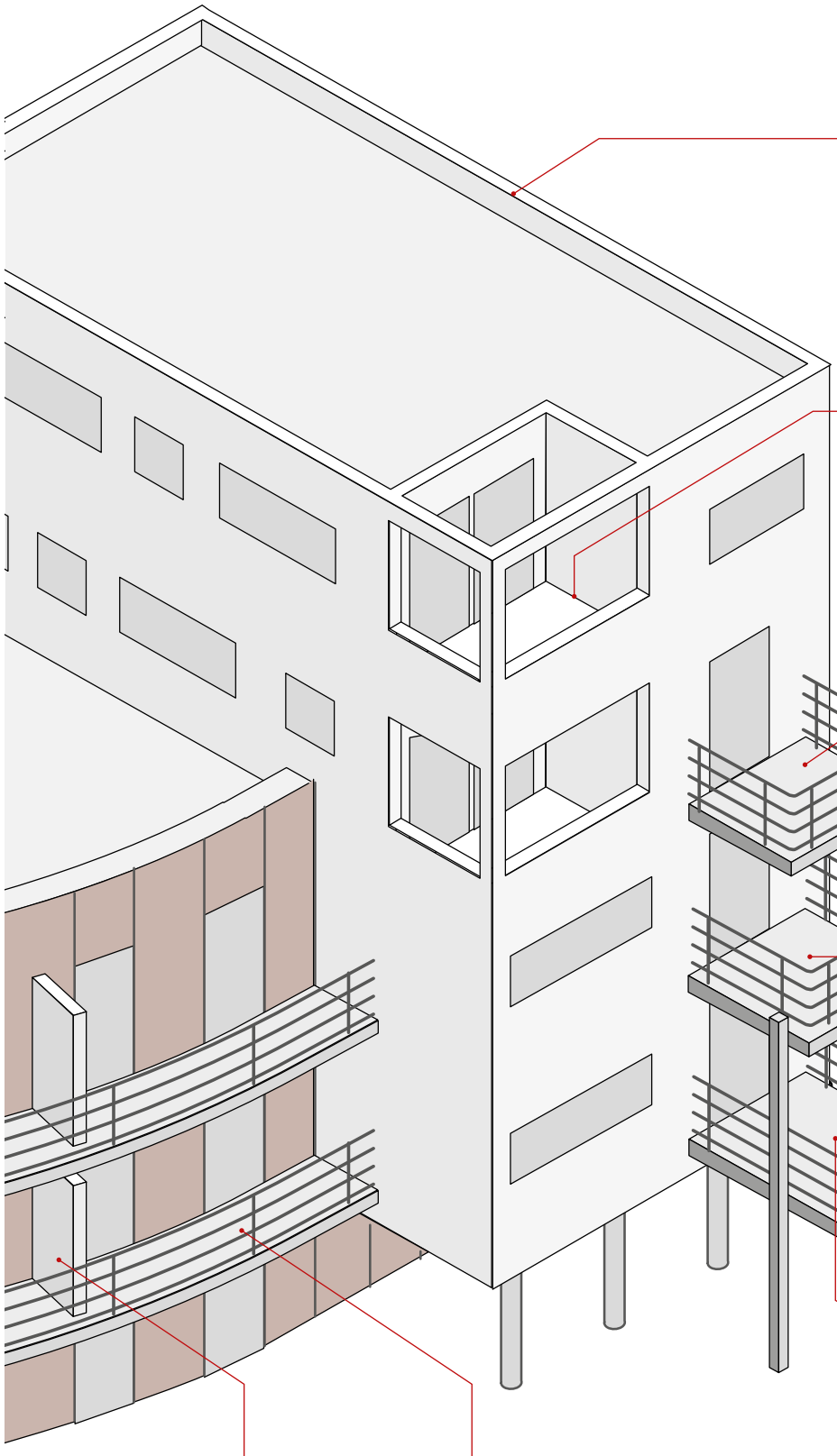


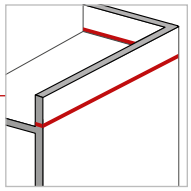
Deformation of balcony slab

Excessive flexure of balcony slab is prevented by observing the correct proportion of length of cantilever arm and thickness of balcony plate. A recommendation of the maximum flexure slenderness can be found in the following table.

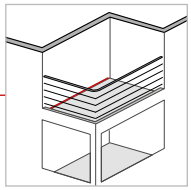
Maximum length of cantilever l_k [m]

Height of Egcobox® element h [mm]	160	180	200	220	240	260	280
Concrete cover c30 mm	1.62	1.90	2.18	2.46	2.74	3.02	3.30
Concrete cover c35 mm	1.55	1.83	2.11	2.39	2.67	2.95	3.23
Concrete cover c50 mm	-	1.62	1.90	2.18	2.46	2.74	3.02

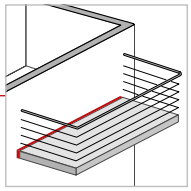




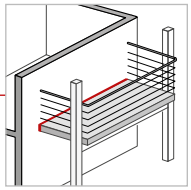
Parapet wall
(Type A)



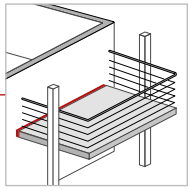
Loggia slab
(Type M±)



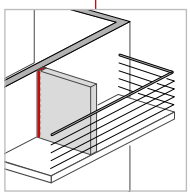
Cantilevered slab
(Type M)



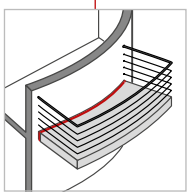
Supported slab
(Type V)



Supported cantilevered
slab (Type V±)

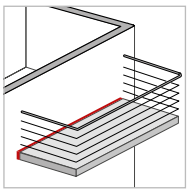


Cantilevered wall
(Type M-W)

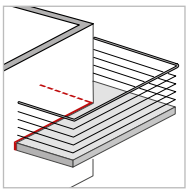


Special elements

Cantilevered balconies

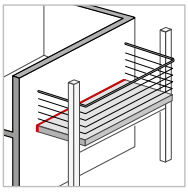


Cantilevered balcony
(Type M)

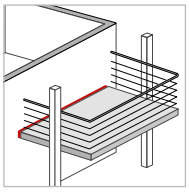


Corner balcony
(Type M-Eck)

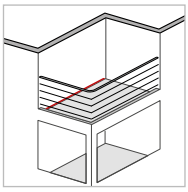
Supported balconies



Supported slab
(Type V)

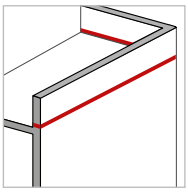


Supported cantilevered
slab (Type V±)

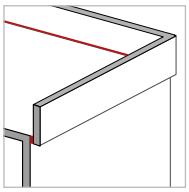


Loggia slab
(Type M±)

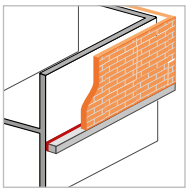
Parapet wall, console, corbel supports



Parapet wall
(Type A)

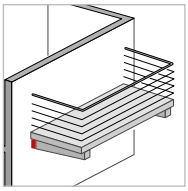


Console element parapet
(Type F)

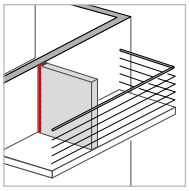


Corbel element
(Type O)

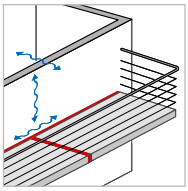
Further standard elements



Cantilevered beam
(Type M-S)

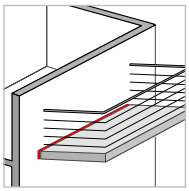


Cantilevered wall
(Type M-W)

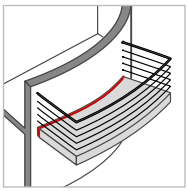


Short elements for special
loads (Type M-VNH)

Special elements



Diagonal balconies

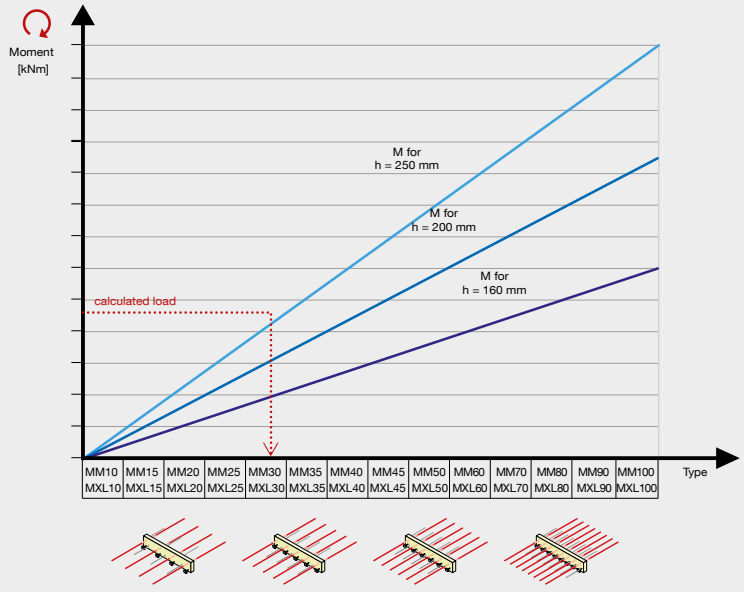


Radial balconies

Egcobox® type determination

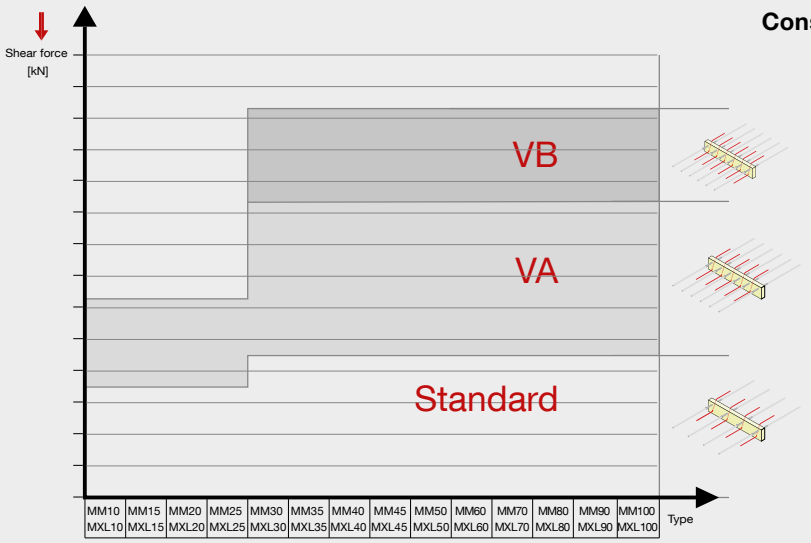
Example: Egcobox® MM50-VA-C35-h200

Type of element	Thickness of element	Bearing load level	Shape of element	Shear force reinforce-ment	Concrete cover	Height of element	Fire protection class	Insulation
M	S (60 mm)	10	**–**	–	C30	h160	**–**	**–**
M±	**M (80 mm)**	20	**(standard length)**	**VA**	**C35**	h170	F90/R90	**(Polystyrene)**
V	L (100 mm)	30	K	VB	C40	h180	REI120	**0.031 W/mK**
V±	XL (120 mm)	40	(short element)	V±	C45	h190		SW
O		**50**	Eck		C50	**h200**		(Rock wool)
F		60	(corner element)			h210		0.037 W/mK
A		70	F			h220		FG
M-S		80	(semi-prefab			h230		(Foamglas)
M-W		90	element)			h240		0.040 W/mK
		100				h250		SF
						h260		(Styrofoam)
						h270		0.036 W/mK
						h280		PF
								(Phenolic foam)
								0.021 W/mK

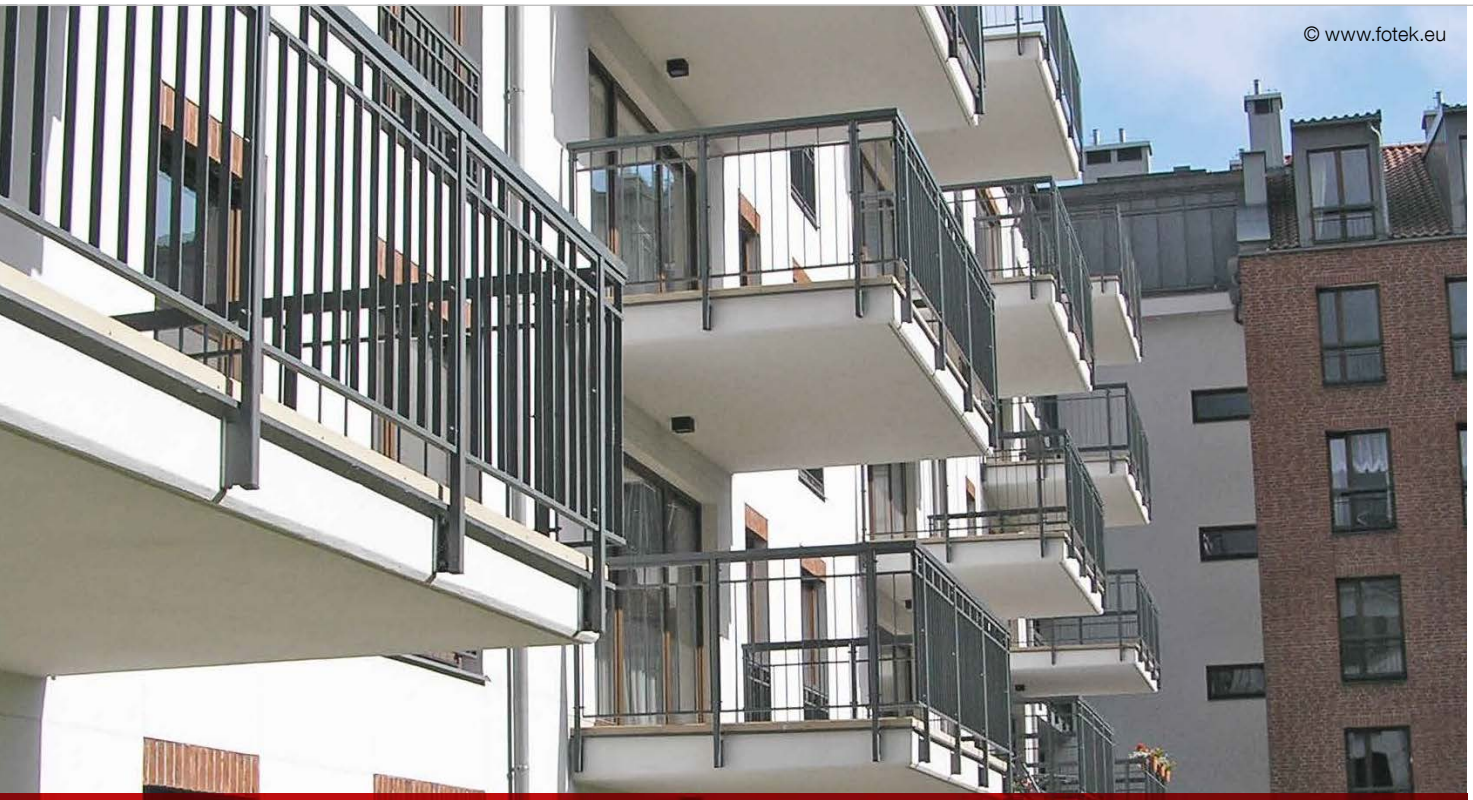


Bending moment depends on plate thickness and type

The diagram is just for illustration; for values please refer to the tables on the following pages.



Consideration of shearing forces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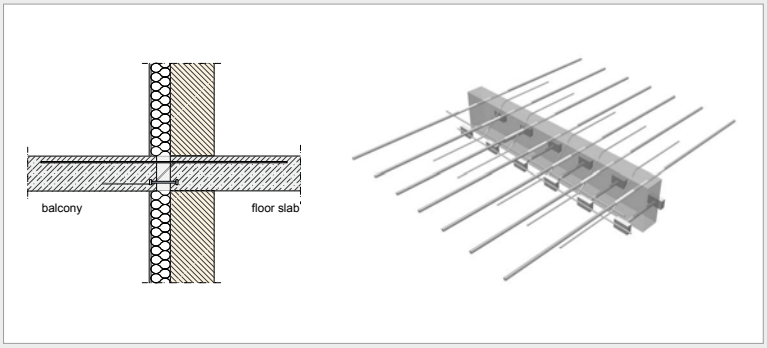
Cantilevering balconies

A building with freely cantilevered balconies has a certain lightness to it. In addition to the aesthetic appearance, the factor of space is a benefit with this balcony type especially in confined areas.

Egcobox® MM / MXL – C20/25

Specifications

Slab thickness: h = 160 – 280 mm
Joint width MM: f = 80 mm
Joint width MXL: f = 120 mm
(other dimensions on request)
Concrete strength: C20/25
Can be provided as semi-prefab element.



Design table Egcobox® MM / MXL – C20/25

Insulation made of 80 mm or 120 mm polystyrene, rock wool or foam glass, other dimensions on request.

Height of connection [mm]				MM10/ MXL10	MM15/ MXL15	MM20/ MXL20	MM25/ MXL25	MM30/ MXL30	MM35/ MXL35	MM40/ MXL40
C30	**C35**	**C50**		$M_{R,d}$ [kNm/m]						
	160			7.5	9.6	14.4	16.9	19.8	20.4	23.8
160	165	**180**		7.9	10.2	15.3	17.9	21.0	21.6	25.2
165	**170**	185		8.3	10.7	16.1	18.9	22.2	22.9	26.7
170	175	**190**		8.8	11.3	17.0	19.9	23.4	24.1	28.1
175	**180**	195		9.2	11.8	17.8	20.8	24.6	25.3	29.5
180	185	**200**		9.6	12.4	18.6	21.8	25.8	26.6	31.0
185	**190**	205		10.1	12.9	19.5	22.8	27.0	27.8	32.4
190	195	**210**		10.5	13.5	20.3	23.8	28.2	29.0	33.8
195	**200**	215		10.9	14.1	21.2	24.8	29.4	30.3	35.3
200	205	**220**		11.4	14.6	22.0	25.8	30.6	31.5	36.7
205	**210**	225		11.8	15.2	22.8	26.7	31.8	32.7	38.2
210	215	**230**		12.2	15.7	23.7	27.7	33.0	33.9	39.6
215	**220**	235		12.6	16.3	24.5	28.7	34.2	35.2	41.0
220	225	**240**		13.1	16.8	25.4	29.7	35.4	36.4	42.5
225	**230**	245		13.5	17.4	26.2	30.7	36.6	37.6	43.9
230	235	**250**		13.9	17.9	27.0	31.7	37.8	38.9	45.3
235	**240**	255		14.4	18.5	27.9	32.7	39.0	40.1	46.8
240	245	**260**		14.8	19.0	28.7	33.6	40.2	41.3	48.2
245	**250**	265		15.2	19.6	29.6	34.6	41.4	42.6	49.6
250	255	**270**		15.7	20.1	30.4	35.6	42.6	43.8	51.1
255	**260**	275		16.1	20.7	31.2	36.6	43.7	45.0	52.5
260	265	**280**		16.5	21.2	32.1	37.6	44.9	46.2	53.9
265	**270**			17.0	21.8	32.9	38.6	46.1	47.5	55.4
270	275			17.4	22.3	33.8	39.5	47.3	48.7	56.8
275	**280**			17.8	22.9	34.6	40.5	48.5	49.9	58.2
280				18.2	23.5	35.4	41.5	49.7	51.2	59.7
				$V_{R,d}$ [kN/m]						
160 - 280			-	34.8	34.8	34.8	34.8	43.5	43.5	43.5
160 - 280			VA	61.8	61.8	61.8	61.8	92.7	92.7	92.7
160 - 280			VB	-	-	-	-	123.6	123.6	123.6
160 - 280			V±	34.8/-34.8	34.8/-34.8	34.8/-34.8	34.8/-34.8	61.8 / -61.8	61.8 / -61.8	61.8 / -61.8

Reinforcement								
Length of element [mm]		1000	1000	1000	1000	1000	1000	1000
Tensile bars		7 ø 6	9 ø 6	8 ø 8	9 ø 8	5 ø 12	6 ø 12	6 ø 12
Length of tensile bars MM [mm]		740	740	940	940	1520	1520	1520
Length of tensile bars MXL [mm]		780	780	980	980	1560	1560	1560
Pressure elements		4 ø 10	4 ø 10	5 ø 10	6 ø 10	5 ø 12	5 ø 12	6 ø 12
Shear force bars	-	4 ø 6	4 ø 6	4 ø 6	4 ø 6	5 ø 6	5 ø 6	5 ø 6
Shear force bars	VA	4 ø 8	4 ø 8	4 ø 8	4 ø 8	6 ø 8	6 ø 8	6 ø 8
Shear force bars	VB	-	-	-	-	8 ø 8	8 ø 8	8 ø 8
Shear force bars	V±	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 8 / 4 ø 8	4 ø 8 / 4 ø 8	4 ø 8 / 4 ø 8
Applicable expansion joint distances MM [m]		13.0	13.0	13.0	13.0	11.7	11.7	11.7
Applicable expansion joint distances MXL [m]		21.7	21.7	21.7	21.7	19.8	19.8	19.8

A verification of the shear force capacity of the slab has to be done by the structural engineer according to EN 1992.

Starter bars

The specified reinforcement refers to a steel with grade B500.

Variation	MM10/ MXL10	MM15/ MXL15	MM20/ MXL20	MM25/ MXL25	MM30/ MXL30	MM35/ MXL35	MM40/ MXL40	MM45/ MXL45	MM50/ MXL50	MM60/ MXL60	MM70/ MXL70	MM80/ MXL80	MM90/ MXL90	MM100/ MXL100
A	ø8/200 mm	ø8/150 mm	ø8/125 mm	ø10/150 mm	ø10/125 mm	ø12/150 mm	ø12/150 mm	ø12/125 mm	ø12/125 mm	ø12/100 mm	ø12/100 mm	ø12/80 mm	ø12/75 mm	ø12/70 mm
B	Q 257 A	Q 257 A	Q188 A + ø8/200	Q188 A + ø8/150	Q188 A + ø8/125	Q188 A + ø10/150	Q188 A + ø10/150	Q188 A + ø10/125	Q188 A + ø10/100	Q257 A + ø12/125	Q257 A + ø12/125	Q257 A + ø12/100	Q335 A + ø12/100	Q424 A + ø12/90

The indicated reinforcement (Variation A: steel reinforcement, Variation B: mesh reinforcement) is a proposal. An alternative reinforcement is possible.

Height of connection [mm]				MM45/ MXL45	MM50/ MXL50	MM60/ MXL60	MM70/ MXL70	MM80/ MXL80	MM90/ MXL90	MM100/ MXL100
C30	**C35**	**C50**		$M_{R,d}$ [kNm/m]						
	160			27.8	31.7	34.4	36.4	40.8	43.6	46.1
160	165	**180**		29.5	33.7	36.4	38.5	43.4	46.3	49.1
165	**170**	185		31.1	35.6	38.5	40.7	46.0	49.1	52.0
170	175	**190**		32.8	37.5	40.6	42.9	48.6	51.9	54.9
175	**180**	195		34.5	39.4	42.6	45.1	51.2	54.6	57.8
180	185	**200**		36.1	41.3	44.7	47.3	53.8	57.4	60.7
185	**190**	205		37.8	43.2	46.8	49.5	56.4	60.1	63.7
190	195	**210**		39.5	45.1	48.9	51.7	58.9	62.9	66.6
195	**200**	215		41.2	47.0	50.9	53.9	61.5	65.7	69.5
200	205	**220**		42.8	49.0	53.0	56.1	64.1	68.4	72.4
205	**210**	225		44.5	50.9	55.1	58.3	66.7	71.2	75.3
210	215	**230**		46.2	52.8	57.1	60.4	69.3	73.9	78.3
215	**220**	235		47.9	54.7	59.2	62.6	71.9	76.7	81.2
220	225	**240**		49.5	56.6	61.3	64.8	74.4	79.4	84.1
225	**230**	245		51.2	58.5	63.3	67.0	77.0	82.2	87.0
230	235	**250**		52.9	60.4	65.4	69.2	79.6	85.0	89.9
235	**240**	255		54.6	62.3	67.5	71.4	82.2	87.7	92.9
240	245	**260**		56.2	64.3	69.6	73.6	84.8	90.5	95.8
245	**250**	265		57.9	66.2	71.6	75.8	87.4	93.2	98.7
250	255	**270**		59.6	68.1	73.7	78.0	90.0	96.0	101.6
255	**260**	275		61.2	70.0	75.8	80.2	92.5	98.8	104.5
260	265	**280**		62.9	71.9	77.8	82.3	95.1	101.5	107.5
265	**270**			64.6	73.8	79.9	84.5	97.7	104.3	110.4
270	275			66.3	75.7	82.0	86.7	100.3	107.0	113.3
275	**280**			67.9	77.6	84.0	88.9	102.9	109.8	116.2
280				69.6	79.6	86.1	91.1	105.5	112.5	119.1
				$V_{R,d}$ [kN/m]						
160 - 280			-	43.5	43.5	43.5	43.5	43.5	43.5	43.5
160 - 280			VA	92.7	92.7	92.7	92.7	92.7	92.7	92.7
160 - 280			VB	123.6	123.6	123.6	123.6	123.6	123.6	123.6
160 - 280			V±	61.8 / -61.8	61.8 / -61.8	120.7 / -48.3	120.7 / -48.3	120.7 / -48.3	120.7 / -48.3	120.7 / -48.3

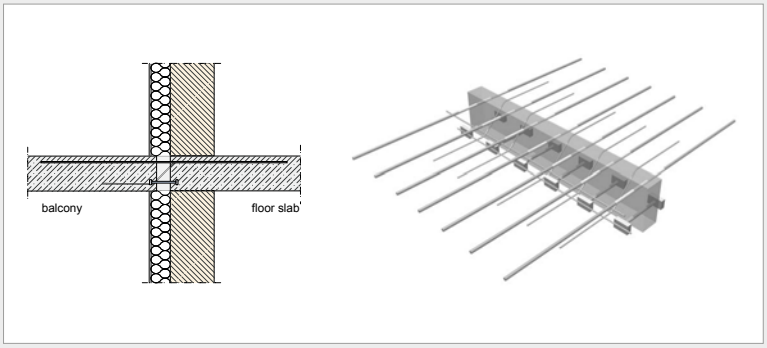
Reinforcement								
Length of element [mm]		1000	1000	1000	1000	1000	1000	1000
Tensile bars		7 ø 12	8 ø 12	9 ø 12	10 ø 12	12 ø 12	13 ø 12	14 ø 12
Length of tensile bars MM [mm]		1520	1520	1520	1520	1680	1680	1680
Length of tensile bars MXL [mm]		1560	1560	1560	1560	1720	1720	1720
Pressure elements		7 ø 12	8 ø 12	9 ø 12	10 ø 12	8 ø 14	9ø14	10ø14
Shear force bars	-	5 ø 6	5 ø 6	5 ø 6	5 ø 6	5 ø 6	5 ø 6	5 ø 6
Shear force bars	VA	6 ø 8	6 ø 8	6 ø 8	6 ø 8	6 ø 8	6 ø 8	6 ø 8
Shear force bars	VB	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8
Shear force bars	V±	4 ø 8 / 4 ø 8	4 ø 8 / 4 ø 8	5 ø 10 / 2 ø 10	5 ø 10 / 2 ø 10	5 ø 10 / 2 ø 10	5 ø 10 / 2 ø 10	5 ø 10 / 2 ø 10
Applicable expansion joint distances MM [m]		11.7	11.7	11.7	11.7	10.1	10.1	10.1
Applicable expansion joint distances MXL [m]		19.8	19.8	19.8	19.8	17.0	17.0	17.0

A verification of the shear force capacity of the slab has to be done by the structural engineer according to EN 1992.

Egcobox® MM / MXL – C25/30

Specifications

Slab thickness: h = 160 – 280 mm
Joint width MM: f = 80 mm
Joint width MXL: f = 120 mm
(other dimensions on request)
Concrete strength: C25/30
Can be provided as semi-prefab element.



Design table Egcobox® MM / MXL – C25/30

Insulation made of 80 mm or 120 mm polystyrene, rock wool or foam glass, other dimensions on request.

Height of connection [mm]				MM10/ MXL10	MM15/ MXL15	MM20/ MXL20	MM25/ MXL25	MM30/ MXL30	MM35/ MXL35	MM40/ MXL40
C30	**C35**	**C50**		$M_{R,d}$ [kNm/m]						
	160			7.5	9.6	14.4	16.9	19.8	20.4	23.8
160	165	**180**		7.9	10.2	15.3	17.9	21.0	21.6	25.2
165	**170**	185		8.3	10.7	16.1	18.9	22.2	22.9	26.7
170	175	**190**		8.8	11.3	17.0	19.9	23.4	24.1	28.1
175	**180**	195		9.2	11.8	17.8	20.8	24.6	25.3	29.5
180	185	**200**		9.6	12.4	18.6	21.8	25.8	26.6	31.0
185	**190**	205		10.1	12.9	19.5	22.8	27.0	27.8	32.4
190	195	**210**		10.5	13.5	20.3	23.8	28.2	29.0	33.8
195	**200**	215		10.9	14.1	21.2	24.8	29.4	30.3	35.3
200	205	**220**		11.4	14.6	22.0	25.8	30.6	31.5	36.7
205	**210**	225		11.8	15.2	22.8	26.7	31.8	32.7	38.2
210	215	**230**		12.2	15.7	23.7	27.7	33.0	33.9	39.6
215	**220**	235		12.6	16.3	24.5	28.7	34.2	35.2	41.0
220	225	**240**		13.1	16.8	25.4	29.7	35.4	36.4	42.5
225	**230**	245		13.5	17.4	26.2	30.7	36.6	37.6	43.9
230	235	**250**		13.9	17.9	27.0	31.7	37.8	38.9	45.3
235	**240**	255		14.4	18.5	27.9	32.7	39.0	40.1	46.8
240	245	**260**		14.8	19.0	28.7	33.6	40.2	41.3	48.2
245	**250**	265		15.2	19.6	29.6	34.6	41.4	42.6	49.6
250	255	**270**		15.7	20.1	30.4	35.6	42.6	43.8	51.1
255	**260**	275		16.1	20.7	31.2	36.6	43.7	45.0	52.5
260	265	**280**		16.5	21.2	32.1	37.6	44.9	46.2	53.9
265	**270**			17.0	21.8	32.9	38.6	46.1	47.5	55.4
270	275			17.4	22.3	33.8	39.5	47.3	48.7	56.8
275	**280**			17.8	22.9	34.6	40.5	48.5	49.9	58.2
280				18.2	23.5	35.4	41.5	49.7	51.2	59.7
				$V_{R,d}$ [kN/m]						
160 - 280			-	34.8	34.8	34.8	34.8	43.5	43.5	43.5
160 - 280			VA	61.8	61.8	61.8	61.8	92.7	92.7	92.7
160 - 280			VB	-	-	-	-	123.6	123.6	123.6
160 - 280			V±	34.8/-34.8	34.8/-34.8	34.8/-34.8	34.8/-34.8	61.8 / -61.8	61.8 / -61.8	61.8 / -61.8

Reinforcement								
Length of element [mm]		1000	1000	1000	1000	1000	1000	1000
Tensile bars		7 ø 6	9 ø 6	8 ø 8	9 ø 8	5 ø 12	6 ø 12	6 ø 12
Length of tensile bars MM [mm]		740	740	940	940	1520	1520	1520
Length of tensile bars MXL [mm]		780	780	980	980	1560	1560	1560
Pressure elements		4 ø 10	4 ø 10	5 ø 10	6 ø 10	5 ø 12	5 ø 12	6 ø 12
Shear force bars	-	4 ø 6	4 ø 6	4 ø 6	4 ø 6	5 ø 6	5 ø 6	5 ø 6
Shear force bars	VA	4 ø 8	4 ø 8	4 ø 8	4 ø 8	6 ø 8	6 ø 8	6 ø 8
Shear force bars	VB	-	-	-	-	8 ø 8	8 ø 8	8 ø 8
Shear force bars	V±	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 8 / 4 ø 8	4 ø 8 / 4 ø 8	4 ø 8 / 4 ø 8
Applicable expansion joint distances MM [m]		13.0	13.0	13.0	13.0	11.7	11.7	11.7
Applicable expansion joint distances MXL [m]		21.7	21.7	21.7	21.7	19.8	19.8	19.8

A verification of the shear force capacity of the slab has to be done by the structural engineer according to EN 1992.

Starter bars

The specified reinforcement refers to a steel with grade B500.

Variation	MM10/ MXL10	MM15/ MXL15	MM20/ MXL20	MM25/ MXL25	MM30/ MXL30	MM35/ MXL35	MM40/ MXL40	MM45/ MXL45	MM50/ MXL50	MM60/ MXL60	MM70/ MXL70	MM80/ MXL80	MM90/ MXL90	MM100/ MXL100
A	ø8/200 mm	ø8/150 mm	ø8/125 mm	ø10/150 mm	ø10/125 mm	ø12/150 mm	ø12/150 mm	ø12/125 mm	ø12/125 mm	ø12/100 mm	ø12/100 mm	ø12/80 mm	ø12/75 mm	ø12/70 mm
B	Q 257 A	Q 257 A	Q188 A + ø8/200	Q188 A + ø8/150	Q188 A + ø8/125	Q188 A + ø10/150	Q188 A + ø10/150	Q188 A + ø10/125	Q188 A + ø10/100	Q257 A + ø12/125	Q257 A + ø12/125	Q257 A + ø12/100	Q335 A + ø12/100	Q424 A + ø12/90

The indicated reinforcement (Variation A: steel reinforcement, Variation B: mesh reinforcement) is a proposal. An alternative reinforcement is possible.

Height of connection [mm]				MM45/ MXL45	MM50/ MXL50	MM60/ MXL60	MM70/ MXL70	MM80/ MXL80	MM90/ MXL90	MM100/ MXL100
C30	**C35**	**C50**		$M_{R,d}$ [kNm/m]						
	160			27.8	31.7	35.7	39.7	42.3	47.6	52.9
160	165	**180**		29.5	33.7	37.9	42.1	45.0	50.6	56.2
165	**170**	185		31.1	35.6	40.0	44.5	47.7	53.6	59.6
170	175	**190**		32.8	37.5	42.2	46.9	50.3	56.6	62.9
175	**180**	195		34.5	39.4	44.3	49.2	53.0	59.6	66.3
180	185	**200**		36.1	41.3	46.5	51.6	55.7	62.6	69.6
185	**190**	205		37.8	43.2	48.6	54.0	58.4	65.7	73.0
190	195	**210**		39.5	45.1	50.8	56.4	61.0	68.7	76.3
195	**200**	215		41.2	47.0	52.9	58.8	63.7	71.7	79.6
200	205	**220**		42.8	49.0	55.1	61.2	66.4	74.7	83.0
205	**210**	225		44.5	50.9	57.2	63.6	69.1	77.7	86.3
210	215	**230**		46.2	52.8	59.4	66.0	71.7	80.7	89.7
215	**220**	235		47.9	54.7	61.5	68.4	74.4	83.7	93.0
220	225	**240**		49.5	56.6	63.7	70.8	77.1	86.7	96.4
225	**230**	245		51.2	58.5	65.8	73.1	79.8	89.8	99.7
230	235	**250**		52.9	60.4	68.0	75.5	82.5	92.8	103.1
235	**240**	255		54.6	62.3	70.1	77.9	85.1	95.8	106.4
240	245	**260**		56.2	64.3	72.3	80.3	87.8	98.8	109.8
245	**250**	265		57.9	66.2	74.4	82.7	90.5	101.8	113.1
250	255	**270**		59.6	68.1	76.6	85.1	93.2	104.8	116.5
255	**260**	275		61.2	70.0	78.7	87.5	95.8	107.8	119.8
260	265	**280**		62.9	71.9	80.9	89.9	98.5	110.8	123.2
265	**270**			64.6	73.8	83.0	92.3	101.2	113.8	126.5
270	275			66.3	75.7	85.2	94.7	103.9	116.9	129.8
275	**280**			67.9	77.6	87.3	97.1	106.6	119.9	133.2
280				69.6	79.6	89.5	99.4	109.2	122.9	136.5
				$V_{R,d}$ [kN/m]						
160 - 280			-	43.5	43.5	43.5	43.5	43.5	43.5	43.5
160 - 280			VA	92.7	92.7	92.7	92.7	92.7	92.7	92.7
160 - 280			VB	123.6	123.6	123.6	123.6	123.6	123.6	123.6
160 - 280			V±	61.8 / -61.8	61.8 / -61.8	120.7 / -48.3	120.7 / -48.3	120.7 / -48.3	120.7 / -48.3	120.7 / -48.3

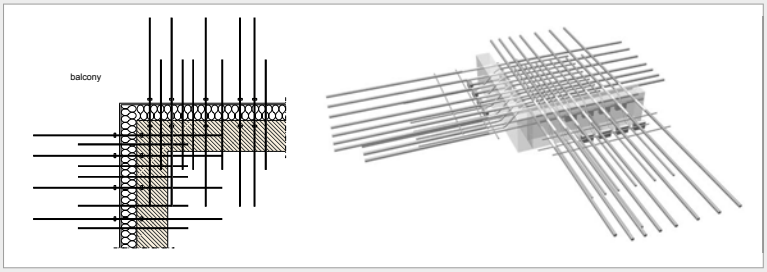
Reinforcement								
Length of element [mm]		1000	1000	1000	1000	1000	1000	1000
Tensile bars		7 ø 12	8 ø 12	9 ø 12	10 ø 12	12 ø 12	13 ø 12	14 ø 12
Length of tensile bars MM [mm]		1520	1520	1520	1520	1680	1680	1680
Length of tensile bars MXL [mm]		1560	1560	1560	1560	1720	1720	1720
Pressure elements		7 ø 12	8 ø 12	9 ø 12	10 ø 12	8 ø 14	9ø14	10ø14
Shear force bars	-	5 ø 6	5 ø 6	5 ø 6	5 ø 6	5 ø 6	5 ø 6	5 ø 6
Shear force bars	VA	6 ø 8	6 ø 8	6 ø 8	6 ø 8	6 ø 8	6 ø 8	6 ø 8
Shear force bars	VB	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8
Shear force bars	V±	4 ø 8 / 4 ø 8	4 ø 8 / 4 ø 8	5 ø 10 / 2 ø 10	5 ø 10 / 2 ø 10	5 ø 10 / 2 ø 10	5 ø 10 / 2 ø 10	5 ø 10 / 2 ø 10
Applicable expansion joint distances MM [m]		11.7	11.7	11.7	11.7	10.1	10.1	10.1
Applicable expansion joint distances MXL [m]		19.8	19.8	19.8	19.8	17.0	17.0	17.0

A verification of the shear force capacity of the slab has to be done by the structural engineer according to EN 1992.

Egcobox® MM-Eck / MXL-Eck

Specifications

Slab thickness: h = 160 – 280 mm
Joint width MM-Eck: f = 80 mm
Joint width MXL-Eck: f = 120 mm
(other dimensions on request)
Concrete strength: C20/25 or C25/30



Design table Egcobox® MM-Eck / MXL-Eck – C20/25

Insulation made of 80 mm or 120 mm polystyrene, rock wool or foam glass, other dimensions on request.

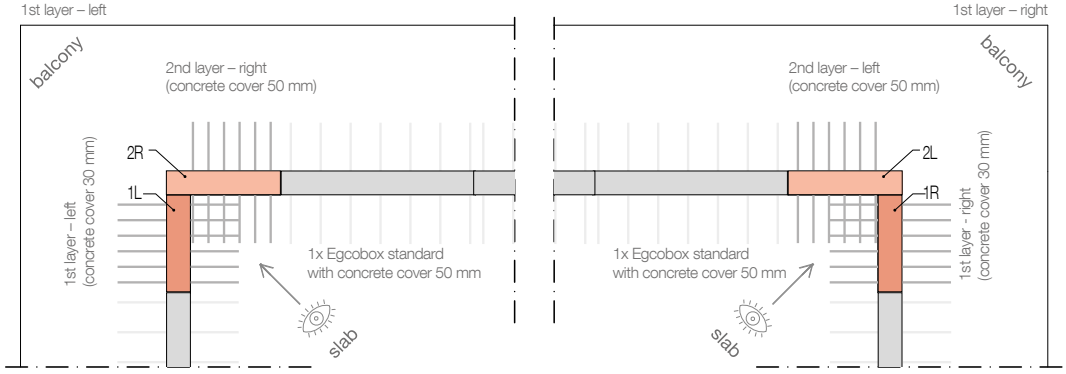
Height of connection [mm]				MM20-Eck MXL20-Eck		MM30-Eck MXL30-Eck		MM50-Eck MXL50-Eck	
1st l. C30 2nd l. C50	1st l. C35 2nd l. C55	1st l. C50 2nd l. C70		$M_{R,d}$ [kNm/side]					
				1st layer	2nd layer	1st layer	2nd layer	1st layer	2nd layer
	160			–	–	–	–	–	–
160	165	**180**		–	–	–	–	–	–
165	**170**	185		16.3	12.8	–	–	–	–
170	175	**190**		17.2	13.7	–	–	–	–
175	**180**	195		18.1	14.5	33.3	28.7	38.6	33.9
180	185	**200**		18.9	15.4	35.2	30.5	40.7	36.1
185	**190**	205		19.8	16.3	37.0	32.3	42.9	38.2
190	195	**210**		20.7	17.2	38.9	34.2	45.1	40.4
195	**200**	215		21.6	18.1	40.7	36.0	47.3	42.6
200	205	**220**		22.4	18.9	42.5	37.9	49.4	44.8
205	**210**	225		23.3	19.8	44.4	39.7	51.6	46.9
210	215	**230**		24.2	20.7	46.2	41.5	53.8	49.1
215	**220**	235		25.1	21.6	48.0	43.4	55.9	51.3
220	225	**240**		25.9	22.4	49.9	45.2	58.1	53.4
225	**230**	245		26.8	23.3	51.7	47.0	60.3	55.6
230	235	**250**		27.7	24.2	53.6	48.9	62.5	57.8
235	**240**	255		28.6	25.1	55.4	50.7	64.6	60.0
240	245	**260**		29.4	25.9	57.2	52.6	66.8	62.1
245	**250**	265		30.3	26.8	59.1	54.4	69.0	64.3
250	255	**270**		31.2	27.7	60.9	56.2	71.1	66.5
255	**260**	275		32.1	28.6	62.7	58.1	73.3	68.6
260	265	**280**		33.0	29.4	64.6	59.9	75.5	70.8
265	**270**			33.8	30.3	66.4	61.7	77.7	73.0
270	275			34.7	31.2	68.3	63.6	79.8	75.2
275	**280**			35.6	32.1	70.1	65.4	82.0	77.3
280				36.5	33.0	71.9	67.3	84.2	79.5
				$V_{R,d}$ [kN/side]					
160 - 280			–	46.4	46.4	96.6	96.6	96.6	96.6
160 - 280			VA	72.4	72.4	139.1	139.1	139.1	139.1

Reinforcement							
Length of element [mm]		500	580	620	700	620	700
Tensile bars		4 ø 12	4 ø 12	6 ø 14	6 ø 14	7 ø 14	7 ø 14
Length of tensile bars MM-Eck [mm]		1520	1520	1830	1830	1830	1830
Length of tensile bars MXL-Eck [mm]		1560	1560	1870	1870	1870	1870
Pressure elements		4 ø 12	4 ø 12	4 ø 14	4 ø 14	4 ø 14	4 ø 14
Pressure bars		–	–	2 ø 14	2 ø 14	3 ø 14	3 ø 14
Length of pressure bars MM-Eck [mm]		–	–	1520	1520	1520	1520
Length of pressure bars MXL-Eck [mm]		–	–	1560	1560	1560	1560
Shear force bars	–	3 ø 8	3 ø 8	4 ø 10	4 ø 10	4 ø 10	4 ø 10
Shear force bars	VA	3 ø 10	3 ø 10	4 ø 12	4 ø 12	4 ø 12	4 ø 12
Applicable expansion joint distances MM [m]		11.7 / 2		10.1 / 2		10.1 / 2	
Applicable expansion joint distances MXL [m]		19.8 / 2		17.0 / 2		17.0 / 2	

A verification of the shear force capacity of the slab has to be done by the structural engineer according to EN 1992.

M...-Eck-L-C30-h...
standard
1st layer – left

M...-Eck-R-C30-h...
mirrored
1st layer – right



Design table Egcobox® MM-Eck / MXL-Eck – C25/30

Insulation made of 80 mm or 120 mm polystyrene, rock wool or foam glass, other dimensions on request.

Height of connection [mm]				MM20-Eck MXL20-Eck		MM30-Eck MXL30-Eck		MM50-Eck MXL50-Eck	
1st l. C30 2nd l. C50	1st l. C35 2nd l. C55	1st l. C50 2nd l. C70		$M_{R,d}$ [kNm/side]					
				1st layer	2nd layer	1st layer	2nd layer	1st layer	2nd layer
	160			–	–	–	–	–	–
160	165	**180**		–	–	–	–	–	–
165	**170**	185		18.3	14.4	–	–	–	–
170	175	**190**		19.3	15.3	–	–	–	–
175	**180**	195		20.3	16.3	36.7	31.3	41.9	36.5
180	185	**200**		21.2	17.3	38.7	33.3	44.2	38.9
185	**190**	205		22.2	18.3	40.7	35.3	46.6	41.2
190	195	**210**		23.2	19.3	42.7	37.3	48.9	43.6
195	**200**	215		24.2	20.3	44.7	39.4	51.3	45.9
200	205	**220**		25.2	21.2	46.7	41.4	53.6	48.3
205	**210**	225		26.2	22.2	48.7	43.4	56.0	50.6
210	215	**230**		27.1	23.2	50.7	45.4	58.3	52.9
215	**220**	235		28.1	24.2	52.7	47.4	60.6	55.3
220	225	**240**		29.1	25.2	54.7	49.4	63.0	57.6
225	**230**	245		30.1	26.2	56.8	51.4	65.3	60.0
230	235	**250**		31.1	27.1	58.8	53.4	67.7	62.3
235	**240**	255		32.1	28.1	60.8	55.4	70.0	64.7
240	245	**260**		33.0	29.1	62.8	57.4	72.4	67.0
245	**250**	265		34.0	30.1	64.8	59.4	74.7	69.3
250	255	**270**		35.0	31.1	66.8	61.4	77.0	71.7
255	**260**	275		36.0	32.1	68.8	63.4	79.4	74.0
260	265	**280**		37.0	33.0	70.8	65.5	81.7	76.4
265	**270**			38.0	34.0	72.8	67.5	84.1	78.7
270	275			38.9	35.0	74.8	69.5	86.4	81.1
275	**280**			39.9	36.0	76.8	71.5	88.7	83.4
280				40.9	37.0	78.8	73.5	91.1	85.7
				$V_{R,d}$ [kN/side]					
160 - 280			–	46.4	46.4	96.6	96.6	96.6	96.6
160 - 280			VA	72.4	72.4	139.1	139.1	139.1	139.1

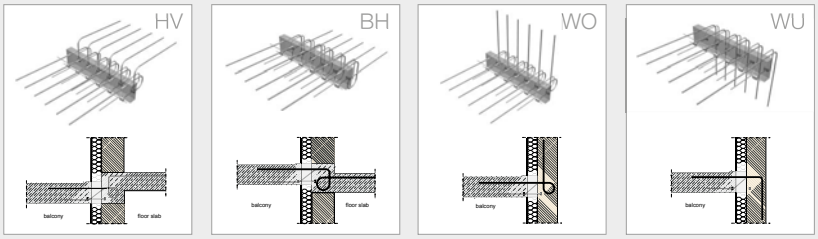
Reinforcement							
Length of element [mm]		500	580	620	700	620	700
Tensile bars		4 ø 12	4 ø 12	6 ø 14	6 ø 14	7 ø 14	7 ø 14
Length of tensile bars MM-Eck [mm]		1520	1520	1830	1830	1830	1830
Length of tensile bars MXL-Eck [mm]		1560	1560	1870	1870	1870	1870
Pressure elements		4 ø 12	4 ø 12	4 ø 14	4 ø 14	4 ø 14	4 ø 14
Pressure bars		–	–	2 ø 14	2 ø 14	3 ø 14	3 ø 14
Length of pressure bars MM-Eck [mm]		–	–	1520	1520	1520	1520
Length of pressure bars MXL-Eck [mm]		–	–	1560	1560	1560	1560
Shear force bars	–	3 ø 8	3 ø 8	4 ø 10	4 ø 10	4 ø 10	4 ø 10
Shear force bars	VA	3 ø 10	3 ø 10	4 ø 12	4 ø 12	4 ø 12	4 ø 12
Applicable expansion joint distances MM [m]		11.7 / 2		10.1 / 2		10.1 / 2	
Applicable expansion joint distances MXL [m]		19.8 / 2		17.0 / 2		17.0 / 2	

A verification of the shear force capacity of the slab has to be done by the structural engineer according to EN 1992.

Egcobox® MM-HV /-BH /-WO /-WU
Egcobox® MXL-HV /-BH /-WO /-WU

Specifications

Slab thickness: h = 160 – 280 mm
Joint width MM: f = 80 mm
Joint width MXL: f = 120 mm
(other dimensions on request)
Concrete strength: C20/25 or C25/30



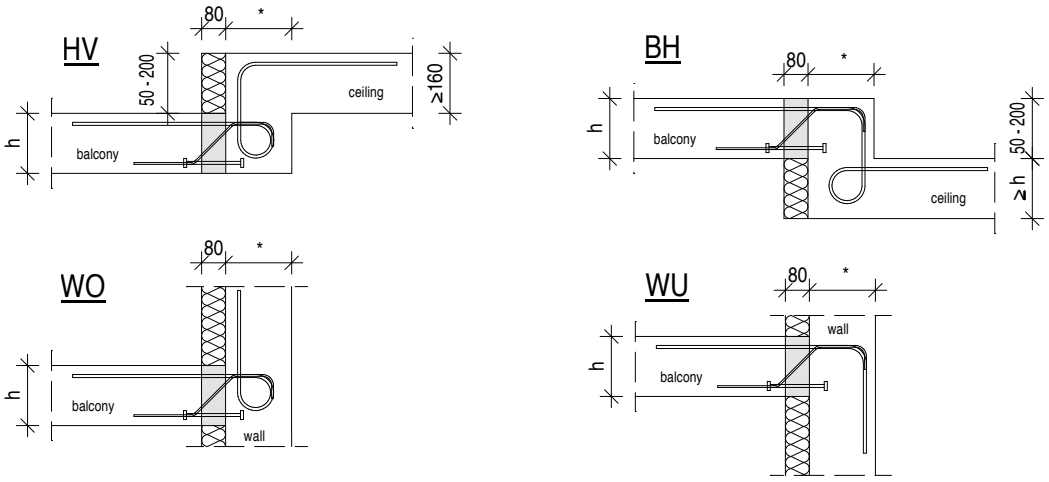
Design table Egcobox® MM-HV /-BH /-WO /-WU and MXL-HV /-BH /-WO /-WU – C20/25

Insulation made of 80 mm or 120 mm polystyrene, rock wool or foam glass, other dimensions on request.

Height of connection [mm]				MM10 -HV/-BH/ -WO/-WU	MM20 -HV/-BH/ -WO/-WU	MM30 -HV/-BH/ -WO/-WU	MM40 -HV/-BH/ -WO/-WU	MM50 -HV/-BH/ -WO/-WU	MM60 -HV/-BH/ -WO/-WU	MM70 -HV/-BH/ -WO/-WU	MM80 -HV/-BH/ -WO/-WU	MM90 -HV/-BH/ -WO/-WU	MM100 -HV/-BH/ -WO/-WU
				MXL10 -HV/-BH/ -WO/-WU	MXL20 -HV/-BH/ -WO/-WU	MXL30 -HV/-BH/ -WO/-WU	MXL40 -HV/-BH/ -WO/-WU	MXL50 -HV/-BH/ -WO/-WU	MXL60 -HV/-BH/ -WO/-WU	MXL70 -HV/-BH/ -WO/-WU	MXL80 -HV/-BH/ -WO/-WU	MXL90 -HV/-BH/ -WO/-WU	MXL100 -HV/-BH/ -WO/-WU
C30	C35	C50		$M_{R,d}$ [kNm/m]									
	160			7.5	14.4	–	–	–	–	–	–	–	–
160	165	**180**		7.9	15.3	–	–	–	–	–	–	–	–
165	**170**	185		8.3	16.1	–	–	–	–	–	–	–	–
170	175	**190**		8.8	17.0	–	–	–	–	–	–	–	–
175	**180**	195		9.2	17.8	25.5	30.7	39.9	43.1	–	–	–	–
180	185	**200**		9.6	18.6	26.7	32.2	41.9	45.1	–	–	–	–
185	**190**	205		10.1	19.5	27.9	33.7	43.8	47.2	–	–	–	–
190	195	**210**		10.5	20.3	29.1	35.1	45.7	49.3	–	–	–	–
195	**200**	215		10.9	21.2	30.4	36.6	47.6	51.3	–	–	–	–
200	205	**220**		11.4	22.0	31.6	38.1	49.5	53.4	56.1	64.8	68.4	72.4
205	**210**	225		11.8	22.8	32.8	39.6	51.5	55.5	58.3	67.4	71.2	75.3
210	215	**230**		12.2	23.7	34.0	41.0	53.4	57.5	60.4	70.0	73.9	78.3
215	**220**	235		12.6	24.5	35.3	42.5	55.3	59.6	62.6	72.6	76.7	81.2
220	225	**240**		13.1	25.4	36.5	44.0	57.2	61.7	64.8	75.2	79.4	84.1
225	**230**	245		13.5	26.2	37.7	45.5	59.1	63.8	67.0	77.8	82.2	87.0
230	235	**250**		13.9	27.0	38.9	46.9	61.1	65.8	69.2	80.4	85.0	89.9
235	**240**	255		14.4	27.9	40.1	48.4	63.0	67.9	71.4	83.1	87.7	92.9
240	245	**260**		14.8	28.7	41.4	49.9	64.9	70.0	73.6	85.7	90.5	95.8
245	**250**	265		15.2	29.6	42.6	51.4	66.8	72.0	75.8	88.3	93.2	98.7
250	255	**270**		15.7	30.4	43.8	52.8	68.7	74.1	78.0	90.9	96.0	101.6
255	**260**	275		16.1	31.2	45.0	54.3	70.7	76.2	80.2	93.5	98.8	104.5
260	265	**280**		16.5	32.1	46.3	55.8	72.6	78.2	82.3	96.1	101.5	107.5
265	**270**			17.0	32.9	47.5	57.3	74.5	80.3	84.5	98.7	104.3	110.4
270	275			17.4	33.8	48.7	58.7	76.4	82.4	86.7	101.3	107.0	113.3
275	**280**			17.8	34.6	49.9	60.2	78.3	84.5	88.9	104.0	109.8	116.2
280				18.2	35.4	51.2	61.7	80.3	86.5	91.1	106.6	112.5	119.1
				$V_{R,d}$ [kN/m]									
160 - 280			–	34.8	34.8	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
160 - 280			VA	61.8	61.8	92.7	92.7	92.7	92.7	92.7	92.7	92.7	92.7
160 - 280			VB	–	–	123.6	123.6	123.6	123.6	123.6	123.6	123.6	123.6

Reinforcement											
Length of element [mm]		1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Tensile bars		7 ø 6	8 ø 8	8 ø 10	10 ø 10	13 ø 10	14 ø 10	10 ø 12	12 ø 12	13 ø 12	14 ø 12
Pressure elements		4 ø 10	5 ø 10	5 ø 12	6 ø 12	8 ø 12	9 ø 12	10 ø 12	8 ø 14	9 ø 14	10 ø 14
Shear force bars	–	4 ø 6	4 ø 6	5 ø 6	5 ø 6	5 ø 6	5 ø 6	5 ø 6	5 ø 6	5 ø 6	5 ø 6
Shear force bars	VA	4 ø 8	4 ø 8	6 ø 8	6 ø 8	6 ø 8	6 ø 8	6 ø 8	6 ø 8	6 ø 8	6 ø 8
Shear force bars	VB	–	–	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8
* Recommended min. thickness of wall [mm]		200	200	220	220	220	220	240	240	240	240
Applicable expansion joint distances MM [m]		13.0	13.0	11.7	11.7	11.7	11.7	11.7	10.1	10.1	10.1
Applicable expansion joint distances MXL [m]		21.7	21.7	19.8	19.8	19.8	19.8	19.8	17.0	17.0	17.0

A verification of the shear force capacity of the slab has to be done by the structural engineer according to EN 1992.



Design table Egcobox® MM-HV /-BH /-WO /-WU and MXL-HV /-BH /-WO /-WU – C25/30

Insulation made of 80 mm or 120 mm polystyrene, rock wool or foam glass, other dimensions on request.

Height of connection [mm]				MM10 -HV/-BH/ -WO/-WU	MM20 -HV/-BH/ -WO/-WU	MM30 -HV/-BH/ -WO/-WU	MM40 -HV/-BH/ -WO/-WU	MM50 -HV/-BH/ -WO/-WU	MM60 -HV/-BH/ -WO/-WU	MM70 -HV/-BH/ -WO/-WU	MM80 -HV/-BH/ -WO/-WU	MM90 -HV/-BH/ -WO/-WU	MM100 -HV/-BH/ -WO/-WU
				MXL10 -HV/-BH/ -WO/-WU	MXL20 -HV/-BH/ -WO/-WU	MXL30 -HV/-BH/ -WO/-WU	MXL40 -HV/-BH/ -WO/-WU	MXL50 -HV/-BH/ -WO/-WU	MXL60 -HV/-BH/ -WO/-WU	MXL70 -HV/-BH/ -WO/-WU	MXL80 -HV/-BH/ -WO/-WU	MXL90 -HV/-BH/ -WO/-WU	MXL100 -HV/-BH/ -WO/-WU
C30	C35	C50		$M_{R,d}$ [kNm/m]									
	160			7.5	14.4	–	–	–	–	–	–	–	–
160	165	**180**		7.9	15.3	–	–	–	–	–	–	–	–
165	**170**	185		8.3	16.1	–	–	–	–	–	–	–	–
170	175	**190**		8.8	17.0	–	–	–	–	–	–	–	–
175	**180**	195		9.2	17.8	25.5	30.7	40.9	44.6	–	–	–	–
180	185	**200**		9.6	18.6	26.7	32.2	42.9	46.7	–	–	–	–
185	**190**	205		10.1	19.5	27.9	33.7	44.9	48.8	–	–	–	–
190	195	**210**		10.5	20.3	29.1	35.1	46.8	51.0	–	–	–	–
195	**200**	215		10.9	21.2	30.4	36.6	48.8	53.1	–	–	–	–
200	205	**220**		11.4	22.0	31.6	38.1	50.8	55.3	61.2	66.4	74.7	83.0
205	**210**	225		11.8	22.8	32.8	39.6	52.7	57.4	63.6	69.0	77.7	86.3
210	215	**230**		12.2	23.7	34.0	41.0	54.7	59.5	66.0	71.7	80.7	89.6
215	**220**	235		12.6	24.5	35.3	42.5	56.7	61.7	68.4	74.4	83.7	93.0
220	225	**240**		13.1	25.4	36.5	44.0	58.6	63.8	70.8	77.1	86.7	96.3
225	**230**	245		13.5	26.2	37.7	45.5	60.6	66.0	73.1	79.7	89.7	99.7
230	235	**250**		13.9	27.0	38.9	46.9	62.6	68.1	75.5	82.4	92.7	103.0
235	**240**	255		14.4	27.9	40.1	48.4	64.6	70.3	77.9	85.1	95.7	106.4
240	245	**260**		14.8	28.7	41.4	49.9	66.5	72.4	80.3	87.8	98.7	109.7
245	**250**	265		15.2	29.6	42.6	51.4	68.5	74.5	82.7	90.4	101.8	113.1
250	255	**270**		15.7	30.4	43.8	52.8	70.5	76.7	85.1	93.1	104.8	116.4
255	**260**	275		16.1	31.2	45.0	54.3	72.4	78.8	87.5	95.8	107.8	119.8
260	265	**280**		16.5	32.1	46.3	55.8	74.4	81.0	89.9	98.5	110.8	123.1
265	**270**			17.0	32.9	47.5	57.3	76.4	83.1	92.3	101.2	113.8	126.4
270	275			17.4	33.8	48.7	58.7	78.3	85.3	94.7	103.8	116.8	129.8
275	**280**			17.8	34.6	49.9	60.2	80.3	87.4	97.1	106.5	119.8	133.1
280				18.2	35.4	51.2	61.7	82.3	89.5	99.4	109.2	122.8	136.5
				$V_{R,d}$ [kN/m]									
160 – 280			–	34.8	34.8	43.5	43.5	43.5	43.5	43.5	43.5	43.5	43.5
160 – 280			VA	61.8	61.8	92.7	92.7	92.7	92.7	92.7	92.7	92.7	92.7
160 – 280			VB	–	–	123.6	123.6	123.6	123.6	123.6	123.6	123.6	123.6

Reinforcement											
Length of element [mm]		1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Tensile bars		7 ø 6	8 ø 8	8 ø 10	10 ø 10	13 ø 10	14 ø 10	10 ø 12	12 ø 12	13 ø 12	14 ø 12
Pressure elements		4 ø 10	5 ø 10	5 ø 12	6 ø 12	8 ø 12	9 ø 12	10 ø 12	8 ø 14	9 ø 14	10 ø 14
Shear force bars	–	4 ø 6	4 ø 6	5 ø 6	5 ø 6	5 ø 6	5 ø 6	5 ø 6	5 ø 6	5 ø 6	5 ø 6
Shear force bars	VA	4 ø 8	4 ø 8	6 ø 8	6 ø 8	6 ø 8	6 ø 8	6 ø 8	6 ø 8	6 ø 8	6 ø 8
Shear force bars	VB	–	–	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8
* Recommended min. thickness of wall [mm]		200	200	220	220	220	220	240	240	240	240
Applicable expansion joint distances MM [m]		13.0	13.0	11.7	11.7	11.7	11.7	11.7	10.1	10.1	10.1
Applicable expansion joint distances MXL [m]		21.7	21.7	19.8	19.8	19.8	19.8	19.8	17.0	17.0	17.0

A verification of the shear force capacity of the slab has to be done by the structural engineer according to EN 1992.

Deflection at the end of cantilever (to pre-set formwork)

Deflection d [mm] = $M_{deflection}$ [kNm/m] x factor k [1/kNm] x length of cantilever l_{kb} [m]

$M_{deflection}$ = $M_{E,k}$ (permanent load) + $M_{E,k}$ (50% variable load)

MM banking factor k

Height of connection [mm]			Egcobox® Type												
C30	C35	C50	MM10	MM15	MM20	MM25	MM30	MM35	MM40	MM45	MM50	MM60	MM70	MM80	MM90	MM100
			banking factor k [1/kNm]													
	160		1,255	1,070	0,849	0,735	0,578	0,524	0,481	0,413	0,361	0,321	0,289	0,278	0,252	0,231
160	165	**180**	1,122	0,956	0,758	0,657	0,514	0,466	0,428	0,367	0,321	0,285	0,257	0,246	0,223	0,204
165	**170**	185	1,010	0,860	0,681	0,590	0,460	0,417	0,383	0,329	0,288	0,256	0,230	0,219	0,198	0,182
170	175	**190**	0,913	0,778	0,615	0,533	0,414	0,376	0,345	0,296	0,259	0,230	0,207	0,196	0,178	0,163
175	**180**	195	0,830	0,707	0,559	0,484	0,375	0,340	0,313	0,268	0,234	0,208	0,188	0,177	0,160	0,147
180	185	**200**	0,757	0,645	0,509	0,441	0,341	0,310	0,284	0,244	0,213	0,190	0,171	0,160	0,145	0,133
185	**190**	205	0,694	0,591	0,466	0,404	0,312	0,283	0,260	0,223	0,195	0,173	0,156	0,146	0,132	0,121
190	195	**210**	0,638	0,544	0,429	0,371	0,286	0,259	0,238	0,204	0,179	0,159	0,143	0,133	0,121	0,111
195	**200**	215	0,589	0,502	0,395	0,343	0,263	0,239	0,219	0,188	0,164	0,146	0,131	0,122	0,111	0,102
200	205	**220**	0,545	0,465	0,366	0,317	0,243	0,220	0,202	0,173	0,152	0,135	0,121	0,113	0,102	0,094
205	**210**	225	0,506	0,431	0,339	0,294	0,225	0,204	0,187	0,161	0,141	0,125	0,112	0,104	0,094	0,086
210	215	**230**	0,471	0,401	0,316	0,274	0,209	0,190	0,174	0,149	0,131	0,116	0,104	0,097	0,088	0,080
215	**220**	235	0,440	0,375	0,294	0,255	0,195	0,177	0,162	0,139	0,122	0,108	0,097	0,090	0,081	0,074
220	225	**240**	0,411	0,350	0,275	0,238	0,182	0,165	0,151	0,130	0,114	0,101	0,091	0,084	0,076	0,069
225	**230**	245	0,385	0,328	0,258	0,223	0,170	0,154	0,142	0,121	0,106	0,094	0,085	0,078	0,071	0,065
230	235	**250**	0,362	0,308	0,242	0,210	0,159	0,145	0,133	0,114	0,100	0,089	0,080	0,073	0,066	0,061
235	**240**	255	0,341	0,290	0,228	0,197	0,150	0,136	0,125	0,107	0,094	0,083	0,075	0,069	0,062	0,057
240	245	**260**	0,321	0,274	0,215	0,186	0,141	0,128	0,117	0,101	0,088	0,078	0,070	0,064	0,058	0,054
245	**250**	265	0,303	0,258	0,203	0,176	0,133	0,121	0,111	0,095	0,083	0,074	0,066	0,061	0,055	0,050
250	255	**270**	0,287	0,244	0,192	0,166	0,126	0,114	0,105	0,090	0,078	0,070	0,063	0,057	0,052	0,048
255	**260**	275	0,272	0,231	0,181	0,157	0,119	0,108	0,099	0,085	0,074	0,066	0,059	0,054	0,049	0,045
260	265	**280**	0,258	0,220	0,172	0,149	0,113	0,102	0,094	0,080	0,070	0,063	0,056	0,051	0,046	0,043
265	**270**		0,245	0,209	0,163	0,142	0,107	0,097	0,089	0,076	0,067	0,059	0,053	0,049	0,044	0,040
270	275		0,233	0,198	0,155	0,135	0,101	0,092	0,085	0,072	0,063	0,056	0,051	0,046	0,042	0,038
275	**280**		0,222	0,189	0,148	0,128	0,097	0,088	0,080	0,069	0,060	0,054	0,048	0,044	0,040	0,036
280			0,211	0,180	0,141	0,122	0,092	0,083	0,077	0,066	0,057	0,051	0,046	0,042	0,038	0,035

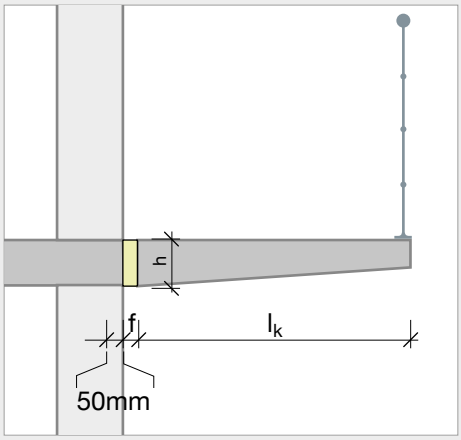
MXL banking factor k

Height of connection [mm]			Egcobox® Type												
C30	C35	C50	MXL10	MXL15	MXL20	MXL25	MXL30	MXL35	MXL40	MXL45	MXL50	MXL60	MXL70	MXL80	MXL90	MXL100
			banking factor k [1/kNm]													
	160		1,527	1,304	1,019	0,882	0,706	0,642	0,588	0,504	0,441	0,392	0,353	0,340	0,308	0,282
160	165	**180**	1,366	1,167	0,910	0,787	0,628	0,571	0,523	0,449	0,392	0,349	0,314	0,300	0,272	0,249
165	**170**	185	1,228	1,049	0,818	0,708	0,562	0,511	0,469	0,402	0,351	0,312	0,281	0,268	0,243	0,222
170	175	**190**	1,111	0,949	0,739	0,639	0,506	0,460	0,422	0,362	0,316	0,281	0,253	0,240	0,218	0,199
175	**180**	195	1,009	0,862	0,671	0,580	0,458	0,417	0,382	0,327	0,286	0,255	0,229	0,216	0,196	0,180
180	185	**200**	0,921	0,787	0,612	0,529	0,417	0,379	0,347	0,298	0,261	0,232	0,208	0,196	0,178	0,163
185	**190**	205	0,844	0,721	0,560	0,485	0,381	0,346	0,317	0,272	0,238	0,212	0,190	0,178	0,162	0,148
190	195	**210**	0,777	0,663	0,515	0,445	0,349	0,318	0,291	0,249	0,218	0,194	0,175	0,163	0,148	0,135
195	**200**	215	0,717	0,612	0,475	0,411	0,321	0,292	0,268	0,230	0,201	0,179	0,161	0,150	0,136	0,124
200	205	**220**	0,663	0,567	0,439	0,380	0,297	0,270	0,247	0,212	0,186	0,165	0,148	0,138	0,125	0,114
205	**210**	225	0,616	0,526	0,407	0,353	0,275	0,250	0,229	0,196	0,172	0,153	0,137	0,127	0,116	0,106
210	215	**230**	0,573	0,490	0,379	0,328	0,255	0,232	0,213	0,182	0,160	0,142	0,128	0,118	0,107	0,098
215	**220**	235	0,535	0,457	0,353	0,306	0,238	0,216	0,198	0,170	0,149	0,132	0,119	0,110	0,100	0,091
220	225	**240**	0,500	0,427	0,330	0,286	0,222	0,202	0,185	0,159	0,139	0,123	0,111	0,102	0,093	0,085
225	**230**	245	0,469	0,401	0,310	0,268	0,208	0,189	0,173	0,148	0,130	0,115	0,104	0,096	0,087	0,079
230	235	**250**	0,440	0,376	0,291	0,252	0,195	0,177	0,162	0,139	0,122	0,108	0,097	0,089	0,081	0,074
235	**240**	255	0,414	0,354	0,273	0,237	0,183	0,166	0,153	0,131	0,114	0,102	0,092	0,084	0,076	0,070
240	245	**260**	0,391	0,334	0,258	0,223	0,172	0,157	0,144	0,123	0,108	0,096	0,086	0,079	0,071	0,065
245	**250**	265	0,369	0,315	0,243	0,211	0,162	0,148	0,135	0,116	0,102	0,090	0,081	0,074	0,067	0,062
250	255	**270**	0,349	0,298	0,230	0,199	0,153	0,140	0,128	0,110	0,096	0,085	0,077	0,070	0,063	0,058
255	**260**	275	0,331	0,282	0,218	0,188	0,145	0,132	0,121	0,104	0,091	0,081	0,073	0,066	0,060	0,055
260	265	**280**	0,314	0,268	0,207	0,179	0,138	0,125	0,115	0,098	0,086	0,076	0,069	0,063	0,057	0,052
265	**270**		0,298	0,254	0,196	0,170	0,131	0,119	0,109	0,093	0,082	0,073	0,065	0,059	0,054	0,049
270	275		0,283	0,242	0,187	0,161	0,124	0,113	0,103	0,089	0,078	0,069	0,062	0,056	0,051	0,047
275	**280**		0,270	0,230	0,178	0,154	0,118	0,107	0,098	0,084	0,074	0,066	0,059	0,054	0,049	0,044
280			0,257	0,220	0,169	0,146	0,112	0,102	0,094	0,080	0,070	0,062	0,056	0,051	0,046	0,042

Calculation example

Dimensions / Marginal conditions

Joint width: f = 80 mm
Cantilever: l_k = 2.20 m
=> $l_{kb} = l_k + f + 50$ mm = 2.33 m
Slab thickness: h = 220 mm
Concrete strength: C25/30
Concrete cover: c = 35 mm



Loads according to EN 1991-1

Dead weight of concrete	1.35 · 0.22 m · 25 kN/m³	= 7.4 kN/m²
Covering	1.35 · 0.75 kN/m²	= 1.0 kN/m²
Live loads / variable load	1.5 · 4.0 kN/m²	= 6.0 kN/m²
		= 14.4 kN/m²
Dead weight balustrade	1.35 · 0.7 kN/m	= 0.95 kN/m
Horizontal load of balustrade at beam height of 1.00 m	1.5 · 0.5 kN/m	= 0.75 kN/m

Calculation

Moment for calculation

$$m_{E,d} = \frac{14.4\ kN/m^2 \cdot (2.33\ m)^2}{2} + 0.95\ kN/m \cdot 2.33\ m + 0.75\ kN/m \cdot 1.0\ m = \underline{42.1\ kNm/m}$$

Shear force for calculation

$$v_{E,d} = 14.4\ kN/m^2 \cdot 2.33\ m + 0.95\ kN/m = \underline{34.5\ kN/m}$$

Selection of elements

Selected type: **MM45-C35-h220**

$M_{R,d}$ = 47.9 kNm/m $V_{R,d}$ = 43.5 kN/m (see table on page 21)

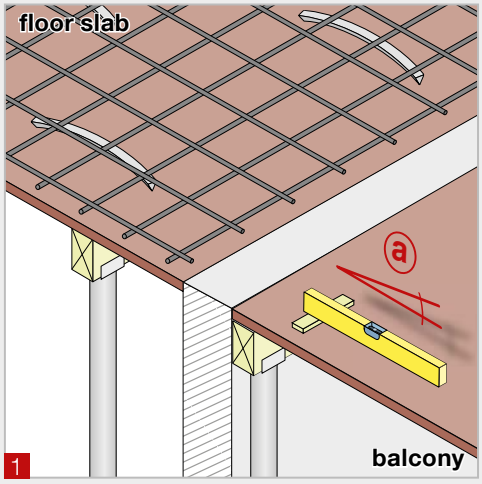
Calculation of required banking in [mm] according to table on page 26;
(Assumptions: permanent load + 50 % variable load with partial protection factors γ_G und γ_Q = 1.0)

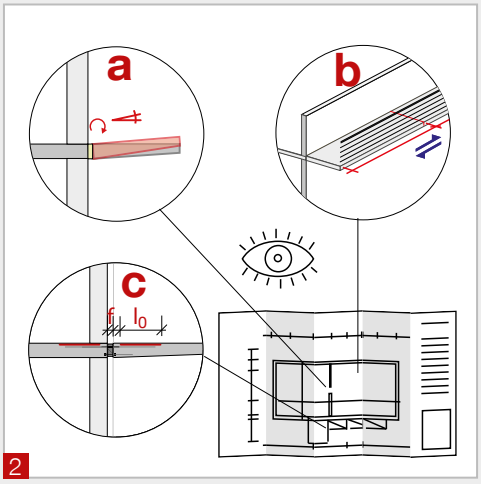
$$M_{vorh.,k} = \frac{(0.22\ m \cdot 25\ kN/m^3 + 0.75 + 0.5 \cdot 4.00\ kN/m^2) \cdot (2.33m)^2}{2} + 0.7\ kN/m \cdot 2.33\ m = \underline{24.0\ kNm/m}$$

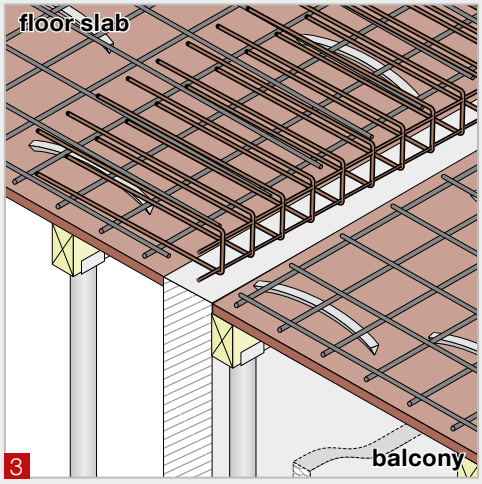
banking factor for MM45-C35-h220 from table on page 26;
k = 0.139 [1/kNm]

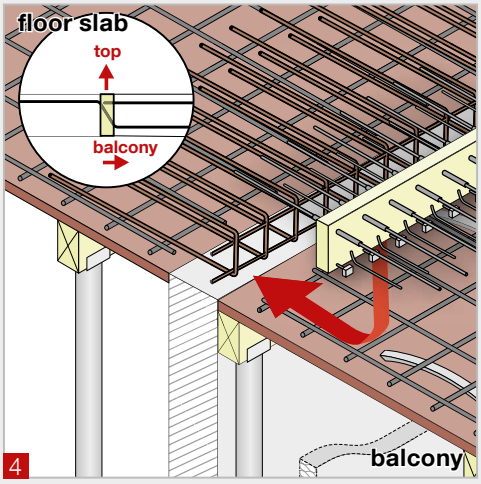
$$d = 24.0\ [kNm] \cdot 0.139\ [1/kNm] \cdot 2.33\ m = 8\ mm\ (= 0.34\ \%)$$

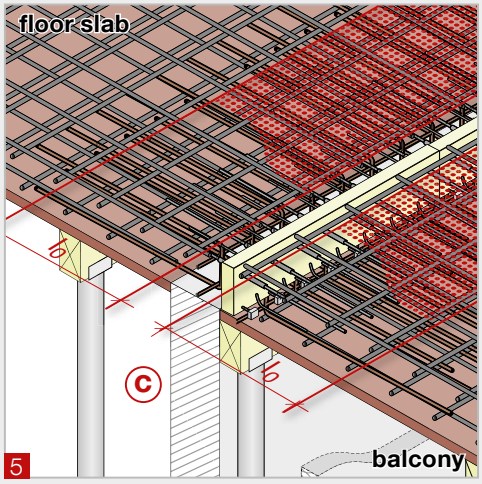
Egcobox® installation guidelines situ concrete

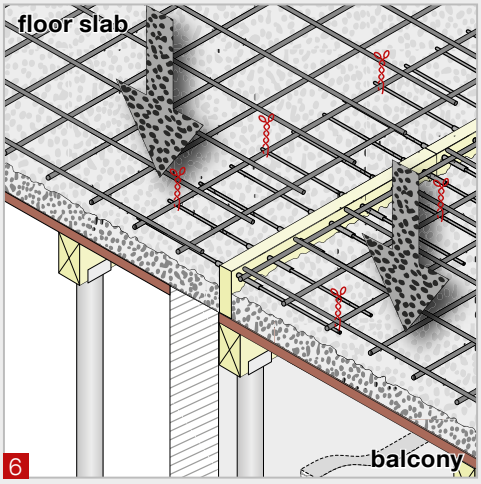












This Installation Guideline is a condensed description of factors having a direct effect on the performance of the MAX FRANK product and is based on the present state of the art. It may be necessary to alter these recommendations, as more information becomes available. Correct use is the responsibility of the user, if in doubt please consult your local supplier.

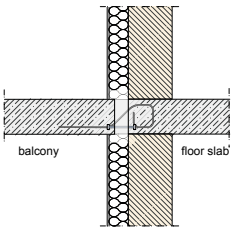
Supported balconies

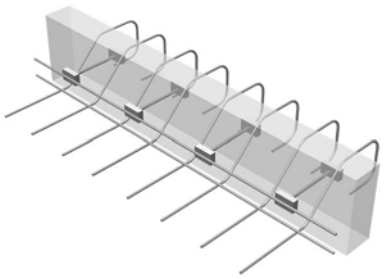
In contrast to freely cantilevered balconies, the balcony slab can be supported on columns. A classic example for this type are pergolas that run along apartment houses or dwelling buildings; their primary use is to provide entrance to the individual dwelling units.
Egcobox® is also used for loggias built as backyard rooms which open towards the exterior.

Egcobox® VM / VXL

Specifications

Slab thickness: h = 160 – 280 mm
Joint width VM: f = 80 mm
Joint width VXL: f = 120 mm
(other dimensions on request)
Concrete strength: min C20/25





Design table Egcobox® VM / VXL

Insulation made of 80 mm or 120 mm polystyrene, rock wool or foam glass, other dimensions on request.

Height of connection [mm]	VM10/ VXL10	VM20/ VXL20	VM30/ VXL30	VM35/ VXL35	VM40/ VXL40	VM50/ VXL50	VM70/ VXL70
	$V_{R,d}$ [kN/m]						
160 - 280	34.8	43.5	52.1	60.8	69.5	86.9	95.6
Reinforcement							
Length of element [mm]	1000	1000	1000	1000	1000	1000	1000
Shear force bars	4 Ø 6	5 Ø 6	6 Ø 6	7 ø 6	8 Ø 6	10 Ø 6	11 Ø 6
Pressure elements	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 10	4 ø 10
	hooked shear force bars at the floor slab with 150 mm						
Applicable expansion joint distances VM [m]	13.5	13.5	13.5	13.5	13.5	13.0	13.0
Applicable expansion joint distances VXL [m]	23.0	23.0	23.0	23.0	23.0	21.7	21.7

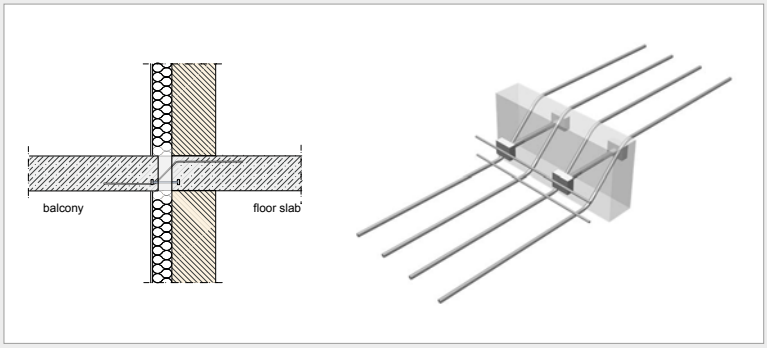
Height of connection [mm]	VM80/ VXL80	VM90/ VXL90	VM100/ VXL100	VM110/ VXL110
	$V_{R,d}$ [kN/m]			
160 - 280	123.6	139.1	169.1	217.4
Reinforcement				
Length of element [mm]	1000	1000	1000	1000
Shear force bars	8 Ø 8	9 Ø 8	7 Ø 10	9 Ø 10
Pressure elements	4 ø 10	4 ø 12	4 ø 12	5 ø 12
	straight shear force bars at the floor slab			
Applicable expansion joint distances VM [m]	13.0	11.7	11.7	11.7
Applicable expansion joint distances VXL [m]	21.7	19.8	19.8	19.8

c = 30 mm
A verification of the shear force capacity of the slab has to be done by the structural engineer according to EN 1992.

Egcobox® VM-K / VXL-K

Specifications

Slab thickness: h = 160 – 280 mm
Joint width VM-K: f = 80 mm
Joint width VXL-K: f = 120 mm
(other dimensions on request)
Concrete strength: min C20/25



Design table Egcobox® VM-K / VXL-K

Insulation made of 80 mm or 120 mm polystyrene, rock wool or foam glass, other dimensions on request.

Height of connection [mm]	VM5-K/ VXL5-K	VM10-K/ VXL10-K	VM15-K/ VXL15-K	VM20-K/ VXL20-K	VM25-K/ VXL25-K	VM30-K/ VXL30-K	VM35-K/ VXL35-K	VM40-K/ VXL40-K
	$V_{R,d}$ [kN/element]							
160 - 280	17.4	30.9	37.3	46.4	61.8	61.8	72.5	46.4
Reinforcement								
Length of element [mm]	200	300	300	400	400	500	500	300
Shear force bars	2 Ø 6	2 Ø 8	3 Ø 8	3 Ø 8	4 Ø 8	4 Ø 8	3 Ø 10	3 Ø 8
Pressure elements	1 Ø 8	1 Ø 10	2 Ø 8	2 Ø 10	2 Ø 10	2 Ø 10	2 Ø 12	2 Ø 10
Applicable expansion joint distances VM-K [m]	13.5	13.0	13.5	13.0	13.0	13.0	11.7	13.0
Applicable expansion joint distances VXL-K [m]	23.0	21.7	23.0	21.7	21.7	21.7	19.8	21.7

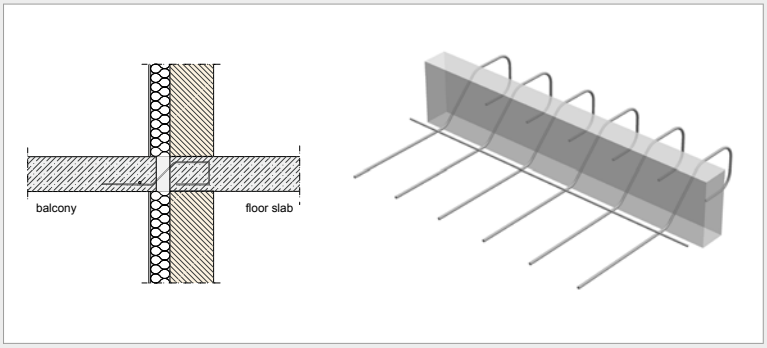
Height of connection [mm]	VM45-K/ VXL45-K	VM50-K/ VXL50-K	VM60-K/ VXL60-K	VM70-K/ VXL70-K	VM80-K/ VXL80-K	VM90-K/ VXL90-K	VM100-K/ VXL100-K
	$V_{R,d}$ [kN/element]						
160 - 280	62.6	72.5	72.5	104.3	104.3	139.1	139.1
Reinforcement							
Length of element [mm]	300	400	300	400	300	400	500
Shear force bars	3 Ø 10	3 Ø 10	3 Ø 10	3 Ø 12	3 Ø 12	4 Ø 12	4 Ø 12
Pressure elements	2 Ø 10	2 Ø 12	2 Ø 12	2 Ø 14	2 Ø 14	3 Ø 14	3 Ø 14
Applicable expansion joint distances VM-K [m]	13.0	11.7	11.7	10.1	10.1	10.1	10.1
Applicable expansion joint distances VXL-K [m]	21.7	19.8	19.8	17.0	17.0	17.0	17.0

c = 30 mm
A verification of the shear force capacity of the slab has to be done by the structural engineer according to EN 1992.

Egcobox® VM Z / VXL Z

Specifications

Egcobox shear force element with zero-stress connection in combination with Egcobox VM / VXL
Slab thickness: h = 160 – 280 mm
Joint width VM Z: f = 80 mm
Joint width VXL Z: f = 120 mm
(other dimensions on request)
Concrete strength: min C20/25



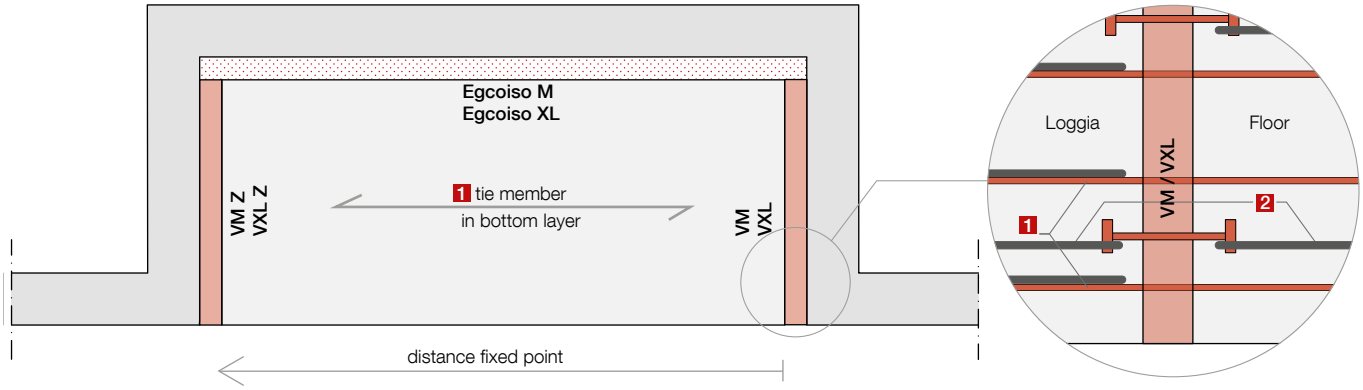
Design table Egcobox® VM Z / VXL Z

Insulation made of 80 mm or 120 mm polystyrene, rock wool or foam glass, other dimensions on request.

Height of connection [mm]	VM Z 10 VXL Z 10	VM Z 20 VXL Z 20	VM Z 30 VXL Z 30	VM Z 35 VXL Z 35	VM Z 40 VXL Z 40	VM Z 50 VXL Z 50	VM Z 70 VXL Z 70
	$V_{R,d}$ [kN/m]						
160 - 280	34.8	43.5	52.1	60.8	69.5	86.9	95.6
Reinforcement							
Length of element [mm]	1000	1000	1000	1000	1000	1000	1000
Shear force bars	4 Ø 6	5 Ø 6	6 Ø 6	7 ø 6	8 Ø 6	10 Ø 6	11 Ø 6
	hooked shear force bars at the floor slab with 150 mm						
Tie member A_s 1	4 Ø 6	4 Ø 6	5 Ø 6	5 ø 6	6 Ø 6	4 Ø 8	5 Ø 8
Stirrup A_s 2	1 Ø 6	1 Ø 6	1 Ø 6	1 Ø 6	1 Ø 6	2 Ø 6	2 Ø 6
VM Z in combination with type	**VM10**	**VM20**	**VM30**	**VM35**	**VM40**	**VM50**	**VM70**
VM Z Span between elements [m]	13.5	13.5	13.5	13.5	13.5	13.0	13.0
VM Z Applicable expansion joint distances [m]	13.5	13.5	13.5	13.5	13.5	13.5	13.5
VXL Z in combination with type	**VXL10**	**VXL20**	**VXL30**	**VXL35**	**VXL40**	**VXL50**	**VXL70**
VXL Z Span between elements [m]	23.0	23.0	23.0	23.0	23.0	21.7	21.7
VXL Z Applicable expansion joint distances [m]	23.0	23.0	23.0	23.0	23.0	23.0	23.0

c = 30 mm
A verification of the shear force capacity of the slab has to be done by the structural engineer according to EN 1992.

Floor plan



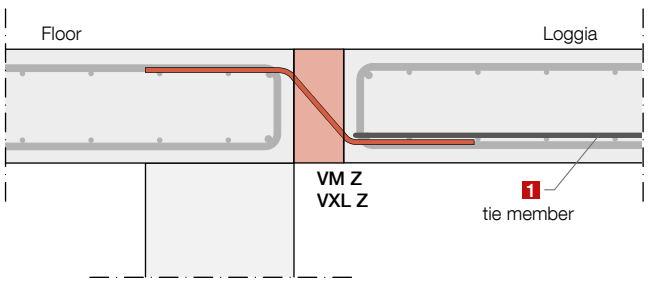
Height of connection [mm]	VM Z 80 VXL Z 80	VM Z 90 VXL Z 90	VM Z 100 VXL Z 100	VM Z 110 VXL Z 110
	$V_{R,d}$ [kN/m]			
160 - 280	123.6	139.1	169.1	217.4

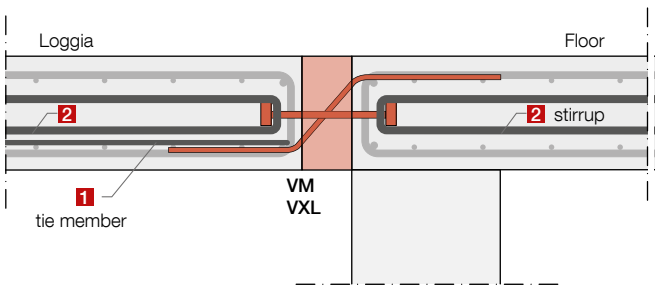
Reinforcement				
Length of element [mm]	1000	1000	1000	1000
Shear force bars	8 Ø 8	9 Ø 8	7 Ø 10	9 Ø 10

	straight shear force bars at the floor slab			
Tie member A_s 1	6 Ø 8	7 Ø 8	8 Ø 8	10 Ø 8
Stirrup A_s 2	2 Ø 6	2 Ø 8	2 Ø 8	2 Ø 8
VM Z in combination with type	**VM80**	**VM90**	**VM100**	**VM110**
VM Z Span between elements [m]	13.0	11.7	11.7	11.7
VM Z Applicable expansion joint distances [m]	13.5	13.5	13.0	13.0
VXL Z in combination with type	**VXL80**	**VXL90**	**VXL100**	**VXL110**
VXL Z Span between elements [m]	21.7	19.8	19.8	19.8
VXL Z Applicable expansion joint distances [m]	23.0	23.0	21.7	21.7

c = 30 mm
A verification of the shear force capacity of the slab has to be done by the structural engineer according to EN 1992.

Section

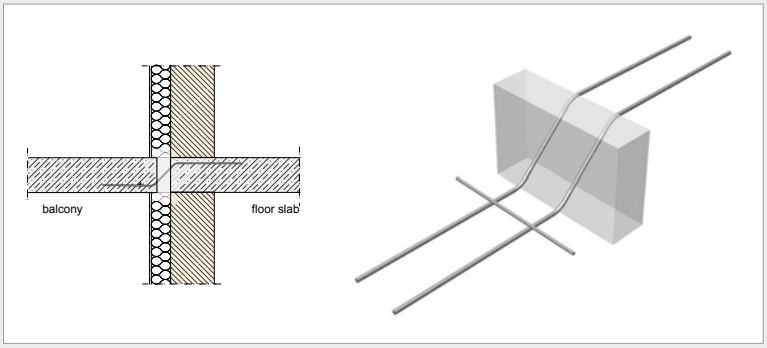




Egcobox® VM Z-K / VXL Z-K

Specifications

Egcobox shear force element with zero-stress connection in combination with Egcobox VM -K / VXL -K
Slab thickness: h = 160 – 280 mm
Joint width VM Z-K: f = 80 mm
Joint width VXL Z-K: f = 120 mm
(other dimensions on request)
Concrete strength: min C20/25



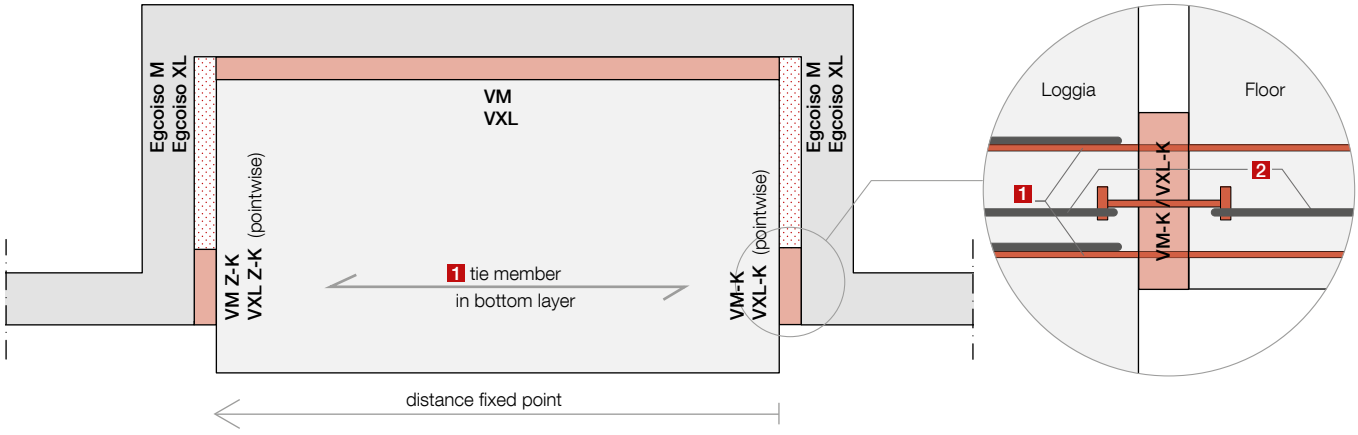
Design table Egcobox® VM Z-K / VXL Z-K

Insulation made of 80 mm or 120 mm polystyrene, rock wool or foam glass, other dimensions on request.

Height of connection [mm]	VM Z 5-K VXL Z 5-K	VM Z 10-K VXL Z 10-K	VM Z 15-K VXL Z 15-K	VM Z 20-K VXL Z 20-K	VM Z 25-K VXL Z 25-K	VM Z 30-K VXL Z 30-K	VM Z 35-K VXL Z 35-K
	$V_{R,d}$ [kN/element]						
160 - 280	17.4	30.9	46.4	46.4	61.8	61.8	72.5
Reinforcement							
Length of element [mm]	200	300	300	400	400	500	500
Shear force bars	2 Ø 6	2 Ø 8	3 Ø 8	3 Ø 8	4 Ø 8	4 Ø 8	3 Ø 10
Tie member A_s 1	2 Ø 6	2 Ø 8	2 Ø 10	2 Ø 10	2 Ø 10	2 Ø 10	3 Ø 10
Stirrup A_s 2	1 Ø 6	1 Ø 6	1 Ø 6	1 Ø 6	1 Ø 6	1 Ø 6	1 Ø 8
VM Z-K in combination with type	**VM 5-K**	**VM 10-K**	**VM 15-K**	**VM 20-K**	**VM 25-K**	**VM 30-K**	**VM 35-K**
VM Z-K Span between elements [m]	6.75	6.5	6.75	6.5	6.5	6.5	5.85
VM Z-K Applicable expansion joint distances [m]	13.5	13.5	13.5	13.5	13.5	13.5	13.0
VXL Z-K in combination with type	**VXL 5-K**	**VXL 10-K**	**VXL 15-K**	**VXL 20-K**	**VXL 25-K**	**VXL 30-K**	**VXL 35-K**
VXL Z-K Span between elements [m]	11.5	10.85	11.5	10.85	10.85	10.85	9.9
VXL Z-K Applicable expansion joint distances [m]	23.0	23.0	23.0	23.0	23.0	23.0	21.7

c = 30 mm
A verification of the shear force capacity of the slab has to be done by the structural engineer according to EN 1992.

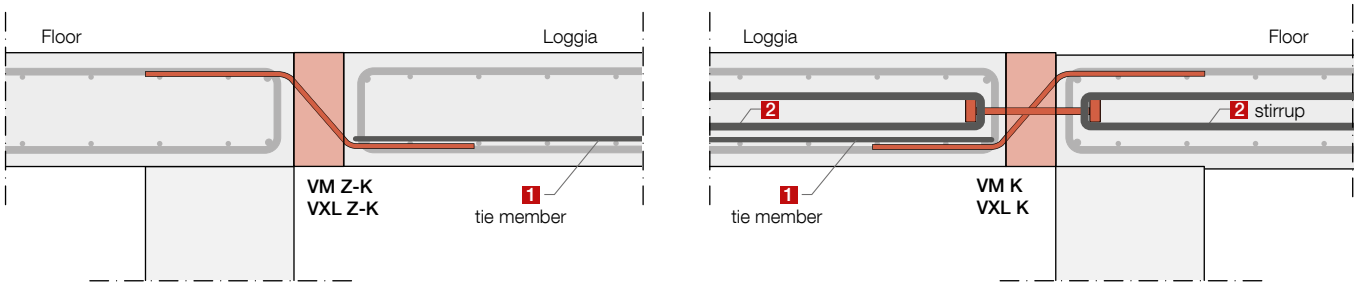
Floor plan



Height of connection [mm]	VM Z 40-K VXL Z 40-K	VM Z 50-K VXL Z 50-K	VM Z 60-K VXL Z 60-K	VM Z 70-K VXL Z 70-K	VM Z 80-K VXL Z 80-K	VM Z 90-K VXL Z 90-K	VM Z 100-K VXL Z 100-K
	$V_{R,d}$ [kN/element]						
160 - 280	46.4	72.5	72.5	104.3	104.3	139.1	139.1
Reinforcement							
Length of element [mm]	300	400	300	400	300	400	500
Shear force bars	3 Ø 8	3 Ø 10	3 Ø 10	3 Ø 12	3 Ø 12	4 Ø 12	4 Ø 12
Tie member A_s 1	2 Ø 10	3 Ø 10	3 Ø 10	3 Ø 12	3 Ø 12	3 Ø 12	3 Ø 12
Stirrup A_s 2	1 Ø 6	1 Ø 8	1 Ø 8	1 Ø 8	1 Ø 8	1 Ø 10	1 Ø 10
VM Z-K in combination with type	**VM 40-K**	**VM 50-K**	**VM 60-K**	**VM 70-K**	**VM 80-K**	**VM 90-K**	**VM 100-K**
VM Z-K Span between elements [m]	6.5	5.85	5.85	5.05	5.05	5.05	5.05
VM Z-K Applicable expansion joint distances [m]	13.5	13.0	13.0	11.7	11.7	11.7	11.7
VXL Z-K in combination with type	**VXL 40-K**	**VXL 50-K**	**VXL 60-K**	**VXL 70-K**	**VXL 80-K**	**VXL 90-K**	**VXL 100-K**
VXL Z-K Span between elements [m]	10.85	9.9	9.9	8.5	8.5	8.5	8.5
VXL Z-K Applicable expansion joint distances [m]	23.0	21.7	21.7	19.8	19.8	19.8	19.8

c = 30 mm
A verification of the shear force capacity of the slab has to be done by the structural engineer according to EN 1992.

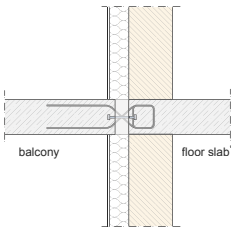
Section

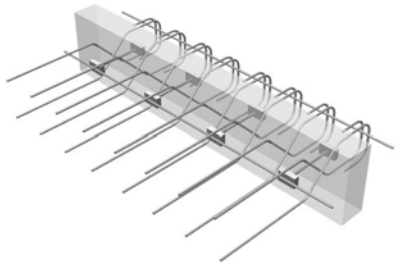


Egcobox® VM± / VXL±

Specifications

Slab thickness: h = 160 – 280 mm
Joint width VM±: f = 80 mm
Joint width VXL±: f = 120 mm
(other dimensions on request)
Concrete strength: min C20/25





Design table Egcobox® VM± / VXL±

Insulation made of 80 mm or 120 mm polystyrene, rock wool or foam glass, other dimensions on request.

Height of connection [mm]	VM10±/ VXL10±	VM20±/ VXL20±	VM30±/ VXL30±	VM35±/ VXL35±	VM40±/ VXL40±	VM50±/ VXL50±
	$V_{R,d}$ [kN/m]					
160 - 280	± 34.8	± 43.5	± 52.1	± 60.8	± 69.5	± 86.9

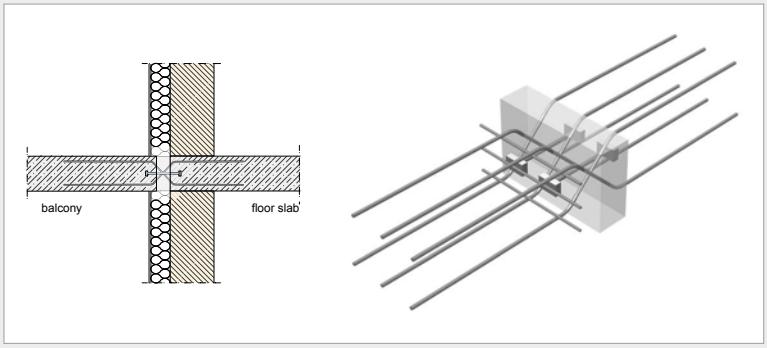
Reinforcement						
Length of element [mm]	1000	1000	1000	1000	1000	1000
Shear force bars	2 x 4 Ø 6	2 x 5 Ø 6	2 x 6 Ø 6	2 x 7 Ø 6	2 x 8 Ø 6	2 x 10 Ø 6
Pressure elements	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 10
Applicable expansion joint distances VM± [m]	13.5	13.5	13.5	13.5	13.5	13.0
Applicable expansion joint distances VXL± [m]	23.0	23.0	23.0	23.0	23.0	21.7

c = 30 mm
A verification of the shear force capacity of the slab has to be done by the structural engineer according to EN 1992.

Egcobox® VM-K± / VXL-K±

Specifications

Slab thickness: h = 160 – 280 mm
Joint width VM-K±: f = 80 mm
Joint width VXL-K±: f = 120 mm
(other dimensions on request)
Concrete strength: min C20/25



Design table Egcobox® VM-K± / VXL-K±

Insulation made of 80 mm or 120 mm polystyrene, rock wool or foam glass, other dimensions on request.

Height of connection [mm]	VM5-K±/ VXL5-K±	VM10-K±/ VXL10-K±	VM15-K±/ VXL15-K±	VM20-K±/ VXL20-K±	VM25-K±/ VXL25-K±	VM30-K±/ VXL30-K±	VM35-K±/ VXL35-K±	VM40-K±/ VXL40-K±
	$V_{R,d}$ [kN/element]							
160 - 280	± 17.4	± 30.9	± 37.3	± 46.4	± 61.8	± 61.8	± 72.5	± 46.4
Reinforcement								
Length of element [mm]	200	300	300	400	400	500	500	300
Shear force bars	2x 2 Ø 6	2x 2 Ø 8	2x 3 Ø 8	2x 3 Ø 8	2x 4 Ø 8	2x 4 Ø 8	2x 3 Ø 10	2x 3 Ø 8
Pressure elements	1 Ø 8	1 Ø 10	2 Ø 8	2 Ø 10	2 Ø 10	2 Ø 10	2 Ø 12	2 Ø 10
Applicable expansion joint distances VM-K± [m]	13.5	13.0	13.5	13.0	13.0	13.0	11.7	13.0
Applicable expansion joint distances VXL-K± [m]	23.0	21.7	23.0	21.7	21.7	21.7	19.8	21.7

Height of connection [mm]	VM45-K±/ VXL45-K±	VM50-K±/ VXL50-K±	VM60-K±/ VXL60-K±	VM70-K±/ VXL70-K±	VM80-K±/ VXL80-K±	VM90-K±/ VXL90-K±	VM100-K±/ VXL100-K±
	$V_{R,d}$ [kN/element]						
160 - 280	± 62.6	± 72.5	± 72.5	± 104.3	± 104.3	± 139.1	± 139.1
Reinforcement							
Length of element [mm]	300	400	300	400	300	400	500
Shear force bars	2x 3 Ø 10	2x 3 Ø 10	2x 3 Ø 10	2x 3 Ø 12	2x 3 Ø 12	2x 4 Ø 12	2x 4 Ø 12
Pressure elements	2 Ø 10	2 Ø 12	2 Ø 12	2 Ø 14	2 Ø 14	3 Ø 14	3 Ø 14
Applicable expansion joint distances VM-K± [m]	13.0	11.7	11.7	10.1	10.1	10.1	10.1
Applicable expansion joint distances VXL-K± [m]	21.7	19.8	19.8	17.0	17.0	17.0	17.0

c = 30 mm
A verification of the shear force capacity of the slab has to be done by the structural engineer according to EN 1992.

Egcobox® MM±

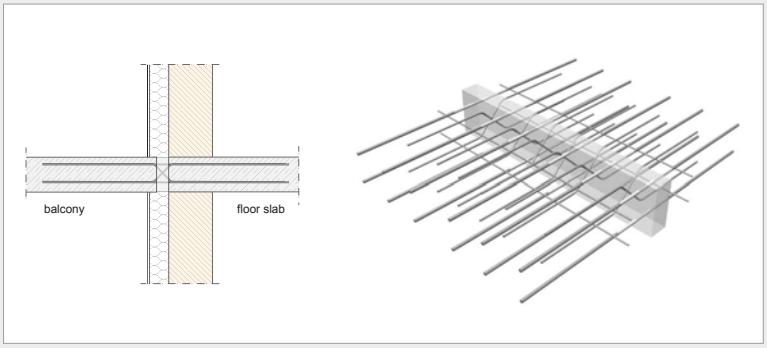
Specifications

Slab thickness: h = 160 – 280 mm

Joint width: f = 80 mm

(other dimensions on request)

Concrete strength: C20/25 or C25/30



Design table Egcobox® MM± – C20/25

Insulation made of 80 mm polystyrene, rock wool or foam glass, other dimensions on request.

Height of connection [mm]			MM30±	MM30± -VA	MM30± -VB	MM50±	MM50± -VA	MM50± -VB	MM70±	MM70± -VA	MM70± -VB	MM90±	MM90± -VA	MM90± -VB
C30	C35	C50	$M_{R,d}$ [kNm/m]											
	160		± 19.1	± 18.1	± 17.0	± 27.3	± 26.2	± 25.2	± 39.5	± 38.5	± 37.5	± 47.7	± 46.7	± 45.6
160	165	**200**	± 20.3	± 19.2	± 18.1	± 28.9	± 27.8	± 26.7	± 41.9	± 40.8	± 39.7	± 50.5	± 49.5	± 48.4
165	**170**	205	± 21.4	± 20.3	± 19.1	± 30.5	± 29.4	± 28.2	± 44.3	± 43.1	± 42.0	± 53.4	± 52.3	± 51.1
170	175	**210**	± 22.6	± 21.4	± 20.1	± 32.2	± 31.0	± 29.8	± 46.6	± 45.4	± 44.2	± 56.3	± 55.1	± 53.9
175	**180**	215	± 23.7	± 22.4	± 21.2	± 33.8	± 32.6	± 31.3	± 49.0	± 47.8	± 46.5	± 59.2	± 57.9	± 56.6
180	185	**220**	± 24.9	± 23.5	± 22.2	± 35.5	± 34.2	± 32.8	± 51.4	± 50.1	± 48.7	± 62.0	± 60.7	± 59.4
185	**190**	225	± 26.0	± 24.6	± 23.2	± 37.1	± 35.7	± 34.3	± 53.8	± 52.4	± 51.0	± 64.9	± 63.5	± 62.1
190	195	**230**	± 27.2	± 25.7	± 24.2	± 38.8	± 37.3	± 35.8	± 56.2	± 54.7	± 53.2	± 67.8	± 66.3	± 64.8
195	**200**	235	± 28.3	± 26.8	± 25.3	± 40.4	± 38.9	± 37.4	± 58.5	± 57.0	± 55.5	± 70.6	± 69.1	± 67.6
200	205	**240**	± 29.5	± 27.9	± 26.3	± 42.0	± 40.5	± 38.9	± 60.9	± 59.4	± 57.8	± 73.5	± 71.9	± 70.3
205	**210**	245	± 30.6	± 29.0	± 27.3	± 43.7	± 42.1	± 40.4	± 63.3	± 61.7	± 60.0	± 76.4	± 74.8	± 73.1
210	215	**250**	± 31.8	± 30.1	± 28.3	± 45.3	± 43.6	± 41.9	± 65.7	± 64.0	± 62.3	± 79.3	± 77.6	± 75.8
215	**220**	255	± 32.9	± 31.2	± 29.4	± 47.0	± 45.2	± 43.4	± 68.1	± 66.3	± 64.5	± 82.1	± 80.4	± 78.6
220	225	**260**	± 34.1	± 32.3	± 30.4	± 48.6	± 46.8	± 44.9	± 70.4	± 68.6	± 66.8	± 85.0	± 83.2	± 81.3
225	**230**	265	± 35.2	± 33.3	± 31.4	± 50.3	± 48.4	± 46.5	± 72.8	± 71.0	± 69.0	± 87.9	± 86.0	± 84.1
230	235	**270**	± 36.4	± 34.4	± 32.4	± 51.9	± 50.0	± 48.0	± 75.2	± 73.3	± 71.3	± 90.7	± 88.8	± 86.8
235	**240**	275	± 37.5	± 35.5	± 33.5	± 53.5	± 51.6	± 49.5	± 77.6	± 75.6	± 73.5	± 93.6	± 91.6	± 89.6
240	245	**280**	± 38.7	± 36.6	± 34.5	± 55.2	± 53.1	± 51.0	± 80.0	± 77.9	± 75.8	± 96.5	± 94.4	± 92.3
245	**250**		± 39.8	± 37.7	± 35.5	± 56.8	± 54.7	± 52.5	± 82.3	± 80.2	± 78.1	± 99.4	± 97.2	± 95.1
250	255		± 41.0	± 38.8	± 36.6	± 58.5	± 56.3	± 54.1	± 84.7	± 82.6	± 80.3	± 102.2	± 100.1	± 97.8
255	**260**		± 42.1	± 39.9	± 37.6	± 60.1	± 57.9	± 55.6	± 87.1	± 84.9	± 82.6	± 105.1	± 102.9	± 100.6
260	265		± 43.3	± 41.0	± 38.6	± 61.8	± 59.5	± 57.1	± 89.5	± 87.2	± 84.8	± 108.0	± 105.7	± 103.3
265	**270**		± 44.4	± 42.1	± 39.6	± 63.4	± 61.0	± 58.6	± 91.9	± 89.5	± 87.1	± 110.8	± 108.5	± 106.1
270	275		± 45.6	± 43.1	± 40.7	± 65.0	± 62.6	± 60.1	± 94.2	± 91.8	± 89.3	± 113.7	± 111.3	± 108.8
275	**280**		± 46.7	± 44.2	± 41.7	± 66.7	± 64.2	± 61.7	± 96.6	± 94.1	± 91.6	± 116.6	± 114.1	± 111.6
280			± 47.9	± 45.3	± 42.7	± 68.3	± 65.8	± 63.2	± 99.0	± 96.5	± 93.9	± 119.5	± 116.9	± 114.3
			$V_{R,d}$ [kN/m]											
160 - 280			± 44.4	± 79.0	± 114.5	± 44.4	± 79.0	± 114.5	± 44.4	± 79.0	± 114.5	± 44.4	± 79.0	± 114.5

Reinforcement												
Length of element [mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Tensile bars	5 ø 12	5 ø 12	5 ø 12	7 ø 12	7 ø 12	7 ø 12	10 ø 12	10 ø 12	10 ø 12	12 ø 12	12 ø 12	12 ø 12
Pressure bars	5 ø 12	5 ø 12	5 ø 12	7 ø 12	7 ø 12	7 ø 12	10 ø 12	10 ø 12	10 ø 12	12 ø 12	12 ø 12	12 ø 12
Length of tensile/ pressure bars [mm]	1520	1520	1520	1520	1520	1520	1520	1520	1520	1520	1520	1520
Shear force bars	2 x 6 ø 6	2 x 6 ø 8	2 x 6 ø 10	2 x 6 ø 6	2 x 6 ø 8	2 x 6 ø 10	2 x 6 ø 6	2 x 6 ø 8	2 x 6 ø 10	2 x 6 ø 6	2 x 6 ø 8	2 x 6 ø 10
Applicable expansion joint distances [m]	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7

at C30: $c_{o,u}$ = 30 mm; at C35: c_o = 35 mm, c_u = 30 mm; at C50: $c_{o,u}$ = 50mm
A verification of the shear force capacity of the slab has to be done by the structural engineer according to EN 1992.

Starter bars

The specified reinforcement refers to a steel with grade B500.

Variation	MM30±	MM30± -VA	MM30± -VB	MM50±	MM50± -VA	MM50± -VB	MM70±	MM70± -VA	MM70± -VB	MM90±	MM90± -VA	MM90± -VB
A	ø12/200 mm	ø12/200 mm	ø12/200 mm	ø12/140 mm	ø12/140 mm	ø12/140 mm	ø12/100 mm	ø12/100 mm	ø12/100 mm	ø12/80 mm	ø12/80 mm	ø12/80 mm

The indicated reinforcement is a proposal. An alternative reinforcement is possible.

Design table Egcobox® MM± – C25/30

Insulation made of 80 mm polystyrene, rock wool or foam glass, other dimensions on request.

Height of connection [mm]			MM30±	MM30± -VA	MM30± -VB	MM50±	MM50± -VA	MM50± -VB	MM70±	MM70± -VA	MM70± -VB	MM90±	MM90± -VA	MM90± -VB
C30	C35	C50	$M_{R,d}$ [kNm/m]											
	160		± 18.9	± 17.7	± 16.5	± 27.0	± 25.8	± 24.6	± 39.3	± 38.1	± 36.9	± 47.4	± 46.3	± 45.0
160	165	**200**	± 20.0	± 18.8	± 17.5	± 28.7	± 27.4	± 26.1	± 41.6	± 40.4	± 39.1	± 50.3	± 49.0	± 47.7
165	**170**	205	± 21.1	± 19.8	± 18.4	± 30.3	± 29.0	± 27.6	± 44.0	± 42.7	± 41.3	± 53.2	± 51.8	± 50.5
170	175	**210**	± 22.3	± 20.9	± 19.4	± 31.9	± 30.5	± 29.1	± 46.4	± 45.0	± 43.5	± 56.0	± 54.6	± 53.2
175	**180**	215	± 23.4	± 21.9	± 20.4	± 33.6	± 32.1	± 30.6	± 48.7	± 47.3	± 45.8	± 58.9	± 57.4	± 55.9
180	185	**220**	± 24.6	± 23.0	± 21.4	± 35.2	± 33.6	± 32.0	± 51.1	± 49.6	± 48.0	± 61.7	± 60.2	± 58.6
185	**190**	225	± 25.7	± 24.1	± 22.4	± 36.8	± 35.2	± 33.5	± 53.5	± 51.9	± 50.2	± 64.6	± 63.0	± 61.3
190	195	**230**	± 26.8	± 25.1	± 23.4	± 38.4	± 36.7	± 35.0	± 55.8	± 54.2	± 52.4	± 67.4	± 65.8	± 64.0
195	**200**	235	± 28.0	± 26.2	± 24.4	± 40.1	± 38.3	± 36.5	± 58.2	± 56.4	± 54.6	± 70.3	± 68.5	± 66.7
200	205	**240**	± 29.1	± 27.3	± 25.4	± 41.7	± 39.9	± 38.0	± 60.6	± 58.7	± 56.9	± 73.2	± 71.3	± 69.4
205	**210**	245	± 30.2	± 28.3	± 26.4	± 43.3	± 41.4	± 39.5	± 62.9	± 61.0	± 59.1	± 76.0	± 74.1	± 72.2
210	215	**250**	± 31.4	± 29.4	± 27.4	± 45.0	± 43.0	± 40.9	± 65.3	± 63.3	± 61.3	± 78.9	± 76.9	± 74.9
215	**220**	255	± 32.5	± 30.5	± 28.4	± 46.6	± 44.5	± 42.4	± 67.7	± 65.6	± 63.5	± 81.7	± 79.7	± 77.6
220	225	**260**	± 33.7	± 31.5	± 29.4	± 48.2	± 46.1	± 43.9	± 70.0	± 67.9	± 65.7	± 84.6	± 82.5	± 80.3
225	**230**	265	± 34.8	± 32.6	± 30.3	± 49.8	± 47.6	± 45.4	± 72.4	± 70.2	± 68.0	± 87.5	± 85.3	± 83.0
230	235	**270**	± 35.9	± 33.7	± 31.3	± 51.5	± 49.2	± 46.9	± 74.8	± 72.5	± 70.2	± 90.3	± 88.0	± 85.7
235	**240**	275	± 37.1	± 34.7	± 32.3	± 53.1	± 50.8	± 48.4	± 77.1	± 74.8	± 72.4	± 93.2	± 90.8	± 88.4
240	245	**280**	± 38.2	± 35.8	± 33.3	± 54.7	± 52.3	± 49.8	± 79.5	± 77.1	± 74.6	± 96.0	± 93.6	± 91.1
245	**250**		± 39.3	± 36.9	± 34.3	± 56.4	± 53.9	± 51.3	± 81.9	± 79.4	± 76.8	± 98.9	± 96.4	± 93.9
250	255		± 40.5	± 37.9	± 35.3	± 58.0	± 55.4	± 52.8	± 84.2	± 81.7	± 79.1	± 101.7	± 99.2	± 96.6
255	**260**		± 41.6	± 39.0	± 36.3	± 59.6	± 57.0	± 54.3	± 86.6	± 84.0	± 81.3	± 104.6	± 102.0	± 99.3
260	265		± 42.8	± 40.1	± 37.3	± 61.2	± 58.5	± 55.8	± 89.0	± 86.3	± 83.5	± 107.5	± 104.8	± 102.0
265	**270**		± 43.9	± 41.1	± 38.3	± 62.9	± 60.1	± 57.3	± 91.3	± 88.6	± 85.7	± 110.3	± 107.6	± 104.7
270	275		± 45.0	± 42.2	± 39.3	± 64.5	± 61.7	± 58.7	± 93.7	± 90.9	± 87.9	± 113.2	± 110.3	± 107.4
275	**280**		± 46.2	± 43.3	± 40.3	± 66.1	± 63.2	± 60.2	± 96.1	± 93.2	± 90.2	± 116.0	± 113.1	± 110.1
280			± 47.3	± 44.3	± 41.3	± 67.8	± 64.8	± 61.7	± 98.4	± 95.5	± 92.4	± 118.9	± 115.9	± 112.8
			$V_{R,d}$ [kN/m]											
160 - 280			± 52.2	± 92.7	± 134.4	± 52.2	± 92.7	± 134.4	± 52.2	± 92.7	± 134.4	± 52.2	± 92.7	± 134.4

Reinforcement												
Length of element [mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Tensile bars	5 ø 12	5 ø 12	5 ø 12	7 ø 12	7 ø 12	7 ø 12	10 ø 12	10 ø 12	10 ø 12	12 ø 12	12 ø 12	12 ø 12
Pressure bars	5 ø 12	5 ø 12	5 ø 12	7 ø 12	7 ø 12	7 ø 12	10 ø 12	10 ø 12	10 ø 12	12 ø 12	12 ø 12	12 ø 12
Length of tensile/ pressure bars [mm]	1520	1520	1520	1520	1520	1520	1520	1520	1520	1520	1520	1520
Shear force bars	2 x 6 ø 6	2 x 6 ø 8	2 x 6 ø 10	2 x 6 ø 6	2 x 6 ø 8	2 x 6 ø 10	2 x 6 ø 6	2 x 6 ø 8	2 x 6 ø 10	2 x 6 ø 6	2 x 6 ø 8	2 x 6 ø 10
Applicable expansion joint distances [m]	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7

at C30: $c_{o,u}$ = 30 mm; at C35: c_o = 35 mm, c_u = 30 mm; at C50: $c_{o,u}$ = 50mm
A verification of the shear force capacity of the slab has to be done by the structural engineer according to EN 1992.

Egcobox® MXL±

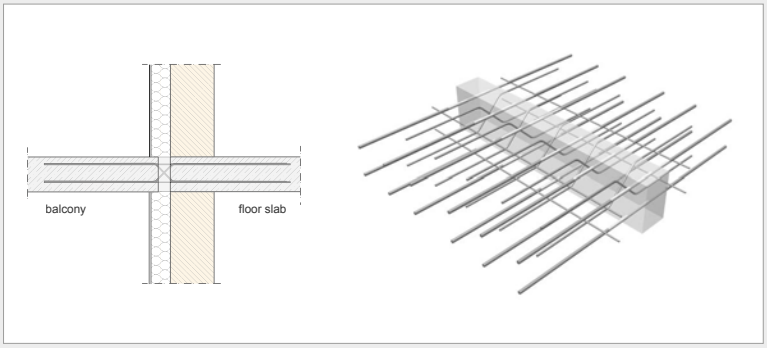
Specifications

Slab thickness: h = 160 – 280 mm

Joint width: f = 120 mm

(other dimensions on request)

Concrete strength: C20/25 or C25/30



Design table Egcobox® MXL± – C20/25

Insulation made of 120 mm polystyrene, rock wool or foam glass, other dimensions on request.

Height of connection [mm]			MXL30±	MXL30± -VA	MXL30± -VB	MXL50±	MXL50± -VA	MXL50± -VB	MXL70±	MXL70± -VA	MXL70± -VB	MXL90±	MXL90± -VA	MXL90± -VB
C30	C35	C50	$M_{R,d}$ [kNm/m]											
	160		± 19.3	± 18.5	± 17.5	± 23.4	± 22.6	± 21.5	± 35.7	± 34.8	± 33.8	± 43.8	± 43.0	± 42.0
160	165	**200**	± 20.5	± 19.6	± 18.5	± 24.8	± 24.0	± 22.8	± 37.8	± 36.9	± 35.8	± 46.5	± 45.6	± 44.5
165	**170**	205	± 21.7	± 20.8	± 19.6	± 26.3	± 25.3	± 24.1	± 40.0	± 39.0	± 37.9	± 49.1	± 48.2	± 47.0
170	175	**210**	± 22.8	± 21.9	± 20.6	± 27.7	± 26.7	± 25.4	± 42.1	± 41.1	± 39.9	± 51.8	± 50.8	± 49.5
175	**180**	215	± 24.0	± 23.0	± 21.7	± 29.1	± 28.1	± 26.7	± 44.3	± 43.2	± 41.9	± 54.4	± 53.4	± 52.1
180	185	**220**	± 25.2	± 24.1	± 22.7	± 30.5	± 29.4	± 28.0	± 46.4	± 45.3	± 44.0	± 57.0	± 56.0	± 54.6
185	**190**	225	± 26.3	± 25.2	± 23.8	± 31.9	± 30.8	± 29.3	± 48.6	± 47.4	± 46.0	± 59.7	± 58.6	± 57.1
190	195	**230**	± 27.5	± 26.3	± 24.8	± 33.3	± 32.1	± 30.6	± 50.7	± 49.5	± 48.0	± 62.3	± 61.1	± 59.6
195	**200**	235	± 28.7	± 27.5	± 25.9	± 34.7	± 33.5	± 31.9	± 52.9	± 51.6	± 50.1	± 65.0	± 63.7	± 62.2
200	205	**240**	± 29.8	± 28.6	± 26.9	± 36.1	± 34.9	± 33.2	± 55.0	± 53.7	± 52.1	± 67.6	± 66.3	± 64.7
205	**210**	245	± 31.0	± 29.7	± 28.0	± 37.5	± 36.2	± 34.5	± 57.2	± 55.8	± 54.1	± 70.2	± 68.9	± 67.2
210	215	**250**	± 32.2	± 30.8	± 29.0	± 39.0	± 37.6	± 35.8	± 59.3	± 57.9	± 56.2	± 72.9	± 71.5	± 69.8
215	**220**	255	± 33.3	± 31.9	± 30.1	± 40.4	± 38.9	± 37.1	± 61.5	± 60.0	± 58.2	± 75.5	± 74.1	± 72.3
220	225	**260**	± 34.5	± 33.0	± 31.1	± 41.8	± 40.3	± 38.4	± 63.6	± 62.1	± 60.3	± 78.2	± 76.7	± 74.8
225	**230**	265	± 35.7	± 34.1	± 32.2	± 43.2	± 41.7	± 39.7	± 65.8	± 64.2	± 62.3	± 80.8	± 79.3	± 77.3
230	235	**270**	± 36.8	± 35.3	± 33.3	± 44.6	± 43.0	± 41.0	± 67.9	± 66.3	± 64.3	± 83.4	± 81.9	± 79.9
235	**240**	275	± 38.0	± 36.4	± 34.3	± 46.0	± 44.4	± 42.3	± 70.1	± 68.4	± 66.4	± 86.1	± 84.5	± 82.4
240	245	**280**	± 39.2	± 37.5	± 35.4	± 47.4	± 45.8	± 43.6	± 72.2	± 70.5	± 68.4	± 88.7	± 87.1	± 84.9
245	**250**		± 40.3	± 38.6	± 36.4	± 48.8	± 47.1	± 44.9	± 74.4	± 72.6	± 70.4	± 91.4	± 89.6	± 87.4
250	255		± 41.5	± 39.7	± 37.5	± 50.2	± 48.5	± 46.2	± 76.5	± 74.7	± 72.5	± 94.0	± 92.2	± 90.0
255	**260**		± 42.7	± 40.8	± 38.5	± 51.7	± 49.8	± 47.5	± 78.7	± 76.8	± 74.5	± 96.7	± 94.8	± 92.5
260	265		± 43.8	± 42.0	± 39.6	± 53.1	± 51.2	± 48.8	± 80.8	± 78.9	± 76.5	± 99.3	± 97.4	± 95.0
265	**270**		± 45.0	± 43.1	± 40.6	± 54.5	± 52.6	± 50.1	± 83.0	± 81.0	± 78.6	± 101.9	± 100.0	± 97.6
270	275		± 46.2	± 44.2	± 41.7	± 55.9	± 53.9	± 51.4	± 85.1	± 83.1	± 80.6	± 104.6	± 102.6	± 100.1
275	**280**		± 47.3	± 45.3	± 42.7	± 57.3	± 55.3	± 52.7	± 87.2	± 85.2	± 82.6	± 107.2	± 105.2	± 102.6
280			± 48.5	± 46.4	± 43.8	± 58.7	± 56.7	± 54.0	± 89.4	± 87.3	± 84.7	± 109.9	± 107.8	± 105.1
			$V_{R,d}$ [kN/m]											
160 - 280			± 36.0	± 64.1	± 100.1	± 36.0	± 64.1	± 100.1	± 36.0	± 64.1	± 100.1	± 36.0	± 64.1	± 100.1

Reinforcement												
Length of element [mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Tensile bars	5 ø 12	5 ø 12	5 ø 12	6 ø 12	6 ø 12	6 ø 12	9 ø 12	9 ø 12	9 ø 12	11 ø 12	11 ø 12	11 ø 12
Pressure bars	5 ø 12	5 ø 12	5 ø 12	6 ø 12	6 ø 12	6 ø 12	9 ø 12	9 ø 12	9 ø 12	11 ø 12	11 ø 12	11 ø 12
Length of tensile/ pressure bars [mm]	1560	1560	1560	1560	1560	1560	1560	1560	1560	1560	1560	1560
Shear force bars	2 x 5 ø 6	2 x 5 ø 8	2 x 5 ø 10	2 x 5 ø 6	2 x 5 ø 8	2 x 5 ø 10	2 x 5 ø 6	2 x 5 ø 8	2 x 5 ø 10	2 x 5 ø 6	2 x 5 ø 8	2 x 5 ø 10
Applicable expansion joint distances [m]	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8

at C30: $c_{o,u}$ = 30 mm; at C35: c_o = 35 mm, c_u = 30 mm; at C50: $c_{o,u}$ = 50mm
A verification of the shear force capacity of the slab has to be done by the structural engineer according to EN 1992.

Starter bars

The specified reinforcement refers to a steel with grade B500.

Variation	MXL30±	MXL30± -VA	MXL30± -VB	MXL50±	MXL50± -VA	MXL50± -VB	MXL70±	MXL70± -VA	MXL70± -VB	MXL90±	MXL90± -VA	MXL90± -VB
A	ø12/200 mm	ø12/200 mm	ø12/200 mm	ø12/160 mm	ø12/160 mm	ø12/160 mm	ø12/110 mm	ø12/110 mm	ø12/110 mm	ø12/90 mm	ø12/90 mm	ø12/90 mm

The indicated reinforcement is a proposal. An alternative reinforcement is possible.

Design table Egcobox® MXL± – C25/30

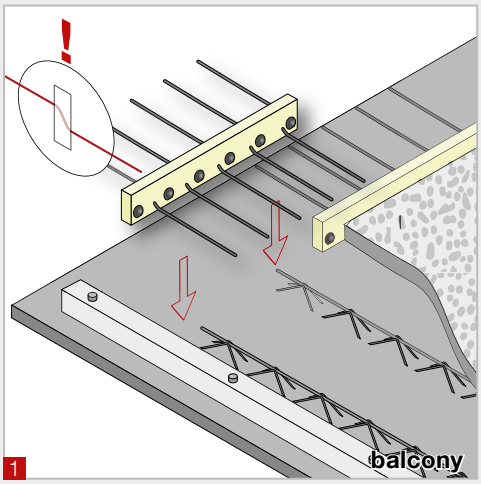
Insulation made of 120 mm polystyrene, rock wool or foam glass, other dimensions on request.

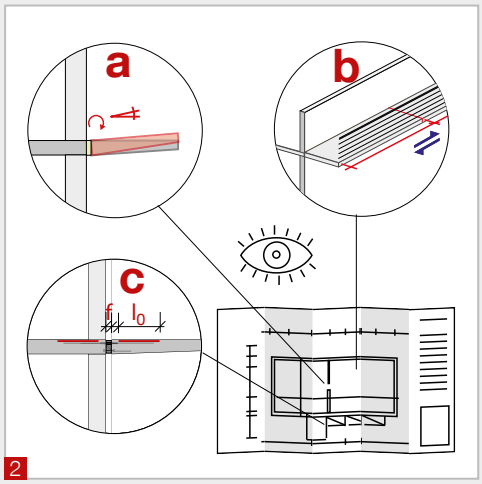
Height of connection [mm]			MXL30±	MXL30± -VA	MXL30± -VB	MXL50±	MXL50± -VA	MXL50± -VB	MXL70±	MXL70± -VA	MXL70± -VB	MXL90±	MXL90± -VA	MXL90± -VB
C30	C35	C50	$M_{R,d}$ [kNm/m]											
	160		± 19.2	± 18.2	± 17.0	± 23.2	± 22.3	± 21.0	± 35.5	± 34.5	± 33.3	± 43.7	± 42.7	± 41.4
160	165	**200**	± 20.3	± 19.3	± 18.0	± 24.6	± 23.6	± 22.3	± 37.6	± 36.6	± 35.3	± 46.3	± 45.3	± 43.9
165	**170**	205	± 21.5	± 20.4	± 19.0	± 26.0	± 25.0	± 23.6	± 39.8	± 38.7	± 37.3	± 48.9	± 47.8	± 46.4
170	175	**210**	± 22.6	± 21.5	± 20.0	± 27.4	± 26.3	± 24.8	± 41.9	± 40.8	± 39.3	± 51.5	± 50.4	± 48.9
175	**180**	215	± 23.8	± 22.6	± 21.0	± 28.8	± 27.6	± 26.1	± 44.0	± 42.8	± 41.3	± 54.2	± 53.0	± 51.4
180	185	**220**	± 24.9	± 23.7	± 22.1	± 30.2	± 29.0	± 27.4	± 46.2	± 44.9	± 43.3	± 56.8	± 55.5	± 53.9
185	**190**	225	± 26.1	± 24.8	± 23.1	± 31.6	± 30.3	± 28.6	± 48.3	± 47.0	± 45.3	± 59.4	± 58.1	± 56.4
190	195	**230**	± 27.2	± 25.9	± 24.1	± 33.0	± 31.7	± 29.9	± 50.5	± 49.1	± 47.3	± 62.1	± 60.7	± 58.9
195	**200**	235	± 28.4	± 27.0	± 25.1	± 34.4	± 33.0	± 31.2	± 52.6	± 51.2	± 49.3	± 64.7	± 63.3	± 61.4
200	205	**240**	± 29.6	± 28.1	± 26.2	± 35.8	± 34.4	± 32.4	± 54.7	± 53.2	± 51.3	± 67.3	± 65.8	± 63.9
205	**210**	245	± 30.7	± 29.2	± 27.2	± 37.2	± 35.7	± 33.7	± 56.9	± 55.3	± 53.3	± 69.9	± 68.4	± 66.4
210	215	**250**	± 31.9	± 30.3	± 28.2	± 38.6	± 37.0	± 35.0	± 59.0	± 57.4	± 55.3	± 72.6	± 71.0	± 68.9
215	**220**	255	± 33.0	± 31.4	± 29.2	± 40.0	± 38.4	± 36.2	± 61.1	± 59.5	± 57.3	± 75.2	± 73.5	± 71.4
220	225	**260**	± 34.2	± 32.5	± 30.2	± 41.4	± 39.7	± 37.5	± 63.3	± 61.6	± 59.3	± 77.8	± 76.1	± 73.9
225	**230**	265	± 35.3	± 33.5	± 31.3	± 42.8	± 41.1	± 38.8	± 65.4	± 63.6	± 61.4	± 80.5	± 78.7	± 76.4
230	235	**270**	± 36.5	± 34.6	± 32.3	± 44.3	± 42.4	± 40.0	± 67.6	± 65.7	± 63.4	± 83.1	± 81.3	± 78.9
235	**240**	275	± 37.6	± 35.7	± 33.3	± 45.7	± 43.8	± 41.3	± 69.7	± 67.8	± 65.4	± 85.7	± 83.8	± 81.4
240	245	**280**	± 38.8	± 36.8	± 34.3	± 47.1	± 45.1	± 42.6	± 71.8	± 69.9	± 67.4	± 88.4	± 86.4	± 83.9
245	**250**		± 39.9	± 37.9	± 35.3	± 48.5	± 46.4	± 43.9	± 74.0	± 72.0	± 69.4	± 91.0	± 89.0	± 86.4
250	255		± 41.1	± 39.0	± 36.4	± 49.9	± 47.8	± 45.1	± 76.1	± 74.0	± 71.4	± 93.6	± 91.5	± 88.9
255	**260**		± 42.3	± 40.1	± 37.4	± 51.3	± 49.1	± 46.4	± 78.2	± 76.1	± 73.4	± 96.2	± 94.1	± 91.4
260	265		± 43.4	± 41.2	± 38.4	± 52.7	± 50.5	± 47.7	± 80.4	± 78.2	± 75.4	± 98.9	± 96.7	± 93.9
265	**270**		± 44.6	± 42.3	± 39.4	± 54.1	± 51.8	± 48.9	± 82.5	± 80.3	± 77.4	± 101.5	± 99.3	± 96.4
270	275		± 45.7	± 43.4	± 40.5	± 55.5	± 53.1	± 50.2	± 84.7	± 82.4	± 79.4	± 104.1	± 101.8	± 98.9
275	**280**		± 46.9	± 44.5	± 41.5	± 56.9	± 54.5	± 51.5	± 86.8	± 84.4	± 81.4	± 106.8	± 104.4	± 101.4
280			± 48.0	± 45.6	± 42.5	± 58.3	± 55.8	± 52.7	± 88.9	± 86.5	± 83.4	± 109.4	± 107.0	± 103.9
			$V_{R,d}$ [kN/m]											
160 - 280			± 42.3	± 75.2	± 117.5	± 42.3	± 75.2	± 117.5	± 42.3	± 75.2	± 117.5	± 42.3	± 75.2	± 117.5

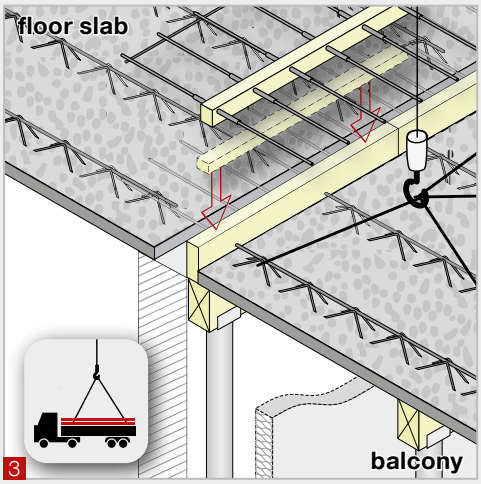
Reinforcement												
Length of element [mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Tensile bars	5 ø 12	5 ø 12	5 ø 12	6 ø 12	6 ø 12	6 ø 12	9 ø 12	9 ø 12	9 ø 12	11 ø 12	11 ø 12	11 ø 12
Pressure bars	5 ø 12	5 ø 12	5 ø 12	6 ø 12	6 ø 12	6 ø 12	9 ø 12	9 ø 12	9 ø 12	11 ø 12	11 ø 12	11 ø 12
Length of tensile/ pressure bars [mm]	1560	1560	1560	1560	1560	1560	1560	1560	1560	1560	1560	1560
Shear force bars	2 x 5 ø 6	2 x 5 ø 8	2 x 5 ø 10	2 x 5 ø 6	2 x 5 ø 8	2 x 5 ø 10	2 x 5 ø 6	2 x 5 ø 8	2 x 5 ø 10	2 x 5 ø 6	2 x 5 ø 8	2 x 5 ø 10
Applicable expansion joint distances [m]	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8

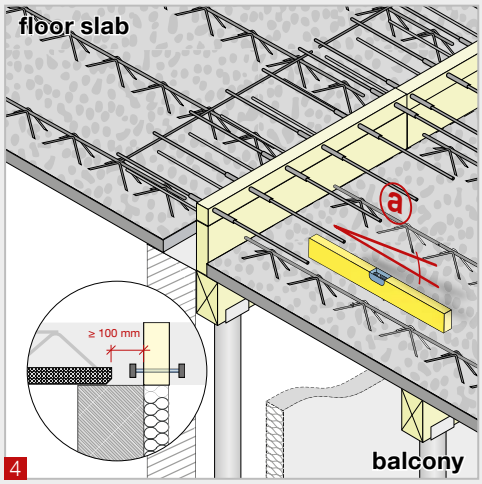
at C30: $c_{o,u}$ = 30 mm; at C35: c_o = 35 mm, c_u = 30 mm; at C50: $c_{o,u}$ = 50 mm
A verification of the shear force capacity of the slab has to be done by the structural engineer according to EN 1992.

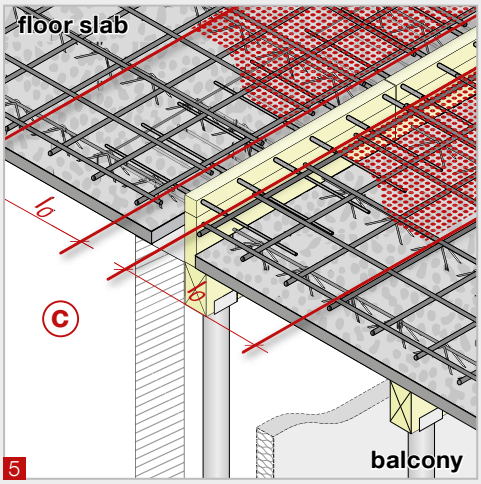
Egcobox® installation guidelines semi-prefab balcony

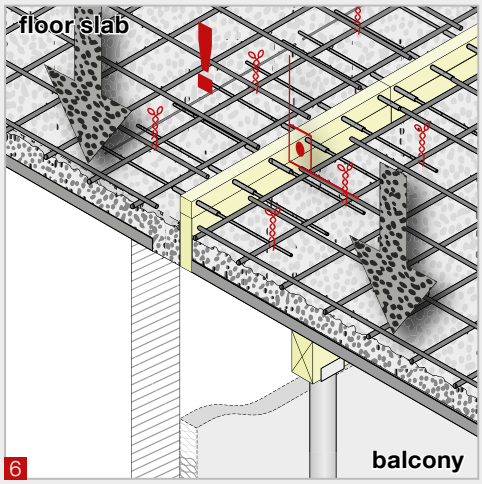












This Installation Guideline is a condensed description of factors having a direct effect on the performance of the MAX FRANK product and is based on the present state of the art. It may be necessary to alter these recommendations, as more information becomes available. Correct use is the responsibility of the user, if in doubt please consult your local supplier.

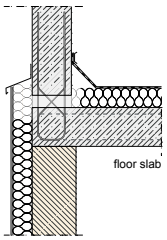
Parapet wall, console, corbel supports

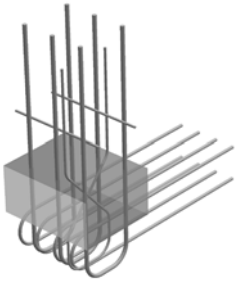
Parapets are extensions of the wall to enclose roof decks.
Corbels and consoles are usually used for optically structuring a facade.

Egcobox® AS / AM / AXL

Specifications

Connection height: h = 140 – 250 mm
Floor slab thickness: d ≥ 160 mm
Joint width: AS = 60 mm
Joint width: AM = 80 mm
Joint width: AXL = 120 mm
(other dimensions on request)
Concrete strength: C20/25 or C25/30





Design table Egcobox® AS / AM / AXL – C20/25; C25/30

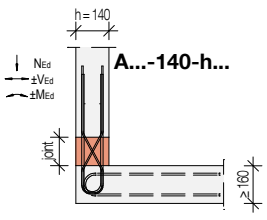
for parapet walls
Insulation made of 60 / 80 / 120 mm polystyrene, rock wool or foam glass, other dimensions on request.

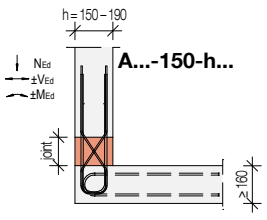
Concrete strength	AS10-140 AM10-140 AXL10-140		AS10-150 AM10-150 AXL10-150		AS10-200 AM10-200 AXL10-200		AS20-140 AM20-140 AXL20-140		AS20-150 AM20-150 AXL20-150		AS20-200 AM20-200 AXL20-200		AS30-140 AM30-140 AXL30-140		AS30-150 AM30-150 AXL30-150		AS30-200 AM30-200 AXL30-200	
	Parapet wall width [mm]																	
	140		150 - 190		200 - 250		140		150 - 190		200 - 250		140		150 - 190		200 - 250	
	$N_{R,d}$ [kN/element] / $M_{R,d}$ [kNm/element]																	
	$N_{R,d}$	$M_{R,d}$	$N_{R,d}$	$M_{R,d}$	$N_{R,d}$	$M_{R,d}$	$N_{R,d}$	$M_{R,d}$	$N_{R,d}$	$M_{R,d}$	$N_{R,d}$	$M_{R,d}$	$N_{R,d}$	$M_{R,d}$	$N_{R,d}$	$M_{R,d}$	$N_{R,d}$	$M_{R,d}$
C20/25 Parapet wall C20/25 Floor slab C20/25	0.0	± 2.39	0.0	± 2.69	0.0	± 3.05	0.0	± 3.83	0.0	± 4.70	0.0	± 6.50	0.0	± 3.83	0.0	± 4.70	0.0	± 6.50
	10.0	± 1.99	10.0	± 2.24	10.0	± 2.43	10.0	± 3.43	10.0	± 4.25	10.0	± 5.85	10.0	± 3.43	10.0	± 4.25	10.0	± 5.85
	20.0	± 1.59	20.0	± 1.79	20.0	± 1.82	20.0	± 3.03	20.0	± 3.80	20.0	± 5.20	20.0	± 3.03	20.0	± 3.80	20.0	± 5.20
	30.0	± 1.19	30.0	± 1.34	30.0	± 1.20	30.0	± 2.63	30.0	± 3.35	30.0	± 4.55	30.0	± 2.63	30.0	± 3.35	30.0	± 4.55
	40.0	± 0.79	40.0	± 0.89	40.0	± 0.59	40.0	± 2.23	40.0	± 2.90	40.0	± 3.90	40.0	± 2.23	40.0	± 2.90	40.0	± 3.90
	50.0	± 0.39	50.0	± 0.44	49.6	± 0.00	50.0	± 1.83	50.0	± 2.45	50.0	± 3.25	50.0	± 1.83	50.0	± 2.45	50.0	± 3.25
	60.0	± 0.00	59.8	± 0.00	-	-	60.0	± 1.43	60.0	± 2.00	60.0	± 2.60	60.0	± 1.43	60.0	± 2.00	60.0	± 2.60
	$V_{R,d}$ [kN/element]																	
	± 4.84		± 5.31		± 6.87		± 5.89		± 6.46		± 8.36		± 11.78		± 12.92		± 16.71	

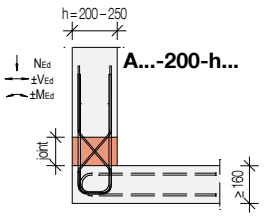
	$N_{R,d}$ [kN/element] / $M_{R,d}$ [kNm/element]																	
	$N_{R,d}$	$M_{R,d}$	$N_{R,d}$	$M_{R,d}$	$N_{R,d}$	$M_{R,d}$	$N_{R,d}$	$M_{R,d}$	$N_{R,d}$	$M_{R,d}$	$N_{R,d}$	$M_{R,d}$	$N_{R,d}$	$M_{R,d}$	$N_{R,d}$	$M_{R,d}$	$N_{R,d}$	$M_{R,d}$
C25/30 Parapet wall C25/30 Floor slab ≥C20/25	0.0	± 2.40	0.0	± 3.12	0.0	± 3.18	0.0	± 3.83	0.0	± 4.70	0.0	± 6.91	0.0	± 3.83	0.0	± 4.70	0.0	± 6.91
	10.0	± 2.05	10.0	± 2.67	10.0	± 2.62	10.0	± 3.43	10.0	± 4.25	10.0	± 6.28	10.0	± 3.43	10.0	± 4.25	10.0	± 6.28
	20.0	± 1.71	20.0	± 2.22	20.0	± 2.07	20.0	± 3.03	20.0	± 3.80	20.0	± 5.66	20.0	± 3.03	20.0	± 3.80	20.0	± 5.66
	30.0	± 1.36	30.0	± 1.77	30.0	± 1.52	30.0	± 2.63	30.0	± 3.35	30.0	± 5.04	30.0	± 2.63	30.0	± 3.35	30.0	± 5.04
	40.0	± 1.02	40.0	± 1.32	40.0	± 0.97	40.0	± 2.23	40.0	± 2.90	40.0	± 4.42	40.0	± 2.23	40.0	± 2.90	40.0	± 4.42
	50.0	± 0.67	50.0	± 0.87	50.0	± 0.42	50.0	± 1.83	50.0	± 2.45	50.0	± 3.80	50.0	± 1.83	50.0	± 2.45	50.0	± 3.80
	60.0	± 0.32	59.8	± 0.42	57.5	± 0.00	60.0	± 1.43	60.0	± 2.00	60.0	± 3.18	60.0	± 1.43	60.0	± 2.00	60.0	± 3.18
	$V_{R,d}$ [kN/element]																	
	± 5.62		± 6.16		± 7.97		± 6.22		± 6.93		± 8.82		± 12.42		± 13.85		± 17.61	

Reinforcement			
Length of element [mm]	250	250	250
Height of connection [mm]	140 - 250	140 - 250	140 - 250
Tensile/pressure bars	2 Ø 10	3 Ø 10	4 Ø 10
Shear force bars	2 x 1 Ø 6	2 x 1 Ø 6	2 x 2 Ø 6
Add. stirrups in floor slab	2 Ø 8	4 Ø 8	4 Ø 10
Applicable expansion joint distances **AS** [m]	7.8		
Applicable expansion joint distances **AM** [m]	13.0		
Applicable expansion joint distances **AXL** [m]	21.7		

Concrete cover parapet wall $c_a \geq 30$ mm; concrete cover floor $25 \geq c_v \geq 35$ mm shear force bars



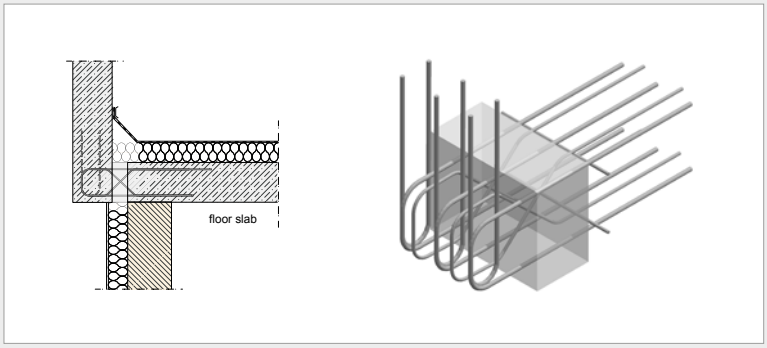




Egcobox® FS / FM / FXL

Specifications

Connection height: h = 160 – 250 mm
Parapet wall width: ≥ 150 mm
Joint width: FS = 60 mm
Joint width: FM = 80mm
Joint width: FXL = 120 mm
(other dimensions on request)
Concrete strength: C20/25 or C25/30



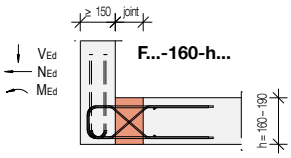
Design table Egcobox® FS / FM / FXL – C20/25; C25/30

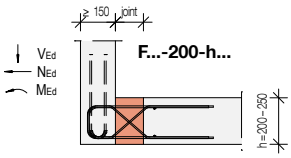
for parapet walls
Insulation made of 60 / 80 / 120 mm polystyrene, rock wool or foam glass, other dimensions on request.

Concrete strength	FS10-160 FM10-160 FXL10-160		FS10-200 FM10-200 FXL10-200		FS20-160 FM20-160 FXL20-160		FS20-200 FM20-200 FXL20-200		FS30-160 FM30-160 FXL30-160		FS30-200 FM30-200 FXL30-200	
	Height of connection [mm]											
	160 - 190		200 - 250		160 - 190		200 - 250		160 - 190		200 - 250	
	$N_{R,d}$ [kN/element] / $M_{R,d}$ [kNm/element]											
	$N_{R,d}$	$M_{R,d}$	$N_{R,d}$	$M_{R,d}$	$N_{R,d}$	$M_{R,d}$	$N_{R,d}$	$M_{R,d}$	$N_{R,d}$	$M_{R,d}$	$N_{R,d}$	$M_{R,d}$
C20/25 Parapet wall C20/25 Floor slab C20/25	- 28.0	± 0.00	- 28.0	± 0.00	- 42.0	± 0.00	- 42.0	± 0.00	- 56.0	± 0.00	- 56.0	± 0.00
	- 16.7	± 0.52	- 16.7	± 0.74	- 25.1	± 0.78	- 25.1	± 1.11	- 33.5	± 1.04	- 33.5	± 1.49
	- 9.2	± 0.86	- 9.2	± 1.24	- 13.9	± 1.29	- 13.9	± 1.86	- 18.5	± 1.73	- 18.5	± 2.48
	- 0.0	± 1.29	- 0.0	± 1.85	- 0.0	± 1.93	- 0.0	± 2.77	- 0.0	± 2.58	- 0.3	± 3.67
	0.0	± 1.73	0.0	± 2.48	0.0	± 2.59	0.0	± 3.67	0.0	± 3.34	0.0	± 3.67
	2.5	± 1.73	2.5	± 2.48	3.7	± 2.59	4.3	± 3.67	7.4	± 3.34	24.3	± 3.67
	17.5	± 1.04	17.5	± 1.49	26.2	± 1.55	26.2	± 2.23	35.0	± 2.07	35.0	± 2.97
	25.0	± 0.69	25.0	± 0.99	37.5	± 1.04	37.5	± 1.49	50.0	± 1.38	50.0	± 1.98
	32.5	± 0.35	32.5	± 0.50	48.7	± 0.52	48.7	± 0.74	65.0	± 0.69	65.0	± 0.99
	40.0	± 0.00	40.0	± 0.00	60.0	± 0.00	60.0	± 0.00	80.0	± 0.00	80.0	± 0.00
C25/30 Parapet wall C25/30 Floor slab ≥C20/25	- 32.5	± 0.00	- 32.5	± 0.00	- 48.7	± 0.00	- 48.7	± 0.00	- 65.0	± 0.00	- 65.0	± 0.00
	- 21.2	± 0.52	- 21.2	± 0.74	- 31.8	± 0.78	- 31.8	± 1.11	- 42.5	± 1.04	- 42.5	± 1.49
	- 13.7	± 0.86	- 13.7	± 1.24	- 20.6	± 1.29	- 20.6	± 1.86	- 27.5	± 1.73	- 27.5	± 2.48
	- 4.5	± 1.29	- 4.5	± 1.85	- 6.7	± 1.93	- 6.7	± 2.77	- 9.0	± 2.58	- 9.0	± 3.70
	0.0	± 1.73	0.0	± 2.48	0.0	± 2.59	0.0	± 3.71	0.0	± 3.45	0.0	± 4.26
	8.9	± 1.73	8.9	± 2.48	13.3	± 2.59	13.3	± 3.71	17.8	± 3.45	28.3	± 4.26
	23.9	± 1.04	23.9	± 1.49	35.9	± 1.55	35.9	± 2.23	47.8	± 2.07	47.8	± 2.97
	31.4	± 0.69	31.4	± 0.99	47.1	± 1.04	47.1	± 1.49	62.8	± 1.38	62.8	± 1.98
	38.9	± 0.35	38.9	± 0.50	58.4	± 0.52	58.4	± 0.74	77.8	± 0.69	77.8	± 0.99
	46.4	± 0.00	46.4	± 0.00	69.6	± 0.00	69.6	± 0.00	92.8	± 0.00	92.8	± 0.00
	$V_{R,d}$ [kN/element]											
	± 13.8		± 17.6		± 13.8		± 17.6		± 13.8		± 17.6	

Reinforcement			
Length of element [mm]	250	250	250
Parapet wall width [mm]	≥150	≥150	≥150
Height of connection [mm]	160 - 250	160 - 250	160 - 250
Tensile/pressure bars	2 Ø 8	3 Ø 8	4 Ø 8
Shear force bars	2 x 2 Ø 6	2 x 2 Ø 6	2 x 2 Ø 6
Add. stirrups in parapet walls	3 Ø 8	3 Ø 8	3 Ø 8
Applicable expansion joint distances **FS** [m]	8.1		
Applicable expansion joint distances **FM** [m]	13.5		
Applicable expansion joint distances **FXL** [m]	23.0		

Concrete cover console c_a ≥ 40 mm; concrete cover floor c_{vo} = 35 mm shear force bars

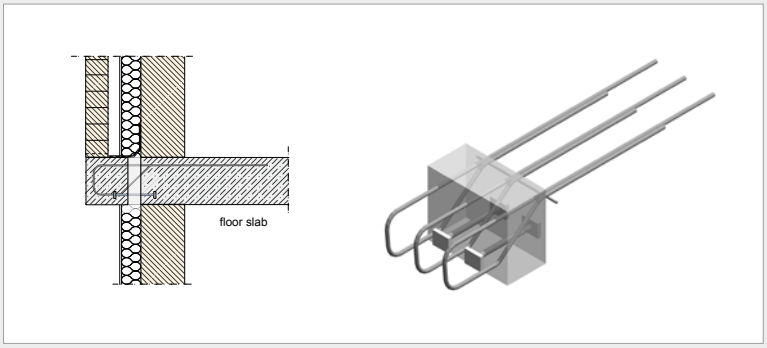




Egcobox® OS / OM / OXL

Specifications

Connection height: h = 180 – 250 mm
Corbel width: 160 bzw. 200 mm
Joint width: OS = 60 mm
Joint width: OM = 80 mm
Joint width: OXL = 120 mm
(other dimensions on request)
Concrete strength: C20/25 or C25/30



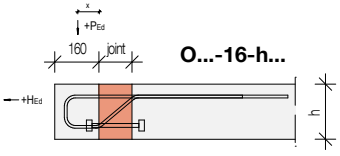
Design table Egcobox® OS / OM / OXL – C20/25; C25/30

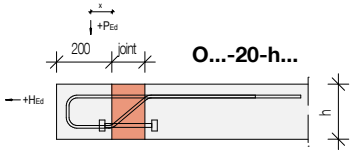
for corbels
Insulation made of 60 / 80 / 120 mm polystyrene, rock wool or foam glass, other dimensions on request.

Concrete strength	Distance x [mm]	OS16 OM16 OXL16	OS20 OM20 OXL20
		Corbel width [mm]	
		160	200
		$H_{Rd,x}$ [kN/element]	
		± 15.0	± 20.0
		$V_{Rd,z}$ [kN/Element]	
C20/25 Floor slab C20/25 Console C25/30	65.0	26.7	29.1
	75.0	25.5	27.8
	85.0	24.4	26.7
	95.0	23.4	25.6
	105.0	22.5	24.6
	115.0	-	23.6
	125.0	-	22.8
	135.0	-	22.0
	145.0	-	21.2
C25/30 Floor slab C25/30 Console C25/30	65.0	27.7	30.5
	75.0	27.5	29.2
	85.0	26.3	27.9
	95.0	25.2	26.8
	105.0	24.2	25.7
	115.0	-	24.8
	125.0	-	23.9
	135.0	-	23.0
	145.0	-	22.2

Reinforcement	
Length of element [mm]	250
Height of connection [mm]	180 - 250
Tensile/shear force bars	3 Ø 10
Pressure elements	2 Ø 12
Applicable expansion joint distances **OS** [m]	6.9
Applicable expansion joint distances **OM** [m]	11.7
Applicable expansion joint distances **OXL** [m]	19.8

concrete cover corbel $c_a \geq 30$ mm; concrete cover floor $c_{vo} = 30$ mm





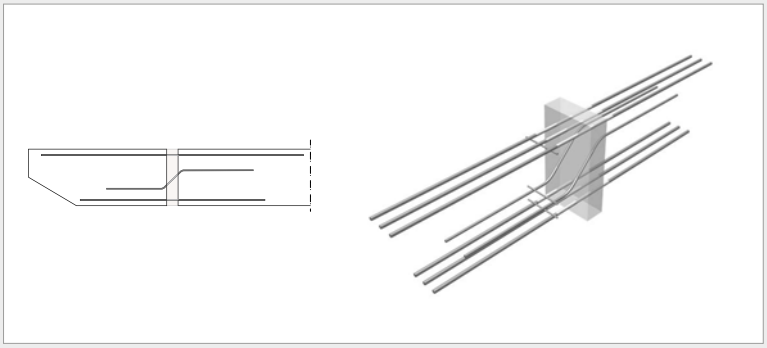
Further standard elements

Cantilever arms are unilaterally supported beams. They are often used as supporting members to the built balconies on top. Egcobox®, however, can be used to ideally connect cantilevering diaphragms as balcony boundaries, among other possibilities. In addition, there are other short elements available to bear special loads, suitable for transmitting horizontal loads caused by earthquakes.

Egcobox® M-SM

Specifications

Connection height: h = 400 – 500 mm
Joint width M-SM: f = 80 mm
(other dimensions on request)
Concrete strength: min C20/25



Design table Egcobox® M-SM

Insulation made of 80 mm polystyrene, rock wool or foam glass, other dimensions on request.

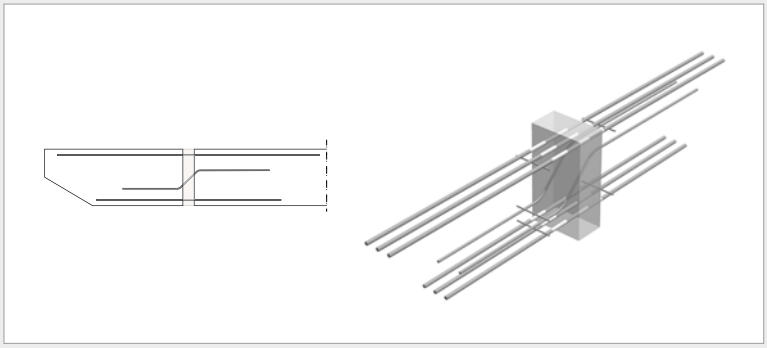
Height of connection [mm]	M-SM10	M-SM20	M-SM30	M-SM40
	$M_{R,d}$ [kNm/element]			
400	22.3	33.2	45.0	59.3
500	29.9	44.7	60.7	80.2
	$V_{R,d}$ [kN/element]			
400 - 500	20.7	32.4	46.6	62.5
Reinforcement				
Length of element [mm]	220	220	220	220
Tensile bars	3 ø 10	3 ø 12	3 ø 14	3 ø 16
Length of tensile bars M-SM [mm] 1)	1180	1520	1830	2160
Pressure bars	3 ø 10	3 ø 12	3 ø 14	3 ø 16
Length of pressure bars M-SM [mm]	1180	1520	1520	2160
Shear force bars	2 ø 8	2 ø 10	2 ø 12	3 ø 12
Applicable expansion joint distances M-SM [m]	13.0	11.7	10.1	9.2

$c_{o,u}$ = 50 mm
1) calculated for good bonding conditions

Egcobox® M-SXL

Specifications

Connection height: h = 400 – 500 mm
Joint width M-SXL: f = 120 mm
(other dimensions on request)
Concrete strength: min C20/25



Design table Egcobox® M-SXL

Insulation made of 120 mm polystyrene, rock wool or foam glass, other dimensions on request.

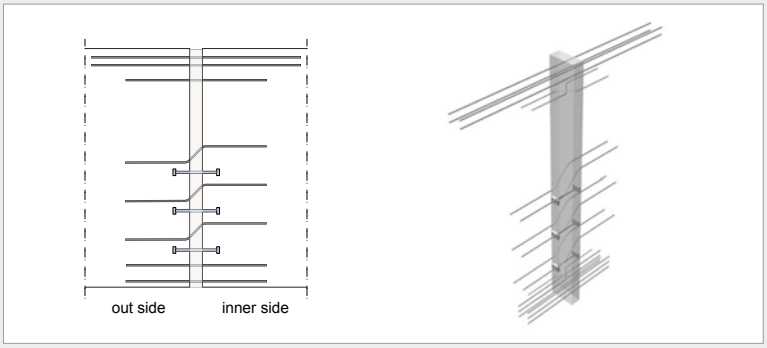
Height of connection [mm]	M-SXL10	M-SXL20	M-SXL30	M-SXL40
	$M_{R,d}$ [kNm/element]			
400	22.3	33.2	45.0	59.3
500	29.9	44.7	60.7	80.2
	$V_{R,d}$ [kN/element]			
400 - 500	20.7	32.4	46.6	62.5
Reinforcement				
Length of element [mm]	220	220	220	220
Tensile bars	3 ø 10	3 ø 12	3 ø 14	3 ø 16
Length of tensile bars M-SXL [mm] 1)	1220	1560	1870	2200
Pressure bars	3 ø 10	3 ø 12	3 ø 14	3 ø 16
Length of pressure bars M-SXL [mm]	1220	1560	1560	2200
Shear force bars	2 ø 8	2 ø 10	2 ø 12	3 ø 12
Applicable expansion joint distances M-SXL [m]	21.7	19.8	17.0	15.5

$c_{o,u}$ = 50 mm
1) calculated for good bonding conditions

Egcobox® M-WM

Specifications

Connection height: h = 1500 – 3500 mm
Thickness wall: b = 150 – 250 mm
Joint width M-WM: f = 80 mm
(other dimensions on request)
Concrete strength: min C20/25



Design table Egcobox® M-WM

Insulation made of 80 mm polystyrene, rock wool or foam glass, other dimensions on request.

Height of connection [mm]	M-WM10	M-WM20	M-WM30	M-WM40
	$M_{R,d,v}$ [kNm/element]*			
1500	57.0	101.6	158.5	186.0
2000	79.1	140.9	220.0	258.2
2500	101.1	180.2	281.5	330.4
3000	123.2	219.6	343.0	402.6
3500	145.2	258.9	404.4	474.8
	$V_{R,d,v}$ [kN/element]			
1500 - 3500	52.2	92.7	144.9	200.8
	$V_{R,d,h}$ [kN/element]			
1500 - 3500	±17.4	±17.4	±17.4	±17.4

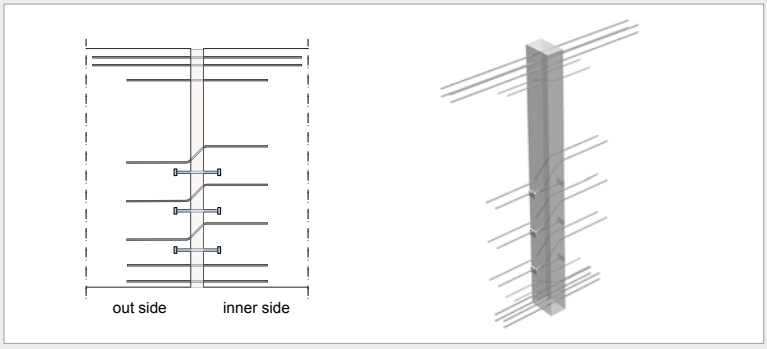
Reinforcement				
Width of connection [mm]	150-250	150-250	150-250	150-250
Tensile bars	4 ø 6	4 ø 8	4 ø 10	4 ø 12
Length of tensile bars M-WM [mm] 1)	980	1480	2000	2080
Pressure elements	3 ø 8	3 ø 10	3 ø 12	3 ø 14
Pressure bars	4 ø 8	4 ø 8	4 ø 10	4 ø 12
Length of pressure bars M-WM [mm]	900	900	1080	1260
Shear force bars	6 ø 6	6 ø 8	6 ø 10	6 ø 12
Shear force bars horizontal	2 x 2 ø 6	2 x 2 ø 6	2 x 2 ø 6	2 x 2 ø 6

thickness wall: b = 150 - 250 mm
$M_{R,d,h}$ = 0
$c_{o,u,s}$ = 50 mm
* 90% capacity specified
1) calculated for moderate bonding conditions

Egcobox® M-WXL

Specifications

Connection height: h = 1500 – 3500 mm
Thickness wall: b = 150 – 250 mm
Joint width M-WXL: f = 120 mm
(other dimensions on request)
Concrete strength: min C20/25



Design table Egcobox® M-WXL

Insulation made of 120 mm polystyrene, rock wool or foam glass, other dimensions on request.

Height of connection [mm]	M-WXL10	M-WXL20	M-WXL30	M-WXL40
	$M_{R,d,v}$ [kNm/element]*			
1500	57.0	92.6	156.0	186.0
2000	79.1	128.4	216.5	258.2
2500	101.1	164.3	276.9	330.4
3000	123.2	200.1	337.4	402.6
3500	145.2	236.0	397.8	474.8
	$V_{R,d,v}$ [kN/element]			
1500 - 3500	52.2	92.7	144.9	200.8
	$V_{R,d,h}$ [kN/element]			
1500 - 3500	±17.4	±17.4	±17.4	±17.4

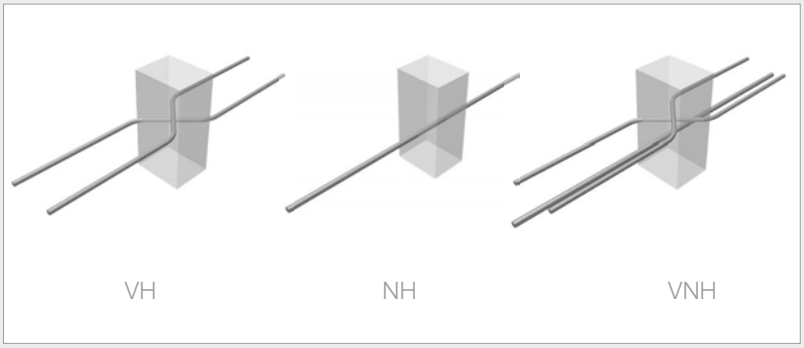
Reinforcement				
Width of connection [mm]	150-250	150-250	150-250	150-250
Tensile bars	4 ø 6	4 ø 8	4 ø 10	4 ø 12
Length of tensile bars M-WXL [mm] 1)	1020	1520	2040	2120
Pressure elements	3 ø 8	3 ø 10	3 ø 12	3 ø 14
Pressure bars	4 ø 8	4 ø 8	4 ø 10	4 ø 12
Length of pressure bars M-WXL [mm]	940	940	1120	1300
Shear force bars	6 ø 6	6 ø 8	6 ø 10	6 ø 12
Shear force bars horizontal	2 x 2 ø 6	2 x 2 ø 6	2 x 2 ø 6	2 x 2 ø 6

thickness wall: b = 150 - 250 mm
$M_{R,d,h}$ = 0
$c_{o,u,s}$ = 50 mm
* 90% capacity specified
1) calculated for moderate bonding conditions

Egcobox® MM-Module / MXL-Module

Specifications

Slab thickness: h = 160 – 280 mm
Joint width MM: f = 80 mm
Joint width MXL: f = 120 mm
(other dimensions on request)
Concrete strength: C20/25 or C25/30



Design table Egcobox® MM-Module / MXL-Module – C20/25

Insulation made of 80 mm (MM-Module) or 120 mm (MXL-Module), rock wool or foam glass, other dimensions on request.

	MM-VH / MXL-VH	MM-NH / MXL-NH	MM-VNH / MXL-VNH
		$H_{R,d,II}$ [kN/element]	
$H_{R,d,II}$	± 7.4	± 0.0	± 7.4
		$H_{R,d,\perp}$ [kN/element]	
$H_{R,d,\perp}$	± 0.0	± 18.1	± 18.1
Reinforcement			
Length of element MM / MXL [mm]	100 / 150	100 / 150	100 / 150
Height of connection [mm]	160 - 280	160 - 280	160 - 280
Shear force bars	2 x 1 Ø 8	–	2 x 1 Ø 8
Tensile/pressure bars	–	1 Ø 10	1 Ø 10
Length of tensile/pressure bars MM / MXL [mm]		640 / 680	640 / 680

Egcobox® VH and VNH are suitable in conjunction with an addtional basic Egcobox® elements only. Required compression bar D_{Rd} > 7.4 kN

Design table Egcobox® MM-Module / MXL-Module – C25/30

Insulation made of 80 mm (MM-Module) or 120 mm (MXL-Module), rock wool or foam glass, other dimensions on request.

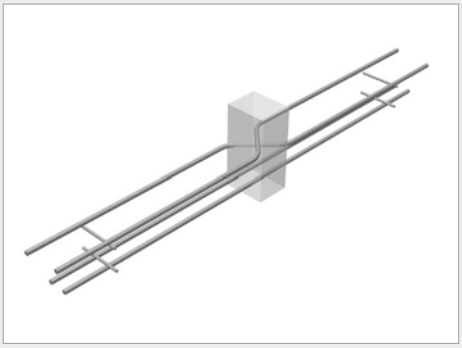
	MM-VH / MXL-VH	MM-NH / MXL-NH	MM-VNH / MXL-VNH
		$H_{R,d,II}$ [kN/element]	
$H_{R,d,II}$	± 8.6	± 0.0	± 8.6
		$H_{R,d,\perp}$ [kN/element]	
$H_{R,d,\perp}$	± 0.0	± 20.9	± 20.9
Reinforcement			
Length of element MM / MXL [mm]	100 / 150	100 / 150	100 / 150
Height of connection [mm]	160 - 280	160 - 280	160 - 280
Shear force bars	2 x 1 Ø 8	–	2 x 1 Ø 8
Tensile/pressure bars	–	1 Ø 10	1 Ø 10
Length of tensile/pressure bars MM / MXL [mm]		640 / 680	640 / 680

Egcobox® VH and VNH are suitable in conjunction with an addtional basic Egcobox® elements only. Required compression bar D_{Rd} > 8.6 kN

Egcobox® MM-Module-E / MXL-Module-E

Specifications

Slab thickness: h = 160 – 280 mm
Joint width MM: f = 80 mm
Joint width MXL: f = 120 mm
(other dimensions on request)
Concrete strength: min C20/25



Design table Egcobox® MM-Module-E / MXL-Module-E

Insulation made of 80 mm or 120 mm polystyrene, rock wool or foam glass, other dimensions on request.

Height of connection [mm]			MM-VNH-E10 / MXL-VNH-E10	MM-VNH-E20 / MXL-VNH-E20
C30	C35	C50	$M_{R,d,y}$ [kNm/element]	
	160		- 3.7	- 8.2
160	165	**180**	- 3.9	- 8.7
165	**170**	185	- 4.2	- 9.1
170	175	**190**	- 4.4	- 9.6
175	**180**	195	- 4.6	- 10.1
180	185	**200**	- 4.8	- 10.6
185	**190**	205	- 5.0	- 11.1
190	195	**210**	- 5.2	- 11.6
195	**200**	215	- 5.5	- 12.1
200	205	**220**	- 5.7	- 12.6
205	**210**	225	- 5.9	- 13.1
210	215	**230**	- 6.1	- 13.6
215	**220**	235	- 6.3	- 14.1
220	225	**240**	- 6.6	- 14.6
225	**230**	245	- 6.8	- 15.0
230	235	**250**	- 7.0	- 15.5
235	**240**	255	- 7.2	- 16.0
240	245	**260**	- 7.4	- 16.5
245	**250**	265	- 7.6	- 17.0
250	255	**270**	- 7.9	- 17.5
255	**260**	275	- 8.1	- 18.0
260	265	**280**	- 8.3	- 18.5
265	**270**		- 8.5	- 19.0
270	275		- 8.7	- 19.5
275	**280**		- 9.0	- 20.0
280			- 9.2	- 20.5
			$H_{R,d,II}$ [kN/element]	
$H_{R,d,II}$			± 15.5	± 34.8
			$Z_{R,d}$ [kN/element]	
$Z_{R,d}$			43.7	98.3

Reinforcement		
Length of element MM / MXL [mm]	100 / 150	100 / 150
Tensile bars	2 ø 8	2 ø 12
Length of tensile bars MM / MXL [mm]	940 / 980	1520 / 1560
Shear force bars	2 x 1 ø 8	2 x 1 ø 12

Egcobox® MM-VNH-E are suitable in conjunction with additional basic Egcobox® elements only (> MM20/MXL20).
$M_{R,d}$, and $H_{R,d,II}$ are not effected simultaneously.

Egcoiso insulation infill unit

Egcoiso is the perfect supplement for Egcobox®. Egcoiso can be used to infill gaps in between Egcobox® elements to maintain uninterrupted insulation across the entire connection length. It can easily be cut to shorter pieces on site. Plastic covers fitted on the top and bottom of the insulation protects it against damage.

Egcoiso standard types

Type	Width of joints mm	Height of element mm	Length of element mm
Egcoiso S	60	160-280	1000
Egcoiso M	80	160-280	1000
Egcoiso L	100	160-280	1000
Egcoiso XL	120	160-280	1000

Special elements with the following variables can be produced according to your requests:

- Insulation
- Execution according to fire protection requirements up to 120 minutes.
- Any kind of special shape
- Special lengths

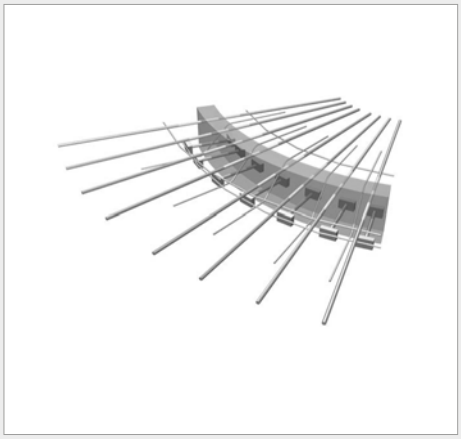
Special elements

In addition to the standard elements, Egcobox® can be customised according to dimensional and structural requirements.
Match the element shape to the building and/or the component that is to be connected.
For example: radial elements for convex outside walls or diagonal elements for angular balconies.

Egcobox® special elements

Special shapes

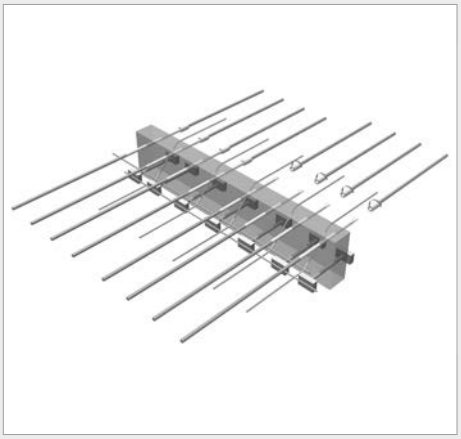
The shape of the Egcobox® cantilever connector can be varied in relation to the building and balcony shape. It is possible to construct radial elements for concave or convex exterior walls or diagonal elements to connect diagonal balconies.



Special elements

Egcobox® can be adjusted to the requirements of the building or the construction site situation.

For example, the Egcobox® cantilever connection can be combined with coupler tension reinforcement. In order to improve delivery and assembly conditions the Egcobox® tension reinforcement can be supplied with screw thread couplers.



Egcobox® checklist

Type of application	In-situ concrete / prefab balcony semi-prefab balcony
Determination of the static system	Type M Type M-Eck Type M± Type V Type V± Type O Type F Type A Type M-S Type M-W
Thickness of insulation	S = 60 mm M = 80 mm L = 100 mm XL = 120 mm
Choice of the concrete cover based on exposure classification	c_{nom} = 30 c_{nom} = 35 c_{nom} = 50
Concrete strength	C20/25 C25/30
Height of element	160 mm – 280 mm
Definition of the bearing load level	5 10 15 20 25 30 35 40 45 50 60 70 80 90 100 110
Determination for the shear force reinforcement (only for the types M and M±)	– (Standard) VA VB V±
Fire protection class	– (Standard) F90/R90 REI120
Distances of movement joints	Requirements checked?
Starter bars	Requirements checked?

Egcobox® project report

Our Egcobox® team is not only specialised in providing technical support, but will also assist you in handling upcoming tasks. Naturally, this includes obtaining the required certification, in particular if any deviations from standards and/or accreditation are required.

In the case below, the task was as follows:

- Connecting a circumferential support console designed to have loads applied to it only in isolated spots
- The support was only to be connected to the floor slab of the building in the area where loads were applied to save costs

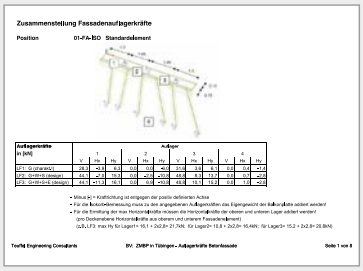
The following loads had to be taken in account:

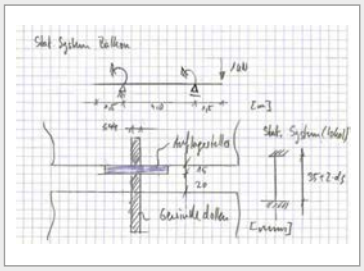
- Permanent load of the support
- Snow loads
- Wind loads
- Seismic loads
- Eccentric loads as a result of maintenance work on the facade

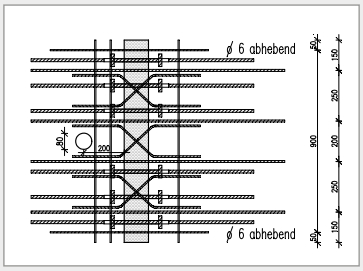
The following structural targets had to be taken in account:

- Only approximately 50 cm of protrusion by the support and, as a result, insufficient space for load application on the element
- Dowel sleeve for load application in the middle of the facade in the general area of the Egcobox® connection
- Some floor slab cut-outs in connection area
- Support console arched
- Partial connection in moderate connection area
- Fire protection class F90

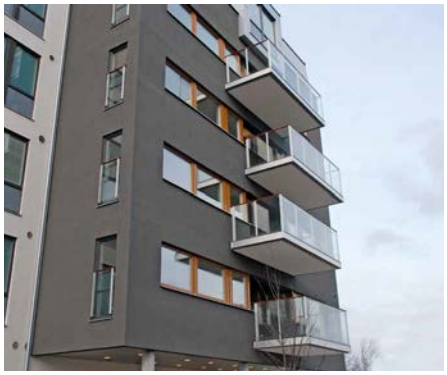
Many of these marginal conditions did not meet the requirements of the general type approval for the Egcobox®, for which reason a single case approval was applied for in cooperation with the executive construction company and the planning company, Teufel Engineering Consultants. In cooperation with the contractor, the responsible construction supervisory board, the structural engineering calculation auditor and the structural engineer, it was possible to combine all requests listed above and obtain an approval for this construction project; it was thus possible to provide the appropriate Egcobox® element.







Egcobox® projects



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